Mental health during childhood and adolescence is fundamental to good quality of life and contributes to future success in society. Healthy and confident children are more likely to turn out into healthy, confident and productive adults. For all human beings, the family is the first port of call. Thus, family characteristics such as socio-economic position (SEP) may be linked to offspring mental health. This thesis investigates this link. The following links are specifically studied: the differential effects of SEP on particular domains of mental health problems (the domain-specific link), mediation by different life stressors of the relations of SEP and mental health (the mediation link), the interaction by SEP of the relation between parental psychopathology and offspring mental health (the interaction link), and the link with mental health service use. The findings are presented and their implications for future research and public health are discussed.

Kennedy P’Olak Amone conducted his PhD research at the Interdisciplinary Centre for Psychiatric Epidemiology of the University Medical Centre, Groningen. His PhD project was part of the TRacking Adolescents’ Individual Lives Survey (TRAILS), a multidisciplinary prospective cohort study of pre-adolescents aimed at charting the trajectory of mental health problems from childhood to early adulthood.

Examining the link between Socio-economic Position and Mental Health in Early Adolescents

Kennedy P’Olak Amone
The PhD project was sponsored by the Graduate School of Behavioral and Cognitive Neurosciences through the Ubbo Emmius scholarship programme. The thesis was printed with financial support from the Graduate School of Behavioral and Cognitive Neurosciences (BCN) with additional funding from the University of Groningen.

The studies in this thesis are embedded in the Tracking Adolescents' Individual Lives Survey (TRAILS) study. TRAILS is a multidisciplinary prospective cohort study of Dutch pre-adolescents aimed at charting the trajectory of mental health problems from childhood to early adulthood. Participating centers of TRAILS include various departments of the University Medical Center and University of Groningen, the Erasmus University Medical Center Rotterdam, the University of Utrecht, the Radboud Medical Center Nijmegen, and the Trimbos Mental Health Institute, all in the Netherlands.

PhD study period

Begin date: December 1, 2005
End date: December 1, 2009

Printed by: Uitgeverij BOX Press, Oisterwijk Tilburg, The Netherlands
Cover design by: Uitgeverij BOX Press with original idea from the author

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Experiencing the link between Socio-economic Position and Mental Health in Early Adolescents

Proefschrift

ter verkrijging van het doctoraat in de Medische Wetenschappen aan de Rijksuniversiteit Groningen op gezag van de Rector Magnificus, dr F. Zwarts, in het openbaar te verdedigen op maandag 16 november 2009 om 13:15 uur

door

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geboren op 28 maart 1968
te Kampala, Uganda
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                        Prof. dr. K. Stronks - University of Amsterdam
                        Prof. dr. W. A. M. Vollebergh - Utrecht University
I dedicate this thesis to my mother - Mrs. Lakeri Atto Olak

Who worked so hard to enable her children have the best start in life,

my uncles

Esau E. Langoya-Okwera and the late Nelson Okeny Ameda (RIP)

Both of whom made sure I completed my secondary school education,

and my father

Mzee Manaseh Kennery Olak
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ABBREVIATIONS

MH = Mental health problems
SEP = Socio-economic position
ERLS = Environment-related life stressors
PRLS = Person-related life stressors
SMHS = Specialist mental health service use
GP = General Practitioner

Para nymphs: Andrea Prince
Martin Paul Bakker
‘An imbalance between the rich and poor is the oldest and most fatal ailment of all republics’

Plutarch (AD 46-122)

Greek historian, biographer, and essayist
INTRODUCTION

Epidemiological data estimate the worldwide one-year prevalence of child and adolescent mental disorders at approximately 23% (WHO, 2005). In the Netherlands, approximately 20% of boys and 23% of girls are reported to have had an emotional and/or behavioral disorder in the previous six months (Vollebergh, Van Dorsselaer, Monshouwer, Verdurmen, Van der Ende, & Ter Boght, 2006; Schneiders, Drukker, Van der Ende, Verhulst, Van Os, Nicolson, 2003). Mental health, especially during adolescence, is fundamental to good quality of life and contributes to future 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). In childhood and adolescence, difficulties associated with mental health such as functional impairment, poor performance in school, substance and drug abuse, and conflicts with authority can impede upward social mobility (Miech, Caspi, Moffit, Wright, & Silva, 1999; Link, Lennon, & Dohrendwend, 1993; Due, Lynch, Holstein, & Modvig, 2003) and may eventually lead to a low socio-economic position (SEP). For example, children may drop out of school or have truncated education due to mental health problems.

Mental health problems in children and adolescents tend to persist into adulthood (Kessler, Bergland, Demler, Jin, Merikangas, & Walters, 2005; Costello, Foley, Angold, 2006; WHO, 2005; Visser, Van der Ende, Koot, & Verhulst, 2000; Hofstra, Van de Ende, & Verhulst, 2001). About 50% of mental disorders in adults are known to begin before the age of 14 (WHO, 2008). Because of the continuum with adult mental disorders, childhood and adolescent mental health problems form a major public health problem. Consequently, research on determinants of mental health and disorders in childhood and adolescence can contribute to understanding of and interventions aimed at preventing disorders not only during childhood and adolescence but in adulthood as well.

Biological, individual, environmental, and family characteristics all contribute to differences in mental health (European Commission, 2005; WHO, 2003). Particularly in childhood and early adolescence, family characteristics such as socio-economic position (SEP) may influence mental health because of the important role of the family in the immediate social environment at this developmental stage. In childhood and early-adolescence, parental SEP is the most informative socio-economic measure because the children and adolescents have not yet acquired their own individual SEP. Although family SEP is associated with offspring mental health, the link remains poorly understood.

The main goal of this thesis is to address the link between family SEP and mental health problems in early adolescents. The aims were four-fold: (1) to explore whether the links were specific to particular domains of mental health problems (i.e. internalizing versus externalizing problems), (2)
to study the mediation of these links by different types of life stressors (environment-related versus person-related), (3) to investigate the synergistic effects of family SEP and familial psychopathology on offspring mental health, and (4) to assess whether family SEP and symptoms of mental health problems independently predict the use of specialty mental health services.

In this introductory chapter, the concept of SEP, the link between SEP and different dimensions of mental health problems, and the challenges of researching the link between SEP and mental health are described. At the end of the chapter, the aims of the current thesis are outlined in more detail and a brief description of the TRAILS research project, in which this thesis is embedded, is given.

The concept of socio-economic position (SEP)

Socio-economic position has been defined as “the relative position of a family or individual on a hierarchical social structure, based on their access to or control over wealth, prestige and power” (Mueller and Parcel, 1981). Miech and Hauser (2001) broadened this definition to a concept that refers to “the placement of persons, families, households and census tracts or other aggregates with respect to the capacity to create or consume goods that are valued in our society.” Both definitions underscore the view of SEP as a multidimensional construct comprising diverse indicators related to economic resources, power, and/or prestige (Braveman, Cubbin, Egerter, et al., 2005).

The multidimensionality of SEP and related measurement issues make it a difficult concept to unravel. First, different measures of SEP such as income, education, and occupation (Bradley, Corwyn, 2002; Ensminger, Fothergill, 2003) are commonly used in contemporary research. Mostly derived from employment, income is associated with material well-being and ability to consume goods and services required for a healthy life. Occupation is related to status and power and also an indicator of working conditions and health. Education represents knowledge and skills, attitudes, and values that can shape health-related behaviors (Conger, Donnellan, 2007; Lahelma, Laaksonen, et al., 2006). Education, income, and occupation are positively correlated (Ensminger, Fothergill, 2003). Second, the different indices of SEP show different levels of stability across time and may predict family processes differently (Duncan, Magnuson, 2003; Ensminger, Fothergill, 2003; Kuh, Ben-Shlomo, 1997). More specifically, education is reported to be more stable than occupation or income (Shavers, 2007). Third, there may be interrelationships in the pathways between and among measures of SEP in relation to outcomes (Lahelma, Laaksonen, Martikainen, Rahkonen, Sarlio-Lahteennkorva, 2006). Full time employment, for example, may promote health through economic well-being resulting from income accrued from the employment. Fourth, the nature and time sequence may be different for different indicators of SEP (Lahelma, Laaksonen,
Martikainen, Rahkonen, Sarlio-Lahteenkorva, 2006). For example, low parental educational status may result in a decreased health-related quality of life for offspring, and subsequently, reduced access to material goods may lead to a lower health-related quality of life for the offspring (Rueden, Gosch, Rajmil, Bisegger, Ravens-Sieberer, 2006). Lastly, the effects of low SEP-related physical, material, social, and psychological adversities may act cumulatively during the life course (Kuh, Ben-Shlomo, 1997; Mheen van de, Stronks, Mackenbach, 1998).

Using an overall index of SEP may provide insights into the overall socio-economic disadvantage of the family. Aggregate measures of SEP can also provide complementary information on exposure of children and early adolescents to social conditions such as violence or environmental hazards and access to leisure activities in a family. However, this view is not without limitations: 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; Araya, Lewis, Rojas, Fritsch, 2003). This thesis aimed to capture the overall SEP of the family and sought to use aggregate measure of SEP that would robustly provide complementary information on the global social conditions of children and adolescents in the family context.

The link between family SEP and mental health problems

Already in 1855, the epidemiologist Edward Jarvis implicated low SEP in the prevalence of psychiatric disorders in his seminal work Insanity and Idiocy in Massachusetts (Jarvis, 1855). Jarvis reported that, compared to those in the upper class, the poor were 64 times more likely to experience insanity. Today, almost two centuries after Jarvis, substantial evidence has accrued that low SEP is associated with increased occurrence of psychiatric disorders among children, adolescents, and adults (Costello, Angold, Burns, 1996; Kessler, Foster, Saunders, Stang, 1995; Robins, Regier, 1991; Dohrenwend, Levava, Shrout, et al. 1992). Studying the influence of family SEP on child and adolescent mental health is vital, since the family is a conduit for SEP influences on offspring mental health (Rowe & Rodgers, 1997; Repetti, Taylor, Seeman, 2002).

Several mechanisms may be involved in the association between SEP and mental ill-health as indicators such as income, occupation or education do not directly cause mental ill-health. The indicators may be markers of more proximal risk factors, mediators, and moderators (Essex, Kraemer, Armstrong, et al., 2006; Felner, Brand, Dubois, Adan, Mulhall, Evans, 1995), among which are behavioral factors, material and structural inequities, and psychological stress (Mackenbach, Mheen van de, Stronks, 1994; Davey Smith, Bartley, Blane, 1994). Specific behavioral factors include poor parenting, child abuse and poor help-seeking in case of mental problems (Bolger, Patterson, Thompson, Kupersmidt, 1995; Bradley and Corwyn, 2002; Costello,
Compton, Keeler, Angold, 2003; McLeod, Shanahan, 1993; McLoyd, 1998; Caspi, Taylor, Moffit, Plomin, 2000; Schneiders, et al., 2003; Zwaanswijk, Verhaak, Bensing, Van der Ende, Verhulst, 2003). Material and structural inequities include poor housing, residing in neighborhoods fraught with substance abuse and delinquent peers (Reijneveld, Brugman, Verhulst, Verloove-Vanhornick, 2005; Schneiders, Drukker, Van der Ende, Verhulst, Van Os, Nicolson, 2003; Reijnneveld, Schene, 1998), and poor access to health services (Zahner, Pawelkiewicz, DeFrancesco, Adnopoulos, 1992; John, Offord, Boyle, Racine, 1995). Chronic psychological stress resulting from low SEP may be associated with a high exposure to life stressors (Evans, 2004; Grant, Compas, Thurm, et al. 2006), and impact on the relationship between parents and their children, for instance through parental negativity and low emotional warmth (Feinberg, Button, Neiderhiser, Reiss, Hetherington, 2007). In addition, family SEP may provide environmental context that can modify the influence of other risk factors such as temperament (Gallo, Matthews, 2003; Pulkki, Elovainio, Viikari, Keltikangas-Jarvinen, 2003; Harper, Lynch, Wan-Ling, et al., 2002) and familial psychopathology (Fendrich, Warner, Weissman 1990; Tuvblad, Grann, Lichtenstein, 2006).

Aims and Outline

Previous research on the association of SEP with mental health has been hampered by some important limitations, which have produced a fragmentary corpus of evidence. As a result, important knowledge gaps in the association of SEP with mental health in pre- and early adolescence have emerged that needs to be filled.

First, the focus of most previous studies has been on the association between SEP and a single category of mental health problems, without considering the possibility that SEP may affect different mental health dimensions differently. Two important broad-band domains of maladjustment that cover the large majority of common mental health problems in children and adolescents are externalizing and internalizing problems. The internalizing domain encompasses problems that are linked to internal distress such as anxiety, depression, and (psycho) somatic complaints. The externalizing domain reflects behaviors associated with conflicts with the external environment, such as aggressive and rule breaking behaviors. Differential effects of SEP are likely, because some risk factors have been attributed more frequently to the etiology of externalizing than internalizing problems (Kapi, Veltsista, Kavadias, Lekea, Bakoula, 2007; Loeber, Farrington, Stouthamer-Loeber, Van Kammen, 1998; Mcleod, Shanahan, 1993), or vice versa. For example, influences from deviant peers are known to promote aggressive and delinquent behaviors (Chen, Mathews, Boyce, 2002). On the other hand, the experience of stressful life events and long-term difficulties, especially those characterized by loss, humiliation, and entrapment, is a well-known risk factor for internalizing problems (Brown, Harris, 1989; Kendler, Hettema, Butera, Gardner, Prescott, 2003; Brilman, Ormel, 2001). As the distribution or influence of these risk factors may
vary with SEP, it is possible that different mental health dimensions may have different relationships with SEP. Additionally, internalizing and externalizing problems often co-occur (Angold, Costello, Erkanli, 1999; Lilienfeld, 2003). Past studies have not considered the shared components between mental health dimensions in their associations with SEP. This may lead to misleading findings, because of the afore-mentioned co-occurrence of internalizing and externalizing problems. Thus, research on the differential effects of SEP on different types of mental health problems may shed light on differences in their etiology or course and provide clues for prevention. This topic is addressed in chapter 2.

Second, low SEP has been suggested to promote environments fraught with stressful life events and long-term difficulties (Hatch, Dohrenwend, 2007; Evans 2004). Most previous research on life events and long-term difficulties has focused on individual life events such as parental divorce (Amato, Keith, 1991). Yet, life stressors tend to cluster together. For instance, divorce may be associated with not only separation from a parent but also loss of income, loss of friendships as a result of changing residence, etc. It is imperative to study categories of life stressors instead of individual life events to gain insight into important theoretical questions and hypotheses about the onset and course of various types of psychopathology (Dohrenwend, 2006). Life stressors have commonly been categorized into independent or dependent events (Brown, Harris, 1989; Kendler, Karkowski, Prescott, 1999). Independent life events occur mainly in the environment of children and adolescents, and are unlikely to depend on their behavior or are outside their control, e.g. death of a parent. In contrast, dependent events are largely determined by personal and behavioral characteristics of the child. Different life stressors may uniquely mediate the relation between family SEP and adolescent mental health to varying degrees. Categorization of life stressors may be of theoretical importance, as the source of these stressors may inform interventions targeted either at the environment level (e.g. neighborhood interventions) or the person (e.g. coping strategies). Previous studies have not been conducted to examine the extent to which different categories of life stressors mediate the relation between family SEP and mental health in early adolescents. Chapter 3 deals with this issue.

Third, there has been a paradigm shift from considering only personal or only environmental risk factors of psychopathology to person-environment interactions. Low family SEP is an example of an environmental context that could modify heritable characteristics such as familial loading on psychopathology. Various theoretical approaches have provided conceptual frameworks for person-environment interactions, for example, the “social push” and the “vulnerability” hypotheses. The “social push” hypothesis (Raine, 2002) posits that genetic risks are stronger in contexts with low environmental risks (e.g. high SEP) and weaker in contexts with high environmental risks (e.g. low SEP). The theory underlying this hypothesis is that an adverse environment obscures genetic effects while lack of competing adverse environmental factors enables genetic effects to emerge
more strongly. Thus, low family SEP would reduce the effects of familial psychopathology on adolescent offspring's mental health while high family SEP would amplify the effects if this hypothesis is true. The vulnerability hypothesis (Shanahan, Hofer. 2005; Plomin, Rutter, 1998; Ormel, Brilman & Oldehinkel. 2001), on the other hand, stipulates that those who are genetically predisposed to psychopathology may be more vulnerable to high risk environments such as low SEP than those without familial vulnerability. Yet, whether environmental contexts such as low family SEP modifies the influence of familial psychopathology on offspring mental health has rarely been studied. Chapter 4 addresses this interaction.

Finally, only a minority of the adolescents with mental health problems seek professional help (Zachrisson, Rodje, Mykletun, 2006), making it vital to study barriers to mental health services. It is estimated that only between 13% and 36% of those with mental health problems in the western world seek help from mental health services (Zachrisson, Rodje, Mykletun, 2006). Family SEP (e.g. education, income, and occupation) is a generic family factor that may be involved in parental recognition and decision to consult a General Practitioner (GP). Coming from a low SEP family could be among the barriers to seeking professional help, especially for children and adolescents who are dependent on their parents to recognize their problems and consult a (GP). Highly educated parents may have superior knowledge about child development, be more aware of mental health problems, appreciate the potential benefits of mental health care more, and have better knowledge of effective treatments than parents with low levels of education.

Previous research linking family SEP and symptoms of offspring mental health problems to mental health service use has been limited in three major ways. First, the use of different definitions and indices of SEP and differences in service organization and health insurance status of the populations studied (Sayal, 2006) yielding conflicting results. Some studies found evidence for a role of family SEP in service use (Zahner et al., 1992; John, Offord, Boyle, Racine, 1995; Pumariega, Glover, Holzer, Nguyen, 1998), whereas others did not (Verhulst, Van der Ende, 1997; Laitinen-Krispijn, van der Ende, Wierdsma, Verhulst, 1999). Second, many previous studies were based on secondary analyses of routinely collected health care data, e.g. medical records (Briggs-Gowan et al. 2000; Brugman, et al. 2001; Laitinen-Krispijn, van der Ende, Wierdsma, Verhulst, 1999). Persons who are not in medical records are excluded in analyses with routinely collected data, making it impossible to account for the level of psychopathology in the total population. Third, and most importantly, low SEP is negatively associated with severity of mental health problems (Loeber, Farrington, Stouthamer-Loeber, Van Kammen, 1998), and severity of mental health problems, in turn, is positively associated with the use of more mental health services (Zwaanswijk, Verhaak, Bensing, Van der Ende, Verhulst, 2003; Verhulst, Van der Ende, 1997; John, Offord, Boyle, Racine, 1995). Therefore, because of the negative relationship of low SEP with symptoms of mental health problems and the positive association of severity of mental health symptoms with
mental health service use, it is possible that the relation between family SEP and mental health service use may be underestimated without correcting for severity of mental health symptoms. Chapter 5 examines this possibility.

As a result, the objectives of this thesis can be summarized as follows:

1. To investigate whether the associations between family SEP and different mental health problems are domain-specific for internalizing or externalizing problems (chapter 2).

2. To assess the extent to which the relation between low SEP and poor mental health in early adolescents is mediated by specific types of life stressors rated as environment-related or person-related (chapter 3).

3. To assess whether low family SEP provides the environmental contexts that amplify the influence of familial psychopathology on offspring mental health problems (chapter 4).

4. To assess the association between family SEP and specialty mental health service use adjusted for the severity of offspring mental health symptoms (chapter 5).

The outline of the current thesis is diagrammatically represented in figure 1.1 below.
Thesis
Examining the link between Socio-economic Position and Mental Health in Early Adolescents

Chapter 1
General introduction

Chapter 2
The Domain-specific link

Chapter 3
The Mediation link

Chapter 4
The Interaction link

Chapter 5
The link with Specialty Mental Health Service Use

Chapter 6
General discussions, conclusions, and summary

Figure 1.1 Outline of the thesis
The TRAILS study

The studies in this thesis are embedded in the Tracking Adolescents’ Individual Lives Survey (TRAILS) study. TRAILS is a multidisciplinary prospective cohort study of Dutch pre-adolescents (N=2,230) aimed at charting the trajectory of mental health problems from childhood (age 10) to early adulthood (age 24) both at the levels of psychopathology and underlying vulnerabilities and environmental risks. The profile of the TRAILS study is described in details elsewhere (de Winter et al. 2005; Huisman, et al. 2008).

The TRAILS data offers a unique opportunity to study the link between family SEP and psychopathology. First, the study is conducted at a crucial and critical period of life, that is, the period between childhood and adulthood. This period can provide important insights into the pathways to psychopathology. Second, it is reported that a substantial rise in psychopathology occurs during adolescence. For example, the one-year prevalence of psychiatric disorders in the Netherlands increases from 10% at age 10-12 to 25% at age 23-25, and results into significant impairment for nearly half of them (Bijl and Ravelli, 2000). Further, rates of mental health problems in adolescents and early adulthood are projected to rise in the future (Collishaw, Maughan, Goodman, Pickles, 2004). Finally, how the period between childhood and adulthood is navigated has important consequences for adult mental health and future socio-economic achievement (Kessler, Foster, Saunders, Stang, 1995; 1997; 1998).

The TRAILS data employed a robust measure of SEP with five indices (both parent’s education and occupation separately and family income) directly obtained from the parents through an interview. Data on SEP directly obtained from parents are reported to be more reliable than those obtained from their offspring or government records (Wardle, Robb, Johnson, 2002). The SEP index was created by averaging all the five indices after standardization. The index captured 61.2 per cent of the variance in the five indices with an internal consistency of 0.84 in the TRAILS population (Veenstra, Lindenberg, Oldehinkel, De Winter, Verhulst, Ormel, 2005). Missing values (e.g. when there is only one parent in the family) did not affect the associations of the SEP variable with other variables.

