

DEPRESSIVE SYMPTOMS IN ADOLESCENCE

A longitudinal study of predictors, pathways, and consequences

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Submitted for the PhD degree at the

Department of Psychology,

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University of Oslo, 2012

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*Series of dissertations submitted to the
Faculty of Social Sciences, University of Oslo
No. 373*

ISSN 1504-3991

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Cover: Inger Sandved Anfinsen.
Printed in Norway: AIT Oslo AS.

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ACKNOWLEDGEMENTS

The present thesis was conducted at the Norwegian Institute of Public Health (NIPH), from 2008 to 2012, and has been funded by grants from the Norwegian Research Council. It has been fantastic fun, educational, and interesting to work with the thesis these years. In between the positive parts, I must admit there have also been lots of frustrations and hair pulling. I am therefore grateful for the number of people who have supported and helped me throughout this work both during its ups and downs. I could not have done it without you!

First of all, I would like to thank my fabulous trio of supervisors. I would like to thank my main supervisor Evalill Karevold for always being helpful and supportive in all stages of my work, and especially for sobering up unrealistic and manic hypotheses and ideas and making them more doable. In addition, my PhD.-project would not have been conducted if you had not applied for the funding five years ago!! I would like to thank my second supervisor Espen Røysamb for being helpful, pragmatic and pedagogical, always clearing up my confused head when it comes to methodology. And I would like to thank Kristin S. Mathiesen for being such an enthusiastic and generous supervisor and boss, as well as starting the Tracking Opportunities and Problems (TOPP)-study 18 years ago and including me in the research-group in 2008.

Further, I would like to thank The Centre of Adolescent Health, at the Murdoch Children's Research Institute/Royal Children's Hospital in Melbourne, Australia and all the knowledgeable and friendly people I met there. Especially I want to thank Craig Olsson for taking the time to supervise a jet-lagged Norwegian, and also for teaching me how to make awesome tables; and George Patton for giving me the opportunity to get to know and use the Victorian Adolescent Health Cohort Study (VAHCS)-study. I also want to thank all the friends and colleagues who made my stay in Melbourne wonderful – We will hopefully meet again soon!

I would like to thank the NIPH, Arne Holte and Ellinor Major for providing me with excellent work conditions and giving me the opportunity to carry out my PhD at the department and Liv Stene-Larsen for always being friendly and helpful with administrative and practical manners. I also want to give out a special thanks to my colleagues and friends at the Division of Mental Health at NIPH for all the nice moments and laughs, not to mention all the sushi, pizzas, hamburgers, chocolates, and mackerel we have shared in between working. You have always made it super fun to go to work! Furthermore, I could also never have imagined being part of such a great research group as the TOPP-group. You are all fantastic people and researchers both without and with wigs, and I am looking forward to collaborating more with you!

I would also like to thank my dear parents, and my brother for always being there for me, and for always believing in me. Big thanks also goes to my friends who have invited me on late dinners (i.e., beibibos) in the most stressful times, and managed to support and listen to me both being stressful, frustrated, and enthusiastic about this work without going crazy.

I further wish to thank the Department of Psychology at the University of Oslo for the possibility to participate in their PhD program, and The Norwegian Research Council for funding the project. Last, but not least, I sincerely want to thank all the participants of both the TOPP-study and the VAHCS -study for being such patiently and enduring respondents continuing to share their life experiences and participate in these two long-lasting studies year after year.

Oslo, November 2012

Wendy Nilsen

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SUMMARY

The current study examined childhood predictors and adulthood consequences of adolescent depressive symptoms. Despite the amount of studies that have examined predictors and consequences of adolescent depressive symptoms, few have examined the interplay between different risk factors while using several measurement points of adolescent depressive symptoms. The first general aim was therefore to extend our knowledge about effects of significant predictors present during childhood and adolescence on symptom development. Furthermore, findings consistently report that girls are at increased risk of developing depression compared to boys in adolescence. Still, there is a lack of longitudinal studies examining this gender-gap. A second general aim was therefore to extend our knowledge about gender differences and gender-specific mechanisms in the association between precursors and predictors of depressive symptoms. The third general aim was to examine consequences of persistent adolescent depressive symptoms on pregnancy outcomes in emerging adulthood.

Questionnaire data were utilized from two ongoing longitudinal studies: 1) The eight-wave Tracking Problems and Opportunities Study (TOPP) following individuals and their families from early childhood to late adolescence (1993-2011), and 2) The nine-wave Victorian Adolescent Health Cohort Study (VAHCS) following individuals from adolescence to adulthood (1992-2011). The thesis includes three papers, in which the first two papers used data from the TOPP-study and the final paper used data from the VAHCS-study.

In the first paper we examined the interplay between maternal distress and child problem behavior (i.e., symptoms of internalizing and externalizing problems) in early childhood (ages 1.5, 2.5 and 4.5), middle childhood (age 8.5), and early adolescence (age 12.5) and their prediction of stable depressive symptoms in adolescence (age 14.5 to 16.5). There were four main findings in this paper. First, we found small to moderate homotypic and heterotypic continuity between internalizing and externalizing problems from early childhood to adolescence. Second, there was a long-term impact of maternal distress already at age 1.5 on later problem behavior. Third, a pattern emerged in which externalizing problems predicted internalizing problems at subsequent time points. Finally, girls and boys were in general similar with regards to these patterns, but problem behavior in middle childhood predicted subsequent problems in adolescence for girls only.

In the second paper, we examined if the longitudinal association between low social skills and increases in depressive symptoms could be mediated by three different sources of social support (from parents, friends, and teachers). There were three main findings: First, we found that adolescent girls reported higher levels of depressive symptoms and social skills compared to adolescent boys, but there were no gender differences in reported support. There were significant increases in depressive symptoms from age 12.5 to 16.5 for girls, but not boys. Second, we found associations between low social skills in early adolescence (age 12.5) and increases in depressive symptoms four years later (from age 12.5 to age 16.5) for both girls and boys. We found low levels of friend support (age 14.5), but not parent or teacher support, to predict increases in depressive symptoms for girls only. Finally, we found that friend support mediated the association between low social skills and increases in depressive symptoms for girls, but not boys.

In the third paper, using data from the VAHCS-study, we examined the associations between persistent depressive symptoms during adolescence (ages 14 - 18) and pregnancy outcomes in emerging adulthood (ages 21 - 24). The main findings were that persistent, but not one-time, depressive symptoms during adolescence prospectively predicted subsequent reproductive outcomes in emerging adulthood, and that this effect was mitigated by externalizing problems.

Theoretically, the findings from the three papers highlight the importance of: 1) the different impact of risk factors at different developmental stages; 2) externalizing problem behavior both as an independent risk factor and in interplay with other factors in the development of depressive symptoms in adolescence and pregnancy outcomes in emerging adulthood; 3) gender-specific patterns in some prospective associations, and gender-universal patterns in other prospective associations. Methodologically, the findings highlight the importance of: 1) measuring predictors and outcomes at several developmental stages; 2) examining the interplay between predictors, and; 3) examining gender-specific pathways in the development of depressive symptoms.

The findings have some implications for prevention and intervention. The results highlight earlier documentations of the link between early maternal distress and child problem behavior, suggesting that clinicians and health personnel should adopt an integrative perspective where maternal symptom level is assessed when children display depressive symptoms, and vice versa. Moreover, the findings indicate that preventive programs could include actions on how girls can cope with interpersonal difficulties and that selective preventive intervention in young women with a history of antisocial and drug use behaviors

could have the potential to improve their sexual and reproductive health outcomes. The findings also emphasize the long-term adverse impact of early problem behavior. It is thus important that kindergarten personnel recognize such problems and are able to put in effective interventions.

LIST OF PAPERS

Paper 1:

Nilsen, W., Gustavson, K., Kjeldsen, Røysamb, E., & Karevold, E. (2012). Pathways from maternal distress and child problem behavior to adolescent depressive symptoms – A prospective examination from early childhood to adolescence. *Submitted to Journal of Developmental and Behavioral Pediatrics*

Paper 2:

Nilsen, W., Karevold, E., Røysamb, E., Gustavson, K., & Mathiesen, K. S (In Press). Social skills and depressive symptoms across adolescence: Social support as a mediator in girls versus boys. *Resubmitted with revision to Journal of Adolescence*.

Paper 3:

Nilsen, W., Olsson, C. A., Karevold, E., O'Loughlin, C., McKenzie, M., & Patton, G. C. (2012). Adolescent depressive symptoms and subsequent pregnancy, pregnancy completion and pregnancy termination in young adulthood: Findings from the Victorian Adolescent Health Cohort Study. *Journal of Pediatric and Adolescent Gynecology*, 25 (1), 6-11.

AMENDMENTS

Since the submission of this dissertation to the Faculty of Social Sciences in June 2012, the revised version of paper 2 has been accepted and is in press in the above mentioned journal. Paper 1 is resubmitted with major changes to the above mentioned journal. The versions in this dissertation are the unrevised versions. The revisions did not result in substation changes in the conclusions.

1. INTRODUCTION

Depression is the leading cause of disability and the 3rd leading contributor to the global burden of disease, according to the World Health Organization (Murray & Lopez, 1996). Compared to other chronic conditions, mental disorders affect a larger proportion of the total life course because they often begin in childhood or adolescence (Kessler, Avenevoli, & Merikangas, 2001). For a long time it was controversial that children and adolescents could have the same affective disorders as adults (Harrington, 1992; Parry-Jones, 2001). However, based on numerous research findings, contemporary theories now see adolescence as a high-risk period for the emergence of depression. The frequency of depressive disorders and depressive symptoms starts to increase in late childhood and early adolescence, and then to peak in middle to late adolescence (Costello, Copeland, & Angold, 2011; Holsen, Kraft, & Vitterso, 2000; Petersen et al., 1993; Hankin et al., 1998; Rudolph, 2009; Wichstrom, 1999). Furthermore, both adolescent sub-threshold levels and depression disorders are associated with adulthood depression and long term problems in several areas of life (Fergusson & Woodward, 2002; Pine, Cohen, Cohen, & Brook, 1999; Shankman et al., 2009; Rutter, Kim-Cohen, & Maughan, 2006; Needham, 2009). Consequently, adolescence is a critical time for examining symptoms of depression, both regarding predictors to and consequences of such symptoms.

Findings indicate that internalizing problems are hard to identify and treat (Costello & Angold, 2006), and only half of the children and adolescents with internalizing problems seek help (Kessler et al., 2001). Increasing our knowledge of the etiology, pathways, and the consequences of depression can help us identifying who, what and how to target intervention and prevention. Further, to be able to implement efficient intervention and prevention, this identification should happen before psychiatric symptoms become chronic.

1.1. Definition and measurement of depression

Depression is one of the most common mental health problems in the population in general, and also amongst children and adolescents (Costello, Egger, & Angold, 2005). With regards to the conceptual and operational definitions of depression, one can distinguish between *dichotomous/categorical* (i.e., depression disorder) and *dimensional/continuous* (i.e., depressive symptoms) representations.

The categorical representation is typically used in clinical, epidemiological and health political settings where individuals with certain patterns of symptoms are classified into diagnostic groups. The diagnostic criteria for a depression disorder (i.e., Major Depressive Disorder) in the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR; American Psychiatric Association, 2012) is used when a person experience a pattern of predefined symptoms persisting at least two weeks with either impaired functioning or clinical distress. To meet the criteria for depression disorder one must experience either depressed mood and/or loss of pleasure in addition to at least four other somatic and/or cognitive symptoms (i.e., changes in weight or appetite, sleep changes, psychomotor changes (agitation or retardation), loss of energy, worthlessness or guilt, concentration problems or indecisiveness, and thoughts of death/suicide). Clear distinctions between diagnostic categories might give policy makers an overview over the frequency of cases and guide clinicians in their choices about whether to give clinical treatment or start preventive interventions (Mayes & Horwitz, 2005; Ingram & Siegle, 2009).

Compared to the categorical representation, the dimensional representation is typically used by researchers to measure individuals' self-reports of depressive symptoms ranging from a low to a high end. However, the items and scoring on dimensional scales are most often based on clinical criteria (e.g., SMFQ; Angold et al., 1995), and the scores correlates highly with results from clinical interviews (e.g., SMFQ; Thapar & McGuffin, 1998). Thus, the distinction between the two types of conceptualizations is not necessarily clear-cut, and there are advantages of both. Dimensional representations are for instance important for capturing a larger variety of problem behavior, while the categorical representations offer a pragmatic cut-off to be used in diagnoses. Enhanced levels of depressive symptoms, even though they do not fulfill the diagnostic criteria defined in the manuals, might still contribute to substantial impairments in important areas of life such as school, work, and in relationships with others (Rudolph, Hammen, & Daley, 2006).

There are some stage-specific differences in the manifestations of symptoms in different developmental periods (Kessler et al., 2001). Helplessness, insomnia, energy depletion, weight loss, and suicide ideation are prevalent symptoms in adolescent and adults, but not in children (Avenevoli & Steinberg, 2001; Yorbik, Birmaher, Axelson, Williamson, & Ryan, 2004). Irritability has been added in DSM-IV-TR in addition to the two main symptoms (depressed mood and loss of pleasure) for adolescents, because it is regarded as a specific symptom in adolescent depressive symptomatology (Kessler et al., 2001; American Psychiatric Association, 2012). Stage-specific challenges are thus relevant for the study of

adolescent depression. Although adolescence is more than just a period of “storm and stress” (Arnett, 1999), the transition from childhood to adolescence is characterized by major biological, cognitive and social changes (Compas, Hinden, & Gerhardt, 1995; Steinberg & Morris, 2001). Thus, it may be difficult to measure depressive symptoms among adolescents. One way to handle this is to measure depressive symptoms across development, i.e. at more than one time point, to minimize the impact of normal emotional fluctuations in depression scores.

1.2. Prevalence of depression

The average rate of depressive disorders is 6.1 % (ranging from 3.1 – 7.2 % in different studies) in adolescents between ages 12 and 19 (Costello et al., 2011). The prevalence of depressive symptoms are higher, with findings indicating that up to 20 - 50 % of youths have experienced significant depressive symptom levels during recall periods between one week and six months (Kessler et al., 2001). The prevalence reported in Norwegian studies is lower, with indications that 15 - 20 % of adolescents have significant depressive symptom levels, and 5 % have severe symptom levels (Wichstrom, 1999; Sund, Larsson, & Wichstrom, 2003; Sund, Larsson, & Wichstrom, 2001).

Starting in adolescence, girls are two to three times more likely than boys to report depressive symptoms in both population-based and clinical samples (Cyranowski, Frank, Young, & Shear, 2000; Hankin et al., 1998; Zahn-Waxler, Crick, Shirtcliff, & Woods, 2006; Nolen-Hoeksema, Larson, & Grayson, 1999; Nolen-Hoeksema & Girgus, 1994). Pre-adolescent girls and boys, in contrast, report similar levels of depressive symptoms, with boys sometimes reporting higher levels (Zahn-Waxler et al., 2006). There is a need for studies examining gender-specific patterns to gain more understanding of this gender gap.

Some researchers argue that there has been a general increase in adolescent depression during the recent decades. Certain findings suggest birth-cohort effects of growing rates of major and minor depression in adolescence (Kessler et al., 2001; Rudolph et al., 2006). Also Norwegian studies indicate considerable increases from the 1990's to the 2000's in referrals for sadness/depression to the Norwegian Child and Adolescent psychiatric services, which point to increases in internalizing problems (Reigstad, Jorgensen, & Wichstrom, 2004). It has been suggested that these increases partly can be explained by cultural and societal changes, such as increased family disruption and academic pressure, but the increases may also be explained by heightened awareness and general acceptance of depression in the population

(Rudolph et al., 2006; Kessler et al., 2001). The latter is supported by a meta-analysis of 26 studies, in which it was concluded that the similar amount of children and adolescents have been depressed the last 30 years, with many being under-diagnosed by clinicians earlier (Costello, Erkanli, & Angold, 2006). The reason for the general increase was suggested to be due to heightened awareness of depression in the general population and within the mental health care system.

2. THEORETICAL PERSPECTIVES

The understanding of the precursors, predictors and consequences of depressive symptoms in the present thesis is based on the framework of developmental psychopathology, stress-, and interpersonal theories. The framework of developmental psychopathology offers an overall perspective, while the stress and interpersonal theories give a specific framework to examine the relationship between general and interpersonal stressors and subsequent development of depressive symptoms.

2.1. Developmental psychopathology

The developmental psychopathology perspective gives an integrative framework for understanding psychopathological and normative behaviors emphasizing the developmental context and impact (Cicchetti & Toth, 1998; Cicchetti & Rogosch, 2002). This framework is used as a guide to the examination of predictors and consequences of depressive symptoms in adolescence, as well as the interpretations of the findings. *Equifinality*¹ and *multifinality* constitute important principles in developmental psychopathology by explaining patterns of pathways. *Equifinality* highlights that there can be several pathways to the same outcome while *multifinality* highlights that one predictor or pathway can have several outcomes (Cicchetti & Rogosch, 1996). As a consequence, an outcome can derive from several different paths for the same individual. There might also be different paths for different individuals, and the same predictors do not necessarily lead to the same outcome for everyone.

2.1.1. *Continuity and change*

The study of continuity/stability and change is important within developmental psychopathology. The current study examined continuity and change in the first paper, and changes in the second paper. There are different types of continuity, such as homotypic and heterotypic continuity, which can describe different types of pathways or continuities across time. *Homotypic continuity* refers to the stability of the same type of problem over time (e.g., internalizing problems preceding subsequent internalizing problems), supporting the notion that a particular problem is manifested robustly across development (Costello et al., 2011).

¹ The notion of equifinality and multifinality was originally derived from general systems theory (Cicchetti & Rogosch, 2002)

Heterotypic continuity refers to the development from one type of problem to another type of problem (e.g., externalizing problems preceding internalizing problems) (Costello et al., 2011). Both homotypic and heterotypic continuity may stem from stability in the vulnerability factors underlying the problems, such as genetic or environmental vulnerability, and/or subsequent influences of the first problem that increases the risk of experiencing the same or other types of problems. Heterotypic continuity might also reflect that there are different phenotypic expressions of a general underlying problem in different developmental stages (Costello et al., 2011).

2.1.2. *Sensitive periods*

Developmental psychopathology highlights the possibility that similar types of input may operate differently at different developmental stages (Pickles & Hill, 2006; Cicchetti, 2006). The timing of the risk or protective factors is therefore important for knowing the stage-salient needs and challenges the child have at that time (Goodman & Brand, 2009). Theories of early life vulnerability emphasize the possibility of sensitive stages where stressors may have a particular strong impact compared to other stages (O'Connor, 2006). Already in the 60s, Harlow and colleagues (1965) reported that monkeys who had been exposed for early maternal deprivation showed adverse long term social effects. Exposure to stressors in early childhood might interfere with the development of important processes and competencies, such as attachment, emotion regulation, interpersonal skills, and stress responses, which can give a heightened risk for subsequent development of depression (Goodman & Brand, 2009). Several studies support the sensitive period model with results showing adverse long-term effect of early experiences (Harlow, Dodsworth, & Harlow, 1965; Karevold, Roysamb, Ystrom, & Mathiesen, 2009; Leckman-Westin, Cohen, & Stueve, 2009), highlighting early childhood as a specific important period for examining risk factors for later symptom development.

Middle childhood is a period characterized by development of specific physical, cognitive and social changes. During this stage, most children master academic skills (e.g., reading and writing), as well as gain social (e.g., gaining social-competences) and cognitive abilities (e.g., increasing self-awareness) (Eccles, 1999). Starting school is accompanied by enhanced expectations and demands regarding academic and social performance. Healthy social development and peer interaction at this stage might therefore be critical for the prevention of depressive symptoms (Huston & Ripke, 2006b). Many studies examine early

childhood and adolescence, but fewer studies have examined middle childhood as a vulnerable period (Huston & Ripke, 2006b).

Adolescence marks the transition from childhood to adulthood. This period is also characterized by increased stress and challenges as individuals undergo major changes both physically and biologically (e.g., the onset of puberty), cognitively (e.g., more abstract thinking), psychological (e.g. increased focus on identity) and socially (e.g., changes in social relations to parents and friends, romantic and sexual relations, transition to high school) (Rudolph et al., 2006; Arnett, 1999; Steinberg & Morris, 2001; Compas et al., 1995). Even though this period is characterized by positive development, and challenges often are met, findings also indicate that the increased changes and challenges make adolescents specifically vulnerable for developing depressive symptoms (Arnett, 1999). Thus, the developmental psychopathology perspective seeks to illuminate how risk factors may operate differently at different developmental stages such as adolescence in addition to early and middle childhood.

2.2. Life stress theories

Several models are developed to give an understanding of the association between stressors and depression. There are well-known associations between stressful life events and depression in children and adolescents (Grant et al., 2006). Individual differences in the vulnerability for developing depressive symptoms when exposed to such stressors can be explained by different life stress models, such as stress-exposure models, stress-reactivity models, and stress-generation-models.

Stress-exposure models suggest that experiencing stressors give a heightened risk of developing depression (e.g., Brown, 1993; Hankin & Abramson, 1999; Rudolph, 2002). Stress-reactivity models, on the other hand, suggest that some individuals are more vulnerable for stressors and therefore have a heightened risk for developing depression when experiencing stressors (e.g., Brown, 1993; Hankin & Abramson, 1999; Rudolph, 2002). The stress-generation model suggest that certain characteristics of the person, for instance having high depressive symptoms, gives a heightened risk for experiencing stressors that increase the vulnerability for the development of depression (Hammen, 1991). One similar type of model that focuses on interpersonal factors is the social skills deficit vulnerability model (Segrin & Flora, 2000; Segrin, 2000)². In this model, it is suggested that low social skills create vulnerability for developing psychosocial problems when experiencing stress. These models

² This model is based on Lewinsohn's social skills deficit theory (Libet & Lewinsohn, 1973; Lewinsohn, 1974).

offer a framework for understanding the gender differences in the development in depressive disorder and symptoms, and will be discussed further in section 3.2.

