‘Let us recognize that there can be no Health without Mental Health’

UN Secretary-General Ban Ki-moon 2008
INTRODUCTION

The thesis was based on data from the TRAILS research project, a longitudinal prospective multidisciplinary study of the development of mental health problems from childhood into early adulthood in the north of the Netherlands. Four aspects of the links between family socio-economic position (SEP) and mental health were examined in a general population cohort of adolescents. In this last chapter, the main findings and conclusions, strengths and limitations, discussions of main findings, implications and summaries in Dutch are given.

Main findings and conclusions

Specifically, four possible links between family SEP and mental health problems were examined in early adolescents: 1) the domain-specific link, 2) the mediation link, 3) the interaction link, and 4) the link with specialist mental health service use.

The study on the domain-specific link (chapter 2) aimed to assess whether family socio-economic risks for mental health problems was similar for the internalizing and externalizing problem domains. We found that family socio-economic risks for mental health problems were larger for externalizing than for internalizing problems. Further, when internalizing and externalizing problems were adjusted for each other, the association of family SEP with internalizing problems attenuated to non-significance while the relation between SEP and externalizing problems remained markedly strong.

The mediation link was assessed by quantifying the extent to which environment-related and person-related life stressors mediated the relations between family SEP and mental health problems differently (chapter 3). The results showed that environment-related, but not person-related life stressors partly mediated the association of family SEP with mental problems in early adolescents. Further, the extent of mediation was larger for internalizing than for externalizing problems.

The interaction link was investigated by assessing whether the synergy between low family SEP and familial psychopathology would confer additional risks of mental health problems on adolescent offspring (chapter 4). This link was examined within the framework of two competing theories: the “social push” (Raine, 2002) and the “vulnerability” (Shanahan, Hofer, 2005; Plomin, Rutter, 1998) hypotheses. The theory behind the “social push” hypothesis is that genetic effects (e.g. including parental loadings on psychopathology) are stronger in contexts with low environmental risks (e.g. high SEP). On the contrary, the “vulnerability” hypothesis postulates that genetic effects are stronger in high risk environments (e.g. low SEP). The results showed that the
combination of low family SEP environment and high loading on psychopathology appears not to confer any significant additional risks of mental health problems in adolescent offspring. Parental psychopathology and low family SEP may be independent and non-interacting risk factors for offspring mental health problems during early adolescence. Hence, the data in this age group support neither the social push nor vulnerability hypothesis.

Finally, the link to mental health service use was assessed by examining whether the effects of different indices of family SEP on mental health service use existed independent of severity of offspring mental health problems (chapter 5). The analyses revealed that without adjustment for severity of mental health problems, the true association between family SEP and mental health service use is underestimated in early adolescents. This became evident when univariate analyses of SEP indices did not significantly predict mental health service use but when severity of mental health problems was accounted for in multivariate analyses, the effects of all SEP indices accentuated. In a separate analysis with all indices of SEP simultaneously included in the same model, specialist mental health service use increased with higher maternal education independent of severity of offspring mental health problems.

**Strengths**

The studies in this thesis have a number of strengths. First, we used data from a large representative population cohort. Our family SEP measure was robust and reliable and included multiple indicators of SEP directly obtained from parents. It has been suggested that reports on family SEP obtained directly from parents is more reliable than reports on family SEP obtained from the offspring (Wardle, Robb, & Johnson, 2002). Secondly, we studied the influence of family SEP on mental health using a study population of adolescents, thus reducing the likelihood that the associations with family SEP are confounded by reciprocal influences of mental health because at this age, it is unlikely that children’s mental health influences family SEP (Wadsworth, Achenbach, 2005). Third, data on mental health were obtained from multiple informants, thus limiting rater and information biases and increasing precision (Verhulst, Koot, Van der Ende, 1994). Fourth, we distinguished between environment-related and person-related life stressors to gain insight into specific pathways through which family SEP influences adolescent mental health. Lastly, we used multiple imputation techniques to address the problem of missing data, particularly common in longitudinal studies with multiple informants (Donders, Heijden, Stijnen, Moons, 2006).