Mental health of the TRAILS children was assessed with the parent-rated Child Behavior Checklist (CBCL) (Achenbach, 1991a); the self-rated Youth Self-Report (YSR) (Achenbach, 1991b); and the teacher rated Teacher Checklist of Psychopathology (TCP). The time frame for CBCL and YSR is previous six months and for TCP is the previous 2 months. The TCP consists of descriptions of problem behaviors similar to Achenbach’s Teacher Report Form (TRF) (Achenbach, 1991c). The
CBCL questionnaire and the self-report version YSR are designed to be completed by parents of children aged 4–18 years and by adolescents aged 11–18 years, respectively. Two dimensions of mental health problems were included in the studies in this thesis: internalizing and externalizing problems. Internalizing problems include the syndrome subscales of “Anxious/Depressed”, “Withdrawn/Depressed”, and “Somatic Complaints” while externalizing problems included “Aggressive behavior” and “Rule-breaking behavior”.

In this thesis, a combined estimate of mental health using the scores given by the different informants was computed. Multiple informants are suggested to be the best approach to assess mental health problems (Offord, Boyle, Racine, et al. 1996). For example, it has been demonstrated in previous studies that a combination of parent and teacher information results in an improved power to predict mental health problems (Verhulst, Koot, Van der Ende, 1994). However, using reports from different informants can be challenging. First, agreements between informants tend to be low (Achenbach et al. 1987). The low agreement could be because the informants observe children in different contexts which may influence or even bias their reports. Second, different ways of combining information from different sources can lead to different estimates of mental problems (Youngstrom, Findling, Calabrese, 2003; Kraemer, Measelle, Ablow, Essex, Boyce, Kupfer, 2003; Noordhof, Oldehinkel, Verhulst, Ormel, 2008). On the whole, reports from multiple informants still represent the best approach of estimating mental health problems. As opposed to diagnostic classification systems such as the DSM-IV, the Achenbach scales are empirically-based (i.e., derived from clusters of symptoms found in the datasets rather than experts' ideas about what should belong together). The syndrome subscales and domains are described in the different studies in this thesis.

In sum, the TRAILS study offers a rich dataset for assessing the link between family SEP and psychopathology in children and early-adolescents.
REFERENCES


Araya R, Lewis G, Rojas G, Fritsch R. Education and income: which is more important for mental health? J Epidemiol Community Health 2003;57:501–505


Braveman PA, Cubbin C, Egerter S, et al. Socioeconomic status in health research: one size does not fit all. JAMA, 2005;294(22):2879-2888


Brilman EI, Ormel J. Life events, difficulties and onset of depressive episodes in later life. Psychol Med, 2001;31:859-869


Due P, Lynch J, Holstein B, Modvig J. Socioeconomic health inequalities among nationally representative sample of Danish adolescents: the role of different types of social relations. *Journal of Epidemiology and Community Health* 2003;57: 692-698


Gallo LC, Matthews K. Understanding the association between socioeconomic status and physical health: do negative emotions play a role? *Psyclhol Bull* 2003;129:10–51


John LH, Offord DR, Boyle MH, Racine YA. Factors predicting use of mental health and social services by children 6-16 years old: Findings from the Ontario Child Health Study. *Amer J Orthopsychiatr*. 1995;65:76-86


Kendler KS, Hettema JM, Butera F, Gardner CO, Prescott CA. Life events dimensions of loss, humiliation, entrapment, and danger in the prediction of onsets of major depression and generalized anxiety. *Arch Gen Psychiatry* 2003;60:789–796


Miech RA, Hauser RM. Socioeconomic Status (SES) and Health at Midlife; A Comparison of Educational Attainment with Occupation-Based Indicators. *Annals of Epidemiology*, 2001;11:75-84


Ormel J, Oldehinkel AJ, Brilman EI. The interplay and etiological continuity of neuroticism, difficulties, and life events in the etiology of major and subsyndromal, first and recurrent depressive episodes in later life. *Am J Psychiatry* 2001;158: 885–891

Plomin R, Rutter M. Child development, molecular genetics and what to do with genes once they are found. *Child Dev* 1998;69:1223-1242


Reijnneveld SA, Schene AH. Higher prevalence of mental disorders in socioeconomically deprived urban areas in the Netherlands: community or personal disadvantage? *Journal of Epidemiol Community Health*. 1998;52, 2-7


Rowe DC, Rodgers JL. Poverty and behavior: Are environmental measures nature or nurture? Dev Rev 1997;17:358-375


Chapter 2

Socio-economic Position and Mental Health Problems
In Pre- and Early-adolescents: The TRAILS study

‘Poverty is the greatest risk factor of all’  Schorr (1988)

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Published in: Social Psychiatry and Psychiatric Epidemiology 2009;44(3):231-238.
ABSTRACT

Background: Family socio-economic position (SEP) is known to be associated with adolescent mental health. Whether the relationship is different for different mental health dimensions is unknown.

Methods: Using a cross-sectional design, we investigated the differential effects of family SEP on multiple mental health dimensions in preadolescents (N = 2230, baseline age 10–12, 51% girls) using reports from multiple informants (parent, self, and teachers). A score equal to or higher than the 85th percentile (averaged across informants) defined mental health problems. Results: SEP was inversely associated with all dimensions. Compared to high SEP, the odds ratios (OR) for externalizing problems were 3.88 (95% confidence interval (CI): 2.56, 5.90) and 2.05 (CI: 1.34, 3.14) for low and intermediate SEP, respectively. For internalizing problems, they were 1.86 (CI: 1.28, 2.70) and 1.37 (CI: 0.94, 2.00), respectively. When adjusted for externalizing problems, SEP effects on internalizing problems materially attenuated (OR: 1.47, CI: 0.78, 1.68 and OR: 1.34, CI: 0.91, 1.96) while the converse was less pronounced (OR: 3.39, CI: 2.24, 5.15) and (OR: 1.91, CI: 1.25, 2.94).

Conclusion: In early adolescence, the risk of mental health problems increases with decreasing SEP, particularly for externalizing problems. Further, the SEP-internalizing problems relationship may be partly explained by shared aspects with externalizing problems.

Key words: socioeconomic position – adolescents – gender – mental health problems.
INTRODUCTION

In children and adolescents, mental health disorders form a major public health problem because they are common, are associated with considerable impairment, and form the basis for later mental disorders (Hofstra, Van de Ende, Verhulst, 2001; WHO, 2005). Apart from being a public health problem, mental health problems, especially externalizing problem behaviors, constitute an increasing burden to the criminal justice system (Due, Lynch, Holstein, Modvig, 2003). Available epidemiological data estimate a worldwide prevalence of child and adolescent mental health disorders at 23% (WHO, 2005).

Psychobiological, environmental and social factors, among which is family socio-economic position (SEP); contribute to differences in mental health (WHO, 2003). Family SEP may be particularly important for mental health in children and adolescents because of the influential role of the family at this stage of development (Conger, Conger, Elder, Lorenz, et al. 1992).

Most previous studies concentrated on the association between SEP and mental health problems as a group, without considering the possibility that SEP may affect different mental health dimensions differently. Indeed, social factors such as SEP have been attributed more frequently to the etiology of externalizing than internalizing problems (Kapi, Veltista, Kavadias, Lekea, Bakoula, 2007; Loeber, Farrington, Stouthamer-Loeber, Van Kammen, 1998; Mcleod, Shanahan, 1993). For example, influences from deviant peers, common in low SEP category, are known to promote aggressive and delinquent behaviors (Chen, Mathews, Boyce, 2002). Conversely, personality characteristics such as temperament (Fendrich, Warner, Weissman, 1990) and the experience of stressful life events, especially those characterized by loss, humiliation, and entrapment are known to be risk factors for internalizing problems (Brown, Harris, 1989; Kendler, Hettema, Butera, Gardner, Prescott, 2003). As the distribution or influence of these risk factors vary with SEP, different mental health dimensions may have different relationships with SEP. Research on the differential effects of SEP on mental health problems may shed light on differences in etiology or course and provide clues for prevention and intervention.

Studies on the differential effects of SEP on a range of mental health dimensions simultaneously in a single cohort are scarce (Wadsworth, Achenbach, 2005). Available studies have focused on one or two narrowband (e.g. aggression, delinquency, anxiety, etc.) or broadband problem domains (e.g. internalizing, externalizing, and total problems) and have yielded inconsistent results (Bradley, Corwyn, 2002). These inconsistencies may be due to the use of different methodologies (Chen, Berdan, 2006), different indicators of SEP used and varying sources of information on family SEP.
(Lahelma, Laaksonen, Martikainen, Rahkonen, Sarlio-Lahteenkorva, 2006; Wardle, Robb, Johnson, 2002) and mental health (Bradley, Corwyn, 2002). In addition, most studies have been conducted in adults (Chen, Mathews, Boyce, 2002), in whom the effects of SEP may be distorted by reciprocal influences, i.e. the influence of mental health on SEP (Miech, Caspi, Moffit, Wright, Silva, 1999). In pre- and early adolescents, these reciprocal effects are implausible because at this stage, mental health problems are unlikely to influence family SEP (Wadsworth, Achenbach, 2005). In summary, research on the effects of SEP on mental health in pre- and early adolescents is fragmentary. Yet, adolescents constitute an important group to policy makers and intervention designers as future burden of mental morbidity may still be prevented by well-designed interventions based on empirical research.

Using a cross-sectional design, we report on an analysis of data from a large population based study of early adolescents using a robust measure of SEP that includes parents’ education, occupation, and family income. Our study investigated the differential effects of family SEP on a variety of mental health dimensions. We hypothesized that SEP is more strongly associated with problems in the externalizing domain than with problems in the internalizing domain. Additionally, gender differences in the relationships between family SEP and various mental health dimensions have been suggested in previous studies (Bolger, Patterson, Thompson, Kupersmidst, 1995). For example, low SEP is known to generate family conflicts, and boys more than girls respond to family conflicts with aggressive and disruptive behaviors, which in turn, will elicit punitive responses from parents (Bolger, Patterson, Thompson, Kupersmidst, 1995). For this reason, we studied gender differences in our sample.

**MATERIALS AND METHODS**

**Sample**

Subjects were participants in the ‘TRacking Adolescents’ Individual Lives Survey’ (TRAILS), a prospective cohort study of Dutch (pre) adolescents, aimed at charting and explaining the development of mental health problems from childhood into early adulthood. TRAILS was approved by the Central Committee on Research Involving Human Subjects. Sample selection involved two steps. First, five municipalities in the North of the Netherlands, including both urban and rural areas, were requested to give names and addresses of all inhabitants born between 10-01-1989 and 09-30-1990 (first two municipalities) or 10-01-1990 and 09-30-1991 (last three municipalities). Of all the children approached for enrolment in the study (N = 3145), 6.7% were excluded because of mental or physical incapability or language problems. Finally, 76.0% (N = 2230, mean age = 11.09, SD = 0.56, 50.8% girls) were enrolled in the study of which 96.4% (N = 2149, 51.0% girls) participated in the first follow-
up assessment (T2-Mean age = 13.6, SD = 0.53, range = 12–15), held about two years after baseline assessment (T1-Mean = 11.1, SD 0.55, range 10–12). The present study involves data from the first and second assessment waves (T1 and T2 respectively). Responders and non-responders did not differ with respect to problem behaviors, socio-demographic variables or mental health problems (De Winter, Oldehinkel, Veenstra, et al., 2005; Huisman, Oldehinkel, De Winter, et al. 2008).

Data collection

At T1, well-trained interviewers visited parents or guardians (preferably mothers, 95.6%) at their homes to administer interviews covering a wide range of topics, including SEP and their children’s mental health. Children filled out questionnaires at school under the supervision of TRAILS assistants. Teachers were asked to fill out a brief questionnaire for all TRAILS-children in their class. T2 involved only questionnaires, to be filled out by the participants, their parents and teachers. As in T1, the adolescents completed their questionnaires at school. Interviews were conducted and questionnaires filled after complete description of the study to participants. Thereafter, written informed consent and assent were obtained from the parents and participants respectively.

Measures

Mental health outcomes: Mental health dimensions of pre- and early adolescents were measured at both T1 and T2 by Child Behavior Checklist (CBCL), Youth Self-Report (YSR), (Achenbach, 1991a; 1991b), and Teacher’s Checklist of Psychopathology (TCP) based on the Teacher Report Form (TRF) (Achenbach, 1991c). The CBCL questionnaire and the self-report version (YSR), are designed to be completed by parents of children aged 4–18 years and by adolescents aged 11–18 years, respectively. The time frame for CBCL and YSR is previous six months and for TCP is the previous 2 months. The TCP was developed to reduce the respondent burden for teachers, as each had multiple participants to report on. This measure contains descriptions (vignettes) of problem behaviors corresponding to the syndrome scales of the CBCL and YSR (vignettes available on request). Response options for each description of the TCP ranged from 0 (not applicable) to 4 (very clearly or frequently applicable). The TCP vignettes correlated around 0.60 with the full Teacher Report Form syndrome scales filled out by a small sample of teachers (Ferdinand, 2003, internal report available on request). Besides a total problems score, both questionnaires contain eight syndrome subscales each: “anxious depressed”, “withdrawn behavior”, “somatic complaints”, “aggressive behavior”, “delinquent behavior”, “social problems”, “thought problems”, and “attention problems”. The questions regard the past six months and are scored as follows: 0 = not true, 1 = somewhat or sometimes true, 2 = very true or often true. The validity of these scales have been
documented (Achenbach, 1991a; 1991b; 1991c) and reiterated in a Dutch sample (Verhulst, Van der Ende, Koot, 1997). In our sample, the reliability statistics are as follows: CBCL-Internalizing (32 items, Cronbach $\alpha = .85$), CBCL-Externalizing (35 items, $\alpha = .90$), YSR-Internalizing (31 items, $\alpha = .87$), YSR-Externalizing (32 items, $\alpha = .85$); TCP-Internalizing (3 vignettes, $\alpha = .71$), and TCP-Externalizing (2 vignettes, $\alpha = .78$).

The percentage of missing data was 1.9% for SEP and between 2 and 13% and 6 and 31% for mental health dimensions at T1 and T2, respectively. We used multiple imputations to estimate values for missing data under the assumption that the missing values only depended on observed values (missing at random). This technique has been shown to produce more valid results than complete case analysis, overall mean imputation and the missing-indicator method when data are not missing completely at random (Donders, Heijdenvd, Stijnen, Moons, 2006). We created five complete datasets using the NORM computer software. Usually, the number of data sets to be created depends on the percentage of missing data, however, 3–5 imputations are known to be adequate to realize superior results (Schafer, 1998, 1999). All five data sets were analyzed in an identical way and their results were pooled.

In this study, information on mental health dimensions was obtained from multiple informants (parents, teachers, and adolescents themselves). Information from different sources is known to be a better predictor of disorder and the best estimate of diagnosis rather than a single source because it reduces rater bias (Achenbach, McConaughy, Howell, 1987; Verhulst, Koot, Van der Ende, 1994). We computed a combined estimate of mental health using the scores given by the different informants. In order to place the same weight on information from different informants, the scores on YSR, CBCL and TCP were all standardized to a zero to one scale by dividing the scores on each scale by its range before averaging over informants. Given our interest in levels of psychopathology rather than age related development and because preliminary analyses showed no major differences between T1 and T2 scores (Cohen’s $d$ denoting effect size for all dimensions <0.2), we averaged the scores on CBCL, YSR, and TCP obtained at T1 and T2.

We dichotomized the mental health dimensions prior to the analyses by choosing the 85th percentile to demarcate the presence or absence of a mental health problem. Previous studies showed that scores greater than or equal to the 85th percentile on the CBCL and TRF Total Problems predicted poor outcomes. Scores over the 85th percentile also denote the borderline clinical mental health disorders (De Winter, Oldehinkel, Veenstra, et al., 2005; Huisman, Oldehinkel, De Winter, et al., 2008; Verhulst, Koot, Van der Ende, 1994), thus making the possible clinical implication of our study of
greater public health relevance. Furthermore, there is often high cross informants agreement on adolescents with high scores (Achenbach, Rescorla, 2001).

Socio-economic position: SEP was assessed at baseline using five indicators: family income, educational level (father and mother), and occupational level (father and mother) using the International Standard Classification of Occupations (ISCO) (Ganzeboom, Treiman, 1996). We averaged the five SEP indices after standardization (z-scores). The lowest 25%, intermediate 50% and highest 25% of the scores were considered to represent low, intermediate and high SEP, respectively. The SEP index captured 61.2 per cent of the variance in the five indicators with an internal consistency of 0.84 in the TRAILS population. Missing values (e.g. when there is only one parent in the family) did not affect the association of the SEP variable with other variables (Veenstra, Lindenberg, Oldehinkel, De Winter, Verhulst, Ormel, 2005).

Data analyses

Although TRAILS is a prospective cohort study, the design for our analysis was cross-sectional because mental health outcomes from the two assessment waves were averaged to a single value. First we assessed the potential of age and gender to confound the associations between SEP and mental health dimensions by studying their distribution across categories of SEP. To examine whether SEP was associated with poor mental health, the prevalence of each specific dimension (narrow-band problems: e.g. aggression, anxious depressed, attention problems, etc.) as well as the broadband problem domains (e.g. externalizing, internalizing, and total problems), was calculated according to SEP categories. Next, binary logistic regression analyses were performed to obtain odds ratios and 95% confidence intervals (95% CI) of mental health problems for the lowest and the intermediate SEP categories, relative to the high SEP category. In these analyses the presence of each separate mental health problem was the dependent variable and SEP (low, intermediate, and high) was entered as a categorical independent variable. Considered a potential confounder, gender was additionally entered into the model. To assess the trends of the relationships between SEP and prevalence of various mental health problems, SEP was entered as a continuous variable (non-categorical) in the logistic regression model. To explore the extent of the associations of the broadband problem domains with SEP were due to a shared component (co-occurrence) of these domains rather than a unique component of each domain, we studied the association between SEP and externalizing problems while additionally adjusting for internalizing problems and vice versa, and compared the results to those of the analyses in which we adjusted only for gender. Finally, to examine the possible modifying effect of gender, we repeated the analyses for boys and girls separately and assessed the interaction between SEP as a continuous variable and gender. All statistical analyses were conducted using
SPSS version 14.0 for Windows (SPSS, Inc., Chicago). Associations with a P value less than 0.05 were considered statistically significant.

RESULTS

Correlations between the variables and means, standard deviations and range of scores are presented in Table 2.1. All the mental health dimensions were correlated with each other and all correlations were statistically significant. There were high correlations among variables within each broadband domain of externalizing problems (aggression and delinquency) and internalizing problems (anxious/depressed and withdrawn/depressed). The correlation between internalizing and externalizing problems was moderate: $r = 0.29$, $p < 0.01$. 
Table 2.1. Bivariate correlations between continuous measures of different dimensions of mental health problems and their mean values

<table>
<thead>
<tr>
<th>Variables</th>
<th>M (SD) Range</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aggression</td>
<td>0.15 (0.11) 00 - 0.69</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delinquency</td>
<td>0.08 (0.07) 00 - 0.60</td>
<td>0.75</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anxious/depressed</td>
<td>0.15 (0.10) 00 - 0.67</td>
<td>0.31</td>
<td>0.18</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Withdrawn/depressed</td>
<td>0.17 (0.11) 00 - 0.72</td>
<td>0.21</td>
<td>0.13</td>
<td>0.63</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Somatic complaints</td>
<td>0.15 (0.09) 00 - 0.64</td>
<td>0.26</td>
<td>0.22</td>
<td>0.54</td>
<td>0.41</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social problems</td>
<td>0.15 (0.10) 00 - 0.59</td>
<td>0.48</td>
<td>0.33</td>
<td>0.67</td>
<td>0.60</td>
<td>0.42</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attention problems</td>
<td>0.25 (0.14) 00 - 0.81</td>
<td>0.64</td>
<td>0.52</td>
<td>0.36</td>
<td>0.30</td>
<td>0.33</td>
<td>0.53</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thought problems</td>
<td>0.09 (0.07) 00 - 0.53</td>
<td>0.42</td>
<td>0.35</td>
<td>0.58</td>
<td>0.43</td>
<td>0.47</td>
<td>0.57</td>
<td>0.47</td>
<td></td>
</tr>
</tbody>
</table>

All correlation coefficients $p < 0.01$
Gender distribution varied slightly across SEP categories with a lower prevalence of female gender in low SEP group (n = 259, 46.8%) and a higher prevalence in intermediate SEP category (n = 585, 54.0%). Average age at T1 (mean = 11.1, SD 0.55, range 10–12) and at T2 (mean = 13.6, SD 0.53, range 12–15) was similar across SEP categories. The prevalence of mental health problems according to SEP is presented in figure 2.1. Generally, a higher level of SEP was gradually associated with a lower prevalence of all mental health problems. However, the gradient was steeper for aggressive, delinquent behaviors (externalizing domain), attention, and total problems, than for anxious/depressed, withdrawn/depressed and thought problems (internalizing domain).
Fig. 2.1 Prevalence rates of mental health outcomes in different levels of SEP
Table 2.2 presents three levels of SEP regressed on the eleven dimensions of mental health while adjusting for gender. As age was equally distributed across SEP categories and preliminary adjustment for it had not changed the results, it was removed from the final analyses.

As compared to high SEP, low SEP and to a lesser extent also intermediate SEP was associated with an increased risk of all mental health problems and most associations were statistically significant. The strongest increases were found for aggression, delinquency, attention, and externalizing problems. When additionally adjusting for internalizing problems, the association between low SEP and externalizing problems hardly attenuated and remained statistically significant. The association between low SEP and internalizing problems, however, markedly attenuated when we additionally adjusted for externalizing problems and the odds ratio was no longer statistically significant.

Due to the monotonously decreasing relationship between SEP and mental health dimensions, we computed the trend of the relationship using a continuous (non-categorical) measure of SEP and the results were statistically significant for all dimensions. After repeating the analyses while stratifying for gender, no material gender differences were observed. Accordingly, effect modification of the prevalence trend with SEP by gender was non-significant for all dimensions.
Table 2.2. Logistic regression analyses: attributable risks of family SEP on mental health dimensions- adjusted for gender (N = 2230).