3. EMPIRICAL FINDINGS

3.1. Risk and protective factors

3.1.1. Child problem behavior

Symptoms of mental health problems in childhood are usually classified into two broadband categories, internalizing and externalizing symptoms, which often are found to correlate with each other and predict later adolescent depressive symptoms (Kovacs, 1989; Rudolph, 2009; Goodman et al., 2011). Internalizing problems include symptoms such as sadness and fearfulness, and are focused inward (i.e., towards the self). Externalizing problems include behaviors such as throwing temper tantrums, and are focused outward (i.e., towards the others/context).

Findings reveal different patterns for the continuity of these two types of problem behavior. Homotypic pathways have been reported for both internalizing and externalizing problems during development (Costello et al., 2011; Kessler et al., 2001; Rudolph, 2009; Holsen et al., 2000; Wichstrom, 1999; Rutter et al., 2006; Pihlakoski et al., 2006). This stability might be explained by underlying stable environmental or genetic factors. For instance, a recent study found that remission of parental depression also predicted decreases in offspring depressive symptoms and functioning (Garber, Ciesla, McCauley, Diamond, & Schloedt, 2011).

On the other hand, studies of heterotypic continuity reveal somewhat mixed findings. Several researchers have reported positive externalizing-internalizing paths (Masten et al., 2005; Mesman, Bongers, & Koot, 2001; Wiesner & Kim, 2006), while there have been inconsistencies in findings regarding the internalizing-externalizing paths. Theoretically, both positive and negative associations have been suggested. Results are mixed with some findings supporting positive associations (Caron & Rutter, 1991; Egeland, Pianta, & Ogawa, 1996; Lavigne et al., 1998), while other findings support negative associations (Pihlakoski et al., 2006; Mesman et al., 2001). Thus, more studies of population based samples followed across child and adolescent development are needed for the further disentanglement of the directions of these paths.

3.1.2. *Maternal distress*

It is well documented that maternal distress, here defined as symptoms of anxiety and depression, is associated with the development of depressive symptoms in their offspring (Goodman et al., 2011; Connell & Goodman, 2002; Goodman, 2007). The transitional mechanisms is suggested to work through both biological (genetic or in utero transitions) (Elgar, McGrath, Waschbusch, Stewart, & Curtis, 2004; Sullivan, Neale, & Kendler, 2000) and environmental (e.g., less sensitive, and emotional unavailable parenting) influences (Leckman-Westin et al., 2009; Lovejoy, Graczyk, O'Hare, & Neuman, 2000), or through a combination of these (Kessler et al., 2001).

Several findings indicate that children experiencing maternal depression in the first couple of years have increased risk for developing further problem behavior (Bagner, Pettit, Lewinsohn, & Seeley, 2010; Connell & Goodman, 2002; Goodman et al., 2011; Karevold et al., 2009; Spence, Najman, Bor, O'Callaghan, & Williams, 2002), supporting theories of early life vulnerability (O'Connor, 2006). Suggested causes for this association are non-optimal mother-child dyadic interactions and failure in basic parenting/care-giving practices (Field, 2010; Lovejoy et al., 2000). In a recent review, Field (2010) reported that maternal depression is associated with less sensitivity and responsiveness towards their offspring. Also, breastfeeding, sleep routines, vaccinations, health care visits and safety practices are negatively affected. Findings from the Dunedin Multidisciplinary Health and Development Study (Dunedin) suggest that maternal distress in middle (from age 5 to 7; and from 9 to 11) and in late childhood (from age 11 to 13) also are associated with subsequent increases in child internalizing problems in (Jaffee & Poulton, 2006). However, more longitudinal studies are needed to examine the time-specific impact of maternal distress.

Highlighting the reciprocal effects between child problem behavior and maternal depression across childhood might give knowledge about the dynamic nature of family relations (Sameroff & MacKenzie, 2003). The longitudinal studies examining this, have generally indicated significant reciprocal effects between maternal distress and either externalizing or internalizing problem behavior (Elgar, Curtis, McGrath, Waschbusch, & Stewart, 2003; Jaffee & Poulton, 2006; Flouri & Malmberg, 2011; Gross, Shaw, & Moilanen, 2008; Kouros & Garber, 2010). Jaffee and Poulton (2006), analyzing data from the Dunedin study, reported reciprocal associations between maternal distress and internalizing problems in both girls and boys, and externalizing problems in girls, but not boys. However, few other studies have concurrently examined the relationships between both internalizing and externalizing problems and maternal distress from early childhood to adolescence. Thus,

longitudinal studies including these three factors are needed to gain more knowledge about the possible interplay between them in the development of depressive symptoms.

3.1.3. Interpersonal factors

In accordance with the social skills deficit vulnerability model of psychosocial problems (Segrin & Flora, 2000; Segrin, 2000), interpersonal factors are found to be important for the development of adolescent depressive symptoms. Good social skills, such as being able to interact with other people in a way that is both appropriate (e.g., not eliciting negative responses from others) and effective (e.g., achieving one's goal with the interaction) (Segrin, 2000), are associated with low adolescent depressive symptoms (Dalley, Bolocofsky, & Karlin, 1994; Negriff, Hillman, & Dorn, 2011). Also high levels of social support, such as mutual respect and gaining material and interpersonal support (Thompson, 1995; Thompson, Flood, & Goodvin, 2006), are associated with low adolescent depressive symptoms (Eberhart, Shih, Hammen, & Brennan, 2006; Oppedal, Roysamb, & Sam, 2004; Rubin et al., 2004; Undheim & Sund, 2005). Such interpersonal resources can make it easier to manage stressors and challenges connected to developmental transitions such as adolescence. Supporting this, findings indicate that having good social skills is specifically important in middle childhood (Huston & Ripke, 2006b; Huston & Ripke, 2006a) and early adolescence (Letcher, Smart, Sanson, & Toumbourou, 2009).

Different sources of support might be important for depressive symptomatology in different ways. While parents are usually the main support source during infancy and childhood, good relationships and social support from others (such as friends and teachers) get increasingly important later in development (Rubin, Bukowski, & Parker, 2006). Despite many studies highlighting the importance of interpersonal factors for depressive symptom development, few longitudinal studies seem to have examined the relative contribution of different sources of support - an aspect that is specifically important for targeting interventions.

Social skills, in addition to being associated with depressive symptoms, have also been associated with social support (Cauce, 1986; Galambos, Leadbeater, & Barker, 2004; Rubin et al., 2004). Findings suggest that social skills might generate more positive interpersonal interactions (Letcher et al., 2009; Lewinsohn, 1974), which in turn might give more social support. Still, the interplay between these three factors has so far not been examined thoroughly. Some findings have suggested a mediational mechanism in which social skills affects social support, which in turn affects depressive symptoms. Relations with others

mediated the relation between social skills and depression both among young adults (Segrin & Rynes, 2009) and among 11 to 17-year olds (Lee, Hankin, & Mermelstein, 2010). Furthermore, Lee et al. (2010) found that conflicting relations with parents, and not friends, were a mediator in this association, suggesting that different support sources may play different roles. However, neither of these studies examined support from parents, friends and teachers concurrently, nor did they examine gender-specific mechanisms. Both factors can be important for future intervention and prevention. Thus, more research is needed to illuminate the relations between social skills, support and depressive symptoms among boys and girls.

3.2. Gender differences

Gender plays a significant role in the development of depression in adolescence, both as an independent predictor and as a moderator of other variables. As earlier mentioned, it is well documented that gender is a potent predictor of depression with adolescence girls reporting two to three times more depressive disorders and symptoms compared to boys. Theoretical models suggest that these gender differences stem from the interplay between biological, psychological, and contextual changes in adolescence, with gender-linked roles, beliefs, and expectations in the interpersonal domain (Rudolph, 2009; Cyranowski et al., 2000; Nolen-Hoeksema et al., 1999; Nolen-Hoeksema & Girgus, 1994; Wichstrom, 1999; Kessler et al., 2001). However, the particular mechanisms are still uncertain and in need for further examinations.

Gender-specific pathways have been reported between risk and protective factors such as maternal distress, interpersonal factors and problem behaviors and adolescent depression. First, gender-specific pathways have been found with regards to both homotypic paths and heterotypic paths between internalizing and externalizing problems. Masten et al., (2005) reported stronger stability in homotypic internalizing paths from adolescence to adulthood in men, but not women. Regarding heterotypic paths, externalizing-internalizing paths have been reported for both girls and boys; while internalizing-externalizing paths have only been reported for girls, and not boys (Wiesner & Kim, 2006; Pihlakoski et al., 2006). However, other findings indicate no gender differences (Egeland et al., 1996). These contradictory findings suggest that more studies should examine these paths with a gender-specific perspective.

Second, the stress-reactivity hypothesis indicates that girls are more sensitive and prone to react with depression in response to stress (Rudolph, 2009; Rudolph et al., 2006).

Supporting this suggestion, gender has been found to moderate the association between maternal distress and depressive symptoms (Burt et al., 2005; Flouri & Malmberg, 2011; Goodman & Gotlib, 1999; Goodman et al., 2011; Pitzer, Jennen-Steinmetz, Esser, Schmidt, & Laucht, 2011). Girls have generally been found to be more vulnerable to maternal distress compared to boys (Burt et al., 2005; Flouri & Malmberg, 2011; Goodman & Gotlib, 1999; Goodman et al., 2011; Pitzer et al., 2011). There are, however, some exceptions in which findings report no gender-differences (Bureau, Easterbrooks, & Lyons-Ruth, 2009; Jaffee & Poulton, 2006; Spence et al., 2002) or boys being more vulnerable early in development (Tronick & Reck, 2009).

Third, several findings suggest that girls, compared to boys, are especially reactive to interpersonal stressors due to increased impact of hormones and gender socialization (Cyranowski et al., 2000; Petersen et al., 1993; Rose & Rudolph, 2006). Still, some findings indicate that boys are more vulnerable (Rueger, Malecki, & Demaray, 2010), and others again indicate no gender differences (Rueger, Malecki, & Demaray, 2008; Letcher et al., 2009). The same inconsistent findings have been found for the association between social skills and depressive symptoms when examining gender-specific patterns (Burt, Obradovic, Long, & Masten, 2008; Letcher et al., 2009; Ohannessian, Lerner, Lerner, & von Eye, 1999).

Simultaneously, girls, compared to boys, report higher levels of social skills (Eberhart et al., 2006; Rose & Rudolph, 2006) and more social support (Eberhart et al., 2006; Rueger et al., 2008), which are potential protectors of developing depressive symptoms (Eberhart et al., 2006; Rose & Rudolph, 2006). This does not offer support for the earlier mentioned stress-exposure hypothesis. Also, a couple of Norwegian studies failed to find gender differences in reported amount of social support suggesting that there might be some cultural differences (Undheim & Sund, 2005; Oppedal et al., 2004). Such differences might be due to the more egalitarian society in Norway compared to other western countries. For instance, Norway was the most gender equal country³ according to the Human development Index (United Nations Development Programme, 2011).

To sum up, despite reporting higher levels of potential protective interpersonal factors, girls generally have a substantially increased risk for developing depressive symptoms during adolescence. So far the research literature has not given a satisfactory explanation for this. Also, there are some inconsistencies in the longitudinal findings regarding associations between maternal distress and child problem behavior and subsequent depressive symptoms. Thus, gender should be modeled as both a main predictor as well as a moderator for other risk

³ Measured by the ratio of women and men having an education and participating in the workforce

factors of adolescent depressive symptoms to clarify gender specific-pathways in the development of depressive symptoms.

3.3. Consequences

Adolescent depression and depressive symptoms has been found to disrupt stage-salient role transitions in emerging adulthood, such as educational attainment and early parenthood (Kessler et al., 1997; Needham, 2009; DiClemente et al., 2001; Miller-Johnson et al., 1999). The emerging adulthood stage is characterized by transitions such as finishing an education, starting a career, and establishing long-lasting romantic relationships and eventually starting family planning (Arnett, 2000; Arnett, 2007). Life role transitions, if emerging too soon, may have adverse effects. Specifically, several findings indicate that early pregnancy appear to disturb several important life role transitions such as developing personal resources and romantic attachments with others, as well as negatively affect finances, educational attainment and secure employment (Falci, Mortimer, & Noel, 2010; Hobcraft & Kiernan, 2001). In addition, early pregnancy has been reported to affect long-term mental and somatic health outcomes in up to middle and late adulthood (Hobcraft & Kiernan, 2001; Falci et al., 2010; Henretta, Grundy, Okell, & Wadsworth, 2008). These associations remained even when adjusting for a range of baseline socioeconomic variables.

Compared to earlier, some of these stage-normative behaviors have changed in many Western countries today. There has been a generational delay in starting both a career and a family. The average years of mothers giving birth have increased the last decades in several Western countries such as Norway, Australia, Canada and the UK (Australian Bureau of Statistics, 2008; Statistics Norway, 2011b; Statistics Canada, 2007; Office for National Statistics, 2008)⁴. This generational delay has given rise to a new concept of emerging adulthood suggested to include the years between 18 and 25 (Arnett, 2000; Arnett, 2007). This delay also implies that the age range of early pregnancy and parenthood could be adjusted to include this period of emerging adulthood.

Although it was associated with lesser effect than those experiencing teenage pregnancy, getting pregnant in the early 20's (between 20 and 23) was also associated with adverse outcomes (Hobcraft & Kiernan, 2001). It is, however, unclear if the risk factors are the same in emerging adulthood as in adolescence because few studies have examined these

⁴ The average age of giving birth was 30.4 years in 2011 compared to 26.0 years in the early 1970s (1971-1975) for Norwegian mothers, and 30.7 years in 2008 compared to 25.4 years in 1971 for Australian mothers.

associations in this age group. Findings from the New Zealand Cohort study indicate that several of the risk factors for adolescent pregnancy also apply to pregnancy in emerging adulthood (Woodward, Fergusson, & Horwood, 2006), suggesting that it is important to adjust for these factors. Reproductive outcomes in emerging adulthood are thus an important area to cover.

Although the association between externalizing problems and early pregnancy has been extensively studied in adolescents (Cavazos-Rehg et al., 2010; Keenan, Loeber, & Green, 1999; Kessler et al., 1997; Miller-Johnson, Winn, Coie, Malone, & Lochman, 2004; Coley & Chase-Lansdale, 1998; Kessler et al., 1997), the role of adolescent depression remains controversial with regards to early pregnancy. Adolescents with elevated depressive symptoms may participate in sexual intercourse to regulate or distract negative emotions and therefore debut earlier and increase the frequency of sexual risk behavior (Cooper, Shapiro, & Powers, 1998). Some researchers have also found a significant relation between depression and risky sexual behavior (DiClemente et al., 2001; Kowaleski-Jones & Mott, 1998), which in turn may lead to increased rates of pregnancy and abortions in emerging adulthood. Some findings have reported longitudinal associations between adolescent depression and early pregnancy/parenthood (Kessler et al., 1997; DiClemente et al., 2001; Miller-Johnson et al., 1999), while others are unable to demonstrate this link (Kowaleski-Jones & Mott, 1998; Lee, O'Riordan, & Lazebnik, 2009; Rubin, Gold, & Primack, 2009). Fewer studies seem to have examined the association between adolescent depressive symptoms and pregnancy outcomes in emerging adulthood. To our knowledge, no studies have isolated emerging adulthood as a subgroup without also including adolescents when examining predictors of pregnancy outcomes.

Findings regarding the association between adolescent depression and pregnancy termination (abortion) have revealed mixed results. Some studies find no associations (Kessler et al., 1997; Larsson, Sydsjo, & Josefsson, 2004), but a more recent longitudinal study by Jonsson and colleagues (2010) reported significant associations between adolescent depression and pregnancy termination in adulthood. The latter study was, however, retrospective, and there is a need for more knowledge about predictors of pregnancy outcomes in emerging adulthood using a prospective longitudinal study.

To sum up, life role transitions that emerge too soon can have adverse effects. Findings indicate that getting pregnant in adolescence and emerging adulthood might be associated with negative outcomes for some females. Therefore, there is a need to assess if the risk factors previously found for pregnancy outcomes in adolescence also predict pregnancy

outcomes in emerging adulthood. In addition, findings regarding the association between depressive symptoms in adolescence and various pregnancy outcomes are unclear, and should be examined in a longitudinal prospective sample.

3.4. An integrative perspective

It is important to acknowledge that a single factor alone (such as gender, social skills, maternal distress, etc) can not be responsible for the development of depressive symptoms. An integrative perspective including factors both within and outside the individual is likely to extend our understanding of the complex etiology of depressive symptomatology. The examination of several risk factors in a multivariate framework makes it possible to study the interplay between different risk factors in their prediction of an outcome and thereby identifying possible mechanisms underlining the relationship between risk factors and outcome. The predictors might interact with each other by moderation, i.e., the relation between a predictor and an outcome varies according to another variable or by mediation where the path between a predictor and an outcome is going through another variable (Baron & Kenny, 1986).

The current study examined risk factors and consequences across several developmental stages. Further, the current study focused upon both *individual factors* such as child problem behavior (i.e., internalizing and externalizing problem behavior), social skills, and pregnancy outcomes; *contextual factors* such as maternal distress, social support from parents, friends, and teachers, and *gender*. Although the current study did not directly examine biological or societal mechanisms, they are used to discuss the link between adolescent depression and: a) maternal distress, which could be both genetically and environmentally mediated, and; b) gender, which could be mediated both biologically (through hormones) and socially (through social expectations and gender roles).

4. GENERAL AIM

The first general aim of the current study was to gain more knowledge on childhood and adolescent predictors of adolescent depressive symptoms. The second aim was to extend our knowledge about gender differences and gender-specific mechanisms in the association between risk/protective factors and depressive symptoms. The third aim was to examine consequences of adolescent depressive symptoms on pregnancy outcomes in emerging adulthood. Although many studies have examined predictors and consequences of adolescent depressive symptoms, few examine the interplay between different risk factors while using several measurement points of adolescent depressive symptoms. Based on the mentioned gaps of knowledge within this research field, the general aims of the current thesis are summed up in a model representing a simplified conceptualization of the three papers belonging to the present study (see Figure 1).

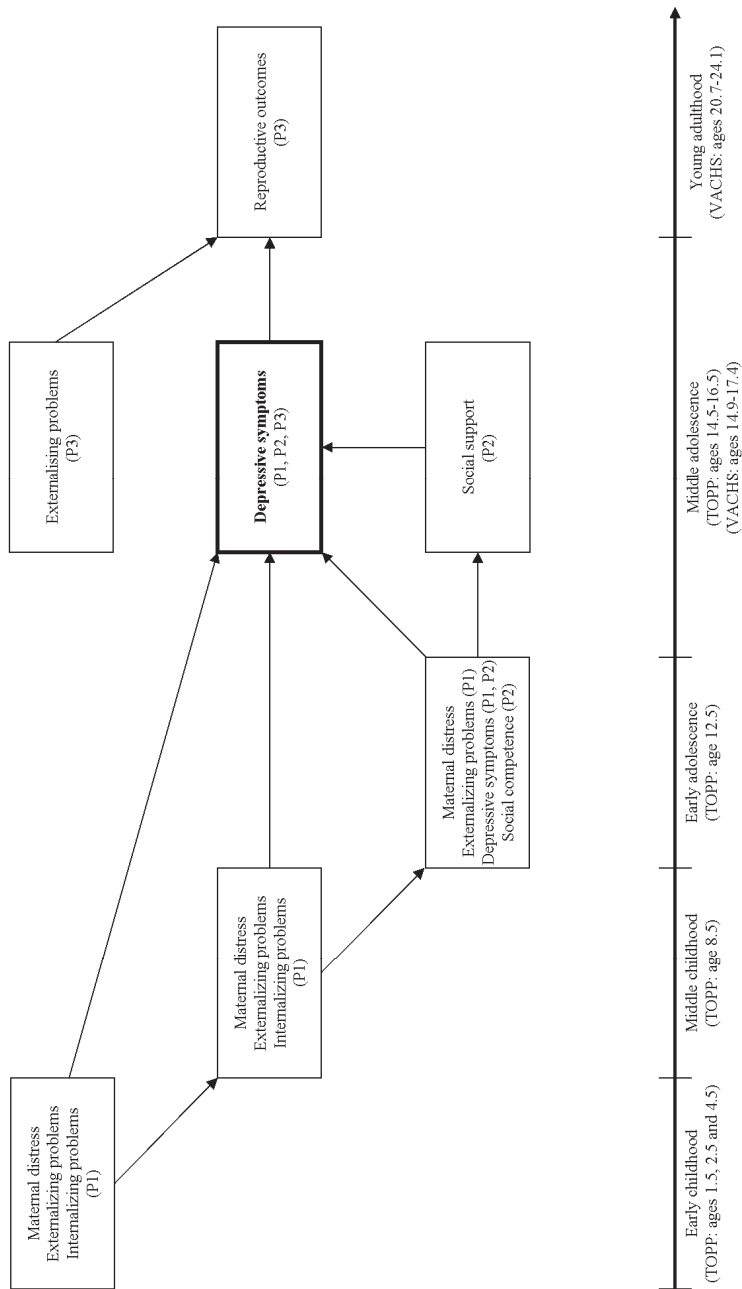


Figure 1. Simplified conceptual figure illustrating the main associations of predictors and consequences of adolescent depressive symptoms examined in the present thesis. P1 (Paper 1), P2 (Paper 2), and P3 (Paper 3) indicates in which paper variables are used. Gender-specific differences and pathways are examined in P1 and P2. Maternal reports are used in early childhood, middle childhood, and early adolescence. Adolescent self-reports are used in early adolescence, middle adolescence, and young adulthood.

4.1. Aims of Paper 1

The main aim of the first paper was to gain a better understanding of the interplay between maternal distress and child problem behavior (i.e., internalizing and externalizing problems) measured at five time points in early childhood (ages 1.5, 2.5, and 4.5), middle childhood (age 8.5) and early adolescence (age 12.5), and their prediction of adolescent depressive symptoms (ages 14.5 and 16.5). We specifically aimed to examine 1) the heterotypic and homotypic pathways of maternally reported child problem behavior across developmental stages; 2) the reciprocal effects between maternal distress and child problem behavior; and 3) the longitudinal pathways from childhood maternal distress and child problem behavior to adolescent depressive symptoms. A fourth aim was to examine the gender-specific pathways in these associations.

