

COPING ABILITY AT MID-LIFE IN RELATION TO HEREDITARY AND ENVIRONMENTAL INFLUENCES AT ADOLESCENCE – A FOLLOW-UP OF SWEDISH TWINS FROM ADOLESCENCE TO MID-LIFE

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Abstract: *From 1964 to 1971 twins and controls were followed from 10 to 16 years of age in the Swedish compulsory school. It was a nationally representative sample of 323 twin pairs, MZ and DZ, and 1193 controls attending the same classes as the twins.*

After 20 years a follow-up has been made of this sample with the purpose of investigating hereditary influences on experienced family and school environments, as well as coping ability at the age of 35. Another purpose was to study the relationship between coping ability at mid-life and family, as well as school environment at adolescence for males and females.

Hereditary influences on perceived family and school environments as well as self-reported coping ability have been investigated by means of intraclass correlations for the MZ and DZ twin pairs. A step-wise linear regression analysis has been applied to determine the environmental influences for coping ability at mid-life.

Coping ability at mid-life seems to be developed both by hereditary and environmental influences. Different environmental factors were, however, operating for males and females. The results show that early environmental factors have a long-term effect on coping ability.

Keywords: *Longitudinal; Twins; Development; Family and school environment; Coping ability.*

Introduction

In a previous Swedish longitudinal twin study hereditary and environmental influences on mental and physical development were investigated (Fischbein 1978, 1979). One of the main results was that two environmental dimensions were of particular importance. A more permissive and stimulating environment tended to give more room for genetic variation while a restrictive and non-stimulating environment reduced this variation. The same characteristic genetic influences could therefore vary according to environmental permissiveness / restrictiveness as well as stimulation / non-stimulation.

There were also significant gender differences in the pace of growth during childhood and adolescence. On average girls mature two years earlier than boys, even if there is a great variation within the groups (Tanner 1978, Westin-Lindgren 1979). The variation seems to be greater for the boys compared to the girls. As early as during the foetus period, boys tend to be influenced more negatively than girls regarding problems in the surrounding environment (Alin Åkerman and Fischbein 1991). It is also evident that such differences remain during the whole childhood and adolescence (Bergman 1978, Nordberg 1994, Sundelin Wahlsten 1991).

Twenty years later, a follow-up study of the original SLU-sample has been made. The main purpose of this follow-up is to investigate hereditary and environmental influences on life situation and coping ability at mid-life during a twenty-year period.

The ability to cope with everyday problems as well as with problems of major significance varies for different individuals. The development of personal and intellectual strength is connected to coping ability and can be derived from influences of genetic as well as environmental factors. The magnitude of these influences is discussed by Baumrind (1993) and Scarr (1993). Baumrind emphasizes the importance of parental influences on children's development. The most destructive parental child raising patterns are *authoritarian* with excessive control and lack of warmth and affection or *neglectful* patterns with resentment and uninvolvedness. *Permissive* parents generally have a warm, accepting and child-centered attitude toward their child. These parents, however, do not require mature behavior from their children but allow them to behave autonomously and independently. Baumrind therefore argues in favour of *authoritative* parents who "actively shape their children's sense of efficacy and self-esteem, and enhance their scholastic performance by producing situations in which their child is effective and by imparting positive messages about their child's qualities and competencies" (Baumrind 1993). Parents can thus be taught how to treat their children in more constructive ways. Lately, Stattin and Kerr (2000) have concluded that it might not be the monitoring of parents but child disclosure of relevant information that is influential in child raising. This can of course be considered a powerful interactive effect.

According to Scarr (1993) the variation in behavioural development depends on genotypic propensities, environmental opportunities and the timing of experiences. However, Scarr (1992) maintains that the genetic - environment correlation is so strong that the environments most parents provide for their children have few differential effects on their offspring.

An important question is *how* genetic factors interact with the environment under specific circumstances. Bronfenbrenner and Ceci (1994) point to the need to identify the mechanisms through which genotypes are transformed into phenotypes. They enhance the importance of what they call "proximal processes" in the optimal development of children and youth. "The external becomes internal and becomes transformed in the process. However, because from the very beginning the organism begins to change its environment, the internal becomes external and becomes transformed in the process" (op. cit. p. 572). These processes occur over time.

Optimal development might of course be many different things, for instance physical, cognitive or emotional development. One very important factor is, however, the ability to cope with everyday problems and to experience your life situation as comprehensible, manageable, and meaningful (Antonovsky 1987).