<table>
<thead>
<tr>
<th>Outcome dimensions</th>
<th>(N≥85th percentile)</th>
<th>Socio-economic position</th>
<th>Trend</th>
<th>Effect modification of trend by gender</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>High</td>
<td>OR (95% CI)</td>
<td>OR (95% CI)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Intermediate</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Low</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reference</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aggression</td>
<td>323</td>
<td>1</td>
<td><strong>2.28 (1.62, 3.37)</strong></td>
<td><strong>4.12 (2.69, 6.30)</strong></td>
</tr>
<tr>
<td>Delinquency</td>
<td>323</td>
<td>1</td>
<td><strong>1.74 (1.24, 2.44)</strong></td>
<td><strong>2.90 (2.03, 4.14)</strong></td>
</tr>
<tr>
<td>Anxious/depressed</td>
<td>332</td>
<td>1</td>
<td>1.30 (0.90, 1.87)</td>
<td>1.56 (0.98, 2.48)</td>
</tr>
<tr>
<td>Withdrawn/depressed</td>
<td>372</td>
<td>1</td>
<td>1.09 (0.80, 1.49)</td>
<td>1.42 (0.99, 1.98)</td>
</tr>
<tr>
<td>Somatic Complaints</td>
<td>319</td>
<td>1</td>
<td><strong>1.73 (1.21, 2.47)</strong></td>
<td><strong>2.65 (1.73, 3.78)</strong></td>
</tr>
<tr>
<td>Social problems</td>
<td>366</td>
<td>1</td>
<td><strong>1.66 (1.16, 2.37)</strong></td>
<td><strong>2.41 (1.63, 3.56)</strong></td>
</tr>
<tr>
<td>Attention problems</td>
<td>347</td>
<td>1</td>
<td><strong>1.81 (1.28, 2.56)</strong></td>
<td><strong>2.91 (1.85, 4.60)</strong></td>
</tr>
<tr>
<td>Thought problems</td>
<td>349</td>
<td>1</td>
<td>1.35 (0.95, 1.90)</td>
<td><strong>1.98 (1.38, 2.84)</strong></td>
</tr>
<tr>
<td>Internalizing problems</td>
<td>343</td>
<td>1</td>
<td>1.37 (0.94, 2.00)</td>
<td><strong>1.86 (1.28, 2.70)</strong></td>
</tr>
<tr>
<td>Externalizing problems</td>
<td>334</td>
<td>1</td>
<td><strong>2.05 (1.34, 3.14)</strong></td>
<td><strong>3.68 (2.56, 5.90)</strong></td>
</tr>
<tr>
<td>Total problems</td>
<td>341</td>
<td>1</td>
<td><strong>1.83 (1.24, 2.72)</strong></td>
<td><strong>3.34 (2.12, 5.24)</strong></td>
</tr>
<tr>
<td>Internalizing problems †</td>
<td>343</td>
<td>1</td>
<td>1.34 (0.91, 1.96)</td>
<td>1.47 (0.78, 1.68)</td>
</tr>
<tr>
<td>Externalizing problems ††</td>
<td>334</td>
<td>1</td>
<td><strong>1.91 (1.25, 2.94)</strong></td>
<td><strong>3.39 (2.24, 5.16)</strong></td>
</tr>
</tbody>
</table>

OR = Odds Ratio; CI = Confidence Intervals; SEP = Socio-economic position
† Adjusted for gender and externalizing problem behavior; †† Adjusted for gender and internalizing problem behavior
DISCUSSION

Our study is a useful addition to the health inequality debate. We examined the differential effects of SEP on multiple dimensions of mental health problems based on a large population cohort of 2230 pre- and early adolescents. The study demonstrated a strong relationship between SEP and all dimensions of mental health problems.

The relationship was not equally pronounced for all dimensions. Associations with SEP were more substantial for externalizing problems particularly aggressive and delinquent behaviors, than for internalizing problem behaviors, especially anxious/depressed and withdrawn/depressed. These observations confirmed our hypothesis. However, the association of SEP with internalizing problems markedly attenuated when corrected for externalizing problems while the converse was not true indicating that the SEP-internalizing problems relationship may, at least in part, be due to shared components (co-occurrence) with externalizing problems. Further, our findings suggest that exposure to different levels of family SEP may not have the same effects on various dimensions of mental health. No evidence of gender modification of the relationships between SEP and mental health problems was found.

Limitations and strengths

A number of limitations need to be mentioned. First, the only sources of information on mental health dimensions in this study were behavior checklists. Some of the associations detected apply only to emotional and behavioral problems that cannot be taken to mean psychiatric disorders defined in terms of clinical diagnoses. However, the checklists may be comparable to interviews in studies involving the classification of psychiatric disorders (Boyle, Offord, Racine, Szatmari, Sanford, Fleming, 1997). Second, the SEP relationship with each dimension cannot be interpreted as independent. This became evident when we assessed the risks of internalizing problems while adjusting for externalizing problems and vice versa. Third, the cross-sectional design of this study makes it impossible to determine whether the effects of SEP regard the incidence of mental health problems, their duration, or both. Lastly, again due to the cross-sectional design, we cannot exclude the possibility that the association between family SEP and mental health problems, at least in part, may have been reciprocal. Nevertheless, in pre- and early adolescents, reciprocal effects are unlikely because their mental health problems have limited influence on family SEP (Wadsworth, Achenbach, 2005).

Our study has a number of strengths too. First, we used data from a large population cohort and a robust measure of SEP directly obtained from the parents. Additionally, data on mental health were obtained from multiple informants, thus limiting rater and information biases and increasing precision (Verhulst, Koot, Van der Ende, 1994). Second, our study is unique in that only one previous study examined the differential incidence and cumulative prevalence of mental health
problems in different socio-economic levels in 8–17 year olds (Wadsworth, Achenbach, 2005). Therefore, our study is the only other that has assessed the effects of SEP on multiple mental health dimensions concurrently in a single cohort, especially in children and adolescents. Lastly, we used multiply imputed datasets to address the problem of missing data, particularly common in longitudinal studies with multiple informants.

Our findings agree with previous studies that have found adolescents in low SEP category to be at risk of mental health problems (Achenbach, Bird, Canino, Phares, Gould, Rubio-Stipec, 1990; Costello, Compton, Keeler, Angold, 2003; Loeber, Farrington, Stouthamer-Loeber, Van Kammen, 1998; Mcleod, Shanahan, 1993; Miech, Caspi, Moffit, Wright, Silva, 1999). However, we observed relatively large effects while previous studies have consistently found that SEP effects on mental health were small, accounting usually for less than one percent of explained variance in total problems scores (Achenbach, Verhulst, Baron, Akkerhuis, 1987; Achenbach, Verhulst, Edelbrock, Baron, Akkerhuis, 1987). When we calculated the percentage of explained variance in all dimension-specific and total problems scores by SEP, the effects were also small (<5%), but somewhat larger than in previous studies. This could have been because we used a more robust measure of SEP based on parents’ education, occupation and family income, while previous studies relied mainly on occupation (Achenbach, Verhulst, Baron, Akkerhuis, 1987; Achenbach, Verhulst, Edelbrock, Baron, Akkerhuis, 1987), income or education levels of fathers as indicators of SEP. We also used multiple informants to report on mental health contrary to previous studies that used single informants. Furthermore, our study registered a high response rate and success in recruiting families often difficult to recruit (De Winter, Oldehinkel, Veenstra, et al., 2005).

We could not easily compare our results with other studies simultaneously addressing similar sets of varying outcome dimensions as no other study tried to examine the effects of SEP on unique aspects of internalizing and externalizing problems. Comparison with previous studies is also hampered by the use of different indices of SEP (income, occupation or education) and the fact that the outcomes in our study denoted the range comprising borderline and clinical mental health problems (scores ≥85th percentile). However, it should be noted that these outcomes implicate odds ratios as measures of the magnitude of effect rather than explained variance in the total distribution of scores.

The finding that the associations between SEP and mental health problems were stronger for externalizing than internalizing problems might be due to a differential role of contextual risk factors. Previous studies have suggested that contextual family risk factors such as low SEP that affects 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). Conversely, individual temperament characteristics such as
negative affectivity and fearfulness are associated with internalizing problems (Oldehinkel, Hartman, De Winter, Veenstra, Ormel, 2004).

The effects of SEP may be different for both girls and boys at different ages and developmental stages (Bolger, Patterson, Thompson, Kupersmidst, 1995). In this study, however, no gender differences were detected on any dimension. This could have been due to the young age as previous studies have found inconsistent SEP effects on mental health of pre- and early adolescents (Conger, Conger, Elder, Lorenz et al., 1992).

Several mechanisms through which SEP may be related to mental health problems have been highlighted. In particular, environmental inequities related to SEP such as goods and services essential for health, and parents’ health promoting behaviors (Bradley, Corwyn, 2002; Evans, 2004) may affect adolescents’ mental health. In addition, low SEP families often secure housing in deprived neighborhoods where drug and substance abuse, delinquent and deviant peer behaviors, and other social problems are known to thrive (Evans, 2004, Reijneveld, Brugman, Verhulst, Verloove-Vanhorick, 2005; Schneiders, Drukker, Van der Ende, Verhulst, Van Os, Nicolson, 2003). Moreover, low SEP is a source of chronic stress that impacts on the relationship between parents and their children, e.g. poor family functioning, child abuse, and poor rearing behaviors (Caspi, Taylor, Moffit, Plomin, 2000; Schneiders, Drukker, Van der Ende, Verhulst, Van Os, Nicolson, 2003; Stansfeld, Head, Bartley, Fonagy, 2008). Furthermore, recent findings indicate an interaction of genotype and parental negativity and low warmth, both common in low SEP families, in predicting antisocial behaviors but not depression (Feinberg, Button, Neiderhiser, Reiss, Hetherington, 2007).

Although the mental health of pre- and early adolescents is unlikely to affect family SEP, we cannot preclude the possibility that children and adolescents with a clinically relevant level of problems may prevent parents from taking a job or force parents to have reduced working hours. Additionally, low SEP of the parent may be the beginning of negative spiral, in which the children are likely to develop mental health problems, which in turn reduces their chance of gaining higher SEP themselves (Mheen van de, Stronks, Looman, et al. 1998; Kahn, Fazio, 2005). It is also possible that, aggressive and delinquent behaviors more than anxious/depressed or withdrawn depressed put one in an unfavorable SEP track due to a combination of adverse social environment and possible genetic contributions of the family that make them drift down or just fail to come out of socio-economic adversity (Dohrenwend, 1990). Furthermore, low family SEP may trigger a chain reaction that subsequently leads to poor mental health in a cumulative process (Dohrenwend, 1990).

The association between SEP and externalizing problems remained nearly unaltered when we adjusted for internalizing problems while the association between SEP and internalizing problems,
however, markedly attenuated when corrected for externalizing problems. This suggests that the SEP-internalizing problems relationship may, at least in part, be due to shared components with externalizing problems. These shared components may include the co-occurrence between internalizing and externalizing problems. For example, delinquency and depression are known to co-occur in adolescents (Angold, Costello, Erkanli, 1999). It has also been suggested that externalizing problems such as disruptive behaviors may be associated with rejection and lack of social support by peers or significant others, which in turn may result in anxiety and depression (Burkes, Loeber, Lahey, Rathouz, 2005; Capaldi, Stoolmiller, 1999).

The mechanisms through which SEP affects adolescent mental health are complex and could well be different for externalizing and internalizing problems. Further research is needed to elucidate mechanisms underlying the observed patterns of associations and to distinguish the relationship between family SEP and various mental health dimensions.

Implications

Findings of this study have implications for both research and policy. Research efforts should be directed at unraveling mediating factors such as stressful life events, family functioning, parental psychopathology, and rearing behaviors. We acknowledge the importance of these contextual factors but considered them beyond the scope of this article. We propose that the findings in this study should lead to further research on the causal paths through which SEP and family-related factors that affect mental health. The results of such studies can inform interventions to prevent adverse mental health outcomes. For policy makers, the implication of this study is to direct interventions to low SEP families, and to design public health policies for early prevention of particularly externalizing problems in children and adolescents. For example, programs such as neighborhood social cohesion that has been shown to limit poor parental rearing practices and children’s externalizing behaviors (Silk, Sessa, Morris, Steinberg, Avenevoli, 2004).

Conclusion

This population-based study shows that low family SEP is associated with poor mental health for all outcomes in early adolescents. However, the effects of family SEP are stronger on externalizing problem domain, particularly aggressive and delinquent behaviors than on internalizing problem domain, notably anxious/depressed and withdrawn depressed. In addition, the smaller SEP effect on internalizing problems is partly explained by shared components with externalizing problems. This signifies that family SEP probably directly contributes to the risk of developing mental health problems in adolescents differently and varies with types of broadband problems. Policies and interventions to reduce mental health problems need to consider background SEP as an important risk or protective factor.
REFERENCES

Achenbach TM. Manual for the teacher’s report form and 1991 profile. University of Vermont, Burlington; 1991c
Achenbach TM, Rescorla LA. Manual for ASEBA School Age Forms & Profiles. Burlington VT: University of Vermont; 2001
Boyle M, Offord D, Racine Y, Szatmari P, Sanford M, Fleming J. Adequacy of interviews vs. checklists for classifying childhood psychiatric disorder based on parent reports. Arch Gen Psychiatry, 1997;54:793–799
Brown GW, Harris TO. Life events and Illness. Guildford, New York; 1989


Feinberg ME, Button TMM, Neiderhiser JM, Reiss D, Hetherington EM. Parenting and adolescent antisocial behavior and depression. *Arch Gen Psychiatry*, 2007;64:457–465


Kendler KS, Hettema JM, Butera F, Gardner CO, Prescott CA. Life events dimensions of loss, humiliation, entrapment, and danger in the prediction of onsets of major depression and generalized anxiety. *Arch Gen Psychiatry*, 2003;60:789–796


Verhulst FC, Van der Ende J, Koot HK. Handleiding voor de Youth Self-Report (YSR) (Manual for the Youth Self-Report (YSR)). Sophia Children’s Hospital, Rotterdam; 1997


Life stressors as mediators of the relation between Socio-economic Position and Mental Health Problems in Early Adolescence:
The TRAILS study.

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Published in:

Objective: Life stressors and family socio-economic position have often been associated with mental health status. The aim of the present study is to contribute to the understanding of the pathways from low socio-economic position and life stressors to mental problems. Method: In a cross-sectional analysis using data from a longitudinal study of early adolescents (N = 2,149, 51% girls; mean age 13.6 years, SD 0.53, range 12-15), we assessed the extent of mediation of the association between family socio-economic position and mental health problems by different types of life stressors in multiple regression models. Stressors were rated as environment-related or person-related. Information on family socio-economic position was obtained directly from parents, and internalizing and externalizing problem behaviors were assessed by reports from multiple informants (parents, self, and teachers). Results: Low socio-economic position was associated with more mental health problems and more life stressors. Both environment-related and person-related life stressors predicted mental health problems independently of socio-economic position. The associations between socio-economic position and all mental health outcomes were partly mediated by environment-related life stressors. Mediation by environment-related and person-related life stressors as assessed by linear regression amounted to 56% (95% confidence interval (CI) 35% to 78%) and 7% (95% CI: 25% to 38%) for internalizing problems and 13% (95% CI 7% to 19%) and 5% (95% CI: 2% to 13%) for externalizing problems, respectively. Conclusions: Environment-related, but not person-related life stressors partly mediated the association between socio-economic position and adolescent mental problems. The extent of mediation was larger for internalizing than for externalizing problems. Because the effect sizes of the associations were relatively small, targeted interventions to prevent impaired mental health may have only modest benefits to adolescents from low socio-economic background.

Key Words: stressors, adolescents, mental health.
Family socio-economic position (SEP) is known to contribute to the development and persistence of mental health problems in childhood and adolescence (Wadsworth, Achenbach, 2005; Loeber, Farrington, Stouthamer-Loeber, Van Kammen, 1998). Previous studies have found a modest, albeit, consistent associations of low SEP with poor mental health (Achenbach, Verhulst, Baron, Akkerhuis, 1987; Leventhal, Brooks-Gunn, 2000; Amone-P’Olak, Burger, Ormel, Huisman, Verhulst, Oldehinkel, 2009), particularly with respect to externalizing problems (Loeber, Farrington, Stouthamer-Loeber, Van Kammen, 1998; Amone-P’Olak, Burger, Ormel, Huisman, Verhulst, Oldehinkel, 2009).

The modest effect of low SEP on adolescent mental health could be because low SEP is not directly causing psychopathology (i.e., it could be a distal risk factor). It has been suggested that low SEP promotes environments with higher densities of proximal risk factors, which are, in turn, directly related to mental health problems (Felner, Brand, DuBois, Adan, Mulhall, Evans, 1995). Proximal risk factors for psychopathology in adolescents that may mediate the association of low SEP with impaired mental health include unfavorable family environment (Tracy, Zimmerman, Galea, McCauley, Stoep, 2008), adverse parenting behaviors, and life stressors (Grant, Compas, Thurm, et al, 2006). Life stressors are established risk factors for psychopathology (Grant, Compas, Thurm et al, 2006; Brown, Harris, 1978; Kendler, Kessler, Walters, et al., 1995). It is well documented that adolescents in low SEP experience more life stressors (Evans, 2004; Hatch, Dohrenwend, 2007), yet few studies have directly tested the degree of mediation of the relation between SEP and mental health by life stressors in adolescents (Felner, Brand, DuBois, Adan, Mulhall, Evans, 1995; Tracy, Zimmerman, Galea, McCauley, Stoep, 2008; Costello, Compton, Keeler, Angold, 2003).

Specific subtypes of life stressors may have different associations with SEP and adolescent mental health problems. Particularly, life stressors such as repeating a grade and contact with police have been associated more strongly with externalizing problems in adolescents (Grant, Compas, Thurm et al, 2006), whereas life stressors such as parental divorce or separation have been associated more with internalizing problems, especially among girls (Grant, Compas, Thurm et al, 2006). It is possible therefore that different life stressors may uniquely mediate the relation between SEP and adolescent mental health to varying degrees.

Previous research has distinguished between two categories of life stressors that have different relations with psychopathology: independent and dependent life events (Brown, Harris, 1978; Kendler, Karkowski, Prescott, 1999). Independent life events are ones that are unlikely to depend on an individual’s behavior and/or outside the control of an individual (e.g., death of a parent). In
contrast, dependent events are more likely to be influenced by an individual's behavior (e.g., contact with police). Independent stressful life events (SLEs) have been associated with the onset of major depression in adults, and the association is suggested to be causal (Kendler, Karkowski, Prescott, 1999). Dependent life events, on the other hand, have been shown to negatively influence people with previous depression, a non-causal association that may be a result of personality factors that predispose to both dependent life events and onset of depression (Kendler, Karkowski, Prescott, 1999). Because independent life events occur mainly in the environment of the child, we will refer to them as environment-related life stressors (ERLS). Similarly, we will refer to dependent life events as person-related life stressors (PRLS) because they are mainly determined by personal and behavioral characteristics of the child.

Past studies on SEP, life stressors, and mental health have drawn on adult samples, and it has not been established whether the same relations between these variables exist in the adolescent population. In adults, SEP and mental health may have reciprocal influences, with mental health problems and SEP, each exerting an influence on the other. These reciprocal effects are implausible in pre- and early-adolescents because, at this age, children's mental health is less likely to adversely influence family SEP (Wadsworth, Achenbach, 2005).

The few studies on mediation by life stressors in the relation between socio-economic background and mental health in adolescence have yielded conflicting results in that some studies did find evidence of mediation (Felner, Brand, DuBois, Adan, Mulhall, Evans, 1995; Tracy, Zimmerman, Galea, McCauley, Stoep, 2008), whereas others did not (Costello, Compton, Keeler, Angold, 2003). Differences in sampling may explain part of the conflicting findings. For example, other studies have used samples from rural settings (e.g. Costello, Compton, Keeler, Angold, 2003) while others sampled children from urban areas (e.g. Tracy, Zimmerman, Galea, McCauley, Stoep, 2008). Yet rural and urban areas report different rates of mental health problems (Vollebergh, Van Dorsselaer, Monshouwer, et al., 2006). Another source of conflicting findings could be the use of different indices of SEP. Some studies used level of family income (Tracy, Zimmerman, Galea, McCauley, Stoep, 2008) and others education or occupation (Felner, Brand, DuBois, Adan, Mulhall, Evans, 1995). 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; Araya, Lewis, Rojas, Fritsch, 2003). Further, in the Great Smoky Mountains Study (Costello, Compton, Keeler, Angold, 2003), the authors suggested that the relatively small sample size of the proportion of children that moved out of poverty may have lead to limited statistical power to detect mediation (Costello, Compton, Keeler, Angold, 2003).
To date, we have not come across any study that examined the extent to which either environment-related or person-related life stressors explain the effect of SEP on mental health in early adolescents. This distinction may be important because the source of these stressors may indicate whether interventions should be directed at either the environment of the child (e.g., neighborhood interventions) or at the child itself (e.g., coping strategies). Further, previous research has mainly focused on individual life events (e.g., parental divorce) (Amato, Keith, 1991) or a single mental health outcome (e.g., depression or aggression) at a time rather than considering subtypes of life events and multiple dimensions of psychopathology (Tracy, Zimmerman, Galea, McCauley, Stoep, 2008; Guerra, Huesmann, Tolan, Van Acker, Eron, 1995).

The present study is a cross-sectional analysis of data from a large population-based ongoing cohort study of early adolescents, using a robust measure of family SEP, reports on various life stressors, and reports on mental health by multiple informants. We aimed to quantify, through our analyses, the extent to which the relation between low SEP and poor mental health was mediated by life stressors and whether this was different for environment-related and person-related life stressors.

METHOD

Sample

Subjects were participants in the TRacking Adolescents’ Individual Lives Survey (TRAILS), a prospective cohort study of Dutch (pre) adolescents, aimed at charting the trajectory of mental health problems from childhood into early-adulthood. The TRAILS study was approved by the Central Committee on Research Involving Human Subjects. Sample selection involved five municipalities in the North of the Netherlands, including both urban and rural areas. The five municipalities were requested to give names and addresses of all inhabitants born between October 1, 1989, and September 30, 1990, (first two municipalities: mean age 11.29 years, SD 0.52, range 10.0-12.0) or October 1, 1990, and September 30, 1991, (last three municipalities: mean age 10.72 years, SD 0.37, range 10.0-11.5). Two birth cohorts were used to minimize the age range during the initial assessment.