4.2. Aims of Paper 2

The main aim of the second paper was to gain more knowledge about the interplay between social skills in early adolescence (age 12.5), social support in middle adolescence (age 14.5), and changes in depressive symptoms from early (age 12.5) to late adolescence (age 16.5). We specifically aimed to examine 1) the longitudinal association between social skills and increases in adolescent depressive symptoms; 2) the potential mediation effect of social support from different sources (i.e., parents, friends, and teachers) on this association, and 3) the gender-specific pathways in these associations.

4.3. Aims of Paper 3

The main aim of the third paper was to gain more knowledge about the longitudinal associations between female depressive symptoms during adolescence (14- to 18-years) and subsequent pregnancy outcomes (becoming pregnant, pregnancy completion, and pregnancy termination) in emerging adulthood (21- to 24-years). We specifically aimed to examine the associations between persistent adolescent depressive symptoms and pregnancy outcomes before and after adjusting for important possible confounding variables, such as externalizing problems, parental divorce/separation and indicators of socioeconomic status.

5. METHOD I: THE TOPP STUDY

The first two papers utilized the “Tracking Opportunities and Problems Project” (TOPP) study, an eight-wave longitudinal population-based study designed to investigate mental health in Norwegian children and their families followed from 1993 to the present.

5.1. Samples and procedure

All families from 19 geographic health care areas in Eastern Norway were invited to complete a survey questionnaire when visiting a public health clinic for their scheduled 18-month vaccination for the index child in 1993 (t1). Routinely, more than 90 % of all Norwegian families with children attend a public health program during the first four years of the child’s life⁵. Of the 1081 invited families, 913 mothers (87 %) participated at t1. The families were invited to participate at seven subsequent waves (See table 2). At the three first waves, questionnaires were handed out by, and given back to, the health care station personnel. From the fourth wave, questionnaires were sent by mail. Mothers completed questionnaires at all waves, fathers were included from t6, and the children/ adolescents completed questionnaires from t5. In the current study, maternal reports at t1 to t5, and self-reports from the adolescents at t5 to t7 were used. See appendix 1 for the questionnaires.

The data collection was approved by the Data Inspectorate and the Regional Committee for Medical Research Ethics. General ethical guidelines for research have been followed. The participants got oral and written information in the first three waves when attending the public health clinic.

Table 1: Participation in TOPP study from 1993 to 2008

Data waves	t1: age 1.5	t2: age 2.5	t3: age 4.5	t4: age 8.5	t5: age 12.5	t6: age 14.5	T7: age 16.5
Year	1993	1994	1996	2000	2004	2006	2008
N mother	913	777	727	505	587	474	421
% mothers*	87 %	83 %	80 %	60 %	65 %	51 %	45 %
N adolescents	--	--	--	--	566	458	375
% adolescents*					60 %	49 %	40 %

* All response rates for T2-T7 are calculated on basis of families participating at T1.

* T1 response rate is calculated on basis of families invited at T1

⁵ At 8 weeks of age, ages 2-3, and age 4, respectively 93, 90 and 89 % of all children in Oslo have been to health station controls in 2011 (Statistics Norway, 2012b).

After that, the participant got written information per post. The information emphasized the confidentiality of the participants, the possibility of skipping questions, and the right to withdraw from the study at any point. Participants gave their written consent, and the family members were provided with an envelope each for returning their survey, thus ensuring privacy. All data was treated with confidentiality; i.e., each participant got an ID-number, and responses were not attached to any personal information. The list connecting personal information and ID-numbers are kept in an encrypted data file, and are separate from the physical surveys and the survey data files. No analyses or reports of findings will enable the identification of individual participants.

The 19 health-care areas were representative of the diversity of social environments in Norway: 28 % of the families lived in large cities, 55 % in densely populated areas, and 17 % in rural areas⁶. At baseline, the age of the mothers ranged from 19 to 46 years ($M = 30$ years; $SD = 4.7$), and a minority of the mothers (9 %) were single. With regards to education, 8 % of the mothers had nine years schooling or less, while 18 % had a college or university education of four years or more. Roughly equal numbers of mothers worked fulltime (32 %), part-time (31 %), or had no paid work (37 %) at t1. The index child was the only child at t1 in 22 % of the families, and gender distribution was even (51 % girls). The only inclusion criterion was that the mothers had to read and write Norwegian to be able to reply to the questionnaires.

The adolescents attended the 7th (80 %) and the 8th (20 %) grade at school at t5. The adolescents attended the 9th (24 %) and the 10th (76 %) grade at t6. The adolescents attended the first (76 %) and the second (24 %) year at high school at t7. Three participants attended the 6th grade at t5, and were therefore excluded from the analyses. The sample of the first paper included maternal reports at t1 to t5, and adolescent self-reports at t6 and t7. The sample for the second paper included adolescent self-reports at t5 to t7.

5.2. Initial response rates and attrition

Background data from the child health clinics showed that non-respondent mothers at t1 did not differ significantly from responding mothers with regards to maternal age, education, employment status, or marital status (Mathiesen & Tambs, 1999). Two attrition analyses; survival analyses of mothers from t1 to t5 (Karevold et al., 2009) and logistic regression analyses from t1 to t7 (Gustavson, von Soest, Roysamb, & Karevold, 2012), revealed no

⁶ Approximately 80 % of the Norwegian population lived in large cities or densely populated cities in 2011, while the rest lived in rural areas (Statistics Norway, 2011a).

differences in drop-out versus remaining families in several traits (mother's temperament and psychological distress, child's temperament, and mothers' emotional support from partner and friends). The only factor in these two analyses that predicted drop-out was low maternal educational level. The associations between variables at baseline did not differ among drop-out versus remaining families later in the study ($t7$), suggesting that estimated associations between variables are generalizable (Gustavson et al., 2012). Also, a Monte Carlo simulation study showed that estimates of associations between variables are far more robust to selective attrition than estimates of mean values and prevalence (Gustavson et al., 2012). Further the simulation showed that the association between attrition and study variables has to approach a strong effect size before estimates of associations become biased in a situation with 50% attrition and an original sample size of 1000.

Additional attrition analyses of adolescent participation conducted in the first paper of the present thesis showed that 3 of 10 variables; female gender, baseline low maternal education and work participation, predicted adolescent participation at $t7$. The remaining 7 variables (maternal age, single-mother household, family finances, maternal distress, parental divorce/separation, and the child's internalizing and externalizing problems) did not predict adolescent participation.

5.3. Missing

To handle missing data in the two first papers, we carried out statistical modelling using missing data estimation techniques using the full information maximum likelihood (FIML) procedure in Mplus (Muthén & Muthén, 2010). FIML takes advantage of participants with partial data. Assuming the data are missing at random (MAR) conditional on covariates included in the model, FIML estimation increases power and decreases potential attrition bias by adjusting for bias related to model variables. This procedure estimates the parameters in the model directly, and the uncertainty of missing is included in the model chi-square. Even if MAR is not assumed, FIML is still the recommended approach because it outperforms common alternative approaches, such as complete case analysis or single imputation strategies (Schafer & Graham, 2002).

5.4. Instruments

In total, nine different scales were utilized in the first two papers. These scales are available in Appendix 1-7.

5.4.1. Adolescent depressive symptoms

The Short Mood and Feelings Questionnaire (SMFQ; Angold et al., 1995; Messer et al., 1995) was used to measure adolescent depressive symptoms (t5 – t7) with self-reports and maternal reports. The SMFQ consists of 13 items, measuring affective and cognitive symptoms of depression (e.g., “didn’t enjoy anything at all” and “felt miserable or unhappy”) drawn from the original 34-item Mood and Feelings Questionnaire. The adolescents/their mothers rated how much they agreed that each statement had happened to themselves/their offspring the past two weeks with three response categories (“True”, “Sometimes true” and “Not True”). One question was omitted (“I found it hard to think properly or concentrate”) at t5 and t6, due to similarities with other items in the survey. At t6, the response categories were slightly different (“Often true”, “Sometimes true” and “Seldom true”). Since the 12- and 13-item versions at t7 correlated highly with each other ($r = .99, p < .000$), the 13-item version at t7 was used.

For the first paper, a latent factor was constructed with the separate mean scores of adolescent self-reported depressive symptoms at t6 and t7 as indicators. The two factor loadings were constrained to be equal to ensure that depressive symptoms at both time points were equally important in the construction of the latent factor. This factor thus captured stability in depressive symptoms across these two time points. Short-term fluctuations in mood just prior to answering the questionnaires should therefore not affect the results. The mean score of maternal reports of SMFQ were also used in the first paper.

For the second paper, the mean score of self-reported depressive symptoms at t5 and t7 was used. Adjusting for depressive symptoms at t5 in all analyses, the outcome variable represented changes in depressive symptoms from t5 to t7. The internal reliability for the self-reported depressive symptoms was $\alpha = .84$, $\alpha = .88$, and $\alpha = .89$ at t5, t6, and t7 respectively, and the internal reliability for maternal-reported depressive symptoms at t5 was $\alpha = .82$.

5.4.2. *Problem behavior in early childhood*

The Behavior Checklist (BCL; Richman & Graham, 1971) measures maternal reports of internalizing and externalizing problems in early childhood (t1 - t3) for the first paper. The

BCL taps three internalizing items: worries, fearfulness, and anxiousness, and three externalizing items; temper tantrums, manageability and irritability. Maternal reports of two of these items (worries and fearfulness) were used to measure internalizing problems in the TOPP-study at t1 and t2. At t3, the third item (anxiousness) from BCL was added to the survey. The informants rated how much they agreed with these behaviors with three response categories ranging from no difficulties to definitive difficulties. An item measuring sadness was added in all three waves by the TOPP-study to cover this important internalizing symptom (Mathiesen, Sanson, Stoolmiller, & Karevold, 2009). The internal reliability of the three (t1 - t2) and four (t3) items of internalizing problems were $\alpha = .42$, $\alpha = .55$, and $\alpha = .57$, respectively. The internal reliability of the externalizing problems were $\alpha = .41$, $\alpha = .45$, and $\alpha = .50$ at t1 to t3, respectively. The relatively low alpha values were expected due to the small number of items, and were comparable to levels reported elsewhere for this scale (Pavuluri, Luk, & McGee, 1996). Moreover, results from previous research with this scale have suggested that it gives a valid assessment of problem behavior (Mathiesen et al., 2009; Pavuluri et al., 1996; Sonuga-Barke, Thompson, Stevenson, & Viney, 1997; Richman & Graham, 1971).

5.4.3. Problem behavior in middle childhood

The Strengths and Difficulties Questionnaire (SDQ; Goodman, 1994; Goodman, 1997) was used to measure maternal reports of internalizing and externalizing problems in middle childhood (t4) for the first paper. The Emotional Problem subscale taps five items about internalizing problems (general worries, sadness, fearfulness, nervousness and somatic complaints) and The Conduct Problem subscale taps five items about externalizing problems (temper, obedience, fighting, lying and stealing). Mothers were asked if these child problems behaviors had happened the past six months or the past school year and responded with three response categories ("Not true", "Somewhat true" and "Certainly true"). The SDQ has shown satisfactory psychometric qualities in earlier studies (Van Roy, Veenstra, & Clench-Aas, 2008; Goodman, 1997). The internalizing and externalizing subscales had internal reliability of $\alpha = .65$, and $\alpha = .47$, respectively. The relatively low internal reliability is in line with former studies (Van Roy et al., 2008).

5.4.4. Externalizing problems in early adolescence

Maternal reports of the TOPP Scale on Antisocial Behavior (TSAB; Kjeldsen, Janson, Stoolmiller, Torgersen, & Mathiesen, 2012) was used to measure the frequency of

externalizing behaviors the last 12 months in early adolescence (t5) for the first paper. Participants responded to three response categories (“Never”, “Once” and “More than once”). The 18-item scale taps interpersonal aggression, stealing, and vandalism. The 18-items was constructed using items from other scales given the absence of an age and culture sensitive measure of problem behavior covering a wide range from relatively normative to serious (illegal) behaviors through adolescence (Kjeldsen et al., 2012). The TSAB had an internal reliability of $\alpha = .69$.

5.4.5. *Maternal depressive symptoms*

Maternal symptoms of anxiety and depression (hereafter referred to as "maternal distress") were assessed with the Hopkins Symptoms Check List (SCL; Hesbacher, Rickels, Morris, Newman, & Rosenfeld, 1980; Winokur, Winokur, Rickels, & Cox, 1984) throughout the TOPP-study. Maternal distress measured from t1 to t5 was used in the first paper. The original version consists of 25 items with four response categories (“Not at all”, “A little”, “Quite a bit”, and “Very much”). The mothers rated how often they had experienced symptoms the last week (t2 - t5). At t1, the introduction text was a bit different and the mothers were asked how often symptoms had bothered them/had negative implications the last week. One item was removed at the first two waves (“Thoughts of killing yourself”), while another item (“Loss of sexual interest or pleasure”) was removed at all waves, because being perceived as offensive in a pilot-study (Mathiesen, Tambs, & Dalgard, 1999).

A 10-item version of SCL was used at t5 for a shorter questionnaire to raise response rates. For the others waves, the 25-item version was used. Findings comparing various short versions of the SCL found all versions to show almost equally high internal consistency, sensitivity and specificity (Strand, Dalgard, Tambs, & Rognerud, 2003; Muller, Postert, Beyer, Furniss, & Achtergarde, 2010; Tambs & Moum, 1993). The SCL has shown satisfactory psychometric qualities in earlier studies (Deane, Leathem, & Spicer, 1992; Nettelbladt, Hansson, Stefansson, Borgquist, & Nordstrom, 1993; Tambs & Moum, 1993). The internal reliability in the current study was high, ranging from $\alpha = .87$ to $\alpha = .91$. Former analyses of the same sample found 7 % to 14 % of the mothers to score above a clinical cut-off (cut-off > 1.75) throughout childhood (t1 - t5) (Skipstein, Janson, Stoolmiller, & Mathiesen, 2010).

5.4.6. *Interpersonal factors*

Social skills. Self-reports of the Social Skills Rating System (SSRS; Gresham & Elliott, 1988) in early adolescence (t5) measured social skills for the second paper. The scale taps cooperation (e.g., “I pay attention in class”), empathy (e.g., “I feel sorry for others when bad things happen to them”), assertion (e.g., “I start conversations with my classmates”) and self-control (e.g., “I end discussions/fights with my parents in a calm way”). The scale originally consisted of 39 items, but analysis of data using this scale at t4 led to development of a 24-item version used for t5 (Mathiesen, Personal Communication). The response categories were originally three (“Never”, “Sometimes”, and “Very Often”), but two extra response categories (“Seldom” and “Often”) was added as recommended by Ogden (1995). The SSRS has shown satisfactory psychometric qualities (DiPerna & Volpe, 2005; Mathiesen & Prior, 2006). The internal reliability was $\alpha = .88$.

Social support. To measure social support from parents, friends and teachers for the second paper, self-reports in middle adolescence (t6) was used. *Parent support* was assessed with adolescent self-reports with ten items (five items about each parent) from the Parental Warmth/Involvement subscale from the Lamborn Parenting Scale (Lamborn, Mounts, Steinberg, & Dornbusch, 1991). Participants were asked to rate items such as “I can count on him/her to help me out, if I have some kind of problems” and “He helps me with my school work if there is something I don’t understand” with five response categories ranging from ‘Almost never’ to ‘Almost always’. The scale was translated and back-translated for the TOPP survey. The scale was constructed by computing the mean score of the ten items. The scale had an internal reliability of $\alpha = .89$.

Friend support was measured with a scale, which has been developed and used in several Norwegian studies, consisting of three items measuring feelings of attachment, mutual respect, and belonging (Dalgard, Bjork, & Tambs, 1995). Participants responded to statements such as “I feel closely attached to my friends” with four response categories ranging from “Agree” to “Disagree”. The scale was constructed by computing the mean score. The internal reliability was $\alpha = .48$ (See section 8.1.2 for a discussion of the low internal reliability).

Teacher support was assessed with three items measuring mutual respect, appreciation, and instrumental help. The questions were derived from the “The Oslo Health Study” (e.g., Oppedal, 2011). Participants rated items such as “My teachers help me when

needed” with four response categories ranging from “Agree” to “Disagree”. The scale was constructed by computing the mean score. The internal reliability was $\alpha = .80$.

5.5. Statistical analyses

The analyses were performed using The Predictive Analytics Software Statistics (PAWS; Originally SPSS) Version 17.0.2 (SPSS Inc, 2009) and Mplus (Muthén & Muthén, 2010). For both the TOPP-papers, we conducted descriptive statistical analyses (such as means, standard deviations, and tests of non-normality), correlation analyses, as well as analyses of increases in depressive symptoms from t5 to t7 with SPSS.

For both papers, we also conducted path analysis with structural equation modeling (SEM) in Mplus. All measures were standardized before being entered in Mplus. Model fit was evaluated with the Chi-square (χ^2), the Comparative Fit Index (CFI), the Tucker-Lewis Index (TLI), and the Root Mean Square Error of Approximation (RMSEA). In the first paper, we used the robust maximum likelihood estimator (MLR) because of lack of multivariate normality. Since χ^2 -values obtained from the MLR estimator can not be used for χ^2 -difference testing of nested models as the differences between them are not χ^2 -distributed. The $\Delta\chi^2$ -test suggested by Satorra and Bentler (2001) was therefore used.

All models were divided by gender and analyzed as two-group models, for both papers. Initially all structural paths were constrained to be equal across gender, and then freed up, one at a time, to test for possible gender differences. The fit of each model was compared to the fit of the less constrained model. If freeing up a constraint on a path lead to significantly improved model fit (as indicated by reduction in chi-square value), the path was allowed to differ across gender.

Analyses for the first paper. For the basic model in the first paper, we allowed cross-time and homotypic paths, representing the stability of the variables (e.g., maternal distress at t5 was regressed on maternal distress at t4, etc). Residual correlations within time points between the variables were also allowed (e.g., maternal distress at t5 was correlated with internalizing problems at t5). Moreover, effects from predictor variables to outcome were allowed for the most proximal time point (t5) upon the outcome latent variable of adolescent depressive symptoms (i.e., adolescent depressive symptoms at t6-7 was regressed on maternal distress, externalizing and internalizing problems at t5).

We then expanded the model by including regression paths between time points suggested by the modification indices, one at a time. These were indicated as expected reduction in χ^2 obtained by modeling them. We allowed significant time logical cross-effects (e.g., from t4-5) among the predictors and long-term direct effects (e.g., from predictors at t1-4) to the latent outcome variable. The adapted strategy involved omitting paths from the basic model that were shown to be insignificant as the model was developed. The final model contained all significant (and theoretically sound) paths and excluded non-significant (and time-illogical) paths (see: Karevold et al., 2009; Kendler, Gardner, & Prescott, 2002; Kendler, Gardner, & Prescott, 2006). The final model included estimates of heterotypic and homotypic paths among predictors, direct effects from predictors upon the outcome, and indirect effects through developmental pathways to the outcome. The final model was adjusted for socioeconomic risks (maternal education and family economy). Indirect effects were tested for statistical significance by the Model Indirect command, which uses the Sobel equation, in Mplus (Muthén & Muthén, 2010).

Analyses for the second paper. For the second paper, we conducted multiple mediation analyses. The SEM approach allows for simultaneous examination of the relative contribution of each variable, in addition to the total indirect effect, in a multiple-mediator model. The causal-step approach proposed by Baron and Kenny (1986) was adopted to examine mediation. Bootstrapping, in which standard errors are estimated based on multiple re-samples of the dataset, was performed to adjust for non-normality and for examining mediation. For a more elaborate description, see paper 2.

6. METHOD II: THE VAHCS STUDY

The third paper utilized data from the “The Victorian Adolescent Health Cohort” –study (VACHS)⁷, a nine-wave longitudinal population-based cohort study designed to investigate adolescent health amongst adolescents and young adults resident in Victoria, Australia followed from 1992 to the present

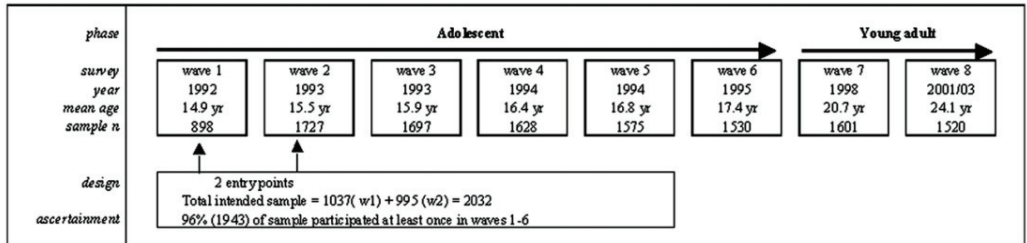


Fig. 1. Sampling and ascertainment in the Victorian Adolescent Health Cohort, 1992 to 2003.

6.1. Sample and procedure

The cohort was defined using a two-stage sampling procedure with representative samples of the Victorian population of mid-secondary-school adolescents in 1992. Two school classes were selected at random from a stratified sample of 44 random selected state-wide schools (60 905 students in total). The first class participated in the first wave in the latter part of their year 9 (ages 14 – 15) (M = 14.9, SD =.46), and six months later in the second wave, the second class entered the cohort in their year 10 (ages 15 – 16) (M = 15.4, SD = .44). Thus half of the participants in the year of sampling had been interviewed once before wave 2. The entire sample was followed-up from wave 2 to completion of the study. The school retention rates in the year of sampling were 98 %. Data collection protocols were approved by The Royal Children’s Hospital Ethics in Human Research Committee. Informed consent was obtained from participating schools and parents. Further participant consent was obtained in the young adult waves.

Participants completed further four questionnaires with six-month intervals between year levels 10 and 12 (wave 3 - 6). These surveys were computer-based and self-administered

⁷ The doctoral candidate visited the Center of Adolescent Health; Royal Children’s Hospital, Melbourne, Australia and had the opportunity to use the VAHCS-data to examine young adult outcomes of adolescent depression which was not feasible with the TOPP-data yet.

on laptop computers within classrooms, allowing a collection of detailed self-report data through branched questionnaires. Subjects who were unavailable for follow-up at school were interviewed by telephone. Participants further completed three follow-up questionnaires in emerging adulthood at age 20 - 21 years (wave 7) and 24 - 25 years (wave 8), and in adulthood at age 28 - 29 years (wave 9). These three waves were administered using a computer-assisted telephone interview. The current study included data collected in waves 1 through 8. The instruments used are available in Appendix 2.