Antonovsky (op. cit.) enhanced the importance of what he called "coping ability" for optimal development and staying healthy in spite of external strain. For this purpose he developed a scale which he calls "*The Sense of Coherence*" (SOC). This can be defined as an expression of the extent to which a person finds life comprehensible, manageable and meaningful. SOC is an integral part of the coping ability and, according to Antonovsky, the SOC is developed quite early in life. "I am then suggesting that by the end of the first decade or so of one's adulthood, having sorted out or accepted the inconsistencies in the different areas of life, one has attained a given location on the SOC continuum" (Antonovsky 1987). Whether the outcome of the coping ability will be

negative, neutral or positive depends on the actual situation and how well the coping strategies of the individual will work to master the stressors (Antonovsky 1987, Furu 1991). According to Antonovsky (1987) the ability to cope with stressors in an efficient way consists of the conception *Generalised Resistance Resources*. It embraces factors such as money, cognitive ability, ego strength, cultural stability, social support etc, which can be related to both individual prerequisites and environmental factors. By means of such resources man can more easily find reason and meaning in all the countless stressors which are constantly influencing him/her. Antonovsky hypothesised that, the stronger the SOC of the parents the more probable it is, that they create experiences for their children which are of such a kind that the SOC of the child develops in the same direction as the SOC of the parents. Experiences during childhood and adolescence are fundamental for the ability to orientate oneself in the surrounding world and to find life comprehensible, manageable and meaningful.

Results supporting this show that the coping style of an adolescent is influenced by family background, especially the coping pattern of the family. Emotionally unstable adolescents tend to select a withdrawn coping style which in turn tends to lead to poorer adjustment. Coping style is thus a contributor to overall adjustment (Schludermann et al. 1996). Therefore, from an educational point of view, it is important to increase the knowledge about individual and environmental factors influencing the developmental process of coping ability both at home and at school.

Aim: There are two purposes of this follow-up study. The *first* one is to investigate hereditary influences on experienced family and school environments at adolescence, and the coping ability at the age of 35 by means of the twin material. The *second* purpose is to investigate the relationship between coping ability at mid-life and family as well as school environment at adolescence for males and females.

Material and Methods

A longitudinal design

This investigation is based upon a Swedish longitudinal study, which started in the middle of the sixties (the SLU-study). Between 1964 and 1971 a nationally representative sample of monozygotic (MZ) and dizygotic (DZ) twins and a control group of singletons were followed from grade 3 at 10 years of age to grade 9 at 16 years of age in the Swedish compulsory school. Originally 323 MZ and DZ twin pairs, as well as 1193 controls were included in the sample. Approximately one third were monozygotic pairs, one third dizygotic of the same sex and one third dizygotic of different sex (Ljung et al. 1977).

The original purpose of this investigation was to study physical and mental growth during puberty as well as hereditary and environmental influences on these growth processes. Several kinds of data were collected, such as physical data (height and weight, menarche, rating of secondary sex characteristics), ability and achievement tests results (intelligence tests, standardised achievement tests), ratings by teachers and classmates concerning school adjustment and socio-economic background data (father's occupation and income).

A follow-up

Sample: After 20 years, when the participants were in their mid-thirties, a follow-up study was initiated. A two-step design was applied. The result of the first step of this follow-up showed that more women than men were positive about participating in a new study about their life situation and self-reported health (Lange and Fischbein 1992). This is in accordance with other Swedish longitudinal studies (Furu 1985).

In the second step of the follow-up study we tried to encourage more males to participate. A questionnaire was sent to a representative sample among those who had agreed to participate in a new study. The goal was to include 600 individuals, half of them women and half of them men. For each sex there were to be 50 per cent twins and 50 per cent controls. This study comprised 320 twins and 322 controls (Table 1). In spite of our recruitment efforts more women than men were willing to participate.

Table 1. Number of participants in the follow-up study.

	Male	Female
MZ	41	54
DZ	104	121
Controls	154	168

To make within pair comparisons both twins in a pair had to participate. The number of complete twin pairs is shown in Table 2. More female than male same sex twin pairs were included in the follow-up.

Table 2. Number of complete twin pairs in the follow-up by sex and zygosity.

	Male	Female	Male/Female
MZ	18	25	-
DZ	20	31	39

Material: The questionnaire dealt with living conditions such as civil status, children, housing, education and present occupation. There were also questions about economy, the frequency of contact (with twin sister/brother, parents, friends and relatives) and questions regarding earlier family and school environment. The participants reported their present health and coping ability (SOC) as well as their experiences of their general life situation. Most of the questions were of multiple choice type.

A main purpose has been to focus on the relationship between the adolescent and the adult life situation. Coping ability at mid-life is therefore regarded as outcome variables. Independent variables such as social class affiliation and retrospective ratings of family situation at adolescence have been related to coping ability.

The Family Environment Scale (FES) (Moos and Moos 1981) was used. Forty of the original ninety items were included in the questionnaire. These were the same items that were used in another longitudinal Swedish twin study, the SATSA-project (Plomin et al.