Of all the children approached (N = 3,145), 6.7 per cent (n = 211) were excluded because of mental or physical incapability or language problems, leaving a total of 2,934. Finally, 76.0% participated in the baseline assessment (T1: N = 2,230, mean age 11.1 years, SD 0.56, range 10.0-12.0), and 96.4 per cent (N = 2,149) were assessed at follow-up (T2: mean age 13.6 years, SD 0.53, range 12.0-15.0), held approximately 2 and a half years after T1 (mean follow-up time...
The present study includes those 2,149 adolescents who participated in the T2 assessment. Responders and non-responders did not significantly differ in levels of problem behaviors or on socio-demographic variables (Huisman, Oldehinkel, De Winter et al., et al. 2008).

Data Collection

The university-educated interviewers received extensive training in interviewing skills, study background, and interview content. At T1, the interviewers visited parents or guardians (preferably mothers, 95.6%) at their homes to administer interviews covering a wide range of topics, including their SEP and their children’s mental health. Interviews were conducted and questionnaires filled out after a complete description of the study was given and written informed consent was obtained from the participants. At both T1 and T2, the children filled out questionnaires at school supervised by TRAILS assistants. The teachers were asked to fill out a brief questionnaire for all TRAILS children in their class. No financial incentives were given; parents instead received a small present (pen or umbrella) for their participation.

Measures

Mental Health Outcomes. Two dimensions of mental health problems were included in this study: internalizing and externalizing problems. These problems were assessed at T1 and T2 with the parent-rated Child Behavior Checklist (CBCL) (Achenbach, 1991a), the Youth Self-Report (YSR) (Achenbach, 1991b), and the Teacher Checklist of Psychopathology (TCP) with a time frame of the past 6 (CBCL and YSR) or past 2 months (TCP). The TCP is composed of descriptions of problem behaviors similar to Achenbach’s Teacher Report Form (Achenbach, 1991c). The TCP was developed to reduce the respondent burden for teachers, as each had several participants to report on. This measure contains descriptions (vignettes) of problem behaviors corresponding to the syndrome scales of the CBCL and YSR (vignettes available on request). Response options for each description of the TCP ranged from 0 (not applicable) to 4 (very clearly or frequently applicable). The TCP vignettes correlated around 0.60 with the full Teacher Report Form syndrome scales filled out by a small sample of teachers (Ferdinand, 2003, internal report available on request). Next, we created broadband scales of internalizing problems (Anxious/Depressed, Withdrawn/Depressed, and Somatic Complaints) and externalizing problems (Aggressive behavior and Rule-breaking behavior). The validity of these scales have been documented (Achenbach, 1991a; 1991b; 1991c) and reiterated in a Dutch sample (Verhulst, Van der Ende, Koot, 1997). In our sample, the reliability statistics are as follows: CBCL-Internalizing (32
items, Cronbach $\alpha = .85$), CBCL-Externalizing (35 items, $\alpha = .90$), YSR-Internalizing (31 items, $\alpha = .87$), YSR-Externalizing (32 items, $\alpha = .85$); TCP-Internalizing (3 vignettes, $\alpha = .71$), and TCP-Externalizing (2 vignettes, $\alpha = .78$).

Reports from different sources are needed to reduce rater bias in the prediction of mental health problems and provide better estimates of diagnosis than those based on a single source. It has also been demonstrated in previous studies that a combination of parent and teacher information results in an improvement of predictive power (Verhulst, Koot, Van der Ende, 1994). For this reason, we computed a combined estimate using the scores on mental health problems given by the children, parents, and teachers at T2. To place the same weight on information from different informants, the scores on YSR, CBCL, and TCP were first standardized to a scale of 0 to 1 before averaging over informants.

**Measurement of SEP.** Socio-economic position was assessed at T1 using five indicators: family income and educational and occupational levels of both parents using the International Standard Classification of Occupations (Ganzeboom, Treiman, 1996). We created a SEP variable by averaging the five indices after standardization. The SEP index captured 61.2 per cent of the variance in the five indices with an internal consistency of 0.84 in the TRAILS population (Veenstra, Lindenberg, Oldehinkel, De Winter, Verhulst, Ormel, 2005). Missing values (e.g. when there is only one parent in the family) did not affect the associations of the SEP variable with other variables.

**Measures of Life Stressors.** Life stressors encompassed SLEs and more chronic problems that we refer to as long-term difficulties. At T2, the adolescents were given a list of 22 SLEs and asked to indicate which events they had experienced over the past 2 years (designated as “A” in Table 3.1). Concurrently, a parent questionnaire with a list of 15 items was used to obtain information on lifetime (adolescent’s life) long-term difficulties (designated as “P” in Table 3.1). We considered the number of life stressors without taking into account their perceived severity. The life stressors were independently and blindly (to SEP and psychopathology) rated as environment-related or person-related by those authors who have a background in psychology (K. A-P., J.O., and A.J.O.). J.O. and A.J.O. were specifically trained in the Life Event and Difficulty Schedule of Brown and Harris (Brown, Harris, 1978). In case of disagreement, consensus classification was rendered. To assess the effect of potential misclassification, two sensitivity analyses were conducted: one in which the contentious items ($n = 4$) were all added to the environment-related category and another in which the contentious events were included in the person-related category.
**TABLE 3.1** Prevalence of Life Stressors in the Study Population (N = 2,149)

<table>
<thead>
<tr>
<th>Life Stressors</th>
<th>Informant</th>
<th>Prevalence (n, %)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Person-related life stressors (PRLS)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chronic illness/handicap (self)</td>
<td>P</td>
<td>228 (10.6)</td>
</tr>
<tr>
<td>High work pressure at school</td>
<td>P</td>
<td>340 (15.2)</td>
</tr>
<tr>
<td>Fewer friends than desired</td>
<td>P</td>
<td>217 (10.1)</td>
</tr>
<tr>
<td>Bullying in the streets</td>
<td>P</td>
<td>208 (9.7)</td>
</tr>
<tr>
<td>Severe conflict with family member</td>
<td>P</td>
<td>122 (5.7)</td>
</tr>
<tr>
<td>Severe conflict with someone else</td>
<td>P</td>
<td>86 (4.0)</td>
</tr>
<tr>
<td>Serious sickness or accident (self)</td>
<td>P</td>
<td>374 (17.4)</td>
</tr>
<tr>
<td>Repeating a grade</td>
<td>A</td>
<td>127 (5.9)</td>
</tr>
<tr>
<td>Dismissal from school</td>
<td>A</td>
<td>32 (1.5)</td>
</tr>
<tr>
<td>Contact with the police</td>
<td>A</td>
<td>245 (11.4)</td>
</tr>
<tr>
<td>Loss of friendship due to conflict</td>
<td>A</td>
<td>234 (10.9)</td>
</tr>
<tr>
<td>Romantic break-up</td>
<td>A</td>
<td>647 (30.1)</td>
</tr>
<tr>
<td>Run away from home</td>
<td>A</td>
<td>80 (3.7)</td>
</tr>
<tr>
<td>Loss of valuable stuff †</td>
<td>A</td>
<td>202 (9.4)</td>
</tr>
<tr>
<td>Victim of violence †</td>
<td>A</td>
<td>155 (7.2)</td>
</tr>
<tr>
<td>Victim of malicious rumor or gossip</td>
<td>A</td>
<td>557 (25.9)</td>
</tr>
<tr>
<td>Victim of bullying at school</td>
<td>A</td>
<td>539 (25.1)</td>
</tr>
<tr>
<td>Victim of sexual harassment</td>
<td>A</td>
<td>256 (11.9)</td>
</tr>
<tr>
<td><strong>Environment-related life stressors (ERLS)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chronic illness/handicap family member</td>
<td>P</td>
<td>417 (19.4)</td>
</tr>
<tr>
<td>Housing problems</td>
<td>P</td>
<td>90 (4.2)</td>
</tr>
<tr>
<td>Neighborhood problems</td>
<td>P</td>
<td>105 (4.9)</td>
</tr>
<tr>
<td>Financial problems</td>
<td>P</td>
<td>114 (5.3)</td>
</tr>
<tr>
<td>Parental unemployment</td>
<td>P</td>
<td>146 (6.8)</td>
</tr>
<tr>
<td>Severe conflict between family members</td>
<td>P</td>
<td>133 (6.2)</td>
</tr>
<tr>
<td>Serious sickness/accident of a family member</td>
<td>P</td>
<td>531 (24.7)</td>
</tr>
<tr>
<td>Serious illness of brother or sister</td>
<td>P</td>
<td>196 (9.1)</td>
</tr>
<tr>
<td>Serious sickness/accident of close friend</td>
<td>A</td>
<td>185 (8.6)</td>
</tr>
<tr>
<td>Death of a mother</td>
<td>A</td>
<td>15 (0.7)</td>
</tr>
<tr>
<td>Death of father</td>
<td>A</td>
<td>15 (0.7)</td>
</tr>
<tr>
<td>Death of brother or sister</td>
<td>A</td>
<td>11 (0.5)</td>
</tr>
</tbody>
</table>
Parental assessment of long-term difficulties (designated as P in Table 3.1) regarded the adolescents’ lifetime. A = reported by the adolescent; P = reported by parent.

† Victimization, property losses, and hospital admission (self) were considered person related in most cases because of provocation, carelessness, and hospitalization not because of accidents, respectively.

†† Indented item is a sub-question dependent on preceding question.

**Data Analyses**

*Multiple Imputation of Missing Data.* The percentage of missing data was between 6% and 31% for mental health dimensions. The SR contained few missing data (1.5%-7%) probably because the questionnaire was usually administered in classrooms, supervised by TRAILS assistants. Missing parent data (7.8%-14%) were mostly because of parents not returning the questionnaires. Most missing data concerned teacher reports (13.6%-31%). Missing teacher data were generally unrelated to child characteristics (Huisman, Oldehinkel, De Winter et al., 2008) but related to teachers being overloaded by other duties besides several TRAILS participants in their classes. Family SEP contained few missing data (1.9%) because the information was obtained through an interview. To minimize the loss of statistical power and risk of bias, we used multiple imputations. This is the preferred method of dealing with missing data when data are not missing completely at random (Donders, Heijden, Stijnen, Moons, 2006). Multiple data sets (i.e., five data sets) were generated to account for the uncertainty in imputed data (Rubin, 1987). They were analyzed in an identical way, and the regression coefficients and standard errors were pooled using Rubin’s method for multiple imputation inference (Rubin, 1987). We used the NORM program for multiple imputation (Schafer, 1999).

**Statistical Analyses.** First, we calculated descriptive statistics for the study population. Subsequently, we tested the proposed mediations using multiple linear regression models. Our interest was exclusively in the extent of explanation of the outcome variables by life stressors as a
measure of mediation and not so much in the structure of the total model. Therefore, we fitted a more parsimonious multiple linear regression model using the criteria outlined by Baron and Kenny (1986).

To ensure that all variables in the mediation model were comparable, we standardized them to a mean of zero and SD of 1 (z scores). We first quantified the relation between SEP and mental health, SEP and life stressors, and life stressors and mental health, adjusted for SEP. Next, we assessed mediation by determining the degree of attenuation in the relation between SEP and mental health when including life stressors as a covariate. The attenuation was scaled as the relative decrease in the regression coefficient for SEP. Analyses for person-related and environment-related life stressors were first performed separately. We then built a mediation model with person-related and environment-related life stressors simultaneously included. We applied bootstrapping methods to obtain 95% confidence limits (95% confidence interval (CI)) for the mediated effects (Preacher, Hayes, 2008). Confidence intervals based on bias-corrected bootstrapping have been shown to be the most accurate method of assessing mediated effects (MacKinnon, Lockwood, Williams, 2004). To obtain dimension-specific results, we partialled out the shared variance between internalizing and externalizing problems.

Previous studies indicate that vulnerability to life stressors is sex specific, with girls reporting more stressors and rating them as more stressful than boys (Grant, Compas, Thurm, et al, 2006). Hence, we included sex and the interaction term between sex and life stressors as predictors in additional analyses. In instances where the informant of the life stressor is the same person as the informant on mental health, associations between mental health and life stressors may be biased. To address this possibility, we performed an additional analysis including only teacher reports (TCP) because the teachers did not report on life stressors.

RESULTS

The demographic characteristics of the study population are shown in Table 3.2. The average number of symptoms experienced in the past 6 months was 0.72 (SD 1.42, range 0-17) for externalizing problems and 0.82 (SD 1.51, range 0-18) for internalizing problems. More adolescents reported experiencing at least one symptom in the internalizing domain (n = 1,079; 50.2%) than in the externalizing domain (n = 1,021; 47.5%). On average, more adolescents experienced ERLS (3.74, SD 2.07, range 0-13) than PRLS (1.96, SD 1.75, range, 0-11). The correlation between the number of ERLS and PRLS was 0.34 (p < .001).
### TABLE 3.2 Demographic Characteristics of the Study Population (N = 2,149)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Female gender (n, %)</td>
<td>1096 (51)</td>
</tr>
<tr>
<td>Age (mean, sd, (min-max))</td>
<td>13.6, 5.3, (12-15)</td>
</tr>
<tr>
<td>Socio-economic position</td>
<td></td>
</tr>
<tr>
<td>Education:</td>
<td></td>
</tr>
<tr>
<td>Low education</td>
<td>752 (35)</td>
</tr>
<tr>
<td>Intermediate education</td>
<td>817 (38)</td>
</tr>
<tr>
<td>High education</td>
<td>580 (27)</td>
</tr>
<tr>
<td>Occupation:</td>
<td></td>
</tr>
<tr>
<td>Low occupation</td>
<td>860 (40)</td>
</tr>
<tr>
<td>Intermediate occupation</td>
<td>860 (40)</td>
</tr>
<tr>
<td>High occupation</td>
<td>429 (20)</td>
</tr>
<tr>
<td>Family income:</td>
<td></td>
</tr>
<tr>
<td>Low income</td>
<td>645 (30)</td>
</tr>
<tr>
<td>Middle income</td>
<td>1118 (52)</td>
</tr>
<tr>
<td>High income</td>
<td>386 (18)</td>
</tr>
</tbody>
</table>

**Note:**

Low education: elementary and lower secondary education; intermediate education: higher tracks of secondary education; high education: senior vocational education and university;

Low occupation (e.g., plant and machine operators, craft-related trades); intermediate occupation (e.g., technicians, clerks, service workers); high occupation (e.g., legislators, professionals).

Monthly family income (minus tax) was categorized as: low income (lower than € 3,000), intermediate income (€ 3,000 – € 5,000) and high income (above € 5,000).

Figures 3.1 and 3.2 give the results of the mediation analyses. Low SEP was inversely associated with both dimensions of mental health problems, especially externalizing problems. Family SEP was inversely associated with ERLS and PRLS, but the association was markedly stronger for ERLS. Each regression coefficient represents the number of SD change in the outcome variable per SD change of the independent variable. For example, the regression of internalizing problems on ERLS means that a change of 1 SD in ERLS is associated with a 0.182 SD change in internalizing problems.
When mental health outcomes were regressed on ERLS while adjusting for SEP, the estimates were positive and statistically significant for both outcome dimensions, although slightly stronger for internalizing than externalizing problems. The proportion of explained variance for the model including ERLS increased from $R^2 = 0.08$ ($F_{4, 2144} = 81.32, p < .001$) to $R^2 = 0.14$ ($F_{5, 2143} = 89.28, p < .001$) for internalizing problems and from $R^2 = 0.10$ ($F_{4, 2144} = 77.69, p < .001$) to $R^2 = 0.13$ ($F_{5, 2143} = 89.38, p < .001$) for externalizing problems. The same pattern was observed when mental health outcomes were regressed on PRLS while adjusting for SEP. The proportion of explained variance for the model when including PRLS increased from $R^2 = 0.08$ ($F_{4, 2144} = 81.32, p < .001$) to $R^2 = 0.21$ ($F_{5, 2143} = 145.79, p < .001$) for internalizing problems and from $R^2 = 0.10$ ($F_{4, 2144} = 77.69, p < .001$) to $R^2 = 0.16$ ($F_{5, 2143} = 108.17, p < .001$) for externalizing problems. Independent of their association with SEP, PRLS was more strongly related to mental health outcomes than ERLS. Interaction terms for sex by ERLS and sex by PRLS were not significant.

Including ERLS as a potential mediator significantly reduced the associations of SEP with internalizing and externalizing problems. Regression coefficients decreased by 56% for internalizing problems and 13% for externalizing problems (Figures 3.1 and 3.2). The bootstrap results showed significant mediation for all outcomes, with 95% CI of 35% to 78% for internalizing problems and 7% to 19% for externalizing problems, indicating mediation by ERLS for both domains of mental health problems.
Person-related life stressors mediated the association between SEP and mental health dimensions less strongly than ERLS, and mediation by PRLS was not statistically significant. Regression coefficients were reduced by 7% for internalizing problems and 5% for externalizing problems. The bootstrap results for the mediated (indirect) effects were not significant for either internalizing problems (95% CI: -25% to 38%) or externalizing problems (95% CI: -2% to 13%), indicating no mediation by PRLS.

Two multiple regression mediation models in which PRLS and ERLS were entered separately. † Represents the β after ERLS were added to the model (effects of SEP mediated by ERLS = 56% (95% CI 35% to 78%). †† Represents the β after PRLS were added to the model (effects of SEP mediated by PRLS = 7% (95% CI -25% to 38%). The β’s above the continuous line from SEP to INT represent the direct effect of family SEP on INT (adjusted for sex and EXT). Associations of INT with life stressors (ERLS, PRLS) are adjusted for SEP. CI = confidence interval; ERLS = environment-related life stressors; EXT = externalizing problems; INT = internalizing problems; PRLS = person-related life stressors; SEP = family socio-economic position.
Figure 3.2

Two multiple regression mediation models in which PRLS and ERLS were entered separately. † Represents the β after ERLS were added to the model (effects of SEP mediated by ERLS = 13% (95% CI 7% to 19%)). †† Represents the β after PRLS were added to the model (effects of SEP mediated by PRLS = 5% (95% CI 2% to 13%)). The β's above the continuous line from SEP to EXT represent the direct effect of family SEP on EXT (adjusted for sex and INT). Associations of EXT with life stressors (ERLS and PRLS) are adjusted for SEP. CI = confidence interval; ERLS = environment-related life stressors; EXT = externalizing problems; INT = internalizing problems; PRLS = person-related life stressors; SEP = family socio-economic position.

When we included ERLS and PRLS simultaneously in the same model as potential mediators, the results were similar to those when including ERLS only. The effects of SEP were reduced significantly by 50% (95% CI: 31%-70%) for internalizing problems and 11% (95% CI: 7%-16%) for externalizing problems. The association between SEP and PRLS was no longer significant (β = -0.034, 95% CI: -0.077 to 0.004) when the two potential mediators were both included in the same model. The proportion of explained variance for the model including both ERLS and PRLS increased from $R^2 = 0.08$ ($F_{4, 2144} = 81.32, p < .001$) to $R^2 = 0.20$ ($F_{5, 2143} = 92.33, p < .001$) for internalizing problems and from $R^2 = 0.10$ ($F_{4, 2144} = 77.69, p < .001$) to $R^2 = 0.17$ ($F_{5, 2143} = 104.27, p < .001$) for externalizing problems.
Restricted analyses of the participants with complete data yielded only small changes in effect sizes and patterns of statistical significance when compared with the full sample results. Equally, separate analyses with only teacher reports yielded similar patterns of results. Lastly, the sensitivity analyses conducted to assess the effect of potential misclassification of contentious items into either ERLS or PRLS produced an almost identical pattern of results as in our original categorizations.

DISCUSSION

Using data from a large population cohort of Dutch adolescents, we found that environment-related life stressors (ERLS), more than person-related life stressors (PRLS), mediated the association between family SEP and mental health problems in adolescents. Mediation was largely limited to life stressors in the environment of the child (i.e., ERLS). Only weak and statistically non-significant mediation was found for stressors deemed person-related (i.e., stressors dependent on the behaviors of the adolescents themselves). This pattern emerged for both internalizing and externalizing problems. Essentially, the same results were obtained when both types of stressors were entered simultaneously in the mediation model compared with the model with ERLS only. This suggests that PRLS are not an independent mediator of the association between SEP and mental health.

This study has several strengths. First, we studied mediation using a study population of adolescents, reducing the likelihood that the effects of family SEP is confounded by reciprocal influences of mental health because, at this age, children’s mental health are less likely to influence family SEP. Second, our study used multiple indicators of SEP directly obtained from parents rather than relying on family income (Tracy, Zimmerman, Galea, McCauley, Stoep, 2008; Costello, Compton, Keeler, Angold, 2003) and education or occupation (Felner, Brand, DuBois, Adan, Mulhall, Evans, 1995). Information on SEP obtained from parents has been shown to be more reliable than information on SEP obtained from children (Wardle, Robb, Johnson, 2002). Third, multiple informants reported on mental health problems, thus limiting information biases and increasing precision in reporting (Verhulst, Koot, Van der Ende, 1994). Fourth, we distinguished between ERLS and PRLS to gain insight into specific pathways through which family SEP influences adolescent mental health. Last, we used data from a large representative population sample.

Nevertheless, to appreciate our findings, some limitations must be discussed. First, we used retrospective report of life stressors, which may be prone to recall bias. Specifically, people with mental health problems are known to over report the number and severity of stressors (Grant, Compas, Thurm et al, 2006). To minimize this potential bias, we used the number of life stressors
and not their perceived severity in our analyses. Furthermore, a separate analysis of teacher reports showed the same pattern of less mediation by PRLS than by ERLS and stronger mediation for internalizing than externalizing problems. Because teachers did not report on life stressors, recall bias cannot explain our results. Second, we did not take into account any changes in family SEP across the follow-up period. However, family SEP is generally a stable construct and sudden changes within a short duration, like in our study, are unlikely. Third, although our approach to determine whether the stressors were person-related or environment-related was inspired by previous works (Brown, Harris, 1978; Kendler, Karkowski, Prescott, 1999), it differed in that our approach was not based on interviews. Our data did not include the contextual information for rating the life stressors as precisely as in studies based on interviews. This could have led to the misclassification of some life stressors. However, there was substantial agreement among the raters (intraclass correlations > 0.80), and sensitivity analyses produced almost identical results as the models using our original event classifications.