**Limitations**

There were limitations too. First, our cross-sectional design made it impossible to determine whether the effects of SEP regarded the incidence of mental health problems, their duration, or both. Second, we used retrospective reports of life stressors (chapters 3), which may be prone to
recall bias. To limit this potential bias, we used the number rather than perceived severity of life stressors in our analyses. Third, contextual information (e.g. based on interviews) is required to rate life stressors as environment-related or person-related (Kendler, Karkowski, Prescott, 1999; Brown, Harris, 1978). Unfortunately, our data did not include the contextual information for rating whether the life stressors were environment-related or person-related as precisely as in studies based on interviews (Brown, Harris, 1978; Ormel & Wohlfarth, 1991; Kendler, Karkowski, Prescott, 1999). Finally, regarding the measure of familial loading on psychopathology, only one parent (often the mother) was interviewed directly, and this parent was used to obtain information on the other parent not interviewed (Ormel, Oldehinkel, Ferdinand, et al., 2005). Although evidence on the disadvantage of using family history interviews as compared to direct interviews of relatives inconclusive and generally associated with underreporting of lifetime parental psychopathology. However, possible misclassification of parental psychopathology was most probably independent of the offspring mental health and therefore unlikely to have substantially affected the associations.

Finally, our measure and construction of SEP might have been limited for a number of reasons. To start with, it was not possible to take into account any changes in family SEP across the follow-up period because family SEP was assessed only at baseline. Furthermore, in conducting studies using a composite measure of SEP, we acknowledge that, although individual measures of SEP may be correlated with each other, they are not interchangeable because they may be linked to different etiological mechanisms (Geyer, Hemstrom, Peter, Vagero, 2006; Shavers, 2007; Lahelma, Laaksonen, Martikainen, Rahkonen, Sarlio-Lahteenkorva, 2006). Our interest was not in the unique influences of the different indices of SEP but in a global insight into the contextual family socio-economic risks for mental health problems in pre- and early-adolescents. The only way to do this was to get as much information as possible about the adverse social conditions of the family by constructing an aggregate measure of SEP.

**Discussion of the main findings**

The first study yielded two main findings. First, the associations of family SEP with mental health is larger for the externalizing than internalizing problem domain. This finding concurs with previous studies suggesting that contextual family risk factors such as SEP that affect the immediate physical and social environment of the child are associated more with externalizing than with internalizing problems (Atzaba-Poria, Pike, Deater-Deckard, 2004; Fendrich, Warner, Weissman, 1990). The second finding indicates that SEP relations with internalizing problems may be partly explained by shared variance with externalizing problems because internalizing and externalizing problems are known to co-occur in adolescents (Burkes, Loebner, Lahey, Rathouz, 2005; Capaldi, Stoolmiller, 1999; Verhulst, van der Ende, 1993). This formed the rationale to adjust internalizing problems for externalizing problems and vice versa in all subsequent studies.
described in this thesis. Although the effects of family SEP on mental health are larger for externalizing problems, the developmental pathways through which family SEP influences mental health problems are complex and multifold (Kendler, Gardner, Prescott, 2002). The pathway to internalizing problems may be through externalizing behaviors. For example, it is suggested that disruptive behaviors can trigger rejection and low social support, thus resulting in worries, anxiety, and subsequently into depression (Burkes, Loeber, Lahey, Rathouz, 2005; Capaldi, Stoolmiller, 1999).

The relations between family SEP and mental health were found to be partly mediated by environment-related but not person-related life stressors. The extent of mediation was larger for internalizing than externalizing problems. This difference could be because family SEP provides the environmental context in which the adolescents are raised and is therefore particularly likely to determine the exposure to environment-related stressors (Evans, 2004). Person-related life stressors, on the other hand, are associated more with personality characteristics such as low self-esteem, shyness, and inadequate social skills (Ormel, Wohlfarth, 1991) rather than family characteristics such as family SEP. These personal characteristics may be less dependent on SEP than the environmental characteristics. The stronger mediation for internalizing problems can be explained by stronger associations of both environment- and person-related life stressors with internalizing problems compared to externalizing problems. This is consistent with previous research suggesting comparable dissimilarities between internalizing and externalizing problems (Grant, Compas, Thurm, et al, 2006; Kendler, Kessler, Walters, et al, 1995).