1988, Pedersen et al. 1991). The items concerning family climate were rated from 1 (agree exactly) to 5 (disagree) and can be assigned to the following areas:

- Cohesion (e.g. Family members really help and support one another)
- Expressiveness (e.g. There are a lot of spontaneous discussions in our family)
- Conflict (e.g. We fight a lot in our family)
- Achievement (e.g. We feel it is important to be the best at whatever you do)
- Culture (e.g. We rarely go to lectures, plays or concerts)
- Activities (e.g. Nobody in our family is active in sports, bowling etc.)
- Organisation (e.g. We are generally very neat and orderly)
- Control (e.g. There is a strong emphasis on following rules in our family)

Questions about parental interest in school (Garfinkle 1982, Crumpacker et al. 1979) were also included in the questionnaire. The perceived school environment at adolescence was rated by the participants. They gave their opinions concerning school work, teachers and schoolmates.

Aron Antonovsky's "Orientation to life questionnaire" (SOC) has been used to estimate coping ability. In *Unraveling the mystery of health*, Antonovsky describes the questionnaire concerning construction and validity (Antonovsky 1987). The questionnaire consists of 29 questions. A shortened version of this instrument has been translated into Swedish and validated on a Swedish sample (Furu 1991). It consists of thirteen questions. Each question has seven possible answers (Appendix).

Analyses: To investigate hereditary influences on perceived family and school environment as well as self-reported coping ability, intraclass correlations for the MZ and DZ twin pairs were calculated. The opposite sex twin pairs were especially important for studying sex-specific influences in the same family.

A step-wise linear regression analysis has been applied to determine the environmental influences accounting for coping ability. The first of the independent variables introduced in this model was social class affiliation at adolescence. After that the eight items of the FES and parental interest in school were included. Finally, the perceived school environment was added.

Results

Hereditary influences

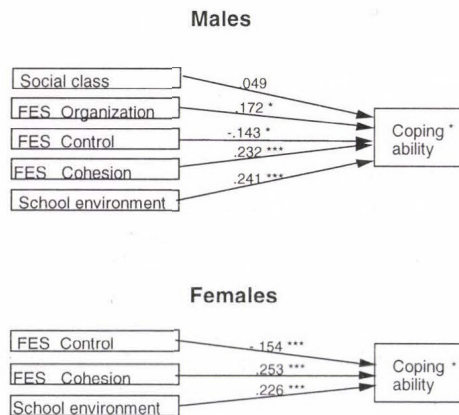
Hereditary influences on coping ability at mid-life have been studied by comparisons of similarities within MZ and DZ twin pairs. The results showed differences between MZ and DZ male twin pairs regarding the perceived *family environment* at adolescence, i.e. the FES variables organisation, control and cohesion (Table 3). Such differences were not evident between MZ and DZ female twin pairs. The opposite sex twin pairs showed high corresponding experiences within pairs regarding family environment. For *school environment*, i.e. the SES variable, and *coping ability*, i.e. the SOC variable, both MZ male and female twin pairs showed more similarity within the pair than the DZ male and female pairs. The opposite sex pairs showed low concordance within pairs for these variables.

Table 3. Intraclass correlations for MZ and DZ twin pairs regarding perceived family and school environment as well as coping ability.

FES	Males				Females				Opposite sex	
	MZ		DZ		MZ		DZ		DZ	
	n	r	n	r	n	r	n	r	n	r
Organisation	17	0.63	20	0.20	24	0.34	30	0.45	39	0.44
Control	17	0.27	20	-0.12	24	0.08	31	0.37	38	0.51
Cohesion	18	0.68	20	0.54	24	0.62	28	0.61	38	0.46
SES										
Perceivedschool	17	0.75	19	0.07	24	0.64	30	0.36	37	-0.03
SOC										
Coping ability	18	0.47	19	-0.07	24	0.34	29	0.11	37	0.02

Environmental influences

Regarding environmental influences at adolescence on coping ability at mid-life, the regression analysis showed different patterns for males and females. *Social class affiliation* during adolescence was related to coping ability for males but not for females (Figure 1). High social class affiliation during adolescence contributed to a better coping ability for the males. However, when the FES variables were introduced into the regression analysis this relationship disappeared. Three FES items, *organisation*, *control* and *cohesion*, seemed to be of importance. Organisation factors within the family influenced coping ability for males but not for females. Perceived control within the family influenced coping ability negatively for both males and females. The analysis showed that cohesion within the family at adolescence was positively related to coping ability for males as well as females. Positive experiences of the *school environment* at adolescence also had an influence on coping ability at mid-life for both sexes.



* SOC, mean values of 13 questions

Figure 1. Environmental influences on coping ability.