Our findings support the view that at least part of the influence of low family SEP on offspring mental health is mediated by the experience of ERLS more than PRLS. This difference in mediation can be explained in several ways. Most likely, in our view, family SEP provides the environmental context in which the adolescents are raised and is therefore more likely to determine the exposure to ERLS (Evans, 2004). Person-related life stressors, on the other hand, are probably associated more with personality-related characteristics such as low self-esteem, shyness, or inadequate social skills (Ormel, Wohlfarth, 1991). It is also possible that PRLS may in part be due to preexisting mental health problems and result from reverse causality. The notion of reverse causality fits well with the concept of person-dependent stressors, as suggested in previous studies (Kendler, Karkowski, Prescott, 1999). Our study findings are consistent with previous studies that reported on mediation of the relation between low SEP and adjustment in adolescents by proximal SLEs (Felner, Brand, DuBois, Adan, Mulhall, Evans, 1995; Tracy, Zimmerman, Galea, McCauley, Stoep, 2008). However, in the Great Smoky Mountain Study (Costello, Compton, Keeler, Angold, 2003), the authors reported that the effect of short-term increase in income on psychiatric symptoms in low-income families was not mediated by several stressors. The likely long-standing effects of low SEP on the adolescents is a possible reason for the different findings between our study and the Great Smoky Mountain Study (Costello, Compton, Keeler, Angold, 2003).

In addition to the difference in the amount of mediation between ERLS and PRLS, the association of family SEP was markedly stronger for externalizing than for internalizing problems. Yet the extent of mediation by life stressors was considerably larger for internalizing problems. The stronger mediation for internalizing problems can be explained by stronger associations of both ERLS and PRLS with internalizing problems compared with externalizing problems. This is
consistent with previous research suggesting stronger associations of stressful events with internalizing problems than with externalizing problems (Grant, Compas, Thurm et al. 2006; Kendler, Kessler, Walters, et al., 1995).

However, the extent of mediation by life stressors in our study point to the presence of other proximal risk factors for psychopathology that may mediate the pathway from low SEP to mental problems. Possible proximal risk factors among the adolescents of low SEP include individual characteristics like poor parental supervision (Costello, Compton, Keeler, Angold, 2003), genetic influences (Kendler, Kessler, Walters, et al., 1995) or genes and environment interaction (Hudziak, Bartels, 2008). Nevertheless, a recent study showed no evidence for the interaction between serotonin transporter gene alleles and adversity as a risk factor for depression and that adversity (stressful life events) alone explains a large proportion (40%) of the risk for depression (Risch, Herrell, Lehner et al. 2009). The study by Risch and colleagues (2009) illustrates the significance of assessing the relative influence of environmental life stressors in attempting to understand the paths to mental health problems. However, the presence of these proximal risk factors (parental supervision, individual characteristics, genetic influences, etc.) is outside the scope of the present study and will be considered in subsequent studies.

Conclusions

The effect sizes of the associations between SEP and mental health found in the present study were relatively small, suggesting that interventions to diminish the influence of low SEP on impaired mental health may have only modest short-term benefits. However, these interventions are more likely to be effective when focused on the environment of the child rather than on the child itself. For example, family therapy for dysfunctional families has been shown to reduce childhood internalizing symptoms (Weissman, Pilowsky, Wickramaratne, et al., 2006). Further, coping skills such as acceptance, distraction, cognitive restructuring, and emotional regulation are reported to alleviate the effects of environment-related stressors on psychopathology (Wadsworth, Raviv, Compas, Connor-Smith, 2005). Furthermore, this period (childhood and adolescence) is the beginning of the life-course and small SEP differences may give rise to increasing differences in mental health outcomes later in life. Moreover, previous studies have suggested that the toxic effect of low SEP may be cumulative (Kuh, Ben-Shlomo, 1997; Mheen, Stronks, Mackenbach, 1998; Dohrenwend, 1990). Therefore, interventions to ameliorate the toxic effects of low family SEP on children and adolescents are still worth the effort from the public health point of view. Finally, distinguishing between ERLS and PRLS may be of theoretical relevance for future research in this area as identifying the source of life stressors may inform interventions.
REFERENCES


Araya R, Lewis G, Rojas G, Fritsch R. Education and income: which is more important for mental health? *J Epidemiol Community Health* 2003;57:501–505


Kuh D, Ben-Shlomo YE. A lifecourse approach to chronic disease epidemiology. New York: Oxford University Press; 1997


Rubin DB. Multiple Imputation for Non-response in Surveys. New York: John Wiley and Sons; 1987


Chapter 4

Parental Psychopathology and Socio-economic Position predict Adolescent Offspring’s Mental Health independently and do not interact: The TRAILS Study

“Can following in the footsteps of the parents be made worse by the thorns on the way or are the footsteps already thorny enough?”

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In Press

Journal of Epidemiology and Community Health: doi:10.1136/jech.2009.092569
ABSTRACT

Background: Familial risk factors have been implicated in the development of mental health problems in adolescents. We investigated whether the associations between parental loading as assessed by lifetime psychopathology and offspring internalizing and externalizing problems were moderated by family socio-economic position (SEP). Two hypotheses of moderation were tested: 1. the “Social Push” hypothesis in which parental loading effects is stronger in contexts with low environmental risks and 2) the “Vulnerability” hypothesis in which parental loading effects are stronger in high risk environments. Method: In a population-based sample of 2,149, familial loading and family SEP were assessed at baseline by parent reports. Offspring psychopathology was assessed by reports from multiple informants (parent, self, and teachers). Multiple linear regression was used to assess the independent associations of parental loading and family SEP on offspring psychopathology and their potential interaction. Results: Both family SEP and familial loading had significant independent main effects on offspring internalizing and externalizing problems. However, the interaction terms were not significant and did not add any explanatory power to the model. Conclusions: Lower levels of family SEP appear not to confer additional risks for mental health problems in offspring of parents with high loading on psychopathology. During early adolescence, parental psychopathology and low family SEP seem independent risk factors for offspring mental health problems. Results do not support either the “Social Push” or “Vulnerability” hypotheses as no evidence of interactions between parental loading and family SEP were found.

Key words: Parental psychopathology, socio-economic position, adolescents, mental health.
INTRODUCTION

Mental health problems during adolescence are frequent (WHO, 2005), associated with significant impairments, future psychopathology (Hofstra, Van de Ende, Verhulst, 2001; Visser, Van der Ende, Koot, Verhulst, 2000), and can disrupt schooling and career development (Miech, Caspi, Moffit, Wright, Silva, 1999; Due, Lynch, Holstein, Modvig, 2003). Parental psychopathology and low family SEP are known risk factors for offspring mental health problems (Loeber, Farrington, Stouthamer-Loeber, Van Kammen, 1998; Leventhal, Brooks-Gunn, 2000; Marmorstein, Iacono, 2004; Dearing, Gotlib, 2009). Parental psychopathology is reported to influence offspring mental health through at least three pathways. First, through predisposition to vulnerability genes (Goodman, Gotlib, 2002; Silberg, Pickle, Rutter, et al, 1999). Second, through exposure to adverse and non-supportive family environment, for instance, poor parenting, that is, parents are more irritable, harsh, and show less affection towards their children (Marmorstein, Iacono, 2004; Conger, Conger, Elder, Lorenz, Simons, Whitbeck, 1992; Conger, Wallace, Sun, Simons, McLoyd, Brody, 2002). Third, through bias information processing, for example, daughters of depressed women interpret information more negatively and less positively than daughters of mothers who are not depressed (Dearing, Gotlib, 2009). However, both genetic and environmental influences may operate on familial loading. For example, life events such as divorce or unemployment may lead to psychopathology (Kendler, Hettema, Butera, Gardner, Prescott, 2003). Likewise, from twin and adoption studies, we know that depression has a substantial genetic component (Sullivan, Neale, Kendler, 2000; Kendler, Prescott, 1999).

Low family SEP is also recognized as a risk factor for adolescent mental health problems (Loeber, Farrington, Stouthamer-Loeber, Van Kammen, 1998; Leventhal, Brooks-Gunn, 2000). For example, low SEP is associated with inadequate material goods (Evans, 2004) and residence in poor and deprived neighborhoods where substance abuse, deviant peer behaviors, and other social problems are known to flourish (Reijneveld, Brugman, Verhulst, Verloove-Vanhörick, 2005; Schneider, Drukker, Van der Ende, Verhulst, Van Os, Nicolson, 2003). Low SEP is also a source of chronic stress that negatively impacts on the relationship between parents and their children as reflected in poor family functioning, child abuse, and poor rearing and health behaviors (Caspi, Taylor, Smart, Jackson, Tagami, Moffitt, 2001; Stansfeld, Head, Bartley, Fonagy, 2008). However, most previous studies (Achenbach, Verhulst, Baron, Akkerhuis, 1987; Achenbach, McConaughy, Howell, 1987; Amone-P’Olak, Burger, Ormel, Huisman, Verhulst, Oldehinkel, 2009) showed that family SEP accounts for a relatively small proportion of variance in adolescent mental health (usually < 5%). We therefore propose that family SEP does not have a strong direct effect on adolescent mental health, but instead moderates the influence of familial and environmental risks associated with parental psychopathology on their adolescent offspring.
Two competing hypotheses have been put forward to explain how environmental contexts such as family SEP may moderate the influence of genetic effects on their offspring. The “social push” hypothesis (Raine, 2002) posits that genetic risks (which include familial psychopathology) are stronger in contexts with low environmental risks (e.g. high SEP) and weaker in contexts with high environmental risks such as low SEP (Figure 4.1). The theory underlying the “Social Push” hypothesis is that an adverse environment obscures genetic effects while lack of competing adverse environmental factors enables genetic effects to emerge more strongly. Thus, low family SEP would reduce the effects of familial loading on adolescent offspring’s mental health while high family SEP would amplify the effects if this hypothesis is true. The vulnerability hypothesis (Shanahan, Hofer, 2005; Plomin, Rutter, 1998; Ormel, Oldehinkel, Ferdinand, et al., 2005), on the other hand, postulates that those who are genetically predisposed to psychopathology may be more vulnerable to high risk environment such as low SEP than those in low risk environment such as high SEP (Figure 4.2). If this hypothesis is correct, low family SEP will amplify the negative effects of familial loading on offspring’s mental health.

Few studies have considered whether familiality for adolescent offspring mental health varied with environmental contexts such as family SEP. One study with adult samples found that the association between serotonin transporter genes (5-HTT) and depression varied with low socio-economic status (Brummett, Boyle, Siegler, et al, 2008). Nevertheless, a recent meta-analysis showed that the serotonin transporter genotype alone or in interaction with stressful life events does not increase the risk of depression (Risch, Herrell, Lehner, et al., 2009). To our knowledge, the only study that considered an adolescent sample showed that heritability for adolescent antisocial behavior (a proxy for genetic heritability) increased with lower socio-economic status in line with the “social push” hypothesis (Tuvblad, Grann, Lichtenstein, 2006).

In the present study we assessed moderation of the relationship between parental loadings on psychopathology (as assessed by lifetime psychopathology) on offspring mental health problems by family SEP using data from a large cohort of Dutch adolescents from a general population. Although gender is unlikely to be related to familial loading on psychopathology or SEP, it is a known correlate of internalizing and externalizing problems. For that reason, we assessed for its confounding effects.
Figure 4.1. Illustration of the Social Push hypothesis.

Higher loading on parental psychopathology (X-axis) will have a stronger influence on mental health (Y-axis) in adolescents from low risk environment (high SEP) than in those from high risk environments (low SEP). Thus, the influence of familial loading on psychopathology on adolescent mental health is reduced by high risk environment (low family SEP).
Figure 4.2. Illustration of the Vulnerability hypothesis.

*Higher loading on parental psychopathology (X-axis) will have a stronger influence on mental health (Y-axis) in adolescents from high risk environment (low SEP) than in those from low risk environments (high SEP). Thus, the influence of familial loading on psychopathology on adolescent mental health is amplified by high risk environment (low family SEP).*

*Key: SEP = Family socio-economic position; FL = Familial loading.*

**METHODS**

**Sample**

Subjects were participants in the ‘TRacking Adolescents’ Individual Lives Survey’ (TRAILS), a prospective cohort study of Dutch (pre) adolescents, aimed at explaining the development of mental health problems from pre-adolescence into adulthood. TRAILS was approved by the Central Committee on Research Involving Human Subjects. Sample selection involved five municipalities in the North of the Netherlands, including both urban and rural areas. The five municipalities were requested to give names and addresses of all inhabitants born between 10-01-1989 and 09-30-1990 (first two municipalities: mean age = 11.29, SD = .52, range = 10.0 – 12.0) or 10-01-1990 and 09-30-1991 (last three municipalities: mean age = 10.72, SD = .37, range = 10.0 –
Two birth cohorts were used in order to minimize the age range during the initial assessment. Of all the children approached (N = 3,145), 6.7% (n = 211) were excluded due to mental or physical incapability or language problems leaving a total of 2934. Finally, 76.0% participated in the baseline assessment (T1 - N = 2,230, mean age = 11.1, SD = 0.56, range = 10.0–12.0) and 96.4% (N = 2,149) were assessed at follow-up (T2 - mean age = 13.6, SD = 0.53, range = 12.0–15.0), held about two and a half years after T1 (mean follow-up time = 2.47, SD = 0.48, range = 0.73 – 3.25). The T1 assessment was conducted from March 2001 through July 2002 and the T2 assessment from September 2003 to December 2004. The present study includes those 2,149 adolescents who participated in the T2 assessment. Responders and non-responders did not significantly differ in levels of problem behaviors or on socio-demographic variables (De Winter, Oldehinkel, Veenstra, et al. 2005; Huisman, Oldehinkel, De Winter, et al., 2008).

Data collection

Interviewers were university graduates extensively trained in interviewing skills, study background, and interview content. At T1, the interviewers visited parents or guardians (preferably mothers, 95.6%) at their homes to administer interviews covering a wide range of topics, including socio-economic position, mental health, and lifetime parental psychopathology. Interviews were conducted and questionnaires filled-out after a complete description of the study was given and written informed consent were obtained from participants. At both T1 and T2, children filled out questionnaires at school supervised by TRAILS assistants. Teachers were asked to fill out a brief questionnaire for all TRAILS children in their class.

Measures

Offspring mental health problems. Two dimensions of mental health problems were included in this study: internalizing and externalizing problems. These problems were assessed at T1 and T2 with the parent-rated Child Behavior Checklist (CBCL) (Achenbach, 1991a), the Youth Self-Report (YSR) (Achenbach, 1991b), and the Teacher Checklist of Psychopathology (TCP) with a timeframe of the past 6 (CBCL and YSR) or 2 months (TCP). The TCP is comprised of descriptions of problem behaviors similar to Achenbach’s Teacher Report Form (TRF) (Achenbach, 1991c). The TCP was developed to reduce the respondent burden for teachers, as each had several participants to report on. This measure contains descriptions (vignettes) of problem behaviors corresponding to the syndrome scales of the CBCL and YSR (vignettes available upon request). Response options for each description of the TCP ranged from 0 (not applicable) to 4 (very clearly or frequently applicable). The TCP vignettes correlated around 0.60 with the full TRF syndrome scales filled out by a small sample of teachers (Ferdinand, 2003,
internal report available upon request). Next, we created broadband scales of internalizing problems (Anxious/Depressed, Withdrawn/Depressed, and Somatic Complaints) and externalizing problems (Aggressive behavior and Rule-breaking behavior). The validity of these scales have been documented (Achenbach, 1991a; Achenbach, 1991b; Achenbach, 1991c) and reiterated in a Dutch sample (Verhulst, Van der Ende, Koot, 1997). In our sample, the reliability statistics are as follows: CBCL-Internalizing (32 items, Cronbach’s \(\alpha = 0.85\)), CBCL-Externalizing (35 items, \(\alpha = 0.90\)), YSR-Internalizing (31 items, \(\alpha = 0.87\)), YSR Externalizing (32 items, \(\alpha = 0.85\)); TCP-Internalizing (3 vignettes, \(\alpha = 0.71\)), TCP-Externalizing (2 vignettes, \(\alpha = 0.78\)).

Reports from different sources are needed to reduce rater bias in the prediction of mental health problems and provide better estimates of diagnosis than those based on a single source (Verhulst, Koot, Van der Ende, 1994). It has also been demonstrated in previous studies that a combination of parent and teacher information results in an improvement of predictive power (Verhulst, Koot, Van der Ende, 1994). For this reason, we computed a combined estimate using the scores on mental health problems given by the children, parents and teachers at T2. In order to place the same weight on information from different informants, the scores on YSR, CBCL and TCP were first standardized to a zero to one scale before averaging over informants.

Family socio-economic position. Family SEP was assessed at baseline using five indicators: family income, educational level of the father and the mother and occupational level of both parents using the International Standard Classification of Occupations (ISCO) (Ganzeboom, Treiman, 1996). We created a SEP variable by averaging the indicators after standardization. An overall index of SEP was considered complementary, thus providing insights into the general family socio-economic disadvantage of the family and exposure of children and adolescents to social conditions such as environmental inequities and hazards, psychosocial stress, and material deprivation. Although individual measures of SEP may be positively correlated, the indices are not interchangeable and may tap into different causal pathways (Geyer, Hemström, Peter, Vagerö, 2006; Lahelma, Laaksonen, Martikainen, Rahkonen, Sarlio-Lahteenkorva, 2006; Shavers, 2007). In addition, preliminary analyses showed no substantial differences among the different indices of SEP.

The SEP index captured 61.2 per cent of the variance in the five items with an internal consistency (Cronbach’s alpha) of 0.84 in the TRAILS population. Missing values (e.g. when there is only one parent in the family) were accounted for in the averaging of the standardized items. Missing values did not affect the associations of the SEP variable with other variables (Veenstra, Lindenberg, Oldehinkel, De Winter, Verhulst, Ormel, 2005). Intact families, where both biological parents and their children live together constituted 76.3% (n=1,640) while families in which biological parents were either divorced or separated or where there was a step-parent or single-parent constituted 23.7% (n=509).
**Familial loadings on psychopathology:** Lifetime parental psychopathology was assessed at T1 by means of the TRAILS Family History Interview (FHI), administered to the parents. The FHI assessed five dimensions of psychopathology: depression, anxiety, substance dependence, persistent antisocial behavior, and psychosis. Each dimension was introduced by a vignette (available on request) describing the main DSM-IV characteristics of the dimension, followed by a series of questions assessing lifetime occurrence, professional treatment, and medication use. Biological parents were interviewed separately using a single informant (often the mother). For each dimension, we assigned each parent to one of the following categories: 0=(probably) never had an episode, 1=(probably) yes, or 2=yes and treatment and/or medication.

The prevalence rates in mothers and fathers respectively were: depression (27% and 15%), anxiety (16% and 6%), substance dependence (3% and 7%), and for antisocial behavior (3% and 7%). We computed familial loadings for the domains of internalizing and externalizing disorders separately. Both disorders are effective accounts of the number of lifetime disorders within each domain reported by the biological parents. Familial loadings on internalizing disorders included depression and anxiety and familial loadings on externalizing disorders included substance dependence and antisocial behavior (Ormel, Oldehinkel, Ferdinand, et al., 2005). The empirical justification for the construction of the familial loadings is twofold (data available on request). First, factor analysis of the disorder correlation matrix, for fathers and mothers separately, yielded two factors of internalizing and externalizing problems that were similar to the two-dimensional structure of common mental disorders (Ormel, Oldehinkel, Ferdinand, et al., 2005). Secondly, the pattern of associations between parental disorders and offspring psychopathology was similar for fathers and mothers, suggesting that the paternal and maternal indices could be combined without distorting important details. Corresponding to this, paternal disorders correlated weakly with maternal disorders (Ormel, Oldehinkel, Ferdinand, et al., 2005). For instance, paternal and maternal depression was associated (0.18) and so were paternal and maternal antisocial behavior (0.26). In spite of these weak correlations, the prevalence rates of subscales that constituted the parental loadings on psychopathology (except father’s anxiety and substance dependence and mother’s antisocial behavior) were comparable to the lifetime rates of large studies such as the NEMESIS study that used direct interviewing (Ormel, Oldehinkel, Ferdinand, et al., 2005; Bijl, Ravelli, van Zessen, 1998).

In this sample, the reliability statistics for familial loading were generally moderate. For familial loading on internalizing, it is Cronbach’s alpha = .55 and for familial loading on externalizing, it is Cronbach’s alpha = .51. Although the Cronbach alphas for the familial loading variables appeared to be moderate, their predictive validity was high and specific. Familial loadings on internalizing problems predicted offspring internalizing problems but not externalizing problems, whereas
familial loading on externalizing problems predicted offspring externalizing but not internalizing problems.

Data analyses

Missing data. The percentage of missing data was between 6 and 31 for mental health dimensions. For family SEP, 2 per cent of the data were missing and for lifetime parental psychopathology, 2 to 3 per cent were missing. To minimize loss of statistical power and risk of bias, we performed multiple imputations using the NORM program (Schafer, 1999). Multiple imputation is the preferred method of dealing with missing data when data are not missing completely at random (Donders, Heijden, Stijnen, Moons, 2006). We created five data sets to account for the uncertainty in imputed data (Rubin, 1987). They were analyzed in an identical way, and combined the regression coefficients and standard errors using Rubin’s method for multiple imputation inference (Rubin, 1987).