6.2. Attrition

From a total sample of 2032 students, 1943 (95.6 %) participated at least once during the first six waves (Figure.1). Between April 2001 and April 2003, 1520 (75 % of the initial sample; 78 % of adolescent participants) were interviewed in wave 8. Non-completion at wave 8 were due to refusal ($n = 267$), loss of contact ($n = 150$) and death ($n = 6$). Those lost to follow-up at wave 7 were more likely to be males, having experienced parental divorce/separation, and having parents with lower education (Lynskey, Coffey, Degenhardt, Carlin, & Patton, 2003).

Multiple Imputation (MI) was used to deal with the potential bias arising from missing data. MI was conducted using NORM software (Version 2.03, USA, 2000). Twenty complete datasets were created by imputation under a multivariable normal model, incorporating all variables of interest measured at all waves of data collection, along with fixed covariates (age, metropolitan or regional school location, and parental education) as well as auxiliary variables (attachment style, impulsivity, neuroticism, parental bonding, parental smoking, language other than English, level of education, and employment status), using adaptive rounding for binary measures (Schafer, 1997; Bernaards, Belin, & Schafer, 2007). Estimates of log odds ratios were obtained within the multiple imputation framework by averaging across the imputed datasets with Wald-type confidence intervals obtained using Rubin's combination rules (Bernaards et al., 2007; Carlin, Galati, & Royston, 2008).

6.3. Instruments

6.3.1. *Symptoms of depression and anxiety*

Adolescent depressive symptoms were assessed using a self-administered, computerized form of the revised Clinical Interview Schedule (CIS-R) during adolescence (waves 1 - 6) (Bifulco, Brown, Moran, Ball, & Campbell, 1998; Lewis et al., 1988). The CIS-R is a structured

diagnostic instrument that was developed from an existing instrument, the Clinical Interview Schedule (CIS), to be used by trained lay interviewers (Brugha et al., 1999; Lewis et al., 1988; Lewis, Pelosi, Araya, & Dunn, 1992).

The CIS-R provides information on frequency, severity, persistence, and intrusiveness of 14 common sections of psychiatric symptoms (such as depression, anxiety, sleep, obsessions, and phobias) in non-clinical populations (Lewis et al., 1988; Lewis et al., 1992). It can be used to generate diagnostic categories according to ICD-10. The section about depression includes for instance sadness, irritability, hopelessness, fatigue and being unable to enjoy things.

Each section of the CIS-R begins with a lead-in question (which is not scored) which relates to symptoms the previous month. A positive response to the initial question results in further four questions (related to the frequency, duration and severity of the symptoms the past week) being administered (five for depressive symptoms). All sections are scored on a scale from 0 – 4 (except depressive symptoms), with each positive response giving a score of ‘1’. A CIS-R depression total score was calculated at each wave during adolescence and dichotomized with a threshold of 11/12 corresponding to the point where a general practitioner might be concerned about an individual’s mental health (Lewis et al., 1988; Lewis et al., 1992; Patton et al., 1997). The internal reliability of the scale across waves 2 - 6 was good ($\alpha = .79$).

Participants in the current study were categorized as having “low depressive symptoms” (never reported depressive symptoms (12+), “moderate depressive symptoms” (depressive symptoms (12+) reported once), and “high depressive symptoms” (depressive symptoms (12+) reported at least twice) across waves 1 to 6.

6.3.2. *Reproductive outcomes*

Emerging adulthood pregnancy outcomes (waves 7 – 8) were assessed by asking participants: “Have you ever had any children of your own?” (Pregnancy completion) and “Have you ever had a termination or abortion?” (Pregnancy termination). As the focus of the analysis was on pregnancy outcomes in emerging adulthood, pregnancies (live births, terminations, and miscarriage) occurring before age 21 years were excluded. All pregnancy outcomes are therefore operationalised to have happened between ages 21 and 24 years. A variable representing “ever been pregnant” was constructed using the pregnancy items in addition to a miscarriage item. Response categories ranged from “yes” to “no”.

6.3.3. *Externalizing problems during adolescence*

Antisocial behavior was assessed during adolescence (waves 1 - 6) with “The Self-Report Early Delinquency Instrument” (Moffitt, 1988), from which 10 items were selected to cover antisocial behaviors that occurred during the last six months prior to data collection (Patton et al., 1997). Behaviors related to property damage (vandalism, car damage, graffiti), interpersonal conflict (fighting, carrying weapons, running away from home, expulsion from school) and theft (stealing from parents and others, stealing cars) were assessed. Response categories were “No, never”, “Yes, only once” and “Yes, more than once”. Antisocial behaviors were stratified into those with antisocial behaviors (one or more antisocial behavior on more than one occasion) and no antisocial behaviors.

Substance use was assessed during adolescence (waves 1 – 6). Tobacco use was defined as any smoking (yes/no) in the last month. Cannabis use was defined as any use (yes/no) over the past 12 months. Binge drinking was assessed using self-reported alcohol use in the previous 6 months. For participants who reported being at least occasional drinkers, a 7-day retrospective diary of alcohol consumption in the week prior to data collection was completed. The diary used a beverage specific approach and detailed types of drinks (e.g. low alcohol beer, normal beer, wine, spirits, and mixed drinks) as well as the quantities consumed on each drinking day (Hilton, 1989). Binge drinking was defined by the average level of alcohol consumption using a cut off of five standard drinks (10 grams of alcohol) per drinking day.

Sample size limitations required thorough assessment of co-linearity between potential confounding factors to ensure well-powered models. Exploratory factor analysis (principal factor analysis with varimax rotation) was used to examine whether indicators of antisocial behavior and drug use were sufficiently co-linear to combine into a single indicator variable of externalizing behavior. Results showed only 1 factor (Eigen value > 1.0; $\alpha = .71$), supporting the use of a single indicator variable for externalizing behavior. Response categories for tobacco and cannabis use, binge drinking, and antisocial behavior variables were standardized to ensure equivalence of meaning, whereby each variable was recoded to represent “Never,” “Moderate” (any behavior, 1-3 waves), and “High” (any behavior, 4+ waves). These four standardized variables were then combined into a single 3-level variable representing “No externalizing behavior” (no high antisocial and/or drug use at any wave), “Moderate externalizing behavior” (any high antisocial behavior and/or drug use, 1-3 waves), and “High externalizing behavior” (any high antisocial behavior and/or drug use, 4+ waves).

6.3.4. *Socioeconomic variables*

Socioeconomic confounder variables were indicated by metropolitan or regional location of school, parental separation/divorce, and parental education (incomplete secondary school or completed secondary/technical qualification).

6.4. Statistical analyses

The data analysis consisted of several steps. Imputations (see earlier description) were conducted with NORM, while final data analysis was conducted with Stata 11, release 1.0 (Stata Corporation LP, College Station, TX, USA, 2007). Associations between recurrent adolescent depression and pregnancy outcomes were adjusted incrementally for the confounding factors. The level of significance was set at .05 for the unadjusted and single adjustment models. Odds ratios were presented with 95 % confidence intervals.

7. RESULTS

7.1. Results of Paper 1

In the first paper, we examined the interplay between maternal distress and child problem behavior across child development, and their prediction of adolescent depressive symptoms (ages 14.5 and 16.5). Four main findings from the first paper are summed up here. First, we found both homotypic pathways in child problem behavior with internalizing problems predicting subsequent internalizing problems, and externalizing problems predicting subsequent internalizing problems, from early childhood to early adolescence, and several heterotypic pathways from externalizing to internalizing problems. Noteworthy, we found this across instruments and informants.

Second, we found several pathways from maternal distress to both internalizing and externalizing during childhood and early adolescence. Most of the pathways originated from early maternal distress (age 1.5), but there were also pathways originating from middle childhood maternal distress (age 8.5). Also, we found indirect paths from early maternal distress to self-reported adolescent depressive symptoms (age 14.5-16.5).

Third, we found a pattern in which externalizing problems at one time point predicted internalizing problems at a subsequent time point. Also, maternally reported externalizing problems during early childhood (age 4.5) directly predicted self-reported adolescent depressive symptoms (ages 14.5 - 16.5). Fourth, we found that girls and boys in general were similar with regards to these before-mentioned patterns. However, we found a gender-specific heterotypic path from middle childhood internalizing (age 8.5) to subsequent externalizing problems (age 12.5) for girls and not boys, and a cross-informant heterotypic path from middle childhood externalizing (age 8.5) to self-reported adolescent depressive symptoms for girls, but not boys.

7.2. Results of Paper 2

In the second paper, we examined if the longitudinal association between low social skills and increases in depressive symptoms could be explained (mediated) by three different sources of social support (from parents, friends, and teachers). We also examined gender-specific paths in this multiple-mediator model.

First, we found that adolescent girls reported higher levels of depressive symptoms and social skills compared to adolescent boys. We found that girls and boys reported the similar levels of social support from all three sources. Further, there were significant increases in depressive symptoms from age 12.5 to age 16.5 for girls, but not boys. Second, we found associations between low social skills in early adolescence (age 12.5) and increases in depressive symptoms four years later (from age 12.5 to age 16.5) for both girls and boys. We found low friend support (age 14.5), but not parent or teacher support, to predict increases in depressive symptoms for girls, but not boys. Further, we found that friend support mediated the association between low social skills and increases in depressive symptoms for girls, and not boys.

7.3. Results of Paper 3:

In the third paper, we examined the longitudinal associations between persistent depressive symptoms during adolescence and reproductive outcomes in young adulthood. We found a twofold increase in the odds of becoming pregnant in females reporting persisting patterns of depressive symptoms during adolescence (2+ waves). However, after staged adjustment for externalizing problem behavior (i.e., antisocial and drug use behavior) and socioeconomic differences, there was no evidence of association. Adolescent externalizing behavior was strongly associated with becoming pregnant and pregnancy termination in emerging adulthood. Adolescent externalizing behavior, such as antisocial and drug use behavior, not depressive symptoms, independently predict pregnancy outcomes in emerging adulthood.

8. DISCUSSION

8.1. Theoretical discussion

The findings revealed interesting patterns in which child problem behavior, maternal distress, interpersonal factors (i.e., social skills and support), and gender predicted adolescent depressive symptoms. The findings also indicated that although persistent depressive symptoms during adolescence were associated with subsequent reproductive outcomes, this link was mitigated by externalizing problems. Below these findings are discussed in light of: i) continuity and change of internalizing symptomatology across childhood into adolescence; ii) the role of externalizing problems and maternal distress as predictors of depressive symptoms and pregnancy outcomes; iii) gender as a risk factor and a moderator, and; iv) the link between depressive symptoms and pregnancy outcomes. Then an overall theoretical section discusses and summarizes the interplay between variables in their prediction of adolescent depressive symptoms and reproductive outcomes, as well as vulnerable periods in which the predictors act.

8.1.1. Continuity and change in internalizing symptomatology

The study improves on previous studies using only one time point of measuring depressive symptoms, underscoring the importance of examining multiple waves looking at internalizing symptomatology in a more dynamic manner. We measured depressive symptoms across adolescence in terms of changes in depressive symptoms (paper 1-2), stability in depressive symptoms (Paper 1) and persistence of depressive symptoms (Paper 3). Furthermore, the findings in the current thesis indicated both group-level increases across adolescence, and homotypic continuity across development for same-informant and cross-informant rated behavior. The findings also underscore changes in problem behavior across childhood- and adolescent development.

Our findings from the second paper indicated group-level increases in depressive symptoms from early adolescence (age 12.5) to middle adolescence (age 16.5), supporting former findings (Wichstrom, 1999; Hankin et al., 1998; Costello et al., 2011). The increase in depressive symptoms pertained only to girls, which also supports former findings (Wichstrom, 1999; Hankin et al., 1998; Costello et al., 2011). The increases were on group level, and as illustrated in studies using person-oriented methods, such as trajectory studies of maternal (Skipstein et al., 2010) and adolescent depressive symptoms (Mazza, Fleming,

Abbott, Haggerty, & Catalano, 2010), there are within-group individual patterns of change. It is thus important to remember that even though we found a general increase in depressive symptoms in girls from early to later adolescence, there are individuals that have stable or decreasing levels of depressive symptoms over time as well.

Furthermore, the findings indicated homotypic paths ranging from small to moderate effects for both maternally reported internalizing problems from early childhood (age 1.5) to early adolescence (age 12.5) (Paper 1) and self-reported depressive symptoms from early (age 12.5) to late adolescence (age 16.5) (Paper 2), supporting former findings of stability of internalizing problems across development (Mesman et al., 2001; Costello et al., 2011; Rutter et al., 2006; Fergusson & Woodward, 2002). Furthermore, this continuity was evident when there were changes in informants from early to middle adolescence (from age 12.5 to 14.5 - 16.5), when there were changes in instruments to capture different manifestations of child problem behavior across development (from age 4.5 to 8.5; and from age 8.5 to 12.5), and for both girls and boys. Our findings thus extend upon former findings by using two different informants, and by supporting the notion that symptoms at different developmental stages reflect the same underlying dispositions (Costello et al., 2011).

Still, there were also considerable changes/plasticity, and the findings thus highlight that even though there are higher risk involved with experiencing former problem behavior for some, not everyone develops further problems at subsequent time points. Problem behaviors and symptoms will vary in each individual over time, and this is especially evident during childhood. Predictors of different developmental trajectories of symptom development could be examined in the future for better identifying those children who are at risk of problems at several time points. Also, as earlier mentioned, these associations might be mediated by other factors. However, regardless of the link between former and subsequent depressive symptoms being genetically or environmentally mediated, the findings underscore the importance of identifying depressive symptoms early, before further problems develop.

8.1.2. The role of externalizing problems across development

The findings illuminate the impact of externalizing problems, both as a direct predictor and as a possible mediator in which other risk factors operate through. The results support previous findings and highlight the importance of this type of problem behavior (Masten et al., 2005; Mesman et al., 2001; Wiesner & Kim, 2006; Costello et al., 2011).

Noteworthy, externalizing problems already at age 4.5 predicted self-reported adolescent depressive symptoms, which may be an indication of a vulnerable period.

Trajectory studies have shown that externalizing problems become less normative from this age onwards (Côté, Vaillancourt, LeBlanc, Nagin, & Tremblay, 2006; NICHD Early Child Care Research Network, 2004), which may contribute to explain why externalizing problems at this age had adverse long-term effects. One possible mechanism behind the externalizing-internalizing path might be common underlying environmental predictors associated with both types of problem. Although the current study and other studies have found that maternal distress predicts both types of problem behavior (Goodman et al., 2011), maternal distress did not mitigate the externalizing-internalizing paths in our study. Furthermore, emotional difficulties may be expressed as externalizing behavior (e.g., frustration or aggression) in earlier stages of life, when the children have less differentiated ways of expressing their emotions. Externalizing problems are more visible to the surroundings than internalizing problems, and may thus be a particular potent predictor.

Supporting the notion of multifinality, we found paths from externalizing problems to several outcomes, such as subsequent internalizing and externalizing problems in childhood, and depressive symptoms in adolescence (Paper 1), and reproductive outcomes (Paper 3). Therefore, intervention and prevention targeted on externalizing problems can have the potential to prevent other adverse long-term problems such as internalizing problems and reproductive outcomes.

8.1.3. The significant role of maternal distress

Our findings highlight and nuance the impact maternal distress can have in early and middle childhood. Especially in the first couple of years (age 1.5), and around early school age (age 8.5), maternal distress had both short and long-term effects on later child problem behavior. Supporting early life vulnerability theories (O'Connor, 2006), there were several paths from early maternal distress throughout development that predicted changes in child problems directly and adolescent depressive symptoms indirectly, with effects over and above later time points. Interestingly, maternal distress in preadolescence, the most proximal measure, did not predict adolescent depressive symptoms. Thus, one may speculate whether the long-term effects of maternal distress in the first couple of years is an indication of heritability of depression (i.e., genetic mediation) or of a specific vulnerable period for development of problem behavior (i.e., environmentally mediated).

With regards to the genetic mediation, the variance explained by genetic influences is found to increase over time from childhood to adolescence (Bergen, Gardner, & Kendler, 2007). In addition, in our study the age of the mothers at baseline ($M = 30$ years; $SD = 4.7$)

was most similar to the adolescents' age at the last wave, and thus the associations found might be an expression of genetic family risk. A recent meta-analysis reported that shared environment account for 14 - 15% of the variance in depression (Burt, 2009). Thus, the significant association between these two time points might express shared environment as well as a familial genetic risk. Other findings have indicated that there might also be an interaction. For instance, researchers from the longitudinal Dunedin study reported interactions between a certain gene (the serotonin transporter/5HTT-gene) and early life stress (Caspi et al., 2003). Even though these findings have both been replicated and criticized (Kendler, Kuhn, Vittum, Prescott, & Riley, 2005; Duncan & Keller, 2011), this emphasizes possible gene-environment interactions that deserves further attention. We can speculate whether the environmental mechanisms, such as the quality of parenting and mother-child interaction (Field, 2010; Lovejoy et al., 2000), in which maternal distress is associated with offspring depression, interact with gene expression. Future studies should thus examine gene-environment interactions in this area closer.

Our results further support previous findings suggesting that middle childhood is another particular vulnerable time for being exposed to maternal distress (Huston & Ripke, 2006a; Jaffee & Poulton, 2006; Huston & Ripke, 2006b). In middle childhood the transition from child care to school can be stressful with new social and academic challenges, making maternal distress at that time point an extra burden. Also, children at this age often still spend a lot of time home, and are more reliant on their parents for support. Adolescents, in contrast, can be more able to avoid stressors associated with maternal distress, or to seek support from their friends or other adults, which is indicated in Paper 2. Noteworthy, maternal distress had a long term direct effect that worked through child problem behavior to adolescent depressive symptoms, suggesting that intervention at early stages are needed for healthy long-term development.

8.1.4. Gender as a risk and a moderator

In addition to being a risk factor, gender was an important moderator. Modeling gender as a predictor, several former findings were replicated (Cyranowski et al., 2000; Hankin et al., 1998; Zahn-Waxler et al., 2006; Nolen-Hoeksema et al., 1999; Nolen-Hoeksema & Girgus, 1994). As expected, girls reported higher depressive symptoms than boys in early and middle adolescence (Papers 1-2). Group level increases in depressive symptoms from age 12 to 16 were only evident for girls, also supporting former findings (Wichstrom, 1999).

Furthermore, girls and boys were similar on several aspects, such as continuity in externalizing and internalizing symptoms. Interestingly, some of our findings were unexpected, such as maternal distress having a universal effect on both girls and boys throughout development. Several earlier findings have indicated a preponderance of girls being more vulnerable for maternal depression in adolescence (Burt et al., 2005; Flouri & Malmberg, 2011; Goodman & Gotlib, 1999; Goodman et al., 2011; Pitzer et al., 2011), while boys are found to be more vulnerable early in life (Tronick & Reck, 2009). The findings may reflect the smaller sample of boys compared to girls in the two first papers. However, a couple other studies have also reported few or no gender difference with regards to similar predictors of depression (Bureau et al., 2009; Jaffee & Poulton, 2006; Spence et al., 2002).

8.1.5. Middle childhood as a sensitive period for girls

The findings indicated that middle childhood can be a vulnerable time period specifically for girls. Internalizing and externalizing problems in middle childhood predicted subsequent externalizing problems in early adolescence and self-reported adolescent depressive symptoms for girls only. A possible explanation may be a heightened vulnerability in the transition to school for girls. As indicated in our second paper and by others, girls are suggested to be more interpersonally vulnerable than boys (Cyranowski et al., 2000; Petersen et al., 1993; Rose & Rudolph, 2006). Experiencing problem behaviors in middle childhood might represent a risk for social and academic problems, which in turn affect further problem behavior. Social and academic stressors have been found to partly explain the link between internalizing and externalizing problems (Little & Garber, 2005), which lends support to this theory. Findings indicate that especially for interpersonal oriented children, which girls more often are (Karevold, Stoolmiller, & Mathiesen, 2007), higher levels of externalizing problems was associated with subsequent interpersonal problems (Little & Garber, 2005).

Especially since children in middle childhood have: 1) more abilities compared to earlier ages; 2) are likely to spend more time with adults both within and outside their families compared to later; and 3) often do not experience the same stressors and challenges as adolescents do, this period offer an opportunity for interventions that can modify or reverse the effects of earlier adversities (Huston & Ripke, 2006b; Huston & Ripke, 2006a).

8.1.6. Interpersonal factors in adolescence for girls and boys

Findings regarding interpersonal factors and depressive symptoms were characterized by several gender-specific patterns (Paper 2). We found that adolescent girls reported higher

social skills compared to boys, supporting former findings (Rose & Rudolph, 2006; Rueger et al., 2008). Still, social skills predicted increases in depressive symptoms both for girls and boys, emphasizing the universal importance of social skills during adolescence.

In contrast to former findings and the stress-exposure hypothesis (Rose & Rudolph, 2006; Rueger et al., 2008), we did not find any gender differences in reported levels of social support from parents, friends or teachers. The finding that friend support predicted depressive symptoms for girls only, lends, however, support to the stress-reactivity hypothesis. Thus, girls seem to react more with depression in response to stress (e.g. lack of social support from friends). We further found that social support mediated the association between social skills and depressive symptoms in girls only. This partly supports the stress-generation theory, where characteristics of a person (in our case; low social skills) predicts stressors (in our case; lack of support) which again is associated with subsequent depressive symptoms. Thus, within the group of girls, different levels of social skills matter with regards to received social support, a within-group difference that is important regarding intervention and prevention.

In sum, our findings are consistent with stress-reactivity models, but not stress-exposure models. Finding that girls do not report less support compared to boys, but in fact report more social skills, and at the same time are more vulnerable for experiencing lower social support, shed light on important gender-specific mechanisms in the development of depression. Future research should further try to disentangle these mechanisms.

8.1.7. The link between depressive symptoms and reproductive outcomes

We found persistent depressive symptoms in adolescence to be associated with a two-fold increase in the odds of getting pregnant in emerging adulthood (Paper 3). Still, this association was mitigated by externalizing behavior, which in former findings has shown to be a potent risk factor of early pregnancy (Cavazos-Rehg et al., 2010; Keenan et al., 1999; Kessler et al., 1997; Miller-Johnson et al., 2004; Coley & Chase-Lansdale, 1998). The role of externalizing problems indicate that the same predictors persist for emerging adulthood as in adolescence pregnancies, supporting former findings (Woodward et al., 2006). There are several possible mechanisms that may explain these findings, which should be examined in future studies.

