

Chapter 6

Predictors of Internalising Behaviour Problems in Adolescents

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Introduction

Internalising problems include symptoms of depression and anxiety, which are among the strongest contributors to the global burden of disease according to the World Health Organization (WHO) (Murray & Lopez, 1996). Typically, for internalising symptoms like sadness and fearfulness, they are focused inward (i.e., towards the self). They start to increase in late childhood and early adolescence, and peak in middle to late adolescence (Costello, Copeland, & Angold, 2011; Rudolph, 2009) (see Chapter 5 for a thorough discussion of prevalence, stability and the interplay between anxiety and depression in adolescence). Internalising problems are hard to identify (Costello & Angold, 2006) and less than half of children and adolescents with internalising problems seek help (Kessler, Avenevoli, & Ries Merikangas, 2001). Thus, a lot of suffering could be reduced if we could increase our knowledge of the aetiology of, and pathways to, depression and anxiety in childhood and adolescence to better to inform to whom, what and how to target intervention and prevention. The current chapter focuses on predicting the development of internalising problems in adolescence.

Data collected by the WHO's World Health Survey reveal that sub-threshold depressive disorders (i.e., high levels of symptoms of depression and anxiety which are not diagnosed as a mental health disorder) are not qualitatively different from full-blown depressive diagnoses (Ayuso-Mateos, Nuevo, Verdes, Naidoo, & Chatterji, 2010). Studying adolescents who experience sub-threshold depression and anxiety is essential because they constitute the majority of the cases. Further, adolescent sub-threshold levels of symptoms are associated with diagnosed depression and other adverse outcomes in adulthood (Pine, Cohen, Cohen, & Brook, 1999; Shankman et al., 2009). For efficient and effective intervention and prevention, early identification of depressive and anxiety symptoms, before they become chronic, is optimal.

This chapter starts with discussion of theoretical frameworks for explaining the development of internalising problems and a review of the relevant literature. The chapter then draws together findings from several studies within the TOPP study on how individual factors (e.g., temperamental traits and behaviour problems), interpersonal factors (e.g., social skills, support from parents, peers and teachers) and familial factors (e.g., family adversity and maternal psychological distress) might predict the development of internalising problems, using a developmental psychopathology framework. The chapter ends with discussion of the applied and research implications of the findings.

Theoretical Frameworks: Developmental Psychopathology

The developmental psychopathology perspective provides an integrative framework for understanding psychopathological and normative behaviours, emphasising their developmental context and impact (Cicchetti & Rogosch, 2002). The developmental psychopathology perspective illuminates how risk factors may interfere with different developmental tasks at different developmental stages. This framework is used as the primary guide to the examination of the predictors of adolescent internalising problems and interpretation of the findings in this chapter.

Developmental psychopathology highlights the fact that similar types of input may operate differently at different developmental stages (Cicchetti, 2006). Theories of early life vulnerability suggest the presence of sensitive stages where stressors may have a particularly strong impact compared to other stages (O'Connor, 2006). The timing of risk or protective factors in relation to the stage-salient needs and challenges of the child at that time is therefore important (Goodman & Brand, 2009). For instance, stressors experienced in early childhood might have different impacts on the development of anxiety and depression than the same stressors at a later stage in childhood/adolescence.

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 the subsequent development of depression (Goodman & Brand, 2009). As discussed in Chapters 2 and 3, these and other empirical findings indicate that early life stressors have long-term adverse consequences lasting even after the stress is reduced (e.g., Leckman-Westin, Cohen, & Stueve, 2009). This highlights early childhood as a particularly important period for examining risk factors for later symptom development.

Middle childhood is a period characterised by the further development of the child. During this stage, most children fine-tune their academic and social skills and cognitive abilities (Eccles, 1999). This might be a developmental stage which is critical for the prevention of depressive symptoms and studies point to middle childhood as a vulnerable developmental stage (Huston & Ripke, 2006).