Statistical analyses. First, we calculated descriptive statistics including product-moment correlations. Secondly, we performed linear regression analyses to assess the strength of individual independent predictors (family socio-economic position and familial psychopathology) on offspring internalizing (adjusted for externalizing problems) and externalizing (adjusted for internalizing problems). Third, by means of multiple linear regression analyses, we assessed the main effects of familial loading and family SEP, as continuous variables, on adolescent internalizing problems in the first model. We decided to use continuous variables for two reasons: 1) to increase the statistical power to detect interaction and 2) because preliminary analyses showed no evidence of a threshold effect, both in the analyses with individual independent variables and analyses with predictors entered simultaneously. To rule out the possibility of spurious independent effects due to random measurement error as much as possible, we conducted and performed analyses based on factor scores. Finally, the interaction term familial loadings on internalizing problems X family SEP was added to the main effects in the second model. A negative regression coefficient for this interaction term would plead for the “Social Push” hypothesis while a positive regression coefficient would support the “Vulnerability” hypothesis. We repeated similar analyses with externalizing problems. To correct for shared variance between them, we adjusted offspring internalizing and externalizing problems for each other to obtain dimension-specific results. Preliminary results did not show gender as a confounder in either individual independent predictors or analyses with predictors entered simultaneously and was subsequently removed from further analyses.
RESULTS

Average age at T1 and T2 were (mean = 11.1, SD 0.55, range 10–12) and (mean = 13.6, SD 0.53, range 12–15) respectively. Fifty-one per cent of the adolescents were female. Correlations between the variables and their means, standard deviations and range of scores are presented in table 4.1. Family SEP correlated more strongly with offspring and parental loading on externalizing problems than with offspring and parental loading on internalizing problems. Although significant, the correlation between family SEP and familial loading on internalizing and externalizing psychopathology were low. Preliminary results did not show gender as a confounder in either analyses with each predictor entered separately or analyses with predictors entered simultaneously. Consequently, it was removed from subsequent analyses.

Table 4.1
Bivariate correlations between measures of family SEP, familial psychopathology, and offspring mental health problems

<table>
<thead>
<tr>
<th>Variables</th>
<th>M (SD) Range</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Socio-economic position</td>
<td>-0.055 (0.80) -1.94, 1.73</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Familial loading on INT</td>
<td>1.10 (1.59) 00, 8.00</td>
<td>-0.09</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Familial loading on EXT</td>
<td>0.27 (0.80) 00, 0.80</td>
<td>-0.21</td>
<td>0.24</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Offspring INT problems</td>
<td>0.16 (0.11) 00, 0.61</td>
<td>-0.13</td>
<td>0.15</td>
<td>0.14</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5 Offspring EXT problems</td>
<td>0.12 (0.09) 00, 0.85</td>
<td>-0.23</td>
<td>0.08</td>
<td>0.18</td>
<td>0.28</td>
<td>1</td>
</tr>
</tbody>
</table>

All correlation coefficients $P < 0.01$

INT = internalizing problems; EXT = externalizing problems;

Family SEP predicted offspring externalizing problems more than internalizing problems and familial loading on internalizing problems had a stronger effect on offspring internalizing problems than familial loading on externalizing problems had on offspring externalizing problems (Table 4.2). Each regression coefficient represents the number of SD change in the outcome variable per SD change of the independent variable. For example, the regression of internalizing problems on familial loading on internalizing problems means a change of one SD in familial loading on internalizing problems is associated with a 0.133 SD change in internalizing problems.
The results of analyses with individual independent predictors for familial loading on psychopathology and family SEP indicated that both factors each significantly predicted offspring internalizing problems (table 4.2). When familial loadings on internalizing problems and family SEP were entered into the same model simultaneously, their respective regression coefficients only slightly changed indicating that both factors are independently associated with more offspring internalizing problems (table 4.2). When we repeated the same analyses with externalizing problems, again both familial loadings on externalizing problems and family SEP each significantly predicted offspring externalizing problems in analyses with individual independent predictors. When familial loadings on externalizing problems and family SEP were entered into the same model simultaneously, their respective regression coefficients only slightly changed indicating that both factors are independently associated with more offspring externalizing problems (table 4.2). We performed preliminary analyses with each predictor entered separately and with predictors entered simultaneously to check for curvilinear (quadratic but no higher-order polynomials) and threshold interaction terms. However, none of these yielded significant effects.

For both offspring internalizing and externalizing problems, the interaction terms did not yield significant results (table 4.2). Compared to the first model, $R^2 = .098$, $F (3, 2145) = 39.75$, $p < .001$, when both familial loadings on internalizing problems and family SEP were simultaneously entered into the same model, addition of the interaction term did not improve the model for internalizing problems, $R^2 = .098$ ($F (4, 2144) = 30.14$, $p < .001$). Likewise, compared to the first model, $R^2 = .122$, $F (3, 2145) = 50.57$, $p < .001$, when both familial loading on externalizing problems were simultaneously entered into the same model, the second model including the interaction term did not add anything beyond the main effects of family SEP and familial loading on externalizing problems on offspring externalizing problems, $R^2 = .121$, ($F (4, 2144) = 37.90$, $p < .001$).
Table 4.2: Regression analyses of offspring mental health problems on familial loading on mental health, family socio-economic position and their interaction term.

<table>
<thead>
<tr>
<th></th>
<th><strong>ANALYSES WITH EACH PREDICTOR</strong></th>
<th><strong>ANALYSES WITH PREDICTORS ENTERED SIMULTANEOUSLY</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>INTERNALIZING PROBLEMS</strong></td>
<td><strong>EXTERNALIZING PROBLEMS</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Model 1 (main effects only)</strong></td>
<td><strong>Model 2 (main effects + interaction term)</strong></td>
</tr>
<tr>
<td></td>
<td>$R^2 = .098 (F (3, 2145) = 39.75, p &lt; .001)$</td>
<td>$R^2 = .098 (F (4, 2144) = 30.14, p &lt; .001)$</td>
</tr>
<tr>
<td><strong>FL on INT</strong></td>
<td>$\beta$ (95% CI)</td>
<td>$\beta$ (95% CI)</td>
</tr>
<tr>
<td>Family SEP</td>
<td>$\beta$ (95% CI)</td>
<td>$\beta$ (95% CI)</td>
</tr>
<tr>
<td>FL on INT * Family SEP</td>
<td>$\beta$ (95% CI)</td>
<td>$\beta$ (95% CI)</td>
</tr>
</tbody>
</table>

Note: Regression analyses are based on standardized variables. FL = Familial loading; INT = Internalizing problems; EXT = Externalizing problems; SEP = Socio-economic position; CI = Confidence intervals. Externalizing and internalizing problems were adjusted for each other.
DISCUSSION

Using data from a large population cohort of young Dutch adolescents, we showed that familial loading on psychopathology and family SEP independently and significantly predicted offspring mental health problems. There was no evidence of interaction between the two factors in predicting offspring internalizing and externalizing problems. Therefore, neither the “Social Push” nor the Vulnerability hypotheses is supported by our results.

Strengths and limitations of the study

The findings should be interpreted in light of three limitations. First, the familial loadings for internalizing and externalizing disorders took into account only lifetime parental psychopathology. Information on mental health problems of other close relatives were not included (Ormel, Oldehinkel, Ferdinand, et al., 2005). In addition, 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 is not conclusive (Kendler, Prescott, 1999), it is generally associated with underreporting of lifetime mental health problems in parents. However, possible misclassification of parental psychopathology has most likely been non-differential as to the outcome variable, i.e. independent of the offspring mental health and thereby unlikely to have affected the associations we studied in any substantial way.

Secondly, familial loading and family SEP may be associated and partly in the same causal chain. For example, those with higher loadings on psychopathology might have had truncated education or high job turnover or losses and were therefore unable to achieve high individual SEP. Nevertheless, our analyses do not support this mechanism as the effects appeared largely independent. This became evident when we entered both familial loading and SEP in the same model and the corresponding coefficients did not drop substantially (table 4.2). It is possible that the independent effects of familial loading and family SEP on offspring mental health were due to measurement errors. To rule out the possibility of spurious independent effects due to measurement errors, we performed our analyses based on factor scores.

Thirdly, we did not take into account any changes in family SEP across the follow-up period. However, family SEP, especially education, is known to be stable over time and sudden changes from one level to another within a short duration of time, like in our study, are unlikely. In addition, the different indices of SEP can provide complementary information on exposure of children and early adolescents to social conditions such as violence or environmental hazards and access to leisure activities in a family. By using an overall index of SEP we may gain insights into the overall
socio-economic disadvantage of the family. However, using an overall index of SEP is not without limitations. Individual measures of SEP may be positively correlated but are not interchangeable and may tap into different causal pathways (Geyer, Hemström, Peter, Vagerö, 2006; Lahelma, Laaksonen, Martikainen, Rahkonen, Sarlio-Lahteenkorva, 2006; Shavers, 2007). Finally, the study involved only early adolescents (mean age 13.6). Interaction effects may be detected later in adolescents or in adulthood as the adverse effects of low SEP are reported to be cumulative (Mheen, Stronks, Mackenbach, 1998).

The major advantages of our study include sufficiently large population-based sample (n = 2,149) to enable reasonable power for detecting interaction, the prospective design, and the use of composite measures of offspring psychopathology based on multiple informants (parent, teacher, and child). Furthermore, other assets include the use of multiply imputed datasets to address the problem of missing data, particularly common in longitudinal studies with multiple informants.

Interpretation

Our findings are not to be interpreted as disagreeing with the evidence for gene-environment interaction (Tuvblad, Grann, Lichtenstein, 2006). This is because our measure of familial loadings on psychopathology might be reflecting both genetic and environmental susceptibility to psychopathology. However, it is not possible, based on our data, to disentangle whether it is the genetic or the environmental aspects of familial loading or both that accounts for their effects on offspring mental health problems. Thus, the mechanisms underlying our findings remain unclear.

The findings might suggest that a model in which variability in adolescent mental problems is divided into independent components of family socio-economic position and familial psychopathology is probably very simple to account for the dynamic interactions of genetic risks (e.g. high loadings on familial psychopathology) and harsh environments (low socio-economic position) in the real world. It is possible that adolescent psychopathology is less predictable in both low SEP and high loading on parental psychopathology, for example due to the influence of non-shared environment as postulated in the seminal work of Plomin and Daniels (1987). This would, in turn lead to an increase in environmental variability and subsequent inability to detect interaction.

Another explanation could be that the interaction model fitting is actually being conducted on the portion of adolescent psychopathology that is independent of the components of both familial psychopathology and family socio-economic position. It is difficult to disentangle the causal relationship between family SEP and familial loadings on psychopathology. Yet, it is plausible that high loadings on lifetime psychopathology can influence family SEP. For example, those with
higher loadings on psychopathology might have had truncated education or high job turnover or even job losses and were therefore unable to achieve high individual SEP. In this study, however, the correlations between family SEP and familial loadings on internalizing and externalizing problems were low, therefore, collinearity was not an issue. In addition, we simultaneously entered both familial psychopathology and family SEP in analyses as predictors, effectively correcting for each other’s influences on offspring mental health problems.

Comparison with other studies is limited because few studies have considered whether familiality for adolescent mental health varies with environmental contexts such as low family socio-economic position. In addition, many studies have used different indices of SEP, making comparisons even more difficult. Thus explanation of our findings may be limited to the construction and measure of SEP we used. Our results contrast with findings from a Swedish longitudinal population-based twin study (TCHAD) (Tuvblad, Grann, Lichtenstein, 2006), which showed that family socio-economic status modified the influence of genetic factors on antisocial problems in adolescents. Unlike in our study, antisocial problems were not adjusted for co-morbid emotional factors in the TCHAD study. In addition, the TCHAD study used educational level, occupational status, and neighborhood socio-economic conditions as indicators of socioeconomic status while in our study; an aggregate measure of SEP (family income, level of education and occupational status for both parents) was used. Furthermore, in the TCHAD study, antisocial behavior was assessed using a questionnaire regarding property, drug-related and violent offences. It is possible that, neighborhood socio-economic conditions (ethnic diversity, neighborhood basic educational and unemployment levels, and neighborhood crimes) captures the nature of these offences (property, drug-related, and violent offences) more than our measure of SEP (family income, parental education and occupational levels). Lastly, our sample consisted of early adolescents (mean age = 13.6, SD 0.53) while the TCHAD study samples were aged 16-17 years.

Regarding the significant main effects of lifetime parental psychopathology and family SEP, our findings are generally in agreement with previous studies (Leventhal, Brooks-Gunn, 2000; Lieb, Isensee, Hofler, et al, 2002; Rutter, Silberg, O’Connor, Simonohoff, 1999a; 1999b; Rutter, Giller, Hagell, 1998; Rhee, Waldman, 2002). The independence of the associations of family SEP and familial loadings on psychopathology with offspring mental problems suggests that different mechanisms may be operating from familial psychopathology and socio-economic position to offspring mental health.

**Conclusions**

During early adolescence, low levels of family SEP do not confer additional risks for mental health problems in offspring from parents with high loading on psychopathology compared to
parents without a history of mental health problems. Both familial loading on psychopathology and family SEP seem independent risk factors for offspring mental health problems in early adolescence. More research is needed to further disentangle the processes between low family SEP and offspring mental health on the one hand and the link between parental psychopathology and offspring mental ill-health on the other. For example, it is possible that child mental health problems are bi-directional, that is, previous child mental health might have influenced parental psychopathology which, in turn, exacerbates current child mental health problems. The likelihood of other environmental factors such as school-related factors (e.g. under-achievement) intervening in between familial loadings and family SEP on the one hand and familial loadings and offspring mental health problems on the other might be an interesting area of study for future research.
REFERENCES


Bijl RV, Ravelli A van Zessen G. Prevalence of psychiatric disorder in the general population: results of The Netherlands Mental Health Survey and Incidence Study (NEMESIS). Social Psychiatry and Psychiatric Epidemiology 1998;33, 587–595


Kendler KS, Hettema JM, Butera F, Gardner CO, Prescott CA. Life events dimensions of loss, humiliation, entrapment, and danger in the prediction of onsets of major depression and generalized anxiety. *Arch Gen Psychiatry* 2003;60:789–796


Plomin R, Daniels D. Why are children in the same family so different from one another? *Behavioral and Brain Sciences* 1987;10:1-60
Plomin R, Rutter M. Child development, molecular genetics and what to do with genes once they are found. *Child Dev* 1998;69:1223-1242


Chapter 5

Socio-economic Position predicts Specialty Mental Health Service Use independent of severity of Mental Health Problems in Early Adolescents: The TRAILS Study

“When you educate a man you educate an individual; when you educate a woman you educate a whole family’.

**Robert M. MacIver** *(1882-1970)*

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Submitted for publication
ABSTRACT

Objective: To investigate associations between different indices of family socio-economic position (SEP) and the use of specialty mental health services (SMHS) and whether the associations exist after adjusting for severity of mental problems. Method: Using data from a large longitudinal study of adolescents (N =2149, mean age = 13.6, SD 0.53, range 12-15, 51% girls), we assessed the relations of family SEP indices with SMHS use while accounting for severity of mental problems in logistic regression models. Multiple informants (parent, self, and teachers) assessed mental health and a parent questionnaire was used to assess family SEP and SMHS use. Results: Overall, 6.7% of the total sample and 42.9% of those with mental problems accessed SMHS. Univariable analyses yielded no significant associations between SMHS and all the indices of SEP. Adjustment for severity of mental problems resulted in substantial and statistically significant associations of indices of SEP with SMHS use. Adolescents were particularly more likely to use SMHS with increasing level of maternal education. Compared to mothers with elementary education, those with university education were three times more likely to consult SMHS independent of severity of their offspring’s mental health problems (OR: 3.18, CI: 1.22, 8.30). For the aggregate measure of SEP, high SEP was associated with increased use of SMHS compared to low SEP, (OR: 1.63, CI: 1.04, 2.55). Conclusion: Higher levels of maternal education and overall SEP predict more SMHS use when severity of mental problems was accounted for. Without correcting for severity of mental problems, the true association between SEP and SMHS use is obscured in early adolescents.

Key words: specialty services, severity of mental health problems, socio-economic position
INTRODUCTION

The prevalence of mental health problems in the general child and adolescent population is estimated to be between 16% and 22% (Zachrisson, Rodje, Mykletun, 2006; WHO, 2005). Of these estimates, only between 13% and 36% of adolescents with mental health problems in Europe and North America are reported to seek mental health services (Zachrisson, Rodje, Mykletun, 2006; Bijl, Ravelli, 2000). There may be particular groups of adolescents with mental health problems who are disadvantaged and whose disadvantages are barriers to treatment by limiting access to specialty mental health services (SMHS). Yet, treatment of mental problems in adolescence is reported to be effective, especially when it starts early (Kadzin, Wassell, 2000; Kearney, Silverman, 1990).

To enhance the use of SMHS by adolescence, it is vital to examine barriers to their access. Many factors are reported to influence pathways into SMHS use for children and adolescents. They include factors related to the family, the social network and the primary healthcare providers (Mechanic, Angel, Davies, 1991; Sullivan, Young, Morgenstern, 1997). Factors known to influence help-seeking, *inter alia*, are the burden and distress parents experience raising the child, attitudes and beliefs, parental psychopathology, family size, and failure to recognize mental health problems and seek for help (Zwaanswijk, Verhaak, Bensing, Van der Ende, Verhulst, 2003; Farmer, Stangl, Burns, Angold, Costello, 1997). Of these factors, parental recognition is important because failure to recognize mental health problems and to consult the General Practitioner (GP) may delay treatment. Children and adolescents depend on their parents to recognize their mental health problems and to consult the GP (Zwaanswijk, Van der Ende, Verhaak, Bensing, Verhulst, 2005).

Family socio-economic position (SEP) is a generic family factor that may determine parental recognition of child and adolescent mental problems and the decision to consult a GP (Sayal, Taylor, Beecham, 2003; Costello, Pescosolido, Angold, Burns, 1998). This is because parents with high levels of education are likely to have superior knowledge about child development and may therefore be more alert on emerging mental health problems. In addition, they may appreciate the potential benefits of specialist care more than parents with low levels of education.

Previous studies on the role of family SEP in the use of mental health services in children and adolescents have yielded conflicting results. Some studies did find evidence of the role of family SEP on mental health service use (Horgan, 1985; Zahner et al., 1992; John, Offord, Boyle, Racine, 1995; Pumariega, Glover, Holzer, Nguyen, 1998) whereas others did not (Verhulst, Van der Ende, 1997; Laitinen-Krispijn, van der Ende, Wierdsma, Verhulst, 1999).
Low SEP is negatively associated with severity of mental health problems (Loeber, Farrington, Stouthamer-Loeber, Van Kammen, 1998; Amone-P’Olak, Burger, Ormel, Huisman, Verhulst, Oldehinkel, 2009). Severity of mental health problems, in turn, is positively associated with mental health service use (Zwaanswijk, Verhaak, Bensing, Van der Ende, Verhulst, 2003; Verhulst, Van der Ende, 1997; John, Offord, Boyle, Racine, 1995). Therefore, because of the negative relationship of low SEP with symptoms of mental health problems and the positive association of severity of mental health symptoms with mental health service use, it is possible that the relation between family SEP and mental health service use may be underestimated if severity of mental health symptoms is not accounted for. Many previous studies were based on analyses of routinely collected health care data such as pediatricians’ records, thus excluding subjects with relevant levels of psychopathology who have not sought help (Briggs-Gowan et al. 2000; Van der Ende, Verhulst, 2003; Laitinen-Krispijn, van der Ende, Wierdsma, Verhulst, 1999). Consequently, the associations between low SEP and reduced SMHS use reported in these studies may have been too small. Further, previous studies have used different indices of SEP such as education, occupation or income (John, Offord, Boyle, Racine, 1995; Horgan, 1985; Zahner, Pawelkiewicz, DeFrancesco, Adnopoz, 1992; Van der Ende, Verhulst, 2003; Vasiliadis, Tempier, Lesage, Kates, 2009), which makes comparison between studies very difficult. We have not come across any study that compared the proportion of the use of SMHS across several indices of family SEP for both parents while adjusting for severity of mental health problems in a population-based study. Yet identifying the source of barriers to SMHS use will inform interventions aimed at children and adolescents with severe mental problems in need of specialist care.

The present study reports on an analysis of data from a large population based cohort study of young Dutch adolescents. Our aim is two-fold: 1) to assess SMHS use by adolescents with different levels of family SEP using multiple indices of SEP, and 2) to investigate the associations between family SEP and SMHS use while accounting for severity of mental health problems.

METHODS

Sample

Subjects were participants in the ‘TRacking Adolescents’ Individual Lives Survey’ (TRAILS), a prospective cohort study of Dutch (pre) adolescents, aimed at explaining the development of mental health problems from pre-adolescence into adulthood. The Central Committee on Research Involving Human Subjects approved the TRAILS study. Sample selection involved five municipalities in the North of the Netherlands, including urban and rural areas. The municipalities were requested to give names and addresses of all inhabitants born between 10-01-1989 and 09-30-1990 (first two municipalities: mean age = 11.29, SD = 0.52, range = 10.0 – 12.0) or 10-01-
Two birth cohorts were used in order to minimize the age range during the initial assessment. Of all the children approached (N = 3,145), 6.7% (n = 211) were excluded due to mental or physical incapability or language problems leaving a total of 2934. Finally, 76.0% participated in the baseline assessment (T1 - N = 2,230, mean age = 11.1, SD = 0.56, range = 10.0-12.0) of which 96.4% (N =2,149) were assessed at follow-up (T2 - mean age = 13.6, SD = 0.53, range = 12.0–15.0), held about two and a half years after T1 (mean follow-up time = 2.47, SD = 0.48, range = 0.73 – 3.25). T1 assessment was conducted from March 2001 through July 2002 and the T2 assessment from September 2003 to December 2004.

The present study includes those 2,149 adolescents who participated in the T2 assessment. We analyzed family SEP and mental health problems assessed at T1, and SMHS use in the past two years assessed at T2. Responders and non-responders did not significantly differ in levels of problem behaviors or on socio-demographic variables (De Winter, et al. 2005; Huisman, et al. 2008).