Although modeled as a confounder in the current study, externalizing problems may also be a mediator. Former findings, including our second paper, have reported heterotypic paths from internalizing to subsequent externalizing problems (Egeland et al., 1996; Lavigne et al., 1998), which offers some support for this suggestion. Another possibility is moderating

relations. For instance, a study by Hallfors, Waller, Bauer, Ford, & Halpern (2005) indicated that depressive symptoms only increased the odds of sexual risk behavior among those experimenting with substance use, which was one of the externalizing problem behaviors in our third paper. Regardless of the mechanism, our findings underscore the importance of looking at both internalizing and externalizing problems when examining reproductive outcomes. Future studies should examine the interplay between these problem behaviors, as well as examining other important moderators such as relationship status, and planned versus unplanned pregnancies. Further studies should thus include such important variables.

8.1.8. Theoretical summary

Several noteworthy theoretical implications can be derived from the findings. First, the results highlight the importance of examining the complex interplay between variables in their prediction of adolescent depressive symptoms and reproductive outcomes. Different patterns of interplay were found between the predictors examined.

Supporting the concept of equifinality (Cicchetti & Rogosch, 1996), we found paths from several risk factors (child problem behavior, maternal distress, and interpersonal factors) to depressive symptoms (Papers 1-2), and paths from several risk factors (externalizing problems, internalizing problems and parental separation/divorce) to reproductive outcomes (Paper 3). As earlier mentioned, we also found several indirect pathways. Thus, we have contributed with possible explanations of the mechanisms in which early maternal distress (through internalizing and externalizing problems) and adolescent social skills (through social support) affect the development of depressive symptoms in adolescence. Furthermore, the association between persistent adolescent depressive symptoms and reproductive outcomes was found to be mitigated when introducing externalizing problems, highlighting the importance of concurrently examining these problem behaviors.

Second, the findings indicate vulnerable periods for being exposed to predictors of depression. Surprisingly, maternal distress in early adolescence did not predict subsequent depressive symptoms in middle adolescence, while social support from friends, but not parents, did. Although these factors (maternal distress and social support) were not examined in the same study, this supports previous findings about contextual factors having increased prominence in adolescence compared to earlier in development. We did find that maternal distress reported in early childhood was indirectly associated with adolescent depressive symptoms, which underscores the importance of early family factors for the development of mental health. Proximal problem behavior, such as externalizing problems in early

adolescence, displayed no association with adolescent depressive symptoms. However, externalizing problems in early (for both genders) and middle childhood (for girls only) was prospectively associated with the development of depressive symptoms in adolescence. These findings underscore the importance of specific vulnerable stages, and the importance of examining predictors of depressive symptomatology across different developmental stages.

The findings together illustrate the importance of holding an integrative perspective when examining adolescent depressive symptoms, with regards to possible mediational and moderational patterns between several risk factors. The findings also highlight the importance of recognizing concepts from developmental psychopathology, such as equifinality, multifinality and vulnerable periods in longitudinal studies following individuals across development.

8.2. Methodological strengths and challenges

The current study has considerable strengths. We used two prospective multi-wave designs, which provide the opportunity to examine the effects of different developmental stages, and longitudinal temporal associations and changes. Other strengths include the assessment of adolescent symptoms of depression using measures with established reliability and validity (e.g., CSI/SMFQ; Lewis et al., 1992; Messer et al., 1995), as well as frequent assessment of these symptoms across multiple adolescent waves. In addition, the Australian sample offered sampling from a representative pool of schools enabling an almost representative adolescent study population, and high participation rates. The Norwegian population-based sample included families that were followed across eight waves with multiple informants. Certain methodological issues and limitations should nonetheless be acknowledged and discussed further. Methodological challenges specific for developmental psychopathology also needs to be discussed.

8.2.1. *Measurement reliability and validity*

Reliability and validity are important for gaining accurate measurements and trustworthy knowledge. While reliability can be defined as gaining consistent results from an instrument across time and informants, validity can be defined as measuring what we intend to measure (Salkind, 2003). General methodological aspects important for good reliability and/or validity, such as low internal reliability, small samples sizes, and informant bias, will thus be discussed.

Two of the child behavior problem instruments (BCL/SDQ) and the friend support scale displayed low internal reliability (i.e., how consistently each item measures the same underlying construct in a scale) (Salkind, 2003). However, these scales consisted of few items (3 - 5 items), which affects internal reliability negatively (Cortina, 1993). Also, alpha levels close to $\alpha = .50$ have been argued to be meaningful (Schmitt, 1996). Findings from previous research with the BCL (Sonuga-Barke et al., 1997), SDQ (Van Roy et al., 2008), and the friend support scale (Dalgard et al., 1995) suggest that they are valid instruments regardless of the low internal reliability score. In the present thesis, social skills predicted depressive symptoms through friend support for girls, indicating that this scale had sufficient reliability to capture important parts of friend relations in the current study. However, we can not rule out the possibility that a better measure could have captured friend support clearer and perhaps associations for boys also could have been found.

Furthermore, the smaller samples of boys (Papers 1-2), and the small total sample of girls in certain cells (e.g., girls with high levels of depression who have experienced live birth) (Paper 3) might affect the reliability of the findings. Most of the findings are, however, in line with former theories and findings. Also, attrition analyses indicated that differences in child problem behavior could not explain the attrition in the TOPP-study. However, we can not rule out the possibility that the smaller samples might explain some of the null findings.

8.2.2. Challenges in developmental psychopathology

There are some methodologically challenges when studying developmental pathways to and from depression in adolescence. Measuring early child problem behavior may represent several threats to validity and reliability. Behaviors in very young children may be more difficult to measure and separate from each other, because young children do not express themselves as clearly as older children, for instance through language. However, Mathiesen (2009; 2000) using the same Norwegian data as the current study found internalizing and externalizing problems to be psychometrically distinct already at age 1.5. The same patterns have also been found in other studies (e.g., Sonuga-Barke et al., 1997).

It is often necessary to use different instruments at different stages when measuring behavior from early childhood to adolescence. A teenager will (in most cases) react differently when being frustrated compared to a toddler. It is therefore important to use developmentally appropriate measures. This represents a methodological challenge when measuring continuity and change, as it is difficult to distinguish actual changes in behavior from changes in the instruments used. Also, if the same instruments are used across

development, the reliability and validity in these scales will change with the development of the child (Kessler et al., 2001). For instance, children themselves become more reliable and valid reporters of behaviors as their cognitive capacities develop. It might also get increasingly easier for observers to capture children's behavior when children can express themselves clearer through language. But at the same time, as they get older they spend less time at home and it thus gets increasingly harder to observe their behaviors. This is also indicated in findings reporting higher agreement between informants' scores of problem behavior in younger children (6-11) compared to older children (12-19) (Achenbach, McConaughy, & Howell, 1987). Therefore, true changes in behavior may be confounded with such variations across development.

Finally, measuring depressive symptoms in adolescence, a time of many biological changes and emotional turbulence, may affect both reliability and validity. However, we have tried to incorporate this potential instability by using different strategies of measuring adolescent depressive symptoms in a more stringent manner than many other studies; i.e., over time. In Paper 1, we used a latent construct of depressive symptoms to capture the common variance (stability) at two time points to adjust for fluctuations across time. In Paper 2, we adjusted for baseline depressive symptoms and thus measured changes in depressive symptoms across four adolescent years. Furthermore, in Paper 3, we found that experiencing depressive symptoms above clinical cut-off levels twice or more, but not once, across adolescence, was associated with subsequent reproductive outcomes. As such, we have tried to meet the challenge of fluctuations across time.

8.2.3. *Generalization*

The patterns of drop-outs in the current samples propose caution in generalizing the findings to the general population. The response rates in the two samples were sound (75 % in the eight wave in VAHCS/2000 Stories), and satisfactory (45 % in the seventh wave in TOPP). Attrition rates as high as 40 - 60 % is not uncommon in longitudinal studies and only systematic non-random drop-outs represent a problem (van der Kamp & Bijleveld, 1998). The only systematic difference between drop-outs and remaining participants was low level of education for Norwegian mothers; low parental education and high parental divorce/separation for the Australian adolescents; and low maternal education and low work participation and female gender for Norwegian adolescents.

Still, one possible bias by analyzing attrition rates in this way is the notion that drop-outs are not static, i.e., drop-outs from the first waves, who are believed not to be different

from respondents, may have changed after dropping out of the study. For instance, participants' stress levels at the second wave may have increased by the third wave. This is often ignored when reporting drop-out analyses. However, associations between variables at baseline did not differ among drop-out versus remaining families later in the TOPP-study (t7), indicating that estimated associations between variables are generalizable (Gustavson et al., 2012). This suggests that on one side significant findings in our study may be stronger in a high risk sample since there will be more variation in the responses, but on the other side; null-findings must be interpreted with care. Thus, we believe that our samples are representative of similar samples of "normal", but not to the same extent representative of high risk populations. Helland & Mathiesen (2009) reported that only 17 % of adolescents with significant emotional problems in samples of "well-functioning" Norwegian families had been in touch with the mental health care service the last year. This indicates how important it is to examine adolescents from "well-functioning" families to be able to intervene and prevent further development of depressive problems.

8.2.4. *Causality*

Only controlled experimental designs with randomly selected groups can validly infer causality, the notion that one variable (e.g., maternal distress) is the cause of another variable (e.g., adolescent depressive symptoms). The associations found in the current thesis might be confounded by other factors; such as joint genes or environmental factors. With the multi-wave prospective (and not retrospective) longitudinal designs used in the current thesis, we can at best examine temporal relationships (i.e., that one variable precedes another in time) and predictors of change (i.e., that one variable predicts changes in another variable). Also, for some of the examined variables in the current study, we have not examined the possible bidirectionality between variables. Still, the long-term associations between risk factors and consequences of depressive symptoms reported in the current thesis are important for the indication of causal directions and valuable for intervention and prevention programs.

8.2.5. *Ethical considerations*

In addition to the before-mentioned ethical approvals and general ethical guidelines that were followed (written consent, confidentiality, etc.), there is the possibility of generating or enhancing distress by asking sensitive questions when conducting research about mental health and reproductive behavior such as in the current study. However, several studies conclude that such questions do not enhance emotional distress. Very few participants (1 % -

5 %) perceive mental health questions as bothersome, and many participants (37 % - 52 %) report feeling better after answering such questions (Jorm et al., 1994; Jacomb et al., 1999). Findings indicate that adolescents with prior reported sexual abuse and adolescents with and without sexual experience do not report discomfort when answering questions on sexuality (Priebe, Backstrom, & Ainsaar, 2010). Also, society and researchers have an ethical responsibility to conduct valid research about, and thus gain more knowledge on, sensitive areas such as mental health and sexual and reproductive health. This may contribute to making these areas less connected to shame and taboo in our society for adolescents suffering from mental health problems.

8.3. Future research

The findings from the current study indicate some directions for further research. Future studies should continue to examine gender differences in the development of depression. In our study, the interpersonal variables examined had a larger role for the development of depressive symptoms for girls, and not boys. It thus remains to examine what other interpersonal factors might be significant predictors for depressive symptoms for boys. Furthermore, it remains to examine the mechanisms in which social skills is prospectively associated with depressive symptoms for adolescent boys. In addition, the current study did not examine the timing in which the child first was exposed to maternal distress, or the effect of cumulative maternal distress. Further studies should examine this as well as examine the possible interaction of environmental and genetic mechanisms involved in the association between maternal distress and problem behavior.

With regards to the possible interplay between internalizing and externalizing problems in the prediction of pregnancy outcomes in young people, future research could try to examine this further. It also remains to examine what factors might be significant predictors for reproductive outcomes for boys in a population-based sample. Another important factor is to examine implications of paternal factors for the development of psychopathology in children and adolescents. Considering the high attrition of adolescent boys found in both the Norwegian and Australian sample, more effort could be done in general for keeping boys in longitudinal studies. In sum, future studies should aim to put more effort to include and keep males in the sample.

Too few longitudinal studies follow individuals from early childhood to adulthood, and more studies should examine how depressive symptomatology develops across this

period. The ideal study would include both the time aspect from toddlerhood to adolescence (such as in the TOPP-study), as well as from adolescence to adulthood (such as in the VAHCS/2000 Stories study); i.e., combining the time span and period of development in the two studies used in the current study. With such data material, one could capture valuable information about important predictors and mechanisms of the development of depression that could be used in early intervention, as well as examine gender-specific patterns in the development of depression from childhood to adulthood.

8.4. Intervention and prevention

There are some translational suggestions derived from current findings about possible intervention and prevention to reduce the development of depression. Although more research is needed to gain a firmer grasp of the mechanisms behind the relations found in the current study, the findings suggest three main areas for treatment and intervention considering *who*, *when*, and *where* to intervene.

First, since mother's distress had both short and long term impact on children's problem behavior, it is very important to target depressed mothers. Clinicians and health personnel should adopt an integrative perspective where mothers are assessed when children display depressive symptoms, and vice versa. Although it is a well-known research finding, the link between maternal depression and child problem behavior should be stronger emphasized in the community to make more depressed mothers seek help. Furthermore, with regards to interpersonal resources, the significant association between low social skills in early adolescence and depressive symptoms in later adolescence underline the importance of including social skills training in programs designed to prevent development of depression. Girls are more at risk for depression, and, as the current findings on gender-specific mechanisms indicate, preventive programs should include actions on how girls can cope with interpersonal difficulties. Also, the findings indicate that selective preventive intervention in young women with a history of antisocial and drug use behaviors could have the potential to improve their sexual and reproductive health outcomes.

Second, our findings indicate that early childhood are important years for targeting children with mothers who experience depressive symptoms, and also target children through their parents. Thus, to help children, mothers should be screened for depressive symptoms as early as possible, preferably from pregnancy and during the first years after birth. The findings also indicate that during the preschool years (around age 4.5) there are adverse long

term effects for some of the children experiencing externalizing problems. A large majority of children at that age (ages 1 to 5) go to kindergarten⁸, and it is important that kindergarten personnel are qualified enough to recognize such problems.

Third, intervening in early childhood may in some cultures be hard, since the child is not as connected to institutions, and young, as opposed to older children, may not be as likely to ask for help themselves. However, in Norway, the majority of children attend health-clinic visits the four first years in childhood⁹, which is an important arena for detection and intervention of problems, especially when it comes to maternal distress. As earlier mentioned, most of children in Norway go to kindergarten from age 1, which also is another important arena for detection and intervention of problems. Thus, intervention and prevention at kindergartens and health clinics could have the potential to reach many.

⁸ Near to 80 % of Norwegian 1-2 year old children attend kindergarten, and the coverage for Norwegian 1-5 year olds is near to 90 % (Statistics Norway, 2012a).

⁹ At 8 weeks of age, ages 2-3, and age 4, respectively 93, 90 and 89 % of all children in Oslo have been to health station controls in 2011 (Statistics Norway, 2012b).

9. CONCLUSION

By studying developmental pathways to and from depression in adolescence in two prospective longitudinal studies, we have had the opportunity to examine the complex interplay between risk factors and temporal relationships. The five most important findings were that: 1) the long-term impact of early maternal distress on child problem behavior and adolescent depressive symptoms; 2) externalizing problem behavior plays a significant role both as an independent risk factor and in interplay with other factors for the development of depressive symptoms in adolescence and reproductive outcomes in emerging adulthood; 3) interpersonal factors, such as social skills, play a significant role in the development of depressive symptoms for both girls and boys; 4) adolescent girls might be more vulnerable for the development of depressive symptoms when experiencing lack of friend support compared to boys and; 5) there might be significant gender-specific vulnerability in middle childhood for long-term negative effects of problem behavior on the development of depressive symptoms in adolescent girls. Still, there were also considerable changes/plasticity, and the findings thus highlight that even though there are higher risk involved with experiencing former problem behavior for some, not everyone develops further problems at subsequent time points.

The findings also indicate that the interplay between variables is important. Underscoring the complexity in the etiology of concepts such as depressive symptoms and pregnancy outcomes, the current findings support the notion of equifinality and multifinality (Cicchetti & Rogosch, 1996). Also, there were some indications of vulnerable periods for developing depressive symptoms in adolescence. Externalizing problems seem to play a significant role at every developmental stage for the development of depressive symptomatology, and also for other outcomes such as reproductive outcomes. Surprisingly, maternal distress and externalizing problems in early adolescence did not predict subsequent adolescent depressive symptoms; while interpersonal factors such as social skills and social skills did. Although this was examined in separate papers, this highlight the notion that contextual factors might have an increasing prominence during adolescence, compared to family factors. This notion was also supported by the finding that friend support, but not parent support, predicted increases in depressive symptoms for adolescent girls.

In addition to being a risk factor of depressive symptomatology, gender was also a moderator of the relation between predictors (such as high externalizing problems and low friend support) and subsequent depressive symptoms. Longitudinal heterotypic paths between internalizing and externalizing problems from middle childhood to adolescence were specific to girls', but not boys' development. Furthermore, although girls reported higher levels of social skills compared to boys, social skills played a noteworthy role in the development of depressive symptoms for both adolescent girls and boys. Consistent with the stress-reactivity, but not the stress-exposure, model, we found that girls did not experience more interpersonal stressors (e.g., less social support for parents, friends, and teachers) than boys, but girls seemed to react more to interpersonal stressors (e.g., lack of friend support). Finding that girls did not report less support compared to boys, but in fact reported more social skills, and at the same time were more vulnerable for experiencing lower social support, shed light on important gender-specific mechanisms in the development of depression. Future research should try to disentangle these mechanisms more thoroughly. Preventive programs could include actions on how girls can cope with interpersonal difficulties.

These findings also have other implications for prevention and intervention. The results support earlier documentations of the link between maternal distress and child problem behavior. We argue that this finding should be stronger emphasized in the community than what is ordinarily the case to day. The effort to make more depressed mothers seek help should be increased further. Our findings also suggest that clinicians and health personnel should adopt an integrative perspective where maternal symptom level is assessed when children display depressive symptoms, and vice versa. The current study further suggests that externalizing problem behavior during toddlerhood is likely to have long term adverse effects on children's symptom level later on. It is thus important that kindergarten personnel recognize such problems and are able to set in effective interventions. It should therefore be discussed whether more preventive efforts and effective interventions could be added in *kindergartens* where more than 90 % of all children in Norway spend most of their daytime and at *health care stations* where the majority of Norwegian families regularly attend compulsory health care visits.

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Social skills and depressive symptoms across adolescence: Social support as a mediator in girls versus boys

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Declarations of interest: None

ABSTRACT

The current population based study of Norwegian adolescents examined gender-specific patterns in the prospective association between social skills in early adolescence (age 12.5; n = 566) and changes in depressive symptoms from early to late adolescence (age 16.5; n = 375). Further, the potential mediation effect of social support (from peers, parents, and teachers) in middle adolescence (age 14.5; n = 456) was examined. The findings indicated that low levels of social skills in early adolescence predict increases in depressive symptoms for both girls and boys. Low levels of friend support in middle adolescence mediated this relationship for girls, but not boys. The findings underline the importance of including social skills training in primary programs designed to prevent development of depression. Preventive programs should also include actions on how girls can cope with interpersonal difficulties.

INTRODUCTION

Starting in adolescence, girls are two to three times more likely than boys to report depression – a gender difference that persists throughout the life span (Hankin et al., 1998; Zahn-Waxler, Crick, Shirtcliff, & Woods, 2006). Several studies suggest that this preponderance of depression in girls might be due to interpersonal vulnerability (Cyranowski, Frank, Young, & Shear, 2000; Petersen et al., 1993). Both lack of social skills and social support are reported to be risk factors for future depressive symptoms (Segrin, 2000; Segrin & Rynes, 2009; Thompson, Flood, & Goodvin, 2006), and several findings indicate that there are gender-specific mechanisms behind these relations (Rose & Rudolph, 2006; Eberhart, Shih, Hammen, & Brennan, 2006). Still, few studies examine the relationship between social skills, support and depressive symptoms in a gender-specific perspective. More knowledge about gender-specific mechanisms behind the prospective association between these interpersonal factors and depressive symptoms across adolescence is important for informing preventive efforts. The current study have therefore applied a gender-specific perspective and examined the longitudinal relationship between social skills and changes in depressive symptoms from early to late adolescence. Using data from a longitudinal study collected when the adolescents were aged 12.5, 14.5, and 16.5, we also examined the possible mediating role of social support from parents, friends, and teachers in this relationship.

The prospective link between social skills and depressive symptoms

Good social skills represent being able to interact with other people in a way that is both appropriate (e.g., not eliciting negative responses from others) and effective (e.g., achieving one's goal with the interaction) (Segrin, 2000). According to the social skills deficit

vulnerability model of psychosocial problems (Segrin & Flora, 2000; Segrin, 2000), which is based on behavioural theories of depression (Lewinsohn, 1974), low social skills create vulnerability for developing psychosocial problems when experiencing stress. Although adolescence is more than just a period of “storm and stress” (Arnett, 1999), the transition from childhood to adolescence is characterized by major biological, cognitive and social changes (Compas, Hinden, & Gerhardt, 1995; Steinberg & Morris, 2001). The social changes include a movement from dependency on parents’ support to a stronger dependency on peer relations (Rubin et al., 2004; Rubin, Bukowski, & Parker, 2006). Such changes can bring increased challenges and stress for some adolescents, emphasizing the importance of being socially skilled in this specific period of life.

In line with the vulnerability model, several studies indicate that social skills in early adolescence prospectively predict depressive symptoms in adolescence (Cole, Martin, Powers, & Truglio, 1996; Ohannessian, Lerner, Lerner, & von Eye, 1999; Letcher, Smart, Sanson, & Toumbourou, 2009; Lee, Hankin, & Mermelstein, 2010; Burt, Obradovic, Long, & Masten, 2008). However, most of these studies have short time lags (1 - 6 months; Lee et al., 2010; Cole et al., 1996; 10 years; Burt et al., 2008) or do not adjust for baseline depression which could confound the finding (Ohannessian et al., 1999).