Low SEP and parental psychopathology did not interact to predict additional mental health problems for offspring in our study. There was no evidence that the presence of both parental psychopathology and low family SEP produced additional mental health problems. It is possible that the absence of interaction is specific for early adolescence and that interaction does not develop until adulthood. However, our findings should not to be interpreted as disagreeing with the evidence for gene-environment interaction (Tuvblad, Grann, and Lichtenstein, 2006; Kendler, Kuhn, Vittum, Prescott, Riley, 2005). This is because our measure of familial loading on psychopathology might be reflecting both genetic and environmental susceptibility to psychopathology.

We are aware of only one study that considered whether familial risk for adolescent mental health problems varies with environmental contexts such as low family SEP: a Swedish longitudinal population-based twin study (TCHAD) which showed that family SEP modified the influence of genetic factors on antisocial problems in adolescents (Tuvblad, Grann, Lichtenstein, 2006). Unlike in our study, antisocial problems in the TCHAD study were not adjusted for co-morbid emotional factors. The TCHAD study used educational level, occupational status, and neighborhood socio-
economic conditions as indicators of SEP, and based its assessment of antisocial behavior on property, drug-related, and violent offences. In this thesis, SEP included family income and both parents’ education and occupation. It is possible that neighborhood SEP (ethnic diversity and neighborhood basic education, unemployment, and crimes) predicts antisocial offences better than the individual measures of SEP used in this thesis. Lastly, the sample in this thesis were early adolescents (mean age 13.6 years, SD 0.53) while the TCHAD study participants were aged 16-17 years.

A final important finding of this thesis was that severity of mental health problems obscured the true association between family SEP and specialty mental health service use. When mental health problems were added to the regression of specialty mental health service use on family SEP, the association with SEP indices increased. In other words, that children from high-SEP families had, on average, fewer problems than children from low-SEP families obscured the fact that children from high-SEP received more mental health services, given a certain level of mental health symptoms than children from low SEP families. Another important finding was that, independent of all other indices of SEP and severity of mental health problems, maternal education strongly predicted specialty mental health service use. Mother’s education may be associated with increased mental health literacy, favorable attitudes, and fewer stigmas to mental problems (Riedel-Heller, Matchinger, Angermeyer, 2005). Moreover, it is possible that educated mothers are not only able to recognize mental problems better than their less educated counterparts but also to search for information about mental problems and communicate more clearly with health workers about their children’s mental health (Chen, Li, 2009). Generally, most young people find it easier to talk to their mothers than to their fathers. Yet good communication at home with both mothers and fathers is suggested to be important for promoting the mental well-being of children (Pederson, 2004). In addition, lack of association of father’s education with specialty mental health service use may reflect the tendency of fathers to devote less time to childcare than mothers (Chen, Li, 2009).

The findings of this thesis regarding predictors of mental health service use agree with results from some previous studies (Zahner et al., 1992; John, Offord, Boyle, Racine, 1995; Pumariega, Glover, Holzer, Nguyen, 1998). On the contrary, Verhulst and Van der Ende (1997) and Laitinen-Krispijn, van der Ende, Wierdsma, and Verhulst (1999) reported that family SEP was not associated with help-seeking, but they used the parent with the highest level of education and highest occupation status as SEP indices. In majority of cases, fathers have the highest level of education and occupation. In this respect, their findings are similar to the ones in this thesis because we did not find an effect of paternal education on service use either.

Generally, the effects of the associations between family SEP and different mental health dimensions remained modest (< 5%) for all outcomes, though slightly higher than in previous
studies (Achenbach, Verhulst, Baron, Akkerhuis, 1987; Achenbach, Verhulst, Edelbrock, Baron, Akkerhuis, 1987). This slightly higher effect of SEP could have been because our measure of SEP based on parents’ education, occupation and family income, explained more variance in mental health than studies that relied on either fathers’ occupation only (Achenbach, Verhulst, Baron, Akkerhuis, 1987) or only family income (Costello, Compton, Keeler, Angold, 2003; Tracy, Zimmerman, Galea, McCauley, Stoep). We also used multiple informants to report on mental health of the participants. It is possible that our aggregate measure of SEP explained more variance for mental problems robustly assessed by multiple informants than mental health problems assessed by only one informant. Moreover, our study registered a high response rate and success in recruiting families often difficult to recruit (De Winter, Oldehinkel, Veenstra, et al. 2005).