Discussion

Hereditary influences

The twin pairs of this follow-up study have made it possible to investigate the hereditary influences on coping ability as well as perceived family and school environment. Organisation, control and cohesion in the family environment at adolescence seem to be influenced by hereditary factors for males compared to females. However, home environment can be assumed to be more differentiated than school environment and that is probably the reason why the MZ twins within pairs, both males and females, had experienced their school environment more similarly than the DZ twin pairs. In another Swedish twin study (Fischbein et al. 1990) it was found that the teachers did not differentiate between the MZ twins thus perceiving that treatment more similarly than the DZ twin pairs. As the MZ twins look alike the teachers have difficulties to distinguish them from each other therefore treating them similarly (Alin Åkerman et al. 1997).

The ability to understand and handle problems varies from individual to individual. The development of coping ability is related to experiences during childhood and early adult life (Antonovsky 1987). However, the developmental potential seems to be somewhat dependent on hereditary factors. MZ twins, both male and female pairs, show moderate similarity within pairs regarding *coping ability*. Within DZ twin pairs there is on the whole no accordance, neither for the same nor for the opposite sex pairs.

Environmental influences

We have investigated perceived family and school influences on coping ability at the age of 35. Results in this follow-up study seem to indicate that early environmental influences have a long-term effect.

It should be observed that both social class affiliation and retrospective ratings of family and school environment were used. An adult that is successfully handling mid-life experiences might have a rosier memory of childhood than one that encounters difficulties. On the other hand, ratings of family and school environment at adult age are probably more balanced and thoughtful opinions.

The development of coping ability at the age of 35 was influenced by different kinds of environmental factors for males and for females. Males who belonged to a higher *social class* at adolescence seem to be more competent at coping with problems at adult age compared to males of a lower social class. Family climate could however reduce the effect of this variable. This was not found for the females. A family environment based on structure with a firm *organisation* and order is also positive for males regarding coping ability.

Cohesion within the family during adolescence seems to be of significant importance for both males and females regarding coping ability at mid-life. It can be assumed that the feeling of cohesion within the family includes a stimulating atmosphere, which supports optimal development (Fischbein 1979). Positive and continuous social relations within the family therefore seem to be of vital importance (Bronfenbrenner and Ceci 1994). Manetti

and Migliorini (1996) have suggested that students with strong support from the family present more positive coping strategies.

Perceived *control* within the family had a negative effect on the development of coping ability for both sexes. A restrictive family environment seems to limit individual prerequisites to develop adequate coping strategies. This implies that the more control there is within the family, the worse is the development of the coping ability of the growing individual. Excessive parental control has been found in other studies to be associated with maladaptive behaviours in children (Aunola et al. in press). These results are also in agreement with recent findings by Stattin and Kerr (2000) where they stress the importance of child disclosure in parental monitoring. This means of course that monitoring cannot be a one-sided activity but has to rely on a mutual relationship between parent and child (e.g. proximal processes). Communication patterns within families therefore seem to be of vital importance.

Positive experiences in the *school environment* at adolescence promote coping ability at the age of 35. Perceived cohesion at school together with classmates can be a stimulating environment in which the ability to cope with problems is supported. In a stimulating environment different individual prerequisites can be activated and more optimally developed in accordance with the choice of the individual. At home as well as at school there are possibilities to organise situations where the interplay between the prerequisites of the individual and environmental factors occur with the purpose of training coping ability. Structural factors seem to be more decisive for males while cohesion and cooperation are important for both males and females.

Interactional effects

Neither environment nor heredity is the sole contributor to individual development. There is always an interaction. In accordance with earlier results (Fischbein 1979, Bronfenbrenner and Ceci, 1994) the development depends on *how* individual prerequisites interact with the environment. Here it ought to be noticed, that environmental factors can be changed over time. The atmosphere of the surrounding environment influences the variations of development. All individuals in the same environment are not affected in the same way. Individuals construct different experiences from the same environmental opportunities, based on their prior experiences and on their genotypes (Scarr 1993). It is therefore important to increase the knowledge about positive and negative factors contributing to the development of coping ability. Bronfenbrenner and Ceci (1994) express this in their bioecological theory where the development is hypothesized to be dependent upon proximal processes. These processes can be compared to the importance of positive relations in the family and school environment. Baumrind (1993) and Antonovsky (1987) also emphasise the importance of the influence of the parents.

The conclusion of this study is that early environmental factors have a long-term effect on coping ability. Hereditary factors also influence the ability to cope with problems. In the interaction between heredity and environment, both the individual and the environment are influenced by and influence each other. Environmental factors and above all positive, continuous social relations are very important for the optimal development of coping ability (Lange 1996, 2000, Fischbein 1998). The expression of these environmental factors and the experience of what is stimulating seem to be different for

males and females. Environmental influences can be directed towards a definite goal. For parents and persons who work with children and young people, knowledge and awareness of environmental structure, support and stimulation are needed to accomplish this goal.

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