Data collection

Interviewers were university graduates extensively trained in interviewing skills, study background, and interview content. At T1, the interviewers visited parents or guardians (preferably mothers, 95.6%) at their homes to administer interviews covering a wide range of topics, including their SEP, their children’s mental health, and mental health service use. Interviews were conducted and questionnaires filled-out after a complete description of the study was given and written informed consent were obtained from participants. At both T1 and T2, children filled out questionnaires at school supervised by TRAILS assistants. Teachers were asked to fill out a brief questionnaire for all TRAILS-children in their class.

Measures

Mental health outcomes. Two dimensions of mental health problems were included in this study: internalizing and externalizing problems. These problems were assessed at T1 and T2 with the parent-rated Child Behavior Checklist (CBCL) (Achenbach, 1991a), the Youth Self-Report (YSR) (Achenbach, 1991b), and the Teacher Checklist of Psychopathology (TCP) with a timeframe of the past 6 (CBCL and YSR) or past 2 months (TCP). The TCP is comprised of descriptions of problem behaviors similar to Achenbach’s Teacher Report Form (TRF) (Achenbach, 1991c). The TCP was developed to reduce the respondent burden for teachers, as each had multiple adolescent participants to report on. This measure contains descriptions (vignettes) of problem behaviors that correspond with the syndrome scales of the CBCL and YSR (vignettes available
upon request). Response options for each description of the TCP ranged from 0 (not applicable) to 4 (very clearly or frequently applicable). The TCP vignettes correlated around 0.60 with the full TRF syndrome scales filled out by a small sample of teachers (Ferdinand, 2003, internal report available upon request). Next, we created broadband scales of internalizing problems (Anxious/Depressed, Withdrawn/Depressed, and Somatic Complaints) and externalizing problems (Aggressive behavior and Rule-breaking behavior). The validity of these scales have been documented (Achenbach, 1991a; 1991b; 1991c) and reiterated in a Dutch sample (Verhulst, Van der Ende, and Koot, 1997). In our sample, the reliability statistics are as follows: CBCL-Internalizing (32 items): \( \alpha = 0.85 \), CBCL-Externalizing (35 items): \( \alpha = 0.90 \), YSR-Internalizing (31 items): \( \alpha = 0.87 \), YSR-Externalizing (32 items): \( \alpha = 0.85 \); TCP-Internalizing (3 vignettes): \( \alpha = 0.71 \), TCP-Externalizing (2 vignettes): \( \alpha = 0.78 \).

Reports from different sources are needed to reduce rater bias in the prediction of mental health problems and provide better estimates of diagnosis than those based on a single source (Verhulst, Koot, Van der Ende, 1994). It has been demonstrated in previous studies that a combination of parent and teacher information results in an improvement of predictive power (Verhulst, Koot, Van der Ende, 1994). For this reason, we computed a combined estimate using the scores on mental health problems given by the children, parents and teachers at T2. In order to place the same weight on information from different informants, the scores on YSR, CBCL and TCP were first standardized (using Z-scores) before averaging over informants.

Socio-economic position. Socio-economic position was assessed at T1 using five indicators: family income, educational levels of both parents and occupational levels of both parents using the International Standard Classification of Occupations (ISCO) (Ganzeboom & Treiman, 1996). Education consisted of five levels: 1) elementary education, 2) lower tracts of secondary education, 3) higher tracts of secondary education, 4) senior vocational education, and 5) university education. Occupation was rated on a 9-point scale: 1) elementary occupations, 2) plant and machine operators and assemblers, 3) craft and related trades workers, 4) skilled agricultural and fisheries workers, 5) service workers, shops and market sales workers, 6) clerks, 7) technicians and associates professionals, 8) professionals, and 9) legislators, senior officials, and managers. For our analyses, three categories of occupation were formed: low (scales 1 through 3), intermediate (scales 4 through 6), and high (scales 7 through 9). Monthly family income (minus tax) was categorized into three categories: low income (lower than € 2,500), intermediate income (€ 2,500 – € 5,500) and high income (above € 5,500). Next, we created an aggregate measure of SEP by averaging the five indicators (family income and education and occupation levels of both parents) after standardization. The lowest 25%, intermediate 50% and highest 25% of the scores were considered to represent low, intermediate and high SEP, respectively. The aggregate SEP index captured 61.2 per cent of the variance in the five items with an internal consistency of 0.84 in
the TRAILS population (Veenstra, Lindenberg, Oldehinkel, De Winter, Verhulst, Ormel, 2005). Missing values (e.g. when there is only one parent in the family) did not affect the association of the SEP variable with other variables.

*Specialty mental health services.* Service use was assessed by a parent questionnaire using the question ‘In the past two years, have you consulted any of the following organizations for the emotional and behavioral problems of your child?’ The services included were: in-patient and out-patient departments of psychiatric hospitals and private practice providing psychiatric and psychological services. From these services, we determined who used one or more SMHS. The items were scored as 0 (no use) and 1 (yes). Specialty mental health services were assessed at T2.

**Multiple imputation of missing data**

The percentage of missing data was between 6 and 31 per cent for mental health dimensions. The YSR contained few missing data (1.5 – 7%). Missing parent data ranged between 7.8 – 14 per cent. Most missing data concerned teacher reports (13.6 – 31%). Missing teacher data were generally unrelated to child characteristics (Huisman, et al. 2008). Family SEP contained few missing data (1.9%). To minimize the loss of statistical power and risk of bias, we employed multiple imputations. This is the preferred method of dealing with missing data when data are not missing completely at random (Donders, et al, 2006). Multiple data sets (i.e. five data sets) were generated to account for the uncertainty in imputed data (Rubin, 1987). They were analyzed in an identical way and the regression coefficients and standard errors pooled using Rubin’s method for multiple imputation inference (Rubin, 1987). We used the NORM program for multiple imputation (Schafer, 1999).

**Statistical analyses**

First, demographic characteristics of the study population were calculated and tabulated. Second, we performed univariable binary logistic regression analyses to obtain odds ratios of SMHS use for z-scores of severity of mental health problems as well as the intermediate and high categories relative to the low category of aggregate SEP, family income, and occupation. For education, odds ratios of SMHS use for lower track of secondary, higher track of secondary, senior vocational, and university education relative to elementary education were calculated. Third, to assess whether the associations of the SEP measures with SMHS use existed independent of severity of mental health problems, we fitted multivariable logistic regression models for each measure of SEP separately while adjusting for internalizing and externalizing problems. Fourth, to assess the unique influence of each indicator of SEP on SMHS use, we repeated these analyses
with all indices of SEP entered simultaneously. Finally, we assessed the statistical significance of trends of increasing values of the SEP indices with SMHS use by entering the SEP indices as independent continuous variables in separate logistic regression models, while adjusting for internalizing and externalizing problems. Odds ratios were supplied with 95% confidence intervals (95% CI) and the level of significance was set at 0.05 (two-sided).

RESULTS

The socio-demographic characteristics of the study population are presented in table 5.1. Adolescents reported experiencing more internalizing than externalizing problems. Of those who scored in the deviant range for internalizing and externalizing problems (scores ≥ 85th percentile), 78 (54%) accessed SMHS.
Table 5.1 Demographic characteristics of the study population (N=2149)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female gender (n, %)</td>
<td>1096 (51)</td>
</tr>
<tr>
<td>Age (mean, sd, ( min-max)</td>
<td>13.6 (0.53, 12–15)</td>
</tr>
<tr>
<td>Symptoms of mental health problems</td>
<td></td>
</tr>
<tr>
<td>Experienced 1 or more symptom of internalizing problems in the past 6 months</td>
<td>1,079 (50)</td>
</tr>
<tr>
<td>Experienced 1 or more symptom of externalizing problems in the past 6 months</td>
<td>1,021 (48)</td>
</tr>
<tr>
<td>Accessed SMHS (as a percentage of total sample)</td>
<td>145 (6.8)</td>
</tr>
<tr>
<td>Accessed SMHS (as a percentage of those with serious symptoms) a</td>
<td>145 (42.8)</td>
</tr>
<tr>
<td>Access to SMHS among female</td>
<td>52 (35.8)</td>
</tr>
<tr>
<td><strong>Indices of SEP</strong></td>
<td></td>
</tr>
<tr>
<td>Maternal education - Elementary</td>
<td>147 (6.8)</td>
</tr>
<tr>
<td>- Lower track secondary</td>
<td>670 (31.0)</td>
</tr>
<tr>
<td>- Lower track secondary</td>
<td>763 (35.4)</td>
</tr>
<tr>
<td>- Senior Vocational</td>
<td>422 (19.6)</td>
</tr>
<tr>
<td>- University</td>
<td>156 (7.2)</td>
</tr>
<tr>
<td>Paternal education - Elementary</td>
<td>106 (5.7)</td>
</tr>
<tr>
<td>- Lower track secondary</td>
<td>503 (26.8)</td>
</tr>
<tr>
<td>- Lower track secondary</td>
<td>604 (32.2)</td>
</tr>
<tr>
<td>- Senior Vocational</td>
<td>398 (21.2)</td>
</tr>
<tr>
<td>- University</td>
<td>263 (14.0)</td>
</tr>
<tr>
<td>Maternal occupation - Low</td>
<td>555 (33.4)</td>
</tr>
<tr>
<td>- Intermediate</td>
<td>574 (34.5)</td>
</tr>
<tr>
<td>- High</td>
<td>534 (32.1)</td>
</tr>
<tr>
<td>Paternal occupation - Low</td>
<td>596 (33.4)</td>
</tr>
<tr>
<td>- Intermediate</td>
<td>595 (33.4)</td>
</tr>
<tr>
<td>- High</td>
<td>593 (33.2)</td>
</tr>
<tr>
<td>Family income - Low (less than € 2,500 per month)</td>
<td>701 (34.9)</td>
</tr>
<tr>
<td>- Intermediate (between € 2,500 – 5,500 per month)</td>
<td>778 (38.7)</td>
</tr>
<tr>
<td>- High (more than € 5,500 per month)</td>
<td>529 (26.3)</td>
</tr>
<tr>
<td>Aggregate SEP - Low</td>
<td>730 (33.4)</td>
</tr>
<tr>
<td>- Intermediate</td>
<td>729 (33.3)</td>
</tr>
<tr>
<td>- High</td>
<td>729 (33.3)</td>
</tr>
</tbody>
</table>
SEP = Socio-economic position; SMHS = Specialist mental health services; Aggregate SEP = mean of maternal education and occupation, paternal education, occupation, and family income after standardization.

Severe symptoms of mental health problems regarded score ≥ 85th %tile; Aggregate SEP and occupation were categorized into three categories: (The lowest 25%, intermediate 50% and highest 25% of the scores were considered to represent low, intermediate and high SEP categories).

Low occupation: elementary occupations, plant and machine operators and assemblers, craft and related trades workers, Intermediate occupation: skilled agricultural and fisheries workers, service workers, shops and market sales workers, and clerks; High occupation: technicians and associate professionals, professionals, and legislators, senior officials, and managers.

Results of logistic regression analyses are presented in table 5.2. The univariable analyses showed that mental health problems were strongly associated with the odds of using SMHS, internalizing more than externalizing problems. Further, none of the indices of SEP including the aggregate measure predicted SMHS use in any significant way and the odds ratios were near unity.

Table 5.2 also gives the results of the multivariable analyses in each of which we adjusted for severity of both internalizing and externalizing problems. Two SEP indices significantly predicted more SMHS use in these analyses: maternal education and aggregate SEP. With increasing level of maternal education, the odds of SMHS use increased steadily and this trend was statistically significant. Compared to mothers with elementary education, children of mothers with university education were more than three times as likely to use SMHS. For aggregate family SEP, the same pattern emerged with a statistically significant trend of a higher odds of SMHS use with increasing aggregate SEP. For each of the remaining indices of SEP similar trends were observed but none of them reached statistical significance. Separate analysis with all indices of SEP simultaneously entered as continuous variables in a logistic regression model while adjusting for internalizing and externalizing problems yielded significant results for maternal education (OR: 1.45, CI: 1.01, 2.07) only. Independent of indices of SEP, each z-score increase in severity of mental health problems were associated with almost twice the odds of using SMHS, internalizing slightly more than externalizing problems.
Table 5.2

Associations between indices of *socio-economic position* (SEP) (independent variables) and *specialist mental health services* (SMHS) use (dependent variable) in univariable and multivariable logistic regression models (N= 2149)

<table>
<thead>
<tr>
<th>Predictors of SMHS</th>
<th>Univariable results</th>
<th>Multivariable results †</th>
<th>Trend</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR (95% CI)</td>
<td>OR (95% CI)</td>
<td>p value</td>
</tr>
<tr>
<td>Gender:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boys (reference)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Girls</td>
<td>0.52 (0.37, 0.74)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mental health problems</td>
<td>OR (95% CI)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internalizing problems a</td>
<td>2.29 (1.87, 2.81)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Externalizing problems a</td>
<td>2.02 (1.70, 2.41)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indices of family SEP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education (maternal)</td>
<td></td>
<td></td>
<td>p &lt; .05</td>
</tr>
<tr>
<td>Elementary</td>
<td>reference</td>
<td>reference</td>
<td></td>
</tr>
<tr>
<td>Lower track secondary</td>
<td>1.16 (0.53, 2.53)</td>
<td>1.45 (0.64, 3.25)</td>
<td></td>
</tr>
<tr>
<td>Lower track secondary</td>
<td>1.27 (0.59, 2.73)</td>
<td>1.85 (0.83, 4.13)</td>
<td></td>
</tr>
<tr>
<td>Senior Vocational</td>
<td>1.24 (0.55, 2.77)</td>
<td>2.19 (0.93, 5.14)</td>
<td></td>
</tr>
<tr>
<td>University</td>
<td>1.58 (0.64, 3.93)</td>
<td><strong>3.18 (1.22, 8.30)</strong></td>
<td></td>
</tr>
<tr>
<td>Education (paternal)</td>
<td></td>
<td></td>
<td>p = .12</td>
</tr>
<tr>
<td>Elementary</td>
<td>reference</td>
<td>reference</td>
<td></td>
</tr>
<tr>
<td>Lower track secondary</td>
<td>0.95 (0.38, 2.35)</td>
<td>0.98 (0.38, 2.35)</td>
<td></td>
</tr>
<tr>
<td>Lower track secondary</td>
<td>1.03 (0.42, 2.50)</td>
<td>1.14 (0.45, 2.86)</td>
<td></td>
</tr>
<tr>
<td>Senior Vocational</td>
<td>0.84 (0.33, 2.15)</td>
<td>1.13 (0.43, 3.02)</td>
<td></td>
</tr>
<tr>
<td>University</td>
<td>1.15 (0.44, 3.01)</td>
<td>1.79 (0.66, 4.90)</td>
<td></td>
</tr>
<tr>
<td>Occupation (maternal)</td>
<td></td>
<td></td>
<td>p = .79</td>
</tr>
<tr>
<td>Low</td>
<td>reference</td>
<td>reference</td>
<td></td>
</tr>
<tr>
<td>Intermediate</td>
<td>0.68 (0.43, 1.08)</td>
<td>0.83 (0.52, 1.34)</td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>0.83 (0.53, 1.29)</td>
<td>1.21 (0.75, 1.94)</td>
<td></td>
</tr>
<tr>
<td>Occupation (paternal)</td>
<td></td>
<td></td>
<td>p = .10</td>
</tr>
<tr>
<td>Low</td>
<td>reference</td>
<td>reference</td>
<td></td>
</tr>
<tr>
<td>Intermediate</td>
<td>1.11 (0.67, 1.82)</td>
<td>1.53 (0.90, 2.61)</td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>1.07 (0.65, 1.78)</td>
<td>1.55 (0.91, 2.63)</td>
<td></td>
</tr>
</tbody>
</table>
## DISCUSSION

The present study showed a statistically significant association of maternal education with the likelihood of SMHS use in early adolescents, but not of household income, occupation or education of the father. In addition, when we did not adjust for severity of mental health problems, the relation of family SEP with SMHS use was obscured. The association appeared to be independent of other indicators of SEP suggesting a unique association of maternal education with use of SMHS. As far as we know, the current study is the first to examine the relationship between different SEP indices with SMHS use while accounting for differences in severity of mental health problems in a large population cohort of young adolescents.

Previous studies that examined the influence of SEP on mental health service use yielded conflicting reports. Differences in findings could be attributed to the use of different definitions and indices of SEP, different measures of SEP and differences in service organization of the populations studied (Sayal, 2006). Verhulst and Van de Ende (1997) reported that family stress, one-parent family and poor family functioning predicted service use among children but not parental education or occupation. However, this study might have over-adjusted for the SEP indices they used because low family SEP is known to be a marker of family stress, one-parent family, and poor family functioning (Gilman et al. 2003; Bradley, Corwyn, 2002; Aseltine, 1996).

<table>
<thead>
<tr>
<th>Family income</th>
<th>p = .49</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low (&lt; € 2,500 per month)</td>
<td>reference</td>
</tr>
<tr>
<td>Intermediate (€ 2,500 – 5,500 per month)</td>
<td>0.97 (0.65, 1.45)</td>
</tr>
<tr>
<td>High (more than € 5,500 per month)</td>
<td>0.87 (0.55, 1.37)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Aggregate SEP</th>
<th>p &lt; .05</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>reference</td>
</tr>
<tr>
<td>Intermediate</td>
<td>1.02 (0.68, 1.55)</td>
</tr>
<tr>
<td>High</td>
<td>1.00 (0.66, 1.52)</td>
</tr>
</tbody>
</table>

* p < .05; Significant results are in **bold**;  a Entered as a continuous variable;  b SEP indices entered as continuous independent variables;  † Adjusted for severity of internalizing and externalizing problems; Aggregate SEP = mean of maternal education and occupation, paternal education, occupation, and family income after standardization. Aggregate SEP and occupations were categorized into three categories: (The lowest 25%, intermediate 50% and highest 25% of the scores were considered to represent low, intermediate and high SEP categories). Low occupation: elementary occupations, plant and machine operators and assemblers, craft and related trades workers. Intermediate occupation: skilled agricultural and fisheries workers, service workers, shops and market sales workers, and clerks. High occupation: technicians and associate professionals, professionals, and legislators, senior officials, and managers.
Although Verhulst and Van der Ende (1997) reported that family SEP was not associated with help-seeking factors, they used the parent with the highest level of education and highest occupation status as SEP indices. In the majority of cases, fathers have the highest level of education and occupation. In this respect, their findings are similar to the ones in this study because we did not find an effect of paternal education on service use either.

The studies which specifically used maternal level of education as an index of SEP reported that mothers with relatively high levels of education were more likely to have used mental health services (John, Offord, Boyle, Racine, 1995; Horgan, 1985; Pumariega, Glover, Holzer, Nguyen, 1998; Zahner, Pawelkiewicz, DeFrancesco, Adnopoz, 1992). This is in agreement with our findings that maternal education, independent of all other indices of SEP and severity of mental health problems were associated with SMHS use.

The associations of maternal education with SMHS use could have various origins. Mother’s education may be positively associated with mental health literacy, favorable attitudes, and fewer stigmas to mental problems (Riedel-Heller, Matchinger, Angermeyer, 2005). This may in turn cause enhanced recognition of these problems and preparedness to seek help. Moreover, mothers with high education may be more motivated to search for information about mental problems and can communicate more clearly with health workers about their children’s mental health than mothers with low education. For a matter of fact, because the different indices of SEP are strongly correlated, the interpretation of the association of maternal SEP with SMHS use as being independent of other indices of SEP must be cautious.

Lack of association of father’s education with use of SMHS may reflect the tendency of fathers to devote less time to childcare than mothers (Chen, Li, 2009). The finding that family income was not a significant predictor of SMHS use could be because of the way health care system is structured in the Netherlands where preventive child health care offers routine assessment, including the early detection of emotional and behavioural problems to the entire Dutch population (Brugman, Reijneveld, Verhulst, Verloove-Vanhorick, 2001; Minister of Public Health, 2001). Further, it is possible the Dutch health insurance system of universal coverage for child mental health services increases access to those with low incomes or unemployed as well.

Another possible reason for differential access to SMHS use in different levels and indices of SEP could be at the level of referral by the General Practitioner (GP). In the Netherlands, the GP is the gateway to specialist care. Recognition of the severity of mental health problems by GPs is crucial for the referral process. It is possible that GPs define mental problems differently for adolescents from different socio-economic backgrounds. Previous studies have suggested that patients from lower social classes are likely to get shorter consultations and receive less information (Britt,
Valenti, Miller, 2005). As a result these patients may be less likely to be referred to specialist care. In addition, parents from lower SEP families might have more difficulties communicating with GPs, which might compromise referral to specialist care.

An important finding of this study was that severity of mental health problems obscured the true association between family SEP and mental health service use in early adolescents. Only when the level of mental health problems was accounted for, the associations of family SEP with SMHS use became apparent. This can be explained by the fact that children from high-SEP families had, on average, fewer problems and therefore received less SMHS than children from low-SEP families.

**Strengths and limitations**

This study has several strengths. First, we used data from a large representative population sample. Second, we used multiple indicators of SEP directly obtained from parents rather than relying only on one indicator of family SEP. Information on SEP obtained from parents has been shown to be more reliable than information on SEP obtained from children (Wardle, Robb, Johnson, 2002). Third, multiple informants reported on mental health problems, thus limiting information biases and increasing precision in reporting (Verhulst, Koot, Van der Ende, 1994). Fourth, we were able to adjust our associations for the level of mental health problems allowing us to gain more insight into the process between SEP and SMHS use.