Adolescence marks the transition from childhood to adulthood. There is a steep increase in the prevalence of depressive symptoms in adolescence, with the peak age of onset for depression occurring around 13 to 15 years of age (Angold, & Costello, 2006). Most models aiming to explain the development of depression converge on the idea that the biological transformations of puberty (e.g., changes in brain structure and function) might contribute to the dramatic rise in depression during puberty (Rudolph & Flynn, 2014). Adolescence is also characterised 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), psychologically (e.g., increased focus on identity) and socially (e.g., initiation of sexual relations) (Arnett, 1999; Rudolph, Hammen, & Daley, 2006). Even though this period also has positive characteristics, the accumulation of challenges and changes make adolescents particularly vulnerable for developing depressive symptoms (Arnett, 1999).

Predictors of Internalising Problems

It is important to emphasise that one single factor alone (e.g., gender, maternal distress, temperament) is seldom responsible for the development of internalising problems. In keeping with the biopsychosocial model of development, as well as insights from developmental psychopathology, an integrative perspective including factors both within and outside the individual is likely to extend our understanding of the complex aetiology of internalising symptomatology. The examination of several risk factors in a multivariate, longitudinal framework across child and adolescent development makes it possible to study the interplay between different risk factors in the prediction of an outcome, and thereby identify

possible mechanisms underlying the relationship between risk factors and outcomes at different developmental stages. The predictors might interact with each other through moderation, i.e., the relation between a predictor and an outcome varies according to another variable; or through mediation, where the path between a predictor and an outcome occurs through another variable (e.g. Baron & Kenny, 1986).

Individual Characteristics

Individual characteristics such as gender (Hankin, Mermelstein, & Roesch, 2007), earlier problem behaviours (e.g., internalising and externalising problems) (Costello et al., 2011; Masten et al., 2005; Pihlakoski et al., 2006; Wiesner & Kim, 2006), temperamental traits (e.g., emotionality, activity, shyness and sociability) (Leve, Kim, & Pears, 2005; Rothbart & Bates, 2006) and social skills (Letcher, Smart, Sanson, & Toumbourou, 2009; Negri, Hillman, & Dorn, 2011) all play important roles in the development of internalising problems. The conceptual pathways by which these are linked to internalising problems are presented below.

Gender plays a significant role in the development of internalising problems in adolescence. For instance, it is well-documented that adolescent girls report two to three times more depressive disorders and symptoms compared to boys in both frequency and severity of symptoms (Hankin et al., 2007). Theoretical models suggest that these gender differences stem from the interplay between biological, psychological and contextual changes in adolescence and gender-linked roles, beliefs and expectations in the interpersonal domain (for reviews, see Hankin, Wetter, & Cheely, 2008; Hilt & Nolen-Hoeksema, 2014). Because gender is one of the most salient predictors of internalising problems, we discuss the issue of gender in interplay with other predictors of internalising problems throughout the entire chapter.

Temperamental traits of shyness (e.g., inhibited and awkward behaviour in social situations), *negative emotionality* (e.g., negativity and irritability), low *sociability* (being outgoing in social situations) and low *activity* levels are considered vulnerabilities for the development of internalising problems (Leve et al., 2005; Rothbart & Bates, 2006) (see Chapter 4 for a more thorough introduction to temperament). A potential mechanism behind these relations is that shyness may increase the development of internalising symptoms because it leads to difficulties with interpersonal relationships (Parker, 2006), while high social activity levels may decrease the development of internalising problems due to their role in enhancing social skills and interpersonal relationships (Pellegrini & Smith, 1998).

During the preschool years, children start to prefer peers of their own gender, probably because of preferences for different types of activities, with girls often preferring relation-oriented activities while boys prefer more instrumental, active activities (Zahn-Waxler, Crick, Shirtcliff, & Wood, 2006). In line with this, the temperamental dimension of activity may be more important for boys and the temperamental dimension of sociability may be more important for girls.