Although girls often are reported to be more socially skilled than boys both in Nordic and other western countries (Eberhart et al., 2006; Rose & Rudolph, 2006; Fossum, Morch, Handegard, & Drugli, 2007), few of the studies seem to examine gender specific mechanisms in the link between social skills and depressive symptoms. Those who do, reveal mixed findings. Some studies report this association to be similar for both girls and boys (Burt et al., 2008; Letcher et al., 2009), while others report this only for boys (Ohannessian et al., 1999). These findings thus call for studies investigating the relationship between social skills and

depressive symptoms from early to late adolescence and focusing on possible gender-specific mechanisms.

The prospective link between social support and depressive symptoms

Social support has been defined as relationships that can provide material and interpersonal resources (Thompson, 1995). Several studies report that social support from various sources are related to depressive symptoms in adolescents (Rubin et al., 2004; Oppedal, Roysamb, & Sam, 2004; Undheim & Sund, 2005). However, several types of relations, formed within different groups, might be important for depressive symptoms in diverse kinds of ways during development. Parents are one of the main sources of social support during childhood, providing in most cases both material and emotional support, while relationships with, and social support from, friends get increasingly important in the transition from childhood to adolescence (Rubin et al., 2006). Few longitudinal studies seem to have examined the relative contribution of different sources of support to the development of depression, an aspect that is specifically important for targeting interventions. In a study of North-American adolescent girls, it was reported that parental, but not peer support, was associated with changes in depression (Stice, Ragan, & Randall, 2004). Furthermore, a Norwegian study of immigrant girls and boys indicated that both classmates and family support predicted mental health, while teacher support did not (Oppedal et al., 2004).

Theoretically, it is unclear whether social support is more influential for developmental outcomes in girls versus boys. It has been suggested that due to heightened sensibility of interpersonal difficulties, in addition to higher exposure of interpersonal stressors, girls are more vulnerable for the development of emotional difficulties (Rose & Rudolph, 2006; Galambos, Leadbeater, & Barker, 2004; Rueger, Malecki, & Demaray, 2008;

Rueger, Malecki, & Demaray, 2010). At the same time, girls, compared to boys, are more likely to seek and receive more emotional support, which might contribute to the development of intimate relationships and protect them from developing depressive symptoms (Rose & Rudolph, 2006). However, Norwegian studies did not reveal gender differences in amount of experienced social support (Undheim & Sund, 2005; Oppedal et al., 2004), which may be indicative of the egalitarian characteristics in the Nordic culture. Findings regarding gender-specific mechanisms in the link between social support and depression are also inconsistent, with some studies suggesting no gender differences (Rueger et al., 2008; Letcher et al., 2009), and others suggesting boys being more vulnerable for developing depressive symptoms when experiencing low support from classmates (Rueger et al., 2010). This is in contrast to theories suggesting that girls are more interpersonally vulnerable. Further, investigation on gender-specific interactions and differences in the association between support from different sources and depressive symptoms are thus needed.

The possible interplay between social skills, social support and depressive symptoms

In addition to being associated with depressive symptoms, findings indicate that social support is linked to social skills (Cauce, 1986; Galambos et al., 2004; Rubin et al., 2004). It is suggested that social skills might protect people from developing internalizing problems because of more positive interpersonal interactions (Letcher et al., 2009; Lewinsohn, 1974). Better quality of interpersonal interactions is associated with social support, which in turn is negatively associated with depressive symptoms (Rubin et al., 2004; Rubin et al., 2006). Still, few studies have examined the interplay between these three factors. Two recent studies yield support for this model. Segrin & Rynes (2009) reported that young adults' positive relations with others significantly mediated the prospective relationship between social skills and

depressive symptoms, and Lee et al., (2010) reported that the prospective association of social skills and depressive symptoms among 11 to 17 year-olds are mediated by conflicting relationships to parents, but not by conflicting relationships with friends, suggesting that different sources of support play a different role. However, neither of these studies examined support from various sources (friends, parents, and teachers) or gender-specific mechanisms.

Girls might have a stronger need for interpersonal affiliation and are at greater risk for developing internalizing symptoms than boys, because of increased impact of gender socialization (Cyranowski, Frank, Young, & Shear, 2000; Petersen et al., 1993; Wichstrom, 1999). The before mentioned gender-differences in the path between these interpersonal factors and depression also suggest that there might be different mediational processes for girls compared to boys.

The majority of the studies examining social skills, social support and depressive symptoms have been conducted with North-American adolescent samples, but results from Scandinavian studies imply similar associations, except for some finding less gender differences (Undheim & Sund, 2005; Oppedal et al., 2004; Frostad & Pijl, 2007). Thus, we believe that it is fruitful to test the proposed mediational model in a Norwegian setting. In sum, adolescents with low social skills in early adolescence might get less social support from people in their lives, such as friends, parents and teachers. Perceiving less social support during adolescence might predict increasing depressive symptoms during adolescence, and especially so for girls who are more relationally focused in general. Thus, we hypothesized that social support mediates the association between low social skills and increases in depressive symptoms from early to late adolescence and that interpersonal factors (social support and social skills) are more strongly related to depressive symptoms for girls compared to boys. Moreover, we wanted to examine if there were gender-specific and source-specific mediation.

METHOD

Participants and Procedure

The sample of adolescents was drawn from the longitudinal study ‘Tracking Opportunities and Problems Project’ (TOPP). Families from 19 geographic health care areas in eastern Norway were invited to complete a survey questionnaire when visiting a public health clinic for their scheduled 18-month vaccination for the index child. Routinely, more than 95% of all Norwegian families with children attend a public health program during the first four years of the child’s life. All participants signed informed consent forms emphasizing the confidentiality of the participants, and the right to withdraw from the study at any point. The Regional Committee for Medical Research Ethics approved the data collection. Of the 1081 invited families, 929 families (86%) participated at t1 (1993). The families were then invited to participate at six further waves (t2-7); with the adolescents responding to questionnaires at ages 12.5 (t5), 14.5 (t6), and 16.5 (t7).

Sample and attrition

The sample included the adolescents from t5 (age 12.5; n = 566; 61 % of families in the t1 sample), t6 (age 14.5; n = 456; 50 %), and t7 (age 16.5; n = 375; 40 %). Respectively, 55 %, 56 %, and 59 % were girls at t5 - t7. The adolescents were invited through a letter sent to their mothers. Background data from the child health clinics showed that non-respondent mothers at baseline did not differ significantly from responding mothers in age, education, employment status, or marital status (Mathiesen & Tambs, 1999). Attrition analyses from baseline to t7 showed that

only low maternal educational level, not other variables (such as mother's temperament and psychological distress, child's temperament, and mothers' emotional support from partner and friends) predicted drop-out (Gustavson, von Soest, Roysamb, & Karevold, 2012; Unpublished results). Associations between variables at baseline did not differ among drop-out versus remaining families, suggesting that estimated associations between variables are generalizable (Gustavson et al., 2012; Unpublished results).

Measures

Depressive symptoms. Depressive symptoms in adolescence (t5/t7) were assessed with the 13 item Short Mood and Feelings Questionnaire (SMFQ) drawn from the original 34-item Mood and Feelings Questionnaire (Angold et al., 1995; Messer et al., 1995). The SMFQ measures affective and cognitive symptoms of depression over the past two weeks (e.g., "I didn't enjoy anything at all" and "I felt miserable or unhappy") with three response categories ('True', "Sometimes true" and "Not True"). One question was omitted ("I found it hard to think properly or concentrate") from the TOPP-survey at t5, due to similarities with other items. Since the 12- and 13-item versions at t7 correlated highly with each other ($r = .99, p < .001$), the 13-item version at t7 was used. A mean score was calculated for t5 and t7, separately. Change in depressive symptoms from t5 to t7 was operationalised as adjusting for the t5-score. The SMFQ has shown satisfactory psychometric qualities in both international (Angold et al., 1995; Wood, Kroll, Moore, & Harrington, 1995) and Norwegian samples (Sund, Larsson, & Wichstrom, 2001). The Cronbach's alpha was, respectively, .84 and .88.

Social skills. Social skills in early adolescence (t5) were assessed with a 24-item self-reported version of the Social Skills Rating System (SSRS; Gresham & Elliott, 1988) which

measures aspects such as cooperation, empathy, self-control and assertion. The response categories were originally three (“Never”, “Sometimes”, and “Very Often”), but two extra response categories (“Seldom” and “Often”) were added as recommended by Ogden (1995). The index was constructed by computing the mean score. The SSRS has shown satisfactory psychometric qualities in both international (DiPerna & Volpe, 2005; Gresham & Elliott, 1988) and Norwegian samples (Ogden, 1995; Frostad & Pijl, 2007). The Cronbach’s alpha was .88.

Social support. Friends support (t6) was assessed by self-report of three items measuring feelings of attachment, mutual respect, and belonging, that have been developed and used in several Norwegian studies (Dalgard, Bjork, & Tambs, 1995). Participants responded to items such as “I feel closely attached to my friends” with four response categories ranging from “Agree” to “Disagree”. The scale was constructed by computing the mean score. The internal reliability was .48 (see limitations for discussion of reliability levels).

Teacher support (t6) was assessed by self-report of three items measuring mutual respect, appreciation, and instrumental help. The questions were derived from “The Oslo Health Study” (e.g., Oppedal, 2011). Participants responded to items such as “My teachers help me when needed” with four response categories ranging from “Agree” to “Disagree”. The scale was constructed by computing the mean score. The internal reliability was .80.

Parent support (t6) was measured by self-report of ten items (five items about each parent) from the Parental Warmth/Involvement subscale (e.g., “I can count on him/her to help me out, if I have some kind of problems”/ “He/She helps me with my school work if there is something I don’t understand”) from the Lamborn Parenting Scale (Lamborn, Mounts, Steinberg, & Dornbusch, 1991). Response categories ranged from one to five (‘Almost never’

to “Almost always”). The scale was constructed by computing the mean score of the ten items. The scale was translated and back-translated for the TOPP survey. The scale has shown satisfactory psychometric qualities in Nordic (Adalbjarnardottir & Hafsteinsson, 2001) and other Western countries (Lamborn et al., 1991; Steinberg, Lamborn, Dornbusch, & Darling, 1992). The scale had an internal reliability of .89.

Analytic strategy

We conducted descriptive statistical analyses (means, standard deviations, and tests of non-normality) and correlation analyses for boys and girls separately, as well as analyses of increases in depressive symptoms from t5 to t7 with SPSS. To test for direct effects and multiple mediation we conducted structural equation modeling (SEM) with Mplus version 6 (Muthén & Muthén, 2010). The SEM approach allows for simultaneous examination of the relative contribution of each variable, in addition to the total indirect effect, in a multiple-mediator model. All measures were standardized before being entered in Mplus. Model fit was evaluated with the Chi-square (χ^2), the Comparative Fit Index (CFI), the Tucker-Lewis Index (TLI), and the Root Mean Square Error of Approximation (RMSEA).

All models were divided by gender and analyzed as two-group models. Initially all structural paths were constrained to be equal across gender, and then freed up, one at a time, to test for possible gender differences. The fit of each model was compared to the fit of the less constrained model. If freeing up a constraint on a path lead to significantly improved model fit (as indicated by reduction in chi-square value), the path was allowed to differ across gender.

The causal-step approach proposed by Baron and Kenny (1986) was adopted to examine mediation. Here four assumptions should be met for mediation to occur (see Figure

1): 1) Social skills at t5 (the predictor) significantly predicts depressive symptoms at t7 (the outcome) before adjusting for social skills at t6 (the mediators) (*path c in Figure 1*); 2) Social skills significantly predicts support (*path a1-3*); 3) Support at t6 significantly predicts depressive symptoms at t7 when adjusted for social skills at t5 (*paths b1-3*); and 4) The significant association between social skills and depressive symptoms (the *path c'*) is either eliminated (in case of total mediation) or reduced significantly (in case of partial mediation) when support (the mediators) is adjusted for. These four assumptions were tested.

Bootstrapping, in which standard errors are estimated based on multiple re-samples of the dataset, was performed to adjust for non-normality and for examining mediation.

The full information maximum likelihood (FIML) procedure in Mplus (Muthén & Muthén, 2010) was used, thus allowing the inclusion of all available information from respondents with missing data. FIML is the recommended approach even if it is not assumed that the data is not missing at random, because it outperforms common alternative approaches, such as complete case analysis or single imputation strategies (Schafer & Graham, 2002).

RESULT

Means, standard deviations, and tests of normality are presented in table 1. Table 1 also presents results from t-tests of gender differences in means. Girls reported significantly higher levels of depressive symptoms at ages 12.5 and 16.5, and more social skills at age 12.5 compared to boys. Table 2 presents the bivariate correlations between the study variables for girls and boys separately. Social skills at age 12.5 correlated negatively with social support at age 14.5 and depressive symptoms at age 16.5 for girls and boys. In general, social support at age 14.5 correlated negatively with depressive symptoms at age 16.5 for girls, but not boys.

There was a significant increase in depressive symptoms from age 12.5 to 16.5 in the total sample ($t(320) = -6.08, p = .000$). Separate analyses for girls and boys showed that there was a significant increase in depressive symptoms for girls ($t(190) = -6.53, p = .000$), but not for boys ($t(129) = -1.30, p = .195$). Regression analysis of depressive symptoms at age 16.5, adjusted for baseline depressive symptoms at age 12.5, showed that being a girl predicted increases in depressive symptoms ($\beta = .33, t = 6.56, p = .000$).

Insert Table 1 about here

Insert Table 2 about here

The association between social skills and changes in depressive symptoms was significant without adjusting for the mediators, thus, the first mediation criterion (path c) was met (see figure 2). A structural model was then constructed where social skills (t5), social support (t6), as well as depressive symptoms (t7) were included. The model was adjusted for baseline depressive symptoms (t5). Equality constraints were imposed across gender on all paths. This model showed satisfactory fit (see model 1 in Table 3). Chi-square tests showed that the path from friend support at t6 to depression at t7 was significantly stronger for girls than for boys ($p < .01$). This path was therefore allowed to differ across gender. None of the other paths were significantly different for boys and girls. Fit indices for all models are shown in Table 3. The structural model showed that the second mediation criterion (associations between predictor and mediators) was met for all mediators for both girls and boys. The third mediation criterion (an association between mediator and outcome) was only met for friend

support among girls ($p < .05$), but not for boys. The other mediators did not meet this criterion ($p > .05$)

Insert Table 3 about here

Figure 2 summarizes the salient path coefficients (paths a, b, c, and c'). Analyses showed that there was a total indirect effect for girls ($\beta = -.82$, $p = .005$), but not for boys ($\beta = -.013$, $p = .602$). The specific indirect effect for girls was only significant for friend support ($\beta = .057$, $p = .014$) and not teacher ($\beta = -.012$, $p = .287$) or parent support ($\beta = -.013$, $p = .501$). The fourth mediation criterion was thus met for friend support among girls.

Insert Figure 2 about here

DISCUSSION

The aim of the current study was to increase our knowledge about the possible mechanism in which social support from different sources could explain the prospective association between social skills in early adolescence and changes in depressive symptoms during adolescence for girls and boys. We examined whether social support from three different sources; friends, parents, and teachers, mediated this relation. As hypothesized, social skills in early adolescence predicted increases in depressive symptoms from early to late adolescence among both girls and boys. Also, low social skills predicted increases in depressive symptoms

through low levels of friend support in adolescent girls, but not boys. In sum, the current study indicated that there are both gender-specific and source-specific mechanisms - specifically related to friend support as a mediator for girls - underlying the relationship between social skills and depressive symptoms.

Social skills and future outcomes in girls and boys

Girls reported higher levels of social skills and depressive symptoms than boys, which is well in line earlier findings (Fossum et al., 2007; Eberhart et al., 2006; Eberhart & Hammen, 2006; Rose & Rudolph, 2006; Zahn-Waxler, Crick, Shirtcliff, & Woods, 2006). Social skills predicted social support from all sources, which also support former findings (Cauce, 1986; Galambos et al., 2004; Rubin et al., 2004). Furthermore, social skills predicted increases in depressive symptoms from early to late adolescence for both girls and boys, supporting the social skills deficit vulnerability model (Segrin & Flora, 2000; Segrin, 2000) and earlier findings (Ohannessian et al., 1999; Lee et al., 2010). Our results points to the universal importance of social skills in both boys and girls in early adolescence to prevent increased depressive symptoms and for gaining social support.

Social support and depressive symptoms

We did not find any gender differences in reported levels of social support from friends, parents and teachers. This is in contrast to theories suggesting that girls experience more interpersonal stressors compared to boys (Rose & Rudolph, 2006), and findings from North-American studies (Galambos et al., 2004; Rueger et al., 2008; Rueger et al., 2010). However, the finding is well in line with former Norwegian findings (Undheim & Sund, 2005; Oppedal et al., 2004), suggesting that in our Norwegian sample, differences in the level of perceived social support can not explain gender differences in depressive symptoms.

Lack of support from friends, but not teachers or parents, in middle adolescence was prospectively and positively associated with increases in depressive symptoms. This was only evident for girls, suggesting that one of the reasons girls develop depressive symptoms in adolescence is related to their vulnerability for lack of support from their social surroundings (friends). This is in line with theories of girls being more interpersonal vulnerable than boys (Rose & Rudolph, 2006).

This gender moderation of social support is in contrast to some former findings (Rueger et al., 2008; Letcher et al., 2009; Eberhart et al., 2006). Eberhart et al. (2006) did not find gender to moderate the association between good relations with peers at age 15 and depression. However, Eberhart and her colleagues examined depression disorders while we measured changes in symptom levels. Our findings are also in contrast to Stice et al. (2004), who reported that only parental and not peer support was associated with changes in depression for girls. Perhaps the difference is due to the larger age group (spanning from 11 to 15) in Stice et al.'s study, because parents may be more important when examining a younger developmental period, compared to older adolescents. Nonetheless, our findings are in accordance with studies suggesting that early adolescence is a time when social competence is specifically important (Letcher et al., 2009)

Friend support as a mediator in girls

Social support from friends could explain the prospective association between social skills and changes in depressive symptoms for girls. This is in contrast to findings by Lee and colleagues (2010), who reported that relations to parents, and not peers, were a mediator in this association. These differences might be due to the instruments used, with Lee et al. focusing on conflicting relations while we focused on supportive relations, and the age and time span differences between the two samples, with Lee et al following 11 to 17 year old

children for 10 weeks while we followed 12.5 year old children for 4 years onwards. Future studies should examine both the role of hostile and supportive relations concurrently in the development of depressive symptomatology in adolescence.

One possible interpretation of this gender-specific interaction might be that girls are more vulnerable for interpersonal stress during adolescence, giving them a stronger need for social skills and support to manage this stress. The vulnerability hypothesis is supported by findings suggesting that adolescent girls, compared to boys, are more interpersonally vulnerable because of increased social expectations (Cyranski et al., 2000; Petersen et al., 1993). Also, the association between social skills and depressive symptoms might be mediated by other interpersonal factors in boys. For instance, rejection sensitivity, which has been linked to social skills and depressive symptoms, has been reported to be higher in boys versus girls (Marston, Hare, & Allen, 2010). This indicates that relational issues related to rejection and conflict may be a more prevalent problem for boys than lack of supportive relations. There can also be more complex processes involved, including specific subgroups of boys, in identifying the link between depression and social support. Karevold, Coplan, Stoolmiller and Mathiesen (2011)'s findings, using the same data material as the current study, suggested that for shy boys, being active in social settings was protective for later depressive and anxiety symptoms.

Another explanation is that a confounding variable is associated with all three study variables for girls. For instance, social skills and social support might be perceived as low due to negative attribution style or insecure attachments, which again are associated with depressive symptoms (Jacobs, Reinecke, Gollan, & Kane, 2008; Sund & Wichstrom, 2002). If so, the associations between social skills, social support and depressive symptoms might only be an epiphenomenon of other underlying problems. Still, since lack of social skills and support normally are more visible for caregivers and healthcare workers compared to

characteristics such as a negative attribution style, it is of great use to know that these interpersonal variables are predictive of changes in depressive symptoms.

Strengths and limitations

The present study has considerable methodological strengths, such as examining a large population-based sample of adolescents at three time points across five years of adolescence and using validated measures at each time point. However, some limitations should also be mentioned.

The current study used only self-reports, and not observational data, on social skills, social support, and depressive symptoms, in which the shared method variance can inflate the strength of the associations. Findings indicate that self-reported and other-reported social support and social skills are significantly related, and associated with depressive symptoms (Cauce, 1986; Thompson et al., 2006), but future studies should still improve upon this with observational or multi-informant designs.

We did not address the possible bidirectionality of social skills and depressive symptoms, and possible causality of these associations. Adolescents with elevated depressive symptoms might act less socially skilled because of their low mood, apathy, and a negative attribution style (Lewinsohn, 1974; Segrin, 2000). However, while studies of social skills and depression in adults do not find causality, studies of children and adolescents indicate that low social skills precede depression (Cole et al., 1996; Lewinsohn et al., 1994). In the current study, we controlled for baseline depressive symptoms, and still social skills and social support predicted future depressive symptoms.

The measure of friend support had relatively low internal reliability, which may lead to underestimated effects of these variables. According to Schmitt (1996), alpha levels close to .50 may still be useful. Findings from previous research with this scale have also suggested

that it is a valid assessment of social support (Dalgard et al., 1995). Social skills predicted depressive symptoms through friend support for girls, indicating that this scale had sufficient reliability to capture important parts of friend relations in the current study. However, we can not rule out the possibility that a better measure could have captured friend support clearer and perhaps associations for boys also could have been found.

Although we have a longitudinal study, only controlled experimental designs with randomly selected groups can validly infer causality. With a longitudinal design we can examine changes by adjusting for baseline depression – and thus our study indicated that social skills preceded and predicted changes in depressive symptoms across adolescence. In total, there can be many mechanisms (interpersonal stressors, life events, negative relations, victimization, etc) in which the association between social skills and depressive symptoms can be explained. We elucidated the role of one factor; social support from three different sources, and found that peer support mediated the relationship between social skills and depressive symptoms for girls, and not boys.