Nevertheless, the findings of our study must be interpreted in light of potential limitations. First, the only sources of information on mental health problems in this study were behavior checklists. It is possible that some of the associations detected apply only to emotional and behavioural problems that cannot be taken to mean psychiatric disorders defined in terms of clinical diagnoses. However, checklists such as those used in our study are comparable to interviews in studies involving the classification of psychiatric disorders (Boyle, et. al., 1997). In addition, 54 per cent of those who accessed SMHS scored in the deviant range, indicating that the checklists largely captured severity of mental health problems like other diagnostic measures. Second, we did not take into account any changes in family SEP across the follow-up period. However, family SEP, especially education, is generally a stable construct and sudden changes within a short duration, like in our study, are unlikely. Further, other factors such as family structure, ethnicity, or urbanization, could be associated with service use. Although these factors are strongly associated with mental health service use, they are outside the scope of the current study and will be dealt with in future studies. Last, we considered only SMHS because previous studies showed that adolescents who entered the mental health system through the specialty mental health sector were the most likely to subsequently receive services from other sectors, e.g. education sector (remedial classes) or social services (psycho-education) (Farmer, Burns, Phillips, Angold, Costello, 2003).
Conclusions

In early adolescents, the true positive association between SEP and SMHS use may be obscured by the association of severity of mental health problems with both SEP and SMHS use. Maternal education, independent of internalizing and externalizing problems, significantly predicts SMHS use. For policy makers, this could mean that mental health literacy in parents, especially mothers with low education, should be given priority. Interventions may include training parents with low education on detection and manifestations of mental health problems and consultation with GP. Finally, the mechanisms underlying inequality in SMHS use between socio-economically advantaged and disadvantaged groups call for further research. Specifically, future studies should examine mediators of the association of maternal education with referral to SMHS use.
REFERENCES


Bradley RH, Corwyn RF. Age and ethnic variations in family process mediators of SES. See Bornstein & Bradley 2003, pp. 161–88


Farmer EMZ, Burns BJ, Phillips SD, Angold A, Costello EJ. Pathways into and through mental health services for children and adolescents. Psychiatric Services, 2003;54:60-66


John LH, Offord DR, Boyle MH, Racine YA. Factors predicting use of mental health and social services by children 6-16 years old: Findings from the Ontario Child Health Study. *Amer J Orthopsychiat*. 1995;65:76-86


'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, Loeb, 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 gezins situaties 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 familair 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.
Hoofdstuk 1 (Dutch)

Psychisch welbevinden is belangrijk voor een goede kwaliteit van leven. Gelukkige en zelfverzekerde kinderen groeien meestal op tot gelukkige en zelfverzekerde volwassenen. Psychische problemen tijdens de volwassenheid zijn vaak geworteld in de kinderjaren. Kinderen met psychische problemen hebben vaak ook andere moeilijkheden, zoals slechte schoolprestaties, verslaving(en) en conflicten met autoriteiten. Deze moeilijkheden kunnen een belemmering gaan vormen voor opwaartse sociale mobiliteit en maatschappelijk succes, en kunnen leiden tot een lage sociaaleconomische positie (SEP).


Dit proefschrift onderzoekt de relatie tussen SEP en psychische problemen bij jongeren. In hoofdstuk 1 wordt het concept SEP besproken in relatie tot psychische problemen. Verder wordt in dit eerste hoofdstuk ingegaan op de uitdagingen die er zijn bij onderzoek naar psychische problemen in de context van SEP. In het laatste gedeelte van dit hoofdstuk worden de doelen van dit proefschrift besproken en de mogelijkheden om deze te bereiken met de TRAILS data. Het eerste doel van dit proefschrift was om te onderzoeken of de verbanden tussen SEP en psychische problemen domein-specifiek zijn voor internaliserende of externaliserende problemen. Het tweede doel was om te onderzoeken of het verband tussen SEP en psychische problemen gemediëerd wordt door verschillende typen stressvolle gebeurtenissen, namelijk omgevingsstressoren en persoonsgebonden stressoren. Het derde doel was om te achterhalen of een lage SEP de invloed van psychische problemen van ouders op de psychische problemen van kinderen versterkt. Het vierde en laatste doel was om te onderzoeken wat het effect is van SEP op zorggebruik in de context van psychiatrie en of dit onafhankelijk is van de samenhang tussen een lage SEP en de ernst van de psychische klachten.
Hoofdstuk 2

Studies uit het verleden hebben niet stilgestaan bij de mogelijkheid dat SEP een verschillend effect heeft op de meerdere dimensies van psychische problemen. Tot op heden is het onbekend of de effecten van SEP meer specifiek zijn voor internaliserende of externaliserende problemen. De studie in hoofdstuk 2 beschrijft domein-specifieke effecten van SEP op internaliserende en externaliserende problemen van jongeren. De resultaten van deze studie laten een negatieve associatie zien tussen SEP en alle dimensies van psychische problemen, maar vooral voor internaliserende problemen. Het effect van SEP op internaliserende problemen verdween en was niet meer significant wanneer we controleerden voor externaliserende problemen. Aan de andere kant, het effect van SEP op externaliserende problemen bleef sterk en significant wanneer we controleerden voor internaliserende problemen. Dit betekent dat het directe effect van SEP op psychische problemen domein-specifiek zou kunnen zijn. Het verband tussen SEP en internaliserende problemen zou mogelijk verklaard kunnen worden door gedeelde variatie met externaliserende problemen. Het is ook mogelijk dat het pad van een lage SEP naar internaliserende problemen loopt via externaliserende problemen. Tot slot, het effect van SEP op zowel internaliserende als externaliserende problemen bleef vrij klein (< 5%), maar dit effect was relatief sterker voor externaliserende problemen.

Hoofdstuk 3

Hoofdstuk 3 beschrijft een studie naar de mogelijke mediatie effecten van verschillende typen stressvolle gebeurtenissen (omgeving stressoren en persoonsgebonden stressoren) op de relatie tussen SEP en psychische problemen. Omgeving stressoren zijn stressvolle gebeurtenissen of lange termijn moeilijkheden die hoogstwaarschijnlijk niet het gevolg zijn van gedragingen van de jongere, en/of buiten de controle liggen van de jongere (bijv. het overlijden van een van de ouders). Aan de andere kant, persoonsgebonden stressoren zijn stressvolle gebeurtenissen of lange termijn moeilijkheden die mede het gevolg kunnen zijn van het gedrag van de jongere zelf (bijv. in aanraking komen met politie of justitie). Omgevingsstressoren medieerde vrij sterk het verband tussen SEP en psychische problemen. Dit was niet het geval voor de persoonsgebonden stressoren. Het verschil in het mediatie effect van omgeving stressoren en persoonsgebonden stressoren kan mogelijk verklaard worden doordat SEP de omgevingscontext bepaald waarin de jongere opgroeit. SEP is daardoor waarschijnlijk meer betrokken bij de blootstelling van jongeren aan omgevingsstressoren. De samenhang tussen SEP en externaliserende problemen was relatief sterker dan tussen SEP en internaliserende problemen. Daarentegen was het mediatie effect van de stressoren sterker voor internaliserende problemen dan voor externaliserende problemen. Dit kan mogelijk verklaard worden doordat zowel omgevingsstressoren als persoonsgebonden stressoren sterker geassocieerd waren met internaliserende problemen dan met externaliserende problemen.
problemen. Dit resultaat is ook consistent met de huidige literatuur die over het algemeen een sterker verband aantoont tussen stressvolle gebeurtenissen en internaliserende problemen.

**Hoofdstuk 4**

In hoofdstuk 4 wordt er gekeken naar de interactie tussen SEP en familiale belasting voor psychopathologie, om te onderzoeken of deze een synergistisch effect hebben op het ontwikkelen van internaliserende en externaliserende problemen bij kinderen. De interactie tussen SEP en ouderlijke psychopathologie is onderzocht in het kader van twee tegenstrijdige theorieën, namelijk de “social push” en de “vulnerability” hypothese. Bij de “social push” hypothese is de achterliggende gedachte dat genetische effecten (o.a. ouderlijke psychopathologie) sterker zijn in een omgeving met weinig risicofactoren (o.a. een hoge SEP), dan in een omgeving met veel risicofactoren. De “vulnerability” of kwetsbaarheid hypothese veronderstelt echter dat genetische effecten juist sterker zijn in een omgeving gekenmerkt door veel risicofactoren (o.a. lage SEP), dan in omgeving met weinig risicofactoren. De resultaten laten zien dat een lage SEP niet geassocieerd is met meer psychische problemen bij kinderen met een hoge dan met een lage familiale belasting voor psychopathologie. De familiale belasting voor psychopathologie en een lage SEP lijken dus onafhankelijk van elkaar te zijn en vormen samen geen synergistisch effect voor het ontwikkelen van internaliserende en externaliserende problemen bij kinderen tijdens de pre- en vroege adolescentie. Het afwezig zijn van een additief effect suggereert dat er geen bewijs is voor een “biologische” of mechanistische interactie. Oftewel, er is geen bevestiging gevonden dat voor het ontwikkelen van psychische problemen in de vroege adolescentie zowel de aanwezigheid van ouderlijke psychopathologie als ook een lage SEP noodzakelijk is. Dit betekent dat noch de “social push” noch de “vulnerability” hypothesen worden ondersteund door de resultaten. Het is echter wel mogelijk, dat, ondanks de afwezigheid van een interactie effect, SEP een omgeving creëert die jongeren kwetsbaar maakt voor het ontwikkelen van psychische problemen. Het is ook mogelijk dat onze maat voor familiale belasting op psychopathologie naast een reflectie van genetische kwetsbaarheid, tevens een kwetsbare omgeving representeert.

**Hoofdstuk 5**

In hoofdstuk 5 wordt de samenhang tussen SEP met zowel de ernst van de psychische klachten bij jongeren bekeken, als met de consumptie van geestelijke gezondheidszorg (GGZ). Eerder onderzoeken laten inconsistentte resultaten zien met betrekking tot SEP en zorggebruik. Enkele studies vinden significante relaties tussen SEP en zorggebruik, terwijl andere studies geen significante relaties vinden. Er zijn twee redenen die deze schijnbaar tegenstrijdige bevindingen verklaren. Ten eerste is een lage SEP geassocieerd met meer psychische problemen en tevens is de ernst van de problematiek gerelateerd aan een toenemend gebruik van zorg. Hoewel een lage
SEP alleen geen verklaring biedt voor de mate van zorggebruik. Echter, de combinatie van een lage SEP en ernstige psychische problemen is wel een mogelijke verklaring voor een lage zorggebruik. Ten tweede zijn veel eerdere studies gebaseerd op data die routinematig zijn verzameld (o.a. ziekenhuisdossiers of huisarts bestanden). Deze studies zijn echter niet gecorrigeerd voor de ernst van psychopathologie van zorggebruikers. In dit hoofdstuk wordt bekeken of er in de algemene bevolking een verband bestaat tussen diverse SEP maten en het gebruik van gespecialiseerde psychiatrische zorg, onafhankelijk van de ernst van psychopathologie. Onze bevindingen geven aan dat wanneer er niet gecorrigeerd wordt voor de ernst van psychopathologie, de verbanden tussen SEP en zorggebruik in jongeren onderschat worden. Uit univariabele analyses blijkt dat SEP geen significante voorspeller was van GGZ consumptie. Echter wanneer er bij multivariabele analyses gecorrigeerd werd voor de ernst van psychopathologie, waren alle SEP maten wel voorspellers van zorggebruik. Er kan dan ook worden geconcludeerd dat de ernst van psychische problemen in de vroege adolescentie de relatie tussen SEP en zorggebruik maskeert. Ook kwam naar voren dat de opleiding van de moeder een significante voorspeller voor zorggebruik was, onafhankelijk van alle andere SEP maten en ernst van psychopathologie bij de jongeren.

Een hoge opleiding van de moeder is mogelijk geassocieerd met een verhoogde bekendheid met deGGZ, of het kunnen formuleren van en actieve hulpvraag en het astigmatisch denken over psychische problemen (Riedel-Heller, Matchinger, Angermeyer, 2005) . Het is mogelijk dat hoog opgeleide moeders niet alleen psychische problemen eerder herkennen dan laag opgeleide moeders, maar dat zij ook beter in staat zijn om informatie over psychische problemen te vinden. Tevens zijn hoogopgeleide moeders wellicht beter in staat dan laagopgeleide moeders te communiceren met de betrokken zorginstantie over de psychische gezondheid van hun kind. Dat het opleidingsniveau van de vader geen voorspeller is voor zorggebruik, zou mogelijk komen door de hoeveelheid zorgtijd die vaders aan hun kinderen besteden. Ook is het wellicht mogelijk dat in de vroege adolescentie kinderen meer verbonden zijn met hun moeder dan met hun vader en mogelijk hebben moeders hierdoor meer zicht op de psychische gezondheid van hun kinderen. De bevinding dat familie inkomen geen significante voorspeller was van zorggebruik komt mogelijk door de Nederlandse zorg zelf, waarin routinematige preventief onderzoek wordt uitgevoerd bij kinderen, inclusief het vroegtijdig opsporen van emotionele en gedragsproblemen.

Hoofdstuk 6

In dit proefschrift worden vier aspecten van het verband tussen SEP en psychische problemen in de pre- en vroege adolescentie onderzocht: nl. domein-specifieke, mediatie door levensgebeurtenissen, interactie met psychopathologie van de ouders en het gebruik van instellingen van geestelijke gezondheidszorg. Het verband tussen de sociaaleconomische positie
(SEP) van het gezin en psychische gezondheid was groter voor het externalizerende dan voor het internalizerende probleemdomein en het verband tussen SEP en psychische gezondheid werd deels gemedieerd door omgevingsgebonden levensgebeurtenissen, met name door internaliserend problemen. Verder werd gevonden dat de lading van gezin op psychopathologie en een lage SEP van het gezin onafhankelijk was en geen inter-acterende risico factor voor psychische gezondheidsproblemen bij kinderen was. Het ware verband tussen gezin SEP en het gebruik van instellingen voor geestelijke gezondheidszorg werd gemaskeerd als gevolg van negatieve beschamen door de ernst van de psychische problemen. De opleiding van de moeder bleek een significante voorspeller te zijn voor het gebruik van instellingen voor geestelijke gezondheidszorg, zelfs als er gecorrigeerd werd voor andere indicatoren van SEP en ernst van de psychische problemen. Concluderend kunnen we stellen dat in de pre- en vroege adolescentie het effect van een lage gezin SEP op de psychische ongezondheid domeinspecifiek is en deels gemedieerd wordt door omgevingsgebonden levensgebeurtenissen en met name door internaliserende problemen. Een laag gezin SEP niveau lijkt geen extra risico met zich mee te brengen wat betreft het risico op psychische problemen bij kinderen van ouders met een hoge lading op psychopathologie. Door de ernst van psychische problemen lijken de ware verbanden tussen de verschillende SEP indicatoren en het gebruik van gespecialiseerde instellingen voor geestelijke gezondheidszorg onduidelijker te worden.
REFERENCES


Boyle M, Offord D, Racine Y, Szatmari P, Sanford M, Fleming J. Adequacy of interviews vs. checklists for classifying childhood psychiatric disorder based on parent reports. *Arch Gen Psychiatry* 1997;54:793-799


John LH, Offord DR, Boyle MH, Racine YA. Factors predicting use of mental health and social services by children 6-16 years old: Findings from the Ontario Child Health Study. *Amer J Orthopsychiat*. 1995;65:76-86


Plomin R, Rutter M. Child development, molecular genetics and what to do with genes once they are found. Child Dev 1998;69:1223-1242

Plomin R, Daniels D. Why are children in the same family so different from one another? Behavioral and Brain Sciences 1987;10:1-60


ACKNOWLEDGEMENTS

When I moved to The Netherlands in January 2003 to pursue a M.Sc. in Health and Behavioral Science at Leiden University, little did I know that I would return to The Netherlands later to pursue a Ph.D. at another Dutch university, this time the University of Groningen. The University of Groningen offered me the opportunity to meet very inspiring people with whom I shared experiences at both professional and personal levels. Without their support, guidance, and contributions I would never have accomplished my PhD research training.

First, I am extremely grateful to my promoter, Prof. Johan Ormel for his guidance and counsel and for giving me the opportunity to pursue a research degree. Second, as my supervisor during the entire period of the PhD project, Dr Huibert Burger played a pivotal role in this thesis for his relentless efforts in supervising the PhD project and training. I must add that I learnt a lot from Dr Burger. Not only from his kindness and generosity but also from his intelligent advice and vast knowledge, particularly of statistics, which I must confess, makes me a little dizzy. Third, I would like to thank all the co-authors on my articles for their support and valuable critiques. Particularly, I would like to thank Prof. Tineke Oldehinkel, Prof. Frank Verhulst, and Dr Martijn Huisman. I learnt a lot from all of you.

Next, I would like to thank all my colleagues: Dr Kirstin Greaves-Lord, Andrea Prince, Eryn Liem, Nienke Bosh, Esther Bouma, Arjen Noordhof, and Martin Bakker, for always being ready to help. I am also grateful to Liesbeth Lindeboom and Martha Messchendorp and all the secretariat workers of the Department of Psychiatry for their kindness and guidance regarding the administration of my Ph.D. project. My gratitude also goes to all the workers of TRAILS project for being such good colleagues: Dr Andrea De Winter, Heidi, Martine, Edwin, Roelie, Thirza, Hanneke, Maaike, and Jantina Douglas for such valuable company and advice. At the BCN office, I was always grateful to meet Dr Britta Kust, Diana Koopmans, Janine Wieringa, Nynke Penninga, and Gerry Hoogenberg. Thank you all for your kindness and help.

To members of the 5th floor: Fokko Nienhuis just opposite my office, Agna, Ellen, Harriette, Melinda, Gerda, Esther Nederhof, Hallie, Conradi, and Sietse, I am so grateful for your understanding and help. To the Para nymphs: Andrea Prince and Martin Bakker, thank you for being part of this great occasion and for sharing with me this very happy moment of my career and life. I am also grateful to Melinda for reading through some of the chapters and improving on the language.

Lastly, I am eternally indebted to my family: my wife Gloria not only for her support and encouragement but also for giving up her job in Uganda in order for us to be together as a family.
When we came over in December 2005, our son Alvin was only three months old but now he is four and represents the time we have been here in The Netherlands. Jeremy, our second son was born here in The Netherlands (therefore a Groninger) and part of my Ph.D. story. Thank you so much Gloria. And for the little boys, thank you for bringing such joy into our lives. To our families in Uganda, I am so happy that you kept in touch and thank you for your prayers and social support that made it possible for my Ph.D. project to succeed. To Gulu University, I am so grateful for granting me leave of absence and for all your contributions towards my PhD project.

I am also grateful to the members of the reading committee: Prof. dr. J. K. Buitelaar, Prof. dr. K. Stronks, and Prof. dr. W. A. M. Vollebergh for accepting to read and evaluate my thesis. Finally, I would like to thank the almighty God for the endurance, strength, and wisdom that enabled me to successfully complete the Ph.D. project.
CURRICULUM VITAE

Born in Kampala, Uganda on March 28, 1968, Kennedy Amone-P’Olak received his primary education at Madi-Opei and Kitgum Primary Schools before joining Sir Samuel Baker School in Gulu, Northern Uganda and St Peter’s College, Tororo in Eastern Uganda for his secondary education. After his high school, Kennedy joined Makerere University to pursue a BA with Education degree and thereafter taught at high school after his bachelor degree before going back to Makerere University for a masters degree in education (M.Ed) majoring in Guidance and Counselling. In 1997, he was appointed assistant lecturer in the Department of Psychology at Mbarara University of Science and Technology.

In January 2003, he won an EED (Evangelischer Entwicklungsdienst) scholarship to pursue an MSc degree in Health and Behavioral Sciences at Leiden University, The Netherlands. He completed the MSc (Cum Laude) in April 2004 and returned to Uganda. In January 2005, Kennedy transferred from Mbarara University to Gulu University and in November 2005 Kennedy was awarded the University of Groningen Ubbo Emmius scholarship to pursue a Ph.D. degree at the University of Groningen. This time round, Kennedy returned to The Netherlands with his wife Gloria and three-month-old son, Alvin. In 2008, they were blessed with another boy, Jeremy. Kennedy will return to Uganda in December 2009 to resume his position as a lecturer at the Departments of Psychology and Mental health at Gulu University in Northern Uganda.

Over the years, Kennedy has attended numerous courses at different universities: Special Needs Education at the University of Oslo, Norway, in 2000; Forced Migration at Oxford University in the UK in 2003; Intervention Mapping for HIV/AIDS Prevention at University of Maastricht, The Netherlands in 2004; The Psychosocial Aspects of Poverty at the University of Padova, in Italy in 2007; and recently in Cognitive Behavioral Therapy with Children and War Foundation, Oslo, Norway, in 2009.

Kennedy’s research interest is mainly on the impact of wars, violence, and traumatic events on children and adolescents. Specifically, Kennedy has conducted research on:

1. The psychological impact of exposure to wars, violence, and other traumatic events and the rehabilitation and reintegration of war-affected children and adolescents in Africa
2. Family and school contextual factors of child and adolescent mental health
PUBLICATIONS

Articles published:


Amone-P'Olak K Mental States of Adolescents exposed to War in Uganda: Finding appropriate methods of rehabilitation. Torture, 2006;16(2):93–107


Articles submitted:

1. Socio-economic position predicts Specialty Mental Health Services independent of severity of mental health problems in early adolescents: The TRAILS Study
2. A conceptual model for understanding the phenomenon of child soldiering in Africa: The case of Northern Uganda.

Book chapter (under review):

Margaret Angucia and Kennedy Amone-P'Olak: The interface between Early School Leaving and Conflict: The case of Northern Uganda
Mental health during childhood and adolescence is fundamental to good quality of life and contributes to future success in society. Healthy and confident children are more likely to turn out into healthy, confident and productive adults. For all human beings, the family is the first port of call. Thus, family characteristics such as socio-economic position (SEP) may be linked to offspring mental health. This thesis investigates this link. The following links are specifically studied: the differential effects of SEP on particular domains of mental health problems (the domain-specific link), mediation by different life stressors of the relations of SEP and mental health (the mediation link), the interaction by SEP of the relation between parental psychopathology and offspring mental health (the interaction link), and the link with mental health service use. The findings are presented and their implications for future research and public health are discussed.

Kennedy P‘Olak Amone conducted his PhD research at the Interdisciplinary Centre for Psychiatric Epidemiology of the University Medical Centre, Groningen. His PhD project was part of the TRacking Adolescents’ Individual Lives Survey (TRAILS), a multidisciplinary prospective cohort study of pre-adolescents aimed at charting the trajectory of mental health problems from childhood to early adulthood.