Both externalising (i.e., outward-focused behaviours such as temper tantrums) and internalising problems in early childhood are associated with internalising problems later in development (Goodman et al., 2011). One possible mechanism behind these associations might be common underlying environmental predictors associated with both types of problem. Another might be that childhood problem behaviours interfere with social and emotional development, making children even more vulnerable to later internalising problems.

Findings support both “homotypic” pathways, in which early internalising problems predict subsequent internalising problems, and “heterotypic” pathways in which externalising problems predict subsequent internalising problems (Costello et al., 2011; Masten et al., 2005; Pihlakoski et al., 2006; Wiesner & Kim, 2006). There are some gender-specific differences suggested. For instance, Masten et al. (2005) report stronger stability in homotypic internalising paths from adolescence to adulthood in boys than in girls. Regarding heterotypic paths, some studies have found that externalising problems

predict internalising problems for both girls and boys, while internalising problems predict externalising problems but only for girls (Pihlakoski et al., 2006; Wiesner & Kim, 2006). However, other findings indicate no gender differences in these associations (Egeland, Pianta, & Ogawa, 1996). These contradictory findings suggest a need for more research on these paths, with a gender-specific focus and with longitudinal data covering several developmental stages.

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 fewer internalising problems in adolescence (e.g., Letcher et al., 2009; Negriff et al., 2011). Good social skills can make it easier to manage the stressors and challenges connected to developmental transitions such as adolescence, and thus protect against the development of internalising problems. Supporting this, findings suggest that having good social skills is particularly important in adolescence (e.g., Letcher et al., 2009).

Several findings suggest that adolescent girls, compared to boys, are especially reactive to interpersonal stressors due to the increased impact of hormones and gender socialisation (Cyranski, Frank, Young, & Shear, 2000; Rose & Rudolph, 2006). Thus, having good social skills might be more important for the healthy development of adolescent girls compared to boys. Few studies have, however, focused on gender differences in the link between social skills and internalising problems, and those that have show some inconsistency. Some studies find no gender differences (Burt, Obradovic, Long, & Masten, 2008; Letcher et al., 2009), while others find that social skills are linked to internalising problems in boys and not girls (Ohannessian, Lerner, Lerner, & von Eye, 1999). (See also Chapter 11 for further exploration of social skills.)

Familial Characteristics and Social Context

Familial characteristics, such as maternal mental health, parental support and family adversity, and social context, such as relations with teachers and peers, are other noteworthy predictors of internalising problems.

Parental Depressive Symptoms and Family Adversity

One of the most important predictors of internalising problems in children and adolescents is parental mental health problems. For instance, children of parents with a depressive disorder have a two to three times greater risk of developing depressive disorders than those of non-depressed parents (Weissman et al., 2006) and are twice as likely to experience an episode of depression than children of parents with other psychiatric or medical conditions (Rice, Harold, & Thapar, 2002). Findings also indicate an increased risk of psychological distress in children even when parents experience mild levels of depressive symptoms (West & Newman, 2003). Many studies demonstrate the effects of maternal depression on child psychopathology (for a review, see Goodman, 2007), whereas studies on the effects of paternal depression are scarce (Phares, Fields, Kamboukos, & Lopez, 2005). (See Chapter 14 for discussion of paternal depression.)

The association between parental and child depression can be mediated through both biological (Elgar, McGrath, Waschbusch, Stewart, & Curtis, 2004; Sullivan, Neale, & Kendler, 2000) and environmental mechanisms (Leckman-Westin et al., 2009; Lovejoy, Graczyk, O'Hare, & Neuman, 2000), and most likely through a combination of these (Kessler et al., 2001). For instance, children with depressed parents are often exposed to other family adversities too, such as parental maladaptive affect and behaviour (for reviews, see Lovejoy et al., 2000; Wilson & Durbin, 2010). Additionally, parental depression is associated with contextual stressors such as increased interpersonal problems within the family (e.g., marital conflict), economic pressures and general social disadvantage which also create more family adversities (Silberg & Rutter, 2002). Such stressful family adversities can affect the de-

velopment of anxiety and depression in childhood and adolescence, as supported by empirical findings (e.g., Luby, Belden, & Spitznagel, 2006).