Conclusion

The results from our study suggest that being socially skilled in early adolescence is important for subsequent supportive relations with friend, parents and teachers, as well as for preventing the development of depressive symptoms in both girls and boys. The findings further indicate social skills are prospectively associated with changes in depressive symptoms through friend support and that this mechanism is gender-specific. The mediation only pertained to girls, highlighting the need for a gendered perspective when examining interpersonal constructs and depressive symptoms, as well as the relative impact that social support from different sources might have.

The significant association between low social skills in early adolescence and depressive symptoms in later adolescence once again underline the importance of including social skills training in primary programs designed to prevent development of depression. Girls are more at risk for depression, and, as the current findings on gender-specific mechanisms indicate, preventive programs should include actions on how girls can cope with interpersonal difficulties.

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Table 1. Descriptives and gender differences of the study variables

Variables	Total sample			Boys		Girls		t	Range
	Mean	(SD)	Skew (SD)	Kurtosis (SD)	Mean (SD)	Mean (SD)			
Depressive symptoms (age 12.5)	.29	(.33)	1.76 (.10)	3.07 (.21)	.25 (.31)	.33 (.34)	-2.67	**	0-2
Depressive symptoms (age 16.5)	.46	(.42)	1.38 (.13)	1.72 (.25)	.28 (.32)	.56 (.41)	-7.35	***	0-2
Social skills (age 12.5)	4.12	(.45)	-.60 (.10)	.27 (.21)	4.04 (.45)	4.18 (.43)	-3.75	***	1-5
Friend support (age 14.5)	3.06	(.72)	-.49 (.12)	-.28 (.23)	3.06 (.71)	3.07 (.73)	-.16		1-5
Parental support (age 14.5)	3.24	(.70)	-1.18 (.12)	1.57 (.23)	3.27 (.62)	3.22 (.74)	.72		0-4
Teacher support (age 14.5)	3.11	(.63)	-.72 (.12)	.80 (.23)	2.09 (.65)	2.12 (.61)	-.45		1-5

* $p < .05$; ** $p < .01$; *** $p < .001$

Notes: n = 369-554 for the total sample, n = 153-253 for boys, and n = 216-302 for girls

Table 2. Pearson's correlations of the study variables for the total sample, and gender separately (boys over the diagonal)

Variables	1	2	3	4	5	6
1. Depressive symptoms (age 12.5)	1	.37 **	-.24 **	-.18 **	-.21 **	-.09
2. Depressive symptoms (age 16.5)		1	-.14 *	-.22 **	-.23 **	-.20 **
3. Social skills (age 12.5)			1	.29 **	.30 **	.19 **
4. Friend support (age 14.5)				1	.35 **	.32 **
5. Parent support (age 14.5)					1	.40 **
6. Teacher support (age 14.5)						1
1. Depressive symptoms (age 12.5)	1	.33 **	-.23 **	-.22 **	-.27 **	-.09
2. Depressive symptoms (age 16.5)	.28 **	1	-.18 *	-.08	-.10	-.04
3. Social skills (age 12.5)	-.29 **	-.30 **	1	.22 **	.31 **	.02
4. Friend support (age 14.5)	-.13	-.32 **	.25 **	1	.31 **	.18 *
5. Parent support (age 14.5)	-.17 *	-.25 **	.25 **	.23 **	1	.35 **
6. Teacher support (age 14.5)	-.14 *	-.26 **	.22 **	.31 **	.40 **	1

* $p < .05$; ** $p < .01$

Table 3. Fit indices for testing the mediation of social support on the relation between social skills and changes in depressive symptoms

Model#	Two-group model with gender	df	χ^2	$\Delta \chi^2$ (df)	CFI	TLI	RMSEA	(90 % CI)
1	Constrained	18	30.23		0.941	0.909	0.047	(.012 - .075)
2	Opened A1	17	30.19	0.05 (1)	0.937	0.896	0.05	(.018 - .079)
3	Opened A2	17	29.79	0.44 (1)	0.939	0.899	0.049	(.016 - .078)
4	Opened A3	17	26.43	3.81 (1)	0.955	0.925	0.042	(.000 - .072)
5	Opened B1	17	20.50	9.73 (1) **	0.983	0.972	0.026	(.000 - .060)
6	Opened B2	16	17.94	2.56 (1)	0.991	0.984	0.020	(.000 - .058)
7	Opened B3	16	19.35	1.16 (1)	0.984	0.972	0.026	(.000 - .061)
8	Opened C'	16	20.033	0.47 (1)	0.981	0.966	0.029	(.000 - .063)
9	Opened D1	16	20.158	0.34 (1)	0.98	0.965	0.029	(.000 - .063)
10	Opened E1	16	19.159	1.34 (1)	0.985	0.973	0.025	(.000 - .061)

The conceptual model illustrated in Figure 1 is tested. The best fitted model is indicated in bold. ** $p < .01$

Notes. df = degrees of freedom. χ^2 = chi-square, $\Delta \chi^2$ = value from $\Delta \chi^2$ -testing, * $p < .05$. CFI = Comparative Fit Index. TLI = Tucker-Lewis Index. RMSEA = Root Mean Square Error of Approximation. 90% C.I. = 90% confidence interval for RMSEA

Model 1: Equality constraints across gender for all paths

Model 2 to 10: Equality constraints are removed one by one to test for gender-moderation

A1-3: Paths between the predictor (social competence at age 12.5) and three mediators (support from friends (A1), parents (A2), and teachers (A3) at age 14.5)

B1-3: Paths between the three mediators (support from friends (B1), parents (B2), and teachers (B3) and the outcome (depressive symptoms at age 16.5)

C': Path between the predictor and the outcome when all other variables are adjusted for

D1: Path between baseline depressive symptoms and the outcome

E1: Path between the predictor and baseline depressive symptoms

Figure

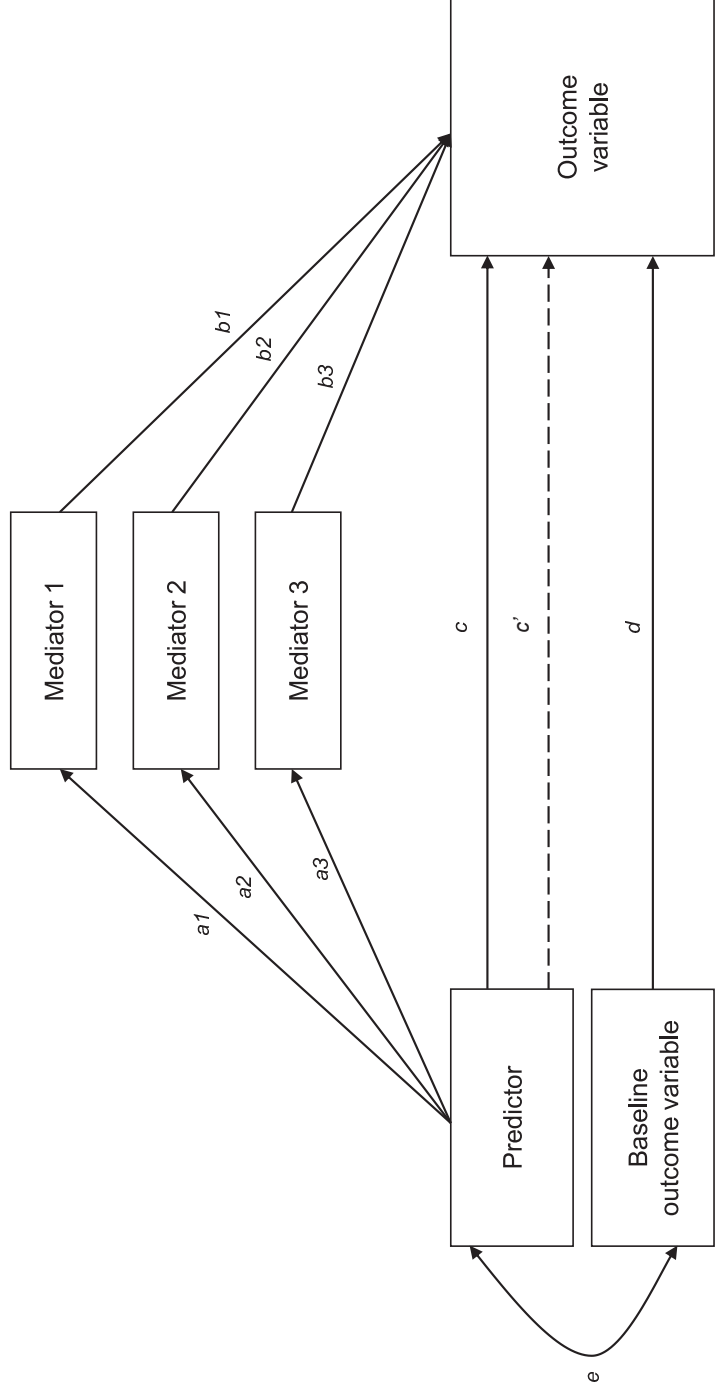


Figure 1. Conceptual figure illustrating the proposed multiple mediation model tested for social support from three different sources as mediators of the longitudinal association between social competence and changes in depressive symptoms. The model was tested separately for adolescent girls and boys.

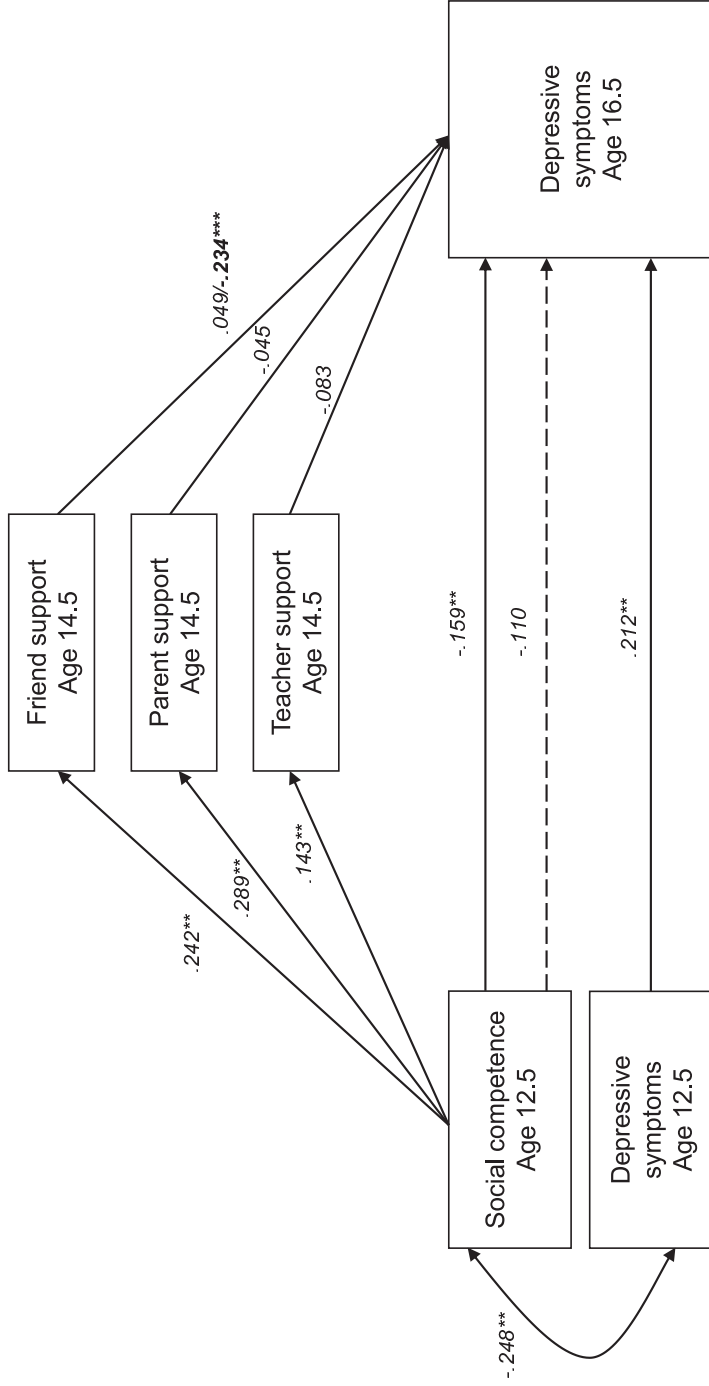


Figure 2. Fit: $\chi^2(17) = 20.50$, $p = .249$; RMSEA = .026; TLI = .972; CFI = .983. Gender-moderated paths are indicated with two estimates, where the bold estimate = girls.

APPENDICES 1 - 8

APPENDIX 1: TOPP T1 – Maternal self-reports of distress (SCL)

APPENDIX 2: TOPP T1 – Maternal reports of child problem behavior (BCL)

APPENDIX 3: TOPP T4 – Maternal reports of child problem behavior (SDQ)

APPENDIX 4: TOPP T5 – Maternal reports of child externalizing problems (TSAB)

APPENDIX 5: TOPP T5 – Adolescent self-reports of social competence (SSRS)

APPENDIX 6: TOPP T6 – Adolescent self-reports of social support

APPENDIX 7: TOPP T7 – Adolescent self-reports of depressive symptoms (SMFQ)

APPENDIX 8: VAHCS/2000 Stories – Self-reports of depressive symptoms (CIS-R)

APPENDIX I:

TOPP T1 – Maternal self-reports of distress (SCL)

Nå skal vi forlate barnet og gå over til spørsmål om deg selv.

DIN OPPLEVELSE AV STRESS SISTE UKE

Nedenfor er det liste over problemer eller plager folk av til har. Vurder hvor mye hvert problem var til plage eller ulempe for deg siste uke (til og med i dag). Sett ett kryss på hver linje.

	1	2	3	4	
	Ikke i det hele tatt	Litt	En god del	Svært mye	
1. Blir plutselig skremt uten grunn					245
2. Føler deg engstelig					246
3. Føler deg svimmel eller kraftløs					247
4. Er nervøs eller urolig					248
5. Har hjertebank					249
6. Skjelver					250
7. Føler deg ansent eller opphisset					251
8. Har hodepine					252
9. Har anfall av redsel eller panikk					253
10. Er rastløs, kan ikke sitte rolig					254
11. Føler deg slapp og uten energi					255
12. Anklager deg selv for ting					256
13. Har lett for å gråte					257
14. Har dårlig appetitt					258
15. Har vanskelig for å sove					259
16. Har lite håp for framtiden					260
17. Føler deg nedfor					261
18. Føler deg ensom					262
19. Følelse av å være fanget					263
20. Bekymrer deg for mange ting					264
21. Har ikke interesse for noe					265
22. Føler alt er anstrengende					266
23. Føler at du ikke er noe verd					267

APPENDIX 2:

TOPP T1 – Maternal reports of child problem behavior (BCL)

* **BARNETS VÆREMÅTE**

Ut fra hvert spørsmål skal du sette kryss i den ruten som passer best for ditt barn nå for tiden. (Kryss av for alle områdene)

Har vanligvis god matlyst.	1	<input type="checkbox"/>	196
Har noen ganger dårlig matlyst.	2	<input type="checkbox"/>	
Har nesten alltid dårlig matlyst.	3	<input type="checkbox"/>	
Spiser all slags mat.	1	<input type="checkbox"/>	197
Har noen favorittretter, vil ikke spise enkelte ting.	2	<input type="checkbox"/>	
Er veldig kresen, vil ikke spise variert mat.	3	<input type="checkbox"/>	
Sover som regel svært lite i løpet av et døgn.	1	<input type="checkbox"/>	198
Sover noen ganger svært lite.	2	<input type="checkbox"/>	
Sover hverken lite eller mye.	3	<input type="checkbox"/>	
Sover som regel svært mye	4	<input type="checkbox"/>	
Er lett å legge og sovner greit.	1	<input type="checkbox"/>	199
Har litt vansker med å roe seg ved sengetid.	2	<input type="checkbox"/>	
Tar ofte mer enn én time på å roe seg i sengen.	3	<input type="checkbox"/>	
Våkner nesten aldri om natten.	1	<input type="checkbox"/>	200
Våkner noen ganger om natten, men roer seg lett.	2	<input type="checkbox"/>	
Våkner ofte og er vanskelig å roe.	3	<input type="checkbox"/>	
Er rolig om natten og sover derfor nesten aldri sammen med oss på grunn av uro.	1	<input type="checkbox"/>	201
Er av og til urolig om natten og sover derfor noen ganger hos oss.	2	<input type="checkbox"/>	
Er ofte urolig og sover derfor ofte sammen med oss.	3	<input type="checkbox"/>	
Er ikke tilstrekkelig aktiv.	1	<input type="checkbox"/>	202
Er ikke spesielt aktiv.	2	<input type="checkbox"/>	
Er svært aktiv.	3	<input type="checkbox"/>	
Er for aktiv, vil ikke sitte stille ved bordet eller andre steder mer enn i 5 minutter.	4	<input type="checkbox"/>	
Leker svært ofte intenst når hun/han er alene.	1	<input type="checkbox"/>	203
Inni mellom leker hun/han intenst for seg selv.	2	<input type="checkbox"/>	
Leker sjelden intenst med noe når hun/han er alene.	3	<input type="checkbox"/>	
Leker konsentrert inne i mer enn ett kvarter om gangen.	1	<input type="checkbox"/>	204
Konsentrerer seg vanligvis i 5-15 minutter, alt etter som.	2	<input type="checkbox"/>	
Leker nesten aldri konsentrert inne i mer enn i 5 minutter.	3	<input type="checkbox"/>	

Tar hele tiden i bruk nye ord og væremåter etter hvert som hun/han lærer dem.	1	<input type="checkbox"/>	
Oppfører seg noen ganger som da han/hun var yngre.	2	<input type="checkbox"/>	205
Bruker som regel de samme ord og væremåter som da hun/han var yngre.	3	<input type="checkbox"/>	
Er ikke sjenert, kan godt overlates til andre som hun/han kjenner.	1	<input type="checkbox"/>	
Bliu urolig når hun/han er borte fra meg, men kommer over det.	2	<input type="checkbox"/>	206
Er svært klengete, kan ikke overlates til andre.	3	<input type="checkbox"/>	
Er selvstendig, ber om lite oppmerksomhet.	1	<input type="checkbox"/>	
Ber noen ganger om mye oppmerksomhet og følger etter meg hele dagen.	2	<input type="checkbox"/>	207
Krever for mye oppmerksomhet, følger etter meg hele dagen.	3	<input type="checkbox"/>	
Er lett å oppdra.	1	<input type="checkbox"/>	
Er noen ganger vanskelig å oppdra og å sette grenser for.	2	<input type="checkbox"/>	208
Er ofte svært vanskelig å oppdra og å sette grenser for.	3	<input type="checkbox"/>	
Har ikke raserianfall.	1	<input type="checkbox"/>	
Har noen ganger raserianfall som varer i noen minutter	2	<input type="checkbox"/>	209
Har hyppige, eller langvarige raserianfall	3	<input type="checkbox"/>	
Er vanligvis glad og fornøyd med unntak av korte perioder hvor hun/han f.eks. er trøtt.	1	<input type="checkbox"/>	
Er noen ganger urolig eller irritabel.	2	<input type="checkbox"/>	210
Er ofte urolig eller irritabel	3	<input type="checkbox"/>	
Virker sjelden lei seg eller ulykkelig.	1	<input type="checkbox"/>	
Virker noen ganger, eller i korte perioder, lei seg eller ulykkelig.	2	<input type="checkbox"/>	211
Virker ofte, eller i lengre perioder, lei seg eller ulykkelig.	3	<input type="checkbox"/>	
Er sjelden eller aldri bekymret og engstelig.	1	<input type="checkbox"/>	
Er noen ganger bekymret og engstelig i korte perioder.	2	<input type="checkbox"/>	212
Er engstelig for svært mange ting; nye omgivelser, endringer i måten å gjøre ting på, for å skade seg, farlige dyr, troll osv.	3	<input type="checkbox"/>	
Bliu sjelden skremt av brå lyder eller av ting som skjer rundt oss.	1	<input type="checkbox"/>	
Bliu av og til skremt av brå lyder og uventede ting.	2	<input type="checkbox"/>	213
Bliu ofte skremt av brå lyder eller av ting som skjer rundt oss.	3	<input type="checkbox"/>	

APPENDIX 3:

TOPP T4 – Maternal reports of child problem behavior (SDQ)

* **BARNETS VÆREMÅTE** *

Her er det meningen at du skal angi hvor godt hvert av utsagnene stemmer på ditt barn: 'Stemmer ikke', 'Stemmer delvis' eller 'Stemmer helt'. Prøv å svare på alt selv om du ikke er helt sikker eller synes utsagnet virker rart. Svar på grunnlag av barnets oppførsel *de siste seks månedene eller dette skoleåret*.