Implications and recommendations for future research

The link between low family SEP and mental ill-health is still poorly understood. There is substantial need for future research to focus on the mechanisms by which low SEP results into impaired mental health. The studies in this thesis showed relatively small associations of SEP with mental health outcomes during early adolescence. Although the relative inequalities were small (as measured by the effect sizes of family SEP on mental health), previous studies have suggested that the negative associations of low SEP with health outcomes may be cumulative (Mheen van de, Stronks, Mackenbach, 1998; Kahn, Fazio, 2005; Dohrenwend, 1990). Since pre- and early adolescence is still at the beginning of the life-course, small SEP differences in early life may give rise to increasing differences later in the life-course and thus important from a public health point of view. Therefore, interventions to ameliorate the negative effect of low SEP in families are still a worthwhile effort. Longitudinal research within the framework of a life-course approach is needed to evaluate the cumulative effects of low family SEP. Since adolescents do not have their own SEP yet, it would be useful to take family SEP as a context to assess the development of mental health problems in offspring within the framework of a life-course perspective. For example, low family SEP may lead to mental problems in early adolescents, mental problems in adolescents, in turn, may interfere with adolescents’ ability to gain high SEP in future, for example because of truncated schooling, and as a consequence, further mental health problems, etcetera (Mheen van de, Stronks, Looman, et al. 1998; Kahn, Fazio, 2005).

The results of the studies in this thesis, especially the low effect size of SEP on mental health outcomes, may have implications for the measurement of SEP. Although traditional indices of SEP such as education, occupation, and income are frequently used, other measures such as neighborhood socio-economic status, the Family Affluence Scale (Currie, Elton, Todd, Platt, 1997) and the Home Affluence Scale (Wardle, Robb, Johnson, 2002) have been used as well, with
conflicting results. Future research should invest in the development of a standard definition and taxonomy that can capture the notion of SEP more accurately. This will make research findings more comparable and policies easier to make.

The finding that environment-related life stressors and not person-related life stressors mediate the association of family SEP with mental health may be of public health and theoretical importance. From a broader public health perspective, the findings suggest that interventions are more likely to be effective when focused on the environment of the child rather than on the child itself. Theoretically, it may be important for future studies to conduct research on the mediating roles of environment- and person-related life stressors. Identifying those with underlying vulnerabilities and environmental risks such as parental psychopathology or a difficult temperament may be important for prevention and intervention programs. Although the combination of low SEP and parental psychopathology did not confer additional risk beyond their main effects, this does not mean that family SEP does not provide the environmental context that makes adolescents susceptible to mental problems.

Further studies are required for adolescents from low SEP background with concurrent vulnerabilities. The results of the study on specialist mental health service use point to the need to account for severity of mental problems while assessing the influence of family SEP on service use. Likewise, caution should be taken while interpreting studies based on routinely collected data such as medical records. Further, the unique influence of maternal education on specialist mental health service use underscores the importance of mental health literacy in parents, especially mothers with low education, with regard to detecting signs of mental health problems and the need for help-seeking.