Empirical findings suggest 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 in several studies, with girls generally more vulnerable to maternal distress compared to boys (Goodman & Gotlib, 1999; Goodman et al., 2011). There are, however, some exceptions, with reports of no gender differences (Bureau, Easterbrooks, & Lyons-Ruth, 2009; Spence, Najman, Bor, O'Callaghan, & Williams, 2002) or boys being more vulnerable early in development (Tronick & Reck, 2009).

Social Support

High levels of social support, such as mutual respect and gaining material and interpersonal support (Thompson, Flood, & Goodvin, 2006), are negatively associated with adolescent internalising problems (Eberhart, Shih, Hammen, & Brennan, 2006; Rubin et al., 2004). Social support may act as an interpersonal resource, making it easier to manage stressors and challenges when growing up. Different sources of support might be important for internalising symptomatology in varying ways. While parents are usually the main source of support during infancy and childhood, strong relationships and social support from others such as friends and teachers become 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 have examined the relative contribution of different sources of support when growing up – an aspect that is specifically important for targeting interventions. (See also Chapter 11 for further exploration of social support.)

As noted above, several findings suggest that adolescent girls, compared to boys, are especially reactive to interpersonal stressors due to the increased impact of hormones and gender socialisation (Cyranski et al., 2000; Rose & Rudolph, 2006), suggesting that a lack of social support might be a stronger risk factor for internalising problems for girls compared to boys. Complex linkages between social support and stress in relation to the development of problems further emphasise the importance of studying such relations over time, using prospective longitudinal research designs.

Findings From the TOPP Study

The multiple waves of data on children's individual, familial and social characteristics in the TOPP study provide a unique opportunity to examine a number of important questions regarding the prediction of internalising problems. We have divided the findings into three topics, which we first present separately, followed by an overall discussion of the findings:

1. The interplay between externalising and internalising problems from childhood to adolescence (Kjeldsen et al., 2016; Moylan et al., 2013; Nilsen, Gustavson, Roysamb, Kjeldsen, & Karevold, 2013)
2. The paths from individual characteristics to adolescent internalising problems (Karevold, Coplan, Stoolmiller, & Mathiesen, 2011; Karevold, Roysamb, Ystrom, & Mathiesen, 2009; Karevold, Ystrom, Coplan, Sanson, & Mathiesen, 2012; Nilsen, Karevold, Roysamb, Gustavson, & Mathiesen, 2013)
3. The role of familial characteristics for the development of internalising problems in adolescence (Karevold et al., 2009; Nilsen, Dion, Karevold, & Skipstein, 2016; Nilsen, Gustavson et al., 2013; Nilsen, Karevold et al., 2013)

Interplay Between Externalising and Internalising Problems From Childhood to Adolescence

The findings from three TOPP studies shed light on the link between different types of early problem behaviour (e.g., childhood internalising and externalising problems, and adolescent smoking) and later symptoms of anxiety and depression.

First, Nilsen, Gustavson et al. (2013) examined the interplay between mother-reported problem behaviour in early childhood (ages 1.5, 2.5 and 4.5), middle childhood (age 8.5) and early adolescence (age 12.5) and the role of this behaviour in predicting adolescent internalising problems (ages 14.5 and 16.5). They found small to moderate homotypic and heterotypic pathways between internalising and externalising problems across the entire period. An overall pattern emerged in which externalising problems at almost all time points predicted subsequent internalising problems.