	1	2	3	
	Stemmer ikke	Stemmer delvis	Stemmer helt	
Er omtenksum, tar hensyn til andre menneskers følelser				261
Er rastløs, overaktiv, kan ikke være lenge i ro				262
Klager ofte over hodepine, vondt i magen eller kvalme				263
Deler gjerne med andre barn (godter, leker, andre ting)				264
Har ofte raserianfall eller dårlig humør				265
Er ganske ensom, leker ofte alene				266
Er som regel lydlig, gjør vanligvis det voksne ber om				267
Har mange bekymringer, virker ofte bekymret				268
Er hjelpsom hvis noen er såret, lei seg eller føler seg dårlig				269
Er stadig urolig eller i bevegelse				270
Har mistet en god venn				271
Slåss ofte med andre barn eller mobber dem				272
Er ofte lei seg, nedfor, eller på gråten				273
Bliir vanligvis likt av andre barn				274
Er lett å avlede, mister lett konsentrasjonen				275
Er nervøs eller klengete i nye situasjoner, blir lett utrygg				276
Er snill mot yngre barn				277
Lyver eller jukser ofte				278
Bliir plaget eller mobbet av andre barn				279
Tilbyr seg ofte å hjelpe andre (foreldre, lærere, andre barn)				280
Tenker seg om før hun/han handler (gjør noe)				281
Stjeler hjemme, på skolen eller andre steder				282
Kommer bedre overens med voksne enn med barn				283
Er redd for mye, lettskremt				284
Fullfører oppgaver, har god konsentrasjonsevne				285
Om du har andre kommentarer eller bekymringer, nevnt disse:				286

APPENDIX 4:

TOPP T5 – Maternal reports of child externalizing problems (TSAB)

BRUDD PÅ REGLER

Her er det listet opp handlinger som har å gjøre med brudd på regler i hjem, skole og samfunn. Noen spørsmål gjelder ting som er ulovlige eller på grensen til det ulovlige, men som mange likevel gjør. Dersom barn gjør dette, er det ikke uvanlig at alt, eller noe av det, er ukjent for foreldrene:

Er du kjent med at ungdommen din har vært med på, eller gjort, noe av det følgende i løpet av de siste 12 månedene? Sett et kryss for hver linje:

	1 Har ikke skjedd	2 Skjedd 1 gang	3 Skjedd flere ganger
248 Lurt seg fra å betale på kino, buss, tog eller liknende			
249 Sprayet graffiti, tegnet eller skrevet på en murvegg eller liknende, uten å ha lov til det			
250 Tatt penger fra noen i familien sin uten å ha lov til det			
251 Tatt varer fra kjøpesenter, butikk eller kiosk uten å betale			
252 Skulket en eller to skoletimer			
253 Med vilje ødelagt eller knust vindusruter, benker, telefonkiosker, postkasser, hageplanter eller liknende			
254 Tyvlånt en sykkel eller moped			
255 Skulket skolen en hel dag			
256 Med vilje ødelagt stoler, bord, pulter, eller andre ting som tilhører skolen sin			
257 Klort eller lugget noen			
258 Med vilje ødelagt seter på en buss, kino, eller andre steder			
259 Stjålet ting fra noens lommer eller veske, når eieren ikke var tilstede			
260 Oppholdt seg på andre steder enn har lov til			
261 Brutt seg inn i en butikk, hus eller leilighet, for å stjele noe			
262 Vært ute mye senere på kvelden eller natten, enn har lov til			
263 Truet med å slå eller skade noen			
264 Vært i slåsskamp på skolen eller andre steder			
265 Truet eller tvunget noen til å gi seg penger eller andre ting			
266 Slått eller sparket noen			
267 Hatt med seg våpen (kniv, balltre, eller liknende) eller andre våpenliknende gjenstander på skolen eller andre steder			
268 Vært i slåsskamp der det har brukt våpen (kniv, balltre eller liknende) eller andre gjenstander			
269 Vært i kontakt med politiet på grunn av noe ulovlig han/hun har gjort			
270a Røyket sigaretter			
270b Drukket så mye alkohol at han/hun har vært synlig beruset (full)			

APPENDIX 5:

TOPP T5 – Adolescent self-reports of social competence (SSRS)

✱ FORHOLD TIL VENNER OG ANDRE

Nedenfor følger en rekke setninger som i større eller mindre grad beskriver hvordan du er nå for tiden. Vi ber deg om å krysse av for hvor godt beskrivelsene passer for deg. (Husk å sette kryss på alle linjene.)

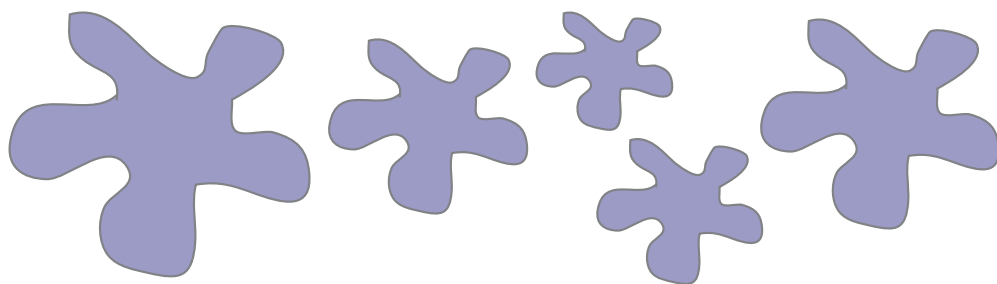
	1	2	3	4	5
	Aldri	Sjelden	Av og til	Ofte	Svært ofte
165					
166					
167					
168					
169					
170					
171					
172					



	1	2	3	4	5
	Aldri	Sjelden	Av og til	Ofte	Svært ofte
173					
174					
175					
176					
177					
178					
179					
180					

HVORDAN ER JEG... EGENTLIG?

		1	2	3	4	5
		Aldri	Sjelden	Av og til	Ofte	Svært ofte
181	Jeg sier ifra når jeg mener at regler er urettferdige					
182	Jeg avslutter krangler med mine foreldre på en rolig måte					
183	Jeg spør om vennene mine kan hjelpe meg når jeg har problemer					
184	Jeg gjør leksene ferdig til tiden					
185	Jeg følger med når læreren underviser					
186	Jeg blir ferdig med arbeidsoppgaver i klassen når jeg skal					
187	Jeg spør om klassekameratene mine vil være med på det jeg driver med					
188	Jeg snakker i en hyggelig tone når vi diskuterer noe i klassen					
189	Jeg synes det er ganske vanskelig å få venner					
190	Andre ungdommer har vanskelig for å like meg					



 Når folk beskriver **vennene sine**, bruker de ofte setninger som nedenfor. Hvordan stemmer disse beskrivelsene for deg? (Kryss av for hvor enig du er i setningen)

	1	2	3	4	5
	Helt enig	Litt enig	Både og	Litt uenig	Helt uenig
191	Jeg føler meg nær knyttet til mine venner				
192	Vennene mine hører på meningene mine				
193	Det hender at jeg føler meg utenfor selv blant venner				

APPENDIX 6:

TOPP T6 – Adolescent self-reports of social support



FORHOLDET TIL FORELDRENE DINE

Les utsagnene nedenfor, og kryss av for hvor ofte foreldrene dine gjør det følgende (husk ett kryss for hver linje):

	0	1	2	3	4
	Nesten aldri	Sjelden	Av og til	Ofte	Nesten alltid
198 Sier noe pent til deg eller roser deg når du har gjort en god jobb					
199 Belønner deg eller gir deg noe ekstra når du gjør som de ønsker					
200 Viser at de liker det når du har gjort noe i huset					
201 Klemmer eller kysser deg når du har fått til noe					
202 Truer med å gi deg straff, men gjør det ikke likevel					
203 Gir opp å få deg til å gjøre som de sier, fordi det blir så mye mas					
204 Har bestemt seg for å gi deg en straff, men du får dem til å la det være					
205 Varierer straffen du får etter hvilket humør de er i					
206 mister kontrollen og slår deg					

Her kommer flere utsagn om hvordan foreldrene er mot barna sine. Kryss av for hvor godt du synes dette stemmer for deg:

	0	1	2	3	4
	Nesten aldri	Sjelden	Av og til	Ofte	Nesten alltid
Tenk på moren din:					
207 Jeg kan stole på at hun hjelper meg hvis jeg har problemer	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
208 Hun oppmuntrer meg alltid til å gjøre mitt beste	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
209 Hun oppmuntrer meg til å ta egne valg	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
210 Hun hjelper meg med skolearbeidet hvis det er noe jeg ikke forstår	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
211 Når hun vil jeg skal gjøre noe, forklarer hun hvorfor	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Tenk på faren din:					
212 Jeg kan stole på at han hjelper meg hvis jeg har problemer	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
213 Han oppmuntrer meg alltid til å gjøre mitt beste	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
214 Han oppmuntrer meg til å ta egne valg	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
215 Han hjelper meg med skolearbeidet hvis det er noe jeg ikke forstår	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
216 Når han vil jeg skal gjøre noe, forklarer han hvorfor	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

		0	1	2	3	4
		Stemmer svært dårlig	Stemmer ganske dårlig	Stemmer litt	Stemmer ganske godt	Stemmer veldig godt
72	Jeg blir ferdig med arbeidsoppgaver i klassen når jeg skal					
73	Jeg spør om klassekameratene mine vil være med på det jeg driver med					
74	Jeg synes jeg ser bra ut					
75	Jeg synes det er ganske vanskelig å få venner					
76	Andre ungdommer har vanskelig for å like meg					
77	Jeg er sammen med venner som er mer enn to år eldre enn meg					
78	Jeg liker utseendet mitt veldig godt					

Når folk beskriver vennene sine, bruker de ofte setninger som nedenfor. Hvordan stemmer disse beskrivelsene for deg?

		4	3	2	1	0
		Helt enig	Litt enig	Både og	Litt uenig	Helt uenig
79	Jeg føler meg nært knyttet til mine venner					
80	Vennene mine hører på meningene mine					
81	Det hender at jeg føler meg utenfor selv blant venner					

HVOR FORNØYD ER DU MED LIVET DITT? Husk å sette et kryss for hver linje. 

		0	1	2	3	4
		Helt uenig	Litt uenig	Verken enig eller uenig	Litt enig	Enig
82	På de fleste områder er livet mitt nær idealet mitt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
83	Alt er lagt kjempefint tilrette for meg	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
84	Jeg er fornøyd med livet mitt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
85	Så langt har jeg oppnådd det jeg ønsker i livet mitt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
86	Hadde jeg kunnet leve livet på nytt, ville jeg nesten ikke forandret noe	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

87 Har dere kjæledyr hjemme? 0 Nei 1 Ja



FRITIDSAKTIVITETER

Har du drevet med organisert idrett eller trimmet de **siste to månedene?**

	4	3	2	1	0
	4 ganger i uka eller oftere	2-3 ganger i uka	Omtrent 1 gang i uka	Omtrent hver 14. dag	En gang i måneden eller sjeldnere
182	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
183	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

184 Har du kjæreste?

- 2 Ja
 1 Nei, men jeg har hatt tidligere
 0 Nei, jeg har aldri hatt kjæreste

185 Er du forelsket i noen?

- 0 Nei
 1 Ja, i en gutt
 2 Ja, i en jente
 3 Usikker

186 Har du hatt samleie? 0 Nei 1 Ja

187 Hvis ja, hvor gammel var du første gang? _____ år

OM SKOLEN

Nå vil vi vite litt om hvordan det går på skolen. Hva var de siste karakterene du fikk på karakterkortet i de følgende fagene?

188	Norsk	<input type="text"/>	191	Samfunnsfag (naturfag, historie)	<input type="text"/>
189	Gymnastikk	<input type="text"/>	192	Formingsfag	<input type="text"/>
190	Engelsk	<input type="text"/>	193	MATEMATIKK	<input type="text"/>

194 Har du i løpet av det siste året fått ekstra støtte/ undervisning i forbindelse med lese- og skrivevansker?

- 0 Nei 1 Ja, noe 2 Ja, ganske mye 3 Ja, veldig mye

Noen lærere gir mye støtte, andre gir lite. Hvordan er lærerne ovenfor deg?

	3	2	1	0
	Stemmer svært godt	Stemmer nokså godt	Stemmer nokså dårlig	Stemmer svært dårlig
195	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
196	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
197	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

APPENDIX 7:

TOPP T7 – Adolescent self-reports of depressive symptoms (SMFQ)

Hvilke områder opplever du som vanskelig for deg **nå for tiden** (sett *en ring rundt et tall* for å indikere hvor enig du er i utsagnet):

		Ikke vanskelig					Veldig vanskelig				
		1	2	3	4	5	1	2	3	4	5
53	Forholdet til foreldrene dine	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
54	Forholdet til venner eller andre personer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
55	Parforhold, kjæreste eller forelskelser	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
56	Opplevelse av egen kropp eller utseende	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
57	Forholdet til tobakk, alkohol eller rus	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
58	Skolen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
59	Tanker om noe vondt som har skjedd	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
60	Tanker om noe vondt som kan skje	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

PLAGSOMME FØLELSER OG TANKER

Her følger en liste over forskjellige følelser og tanker man av og til kan ha. Tenk på **de to siste ukene** og kryss av for hvor ofte du har følt eller tenkt noe av det som står nedenfor (sett *kun ett kryss på hver linje*):

		2	1	0
		Stemmer	Stemmer noen ganger	Stemmer ikke
61	Jeg var lei meg eller ulykkelig	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
62	Jeg følte meg så trøtt at jeg bare ble sittende uten å gjøre noen ting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
63	Jeg var veldig rastløs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
64	Jeg var ikke glad for noe	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
65	Jeg følte meg lite verdt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
66	Jeg gråt mye	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
67	Jeg tenkte at livet ikke var verdt å leve	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
68	Jeg synes det var vanskelig å tenke klart eller konsentrere meg	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
69	Jeg hatet meg selv	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
70	Jeg tenkte at jeg aldri kunne bli så god som andre ungdom	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
71	Jeg følte meg ensom	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
72	Jeg tenkte at ingen egentlig var glad i meg	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
73	Jeg følte meg som et dårlig menneske	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

		2	1	0
		Stemmer	Stemmer noen ganger	Stemmer ikke
74	Jeg syntes jeg gjorde alt galt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
75	Jeg tenkte at fremtiden ikke hadde noe positivt å by meg	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
76	Jeg tenkte på å ta livet mitt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Les gjennom alle utsagnene og kryss av for å vise i hvor stor grad du føler at utsagnet passer for deg den siste uken. Det er ingen svar som er riktige eller gale.

		0	1	2	3
		Passer ikke i det hele tatt	Passer til en viss grad, eller noe av tiden	Passer godt, eller en god del av tiden	Passer best, eller mesteparten av tiden
77	Jeg merket at jeg var tørr i munnen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
78	Jeg hadde pustevansker (f.eks. pustet altfor fort, eller ble andpusten uten fysisk anstrengelse)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
79	Jeg følte meg skjelve (f.eks. følte at bena kom til å gi etter under meg)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
80	Jeg opplevde situasjoner som gjorde meg så engstelig at jeg ble utrolig lettet når de var over	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
81	Jeg følte at jeg kom til å besvime	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
82	Jeg svettet mye (f.eks. i hendene) uten at det var varmt og uten fysisk anstrengelse	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
83	Jeg følte meg redd uten å ha særlig grunn til det	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
84	Jeg hadde problemer med å svelge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
85	Jeg var oppmerksom på hjerterytmen min uten at jeg hadde vært i fysisk aktivitet (f.eks. følelse av økt hjerterytme, eller at hjertet hoppet over et slag)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
86	Jeg følte at jeg var nær ved å få panikk	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
87	Jeg var redd for at selv en enkel, triviell oppgave kunne bringe meg ut av fatning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
88	Jeg var livredd	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
89	Jeg bekymret meg for å komme opp i situasjoner der jeg kunne få panikk og dumme meg ut	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
90	Jeg skalv ofte (f.eks. på hendene)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
91	Jeg unngikk aktiviteter hvor jeg var i sentrum for andres oppmerksomhet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
92	Jeg unngikk å gjøre ting eller snakke til andre av redsel for å bli flau	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

APPENDIX 8:
VAHCS/2000 Stories – Self-reports of depressive symptoms (CIS-R)

Appendix 12: CIS-R Wave 7: Symptoms of Depressions

Back to Symptoms of Depression CIS-R section

11. Mental Health Personality and Behaviour: Clinical Interview Schedule: (CIS-R)								
Var name	Var label	1	2	3	4	5	6	7
q18	How has your appetite been over the past seven days	Good feels like eating the same as usual	Feels like eating less	Hardly ever feels like eating				
q19a	Have you lost any weight over the past few weeks or months?	No	Yes	Yes, ... more than 3kg	Yes, ... been trying to lose weight	Don't know		
q19b	Have you gained any weight in the last month?	Yes	No					
q20	Do you have, or have you recently had, a serious physical illness that needs regular visits to the doctor or hospital?	Yes	No					
qa1	Have you had any sort of ache or pain recently?	Yes	No					
qa2	Is this pain brought on, or made worse, by feeling low, anxious or stressed?	No	Sometimes	Yes				
qa3	On how many days have you noticed this pain during the past seven days?	None	One to three days	Four days or more				
qa4	Has the pain lasted more than 3 hours on any day during the past week?	Yes, more than 3 hours on one day	No, less than 3 hours					
qa5	Has the pain been unpleasant in the past week?	Not at all	A little unpleasant	Unpleasant	Very unpleasant			
qa6	Has the pain bothered you when you were doing something interesting in the past week?	Yes	No	Haven't done anything interesting				
qa7	Recently, have you been bothered by any sort of physical discomfort, for example, headaches or stomach aches?	Yes	No					
qa8	Was this discomfort brought on, or made worse by feeling low, anxious or stressed?	No	Sometimes	Yes				

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qa9	On how many days have you noticed this discomfort during the past seven days?	None	One to three days	Four days or more				
qa10	Has the discomfort lasted more than 3 hours on any day during the past week?	Yes, more than 3 hours	No, less than 3 hours					
qa11	Has the discomfort been unpleasant in the past week?	Not at all	A little unpleasant	Unpleasant	Very unpleasant			
qa12	Has the discomfort bothered you when you were doing something interesting, in the past seven days?	Yes	No	Haven't done anything interesting				
qa13	How long have you been feeling this ache or pain as you have just described?	Less than 2 weeks	Two weeks but less than 6 months	Six months but less than 1 year	One year but less than 2 years	Two years or more		
qb1	Have you noticed that you've been getting tired recently?	Yes	No					
qb2	On how many days have you felt tired during the past seven days?	None	One to three days	Four days or more				
qb3	Have you felt tired for more than 3 hours on any day in the past week?	Yes, more than 3 hours	No, less than 3 hours					
qb4	Have you felt so tired that you've had to push yourself to get things done during the past week?	Yes, at least once	No					
qb5	Have you felt tired when you were doing things that you enjoy during the past week?	Yes, at least once	No	No, haven't done anything enjoyable				
qb6	What do you think is the MAIN reason you feel tired? (That is, the most important reason)	Don't know	Problems with sleep	Tablets or medication	Physical reason: illness or physical condition	Working too hard	Stress or other psychological reason	Boredom Other
qb7	Have you felt you've been lacking in energy recently?	Yes	No					

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qb8	On how many days have you felt lacking in energy during the past week?	None	One to three days	Four days or more						
qb9	Have you felt lacking in energy, for more than 3 hours, on any day in the past week?	Yes, more than 3 hours	No, less than 3 hours							
qb10	During the past week, have you felt so lacking in energy that you've had to push yourself to get things done?	Yes, on at least one occasion	No							
qb11	Have you felt lacking in energy when doing things that you enjoy doing during the past week?	Yes, at least once	No							
qb12	What do you think is the main reason for lacking in energy?	Don't know	Problems with sleep	Tablets or medication	Physical reason: illness or physical condition	Working too hard	Stress or other psychological reason	Boredom	Other	
qb13	How long have you been feeling tired, or lacking in energy, in the way you have just described?	Less than 2 weeks	Two weeks but less than 6 months	Six months but less than 1 year	One year but less than 2 years	Two years or more				
qc1	Recently have you had any problems in concentrating on what you were doing?	No problems	Yes, have had problems concentrating							
qc2	On how many days have you noticed problems with your concentration during the past week?	Not in the past week	One to three days	Four days or more						
qc3	Have you noticed any problems with forgetting things recently?	Yes	No							
qc4	On how many days have you noticed problems with your memory during the past week?	Not in the past week	One to three days	Four days or more						
qc5	Can you concentrate without your mind wandering on a whole TV program, a newspaper article or when talking to someone?	Yes, can concentrate on all of them	No, can't concentrate on one or more							
qc6	You have said you have been forgetting things. Have you forgotten anything IMPORTANT in the past seven days?	Yes, forgotten something important	No							
qc7	Have you given up doing something because you couldn't concentrate on it in the past week?	Yes	No							

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qd8	How long have you been having the problems with your concentration or memory as you have described?	Less than 2 weeks	Two weeks but less than 6 months	Six months but less than 1 year	One year but less than 2 years	Two years or more				
qd1	In the past week, have you been having problems with losing sleep?	Yes	No							
qd2	How many hours sleep did you lose on the worst night you had in the past week?	Less than 15 minutes	15 minutes to 1 hour	More than 1 hour and less than 3 hours	Three hours or more					
qd3	On how many nights in the past week have you had any problems with your sleep?	Three nights or less	Four nights or more							
qd4	On how many nights in the past seven days did you lose MORE than 3 hours sleep?	One to three nights	Four nights or more							
qd5	Do you wake more than two hours earlier than you need to and then find you can't get back to sleep?	Yes, but I can get back to sleep quickly	Yes, and I can't get back to sleep	No						
qd6	Has sleeping more than usual been a problem for you over the past week?	Yes	Slept more but this is not a problem	No						
qd8	In the past week, how much longer than usual did you sleep on the days or nights you slept the longest?	Less than 15 minutes	15 minutes to 1 hour	More than 1 hour and less than 3 hours	Three hours or more longer					
qd9	On how many days or nights in the past week have you had any problems with sleeping more than usual?	One to three days/nights	Four days/nights or more							
qd10	On how many days or nights in the past week did you sleep MORE than 3 hours extra?	One to three days/nights	Four days/nights or more							
qd11	How long have you had these problems with your sleep as you have described?	Less than 2 weeks	Two weeks but less than 6 months	Six months but less than 1 year	One year but less than 2 years	Two years or more				

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qh2	In the past week have you felt guilty or have you blamed yourself when things have gone wrong?	Never	Only when it was my fault	Sometimes	Often				
qh3	During the past week, have you been feeling that you are not as good as other people?	Yes (not as good)	No (as good as others)						
qh4	When you have felt sad, miserable or depressed in the past week...?	have you been so restless that you couldn't sit still?	have you been doing things more slowly (eg. walking)?	have you been less talkative than normal?					
qh5	During the past week, has your self confidence been so low that you wouldn't have your say about things?	No, never	Sometimes	Often					
qh6	Over the past week have you had times when you felt no good as a person?	Not at all	Sometimes	Often					
qh7	Have you felt hopeless at all during the past week, for instance, about your future?	Yes	No						
qh8	In the past week, have you been feeling that life isn't worth living?	Yes	(spontaneous) Yes, but not in the past week	No					
qh9	In the past week, have you thought of killing yourself?	Yes	(spontaneous) Yes, but not in the past week	No					
qh10	Have you thought about a way in which you might kill yourself?	Yes	(spontaneous) Yes, but not in the past week	No					
qh11	Have you talked to your doctor about these thoughts of killing yourself?	Yes	No, but have talked to other people	No					
	Since this is a very serious matter it is important that you talk to your doctor about these thoughts.	(no da's)							
Note	Beck Self harm introduced here in W7								