Summary

Mental health is fundamental to good quality of life and contributes to success in society. Healthy and confident children are more likely to turn out into healthy, confident and productive adults, who in turn contribute to the health and well-being of their societies (Rao, 2001). Low family SEP may have negative consequences for child and adolescent mental health. However, little is known about the link between low family SEP and mental ill-health. This thesis examined four aspects of this link in pre- and early adolescents: 1) the domain-specific link, 2) the mediation link, 3) the interaction link, and 4) the link with specialty mental health service use. The link between family SEP and mental health was found to be larger for the externalizing than internalizing problem domain. Regarding the mediation link, the SEP-mental health relationship was partly mediated by environment-related life stressors, particularly for internalizing problems. The interaction link showed that familial loading on psychopathology and low family SEP was
independent and non-interacting risk factors for offspring mental health problems. Finally, the link with specialty mental health services demonstrated that the true association between family SEP and specialty mental health service use was obscured by severity of mental problems. Maternal education, even when corrected for all the other indices of SEP and severity of mental health problems, was significantly associated with increased use of mental health services. In conclusion, in pre- and early adolescents, the effect of low family SEP on mental ill-health may be domain-specific and partly mediated by environment-related life stressors particularly for internalizing problems. Lower levels of family SEP appear not to confer additional risks for mental health problems in offspring of parents with high loading on psychopathology. Finally, severity of mental health problems appear to obscure the true associations between different indices of family SEP and specialty mental health service use.

**Samenvatting (Summary in Dutch)**

Geestelijke gezondheid is fundamenteel voor een goede kwaliteit van leven succesvol maatschappelijk functioneren. Gezonde en zelfverzekerde kinderen zullen waarschijnlijk uitgroeien tot gezonde en zelfverzekerde volwassenen die op hun beurt bijdragen aan het welzijn binnen hun gemeenschap (Rao 2001). Ongunstige gezinssituaties zoals een lage sociaal-economische positie (SEP) kunnen negatieve gevolgen hebben voor de geestelijke gezondheid (GG) van kinderen en adolescenten. Er is echter weinig bekend over het verband tussen een lage sociaal-economische positie van een gezin en de geestelijke gezondheid. In dit proefschrift worden vier aspecten van dit verband onderzocht 1) het domein-specifieke verband, 2) mediatoren van het verband; 3) interactie tussen risicofactoren en 4) het verband met het gebruik van specialistische geestelijke gezondheidszorg (GGZ).

Het verband tussen lage SEP en GG was sterker voor het domein “externaliseren van problemen” dan voor het domein “internaliseren van problemen”. De relatie tussen SEP en GG werd deels gemedieerd door stressoren die omgevingsgebonden waren. Dit gold met name voor het internaliseren van problemen. Familiair voorkomen van psychopathologie en een lage SEP waren onafhankelijke risicofactoren voor internaliserende en externaliserende problemen bij de adolescenten en er was geen interactie. Dit betekent dat er geen evidentie was voor de “social push” hypothese die stelt dat genetische factoren meer tot uiting komen in een risicoarme omgeving. Het betekent ook dat er voor het omgekeerde, dat genetische factoren en risico’s verbonden aan de omgeving elkaars effecten versterken, de “vulnerability” hypothese, geen aanwijzingen waren.

Tenslotte werd er alleen een positief verband tussen SEP en het gebruik van specialistische geestelijke gezondheidszorg gevonden wanneer rekening werd gehouden met de ernst van de
geestelijke gezondheidsproblemen. De opleiding van de moeder was een significante voorspeller van het gebruik van specialistische GGZ en was onafhankelijk van andere factoren van SEP en de ernst van de geestelijke gezondheidsproblemen.

Concluderend kunnen we zeggen dat het effect van een lage SEP op de geestelijke gezondheid domein-specifiek is en deels gemedieerd wordt door omgevingsgebonden stressoren bij adolescenten. Een lage SEP lijkt een onafhankelijk risico te vormen voor het ontstaan van geestelijke gezondheidsproblemen bij kinderen van ouders met familiair voorkomen van psychopathologie. Wanneer niet gecorrigeerd wordt voor de ernst van de geestelijke gezondheidsproblemen wordt het ware verband tussen SEP en specialistische GGZ in de vroege adolescentie gemaskeerd. De effecten van SEP op de GG mag relatief klein zijn maar de negatieve consequenties kunnen cumulatief en aanhoudend zijn. Daarbij komt dat kleine verschillen in SEP in de vroege jeugd uit kunnen groeien tot grote verschillen later in het leven. Daarom zouden grootschalige interventies om de negatieve effecten van een lage SEP op de GG te beperken een maatschappelijk waardevolle investering kunnen zijn.