Moreover, early childhood (age 4.5) emerged as an important developmental stage in which externalising problems predicted self-reported adolescent internalising problems (Nilsen, Gustavson et al., 2013). Trajectory studies have shown that externalising problems become less normative from this age onwards (Cote, Vaillancourt, LeBlanc, Nagin, & Tremblay, 2006; Network, 2004), as those starting to be seen as having such problems then are more likely to have internalising problems later. There was a gender-specific path from middle childhood externalising problems (at age 8.5) to self-reported adolescent depressive symptoms for girls but not boys, suggesting that middle childhood may be a vulnerable time period specifically for girls. A possible explanation may be increased vulnerability for girls in the transition from kindergarten to school, when social interactions become more complex. Some findings do suggest that girls are more interpersonally vulnerable than boys (Rose & Rudolph, 2006) and higher levels of externalising problems have been found to be linked with interpersonal problems as well (Little & Garber, 2005). Another reason might be that externalising problems are less common in girls and less socially acceptable, and therefore might lead to rejection by peers as well as to internalising problems.

Second, Kjeldsen et al. (2016) identified different trajectories of externalising behaviour problems from early childhood (18 months) to late adolescence (age 14.5) and used these to predict internalising problems four years later. They reported that the High Stable trajectory of externalising behaviour problems across childhood and adolescence predicted internalising problems in emerging adulthood (age 19). Notably, gender-specific patterns also emerged in this study – only the boys in the High Stable externalising trajectory class had higher depressive symptoms later and only the girls in the High Stable class had elevated anxiety symptoms later. (See also Chapters 7 and 8 for more in-depth discussion of these findings in an externalising problem behaviour framework.)

Moving to predictors in adolescence, in the third study of externalising problems Moylan et al. (2013) examined the bidirectional relationship between tobacco smoking and internalising problems (e.g., anxiety) in adolescence and emerging adulthood. They found that smoking in adolescence predicted increased internalising problems in adulthood, but adolescent anxiety did not predict adulthood smoking. In addition, adolescent smoking increased the relationship between early childhood internalising problems and later anxiety in early adulthood. This indicates that smoking is not only a consequence of internalising problems, but might also be an exogenous risk factor altering the development of internalising problems. Thus, in addition to the known adverse health consequences of smoking, these findings highlight the importance of early smoking prevention and cessation to prevent subsequent internalising problems.

This set of findings from three publications underscores the influence of externalising problems on later internalising problems, a link which emerged when using variable-oriented methods (Nilsen, Gustavson et al., 2013) and person-oriented methods (Kjeldsen et al., 2016), and when using different ways of measuring externalising problems (Kjeldsen et al., 2016; Nilsen, Gustavson et al., 2013), as well as additional risk behaviours like tobacco smoking (Moylan et al., 2013). These results highlight the importance of taking a “whole person” approach rather than focusing on a single problem in isolation,

and support previous findings about the significance of this type of problem behaviour (Costello et al., 2011; Masten et al., 2005; Wiesner & Kim, 2006). Together, the findings suggest that: 1) the presence of externalising problems poses a risk for later internalising problems in particular stages of life (i.e., early and middle childhood); and 2) High Stable patterns of externalising behaviour problems across the entire childhood period predict internalising problems up to emerging adulthood.

Paths From Individual Characteristics to Adolescent Internalising Problems

The findings reported above deal with individual (externalising problems) predictors of internalising problems separately. However, the TOPP sample is particularly valuable because it has extensive data on individual, interpersonal and environmental factors over time, and thus can address the unique and combined roles of a wide range of predictors. Four publications based on the TOPP study have examined the links between two other individual characteristics, temperament and social skills, and subsequent internalising problems in adolescence (Karevold et al., 2011; Karevold et al., 2009; Karevold et al., 2012; Nilsen, Karevold et al., 2013). The publications focus on interpersonal skills (Nilsen, Karevold et al., 2013), interpersonal-oriented types of temperament (i.e., shyness and activity) and other temperamental traits (i.e., emotionality) (Karevold et al., 2011; Karevold et al., 2009; Karevold et al., 2012).

Karevold and colleagues (2009) found direct pathways from maternal-reported temperamental traits (emotionality and shyness) in middle childhood (age 8.5) to self-reported internalising problems in adolescence (age 12.5). They also found that the influence of family characteristics (maternal distress, family adversity and family social support) and temperament (shyness) on early adolescent internalising problems (age 12.5) was mediated through the trait of negative emotionality across early childhood (ages 1.5–8.5). Together all risk factors explained 25–38% of the variance in internalising problems in early adolescence.

Using growth-curve models, Karevold et al. (2012) identified trajectories of temperamental shyness from early to middle childhood (from ages 4.5) and found that both moderate stable levels of shyness as well as increases in shyness over time predicted adolescent internalising problems (age 12.5). These associations extend former findings by using multi-informant data and examining symptom levels, rather than diagnosed internalising disorders (Caspi, Moffitt, Newman, & Silva, 1996; Prior, Smart, Sanson, & Oberklaid, 2000). Despite small effect sizes, these findings demonstrate a continuous impact of shyness on internalising problems across childhood.

Nilsen, Karevold et al. (2013) examined associations between social skills and internalising problems during three points in adolescence. They report that low social skills predicted increases in depressive symptoms from ages 12.5 to 16.5. They found that low levels of friend support, but not teacher or parent support, could explain these increases in depressive symptoms in adolescent girls, but not boys. Supportive peer relationships might be particularly important for girls' internalising problems. In line with this, Karevold et al. (2011) also found gender-specific interactions in interpersonal-related temperament traits. They found that shy boys, but not girls, were protected by high activity levels from the development of internalising problems. This suggests that some boys may also be reactive to the stress related to social relationships (i.e., being shy), but that higher activity levels can protect them. In sum, while the interplay of social skills and friend support played a larger role for adolescent girls' internalising problems, the interplay between shyness and activity levels played a larger role for boys' internalising problems. This highlights the need for a gender-specific perspective when thinking about prevention.

Role of Familial Characteristics for Development of Internalising Problems in Adolescence

Four publications from the TOPP study examined the impact of familial factors such as parental mental health, family adversity and family social support for the development of internalising problems in ado-

lescence (Karevold et al., 2009; Nilsen et al., 2016; Nilsen, Gustavson et al., 2013; Nilsen, Karevold et al., 2013). Understanding the link between familial characteristics and internalising problems during adolescence can shed light on the dynamic nature of intergenerational transmission of mental health problems (Sameroff & Mackenzie, 2003).

Findings from three TOPP studies investigating the role of maternal symptoms of anxiety and depression (i.e., maternal distress) for subsequent adolescent internalising problems suggest there are certain vulnerable developmental stages. First, the early childhood years are one such vulnerable stage. Karevold et al. (2009) report that children who experienced early maternal distress (at age 1.5) had higher levels of internalising problems in early adolescence (age 12.5), even when adjusted for later exposure to maternal distress. Nilsen, Gustavson et al. (2013) extend this finding and show that maternal distress at age 1.5 predicted adolescent self-reported internalising problems at ages 14.5 and 16.5, even when adjusting for maternal distress experienced between ages 1.5 and 16.5. In addition, high levels of family adversity (e.g., finances, housing, illness in the family) and low levels of social support to mothers from family, friends and fathers in the early childhood years (ages 2.5 and 4.5) predicted later internalising problems (Karevold et al., 2009). Second, middle childhood (age 8.5) appears to be another vulnerable period, with findings indicating that experiencing maternal distress in the early and middle childhood years had long-term implications for the subsequent development of internalising problems (Nilsen, Gustavson et al., 2013).

A further TOPP finding is that having mothers with persistent levels of distress, both high and moderate, across the entire childhood period (ages 1.5 to 12.5) predicted higher internalising problems in emerging adulthood (ages 18–20 years) (Nilsen et al., 2016). Thus, the TOPP study findings indicate that especially early but also cumulative experience of maternal distress has long-term implications for children's internalising problems.

With regards to gender differences, both early and cumulative maternal distress had an effect on girls' and boys' internalising problems throughout development (Karevold et al., 2009; Nilsen et al., 2016; Nilsen, Gustavson et al., 2013). As noted above, several earlier findings indicate that girls are more vulnerable to maternal depression in adolescence (Goodman & Gotlib, 1999; Goodman et al., 2011), while boys are more vulnerable early in life (Tronick & Reck, 2009). Our findings may reflect the gender-egalitarian culture of Norway, which may lead to girls and boys reacting similarly to maternal distress. They are also in line with some findings of few or no gender differences concerning predictors of depression (e.g., Bureau et al., 2009; Spence et al., 2002). Findings by Karevold et al. (2009) did, however, indicate that more variance was explained by early risk factors (maternal distress, family adversity and social support) in the internalising problems of adolescent boys (38 %) compared to girls (25 %).

The findings from the TOPP study also suggest different mechanisms by which maternal distress affects adolescents' internalising problems. First, Karevold et al. (2009) found that the pathways from early maternal distress to internalising problems in adolescents at age 12.5 were mediated through family adversity. This is in line with earlier studies using the TOPP data which reported links between family adversity and social support and distress in mothers in the early childhood years (Mathiesen, Tambs, & Dalgard, 1999; Nærde, Tambs, & Mathiesen, 2002; Nærde, Tambs, Mathiesen, Dalgard, & Samuelsen, 2000). Second, the TOPP data also indicate that individual characteristics and behaviours, such as early problem behaviour (Nilsen, Gustavson et al., 2013) and temperament (Karevold et al., 2011; Karevold et al., 2009), are mechanisms through which maternal distress predicts adolescent internalising problems.

In total, the findings provide a more nuanced understanding of the impact of maternal distress in early and middle childhood (Karevold et al., 2009; Nilsen, Gustavson et al., 2013). 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 in adolescent depressive symptoms indirectly, over and above later experience of maternal distress. Maternal distress in pread-

olence, the most proximal measure, surprisingly did not predict adolescent depressive symptoms. Thus, we may speculate about whether the long-term effects of maternal distress in the first years of life are an indication of the heritability of depression (i.e., genetic mediation) or a specific vulnerable period for the development of problem behaviour (i.e., environmentally mediated).

Our findings also lend some support to previous suggestions that middle childhood is another period of particular vulnerability to maternal distress (Huston & Ripke, 2006). In middle childhood, the transition to school can be stressful with new social and academic challenges, and maternal distress at that time point may limit the support that the child receives in coping with these. In addition, children at this age often still spend a lot of time at home and are more reliant on their parents for support.

These findings suggest that intervening early to prevent maternal distress and family adversity and to enhance social support for mothers experiencing symptoms of anxiety and depression could stop a cascade of increasing childhood emotional problems leading to the development of adolescent internalising problems.

Conclusions, Discussion, and Implications

There are several noteworthy theoretical implications of the TOPP study findings on the prediction of internalising problems. First, the results highlight the importance of examining the complex interplay between variables in their prediction of adolescent internalising problems. Predictive associations were evident even when there were changes in informants on internalising problems (e.g., from early to middle adolescence) and changes in instruments to capture different manifestations across development (e.g., from early to middle childhood and adolescence). These studies also treated the internalising data in various ways: sometimes using multi-informant reports, sometimes mother reports and sometimes self-reports; sometimes analysing symptoms of anxiety and depression separately and sometimes aggregated, and at times combining scores from two time points. Despite all these variations, the findings generally reveal similar associations and most of the findings of associations are gender-universal.

The findings suggest that there may be vulnerable periods for being exposed to factors which act as predictors of later internalising problems. While familial characteristics such as maternal distress and family adversity are potent predictors in early and middle childhood (Karevold et al., 2009; Nilsen, Gustavson et al., 2013), temperamental traits are powerful predictors when measured at the same developmental period (Karevold et al., 2011; Karevold et al., 2012). In addition, the three studies using person-oriented methods to examine trajectories of risk factors across childhood and subsequent internalising problems indicate that experiencing high, stable, adverse patterns of maternal distress, externalising problems and shyness was predictive of subsequent internalising problems for children (Karevold et al., 2012; Kjeldsen et al., 2016; Nilsen et al., 2016). This underscores the importance of both specific vulnerable stages and prolonged exposure to risk, and hence reinforces the importance of examining predictors of depressive symptomatology across multiple developmental stages.

Supporting the concept of equifinality (i.e., that different factors can lead to the same outcome (Cicchetti & Rogosch, 2002), we found direct pathways from several different risk factors (individual, familial and contextual) to internalising problems (Karevold et al., 2009; Kjeldsen et al., 2016; Moylan et al., 2013; Nilsen, Gustavson et al., 2013; Nilsen, Karevold et al., 2013). The findings together illustrate the need to adopt an integrative perspective that pays attention to possible mediational mechanisms and moderation patterns between several risk factors measured at different time points throughout development.

There are some translational suggestions derived from current findings about possible intervention and prevention efforts to reduce the development of internalising problems. Although more research is needed on the mechanisms lying behind the relationships found, the results suggest three main areas for treatment and intervention, considering *who*, *when* and *where* to intervene.

First, since mothers' distress has both short-term and long-term impacts on children's problem behaviours, it is very important to target depressed mothers with effective treatment and support. Since this link is found for both girls and boys throughout different developmental stages, it seems a particularly salient risk factor. Clinicians and health personnel should adopt an integrative perspective where mothers are assessed when children display emotional symptoms, and vice versa. The link between maternal distress and child problem behaviour should be emphasised more strongly in the community, to encourage low-threshold interventions for mothers with high levels of psychological distress. The current findings suggest that early and middle childhood could be important time points for such interventions.

Second, the findings indicate a need to identify emerging problems in children and adolescents as early as possible. There is a heightened probability for adverse long-term internalising problems for children experiencing externalising problems. A large majority of young children go to kindergarten/daycare/school¹ and it is important to train kindergarten personnel in how to recognise both internalising and externalising problems. Externalising problems, in contrast to internalising problems, are more easily identified and tracked, and kindergarten and health care personnel should therefore be aware of the connections between these two types of problem behaviours.

Third, the significant association between low social skills in early adolescence and depressive symptoms in later adolescence underlines the importance of including social skills training in programs designed to prevent the development of depression. As the findings suggest, girls are more interpersonally vulnerable and shy boys benefit from higher activity levels, so preventive programs should include planning on how to make tailored efforts to meet the needs of adolescent girls and boys in optimal ways.

Finally, intervening in early childhood may be difficult in some cultures where the child is not closely connected to any social institutions, given that young children are not likely to ask for help themselves. However, in Norway the majority of children attend public health clinic visits during the four first years of childhood,² and this is an important arena for detection of and intervention with problems, especially when they involve maternal distress, and most go to kindergarten/daycare/preschool from age 1, another important arena for detection of and intervention with problems. Thus, intervention and prevention at health clinics and kindergartens have the potential to reach many of those in need.

Few longitudinal studies follow individuals from early childhood to adolescence and the TOPP findings here illustrate the value of doing so. More studies examining how depressive symptomatology develops across this period would be valuable. Furthermore, the ideal study would extend from toddlerhood into adulthood. Such data would provide valuable information about predictors and mechanisms in the development of depression that could be used in early intervention. We hope the TOPP study will be able to provide such data in the future.

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

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

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