



Life Situation, Self reported Health and Coping Ability of 35-year old Twins and Controls - A Follow-up of a Longitudinal Swedish Twin Study at Adolescence

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Abstract. During the years 1964 to 1971 a nationally representative sample of MZ and DZ twins and controls was followed through the Swedish compulsory school. The main purpose was to study physical and mental growth during puberty as well as heredity-environment influences on these growth processes.

After 20 years a follow-up has been made of this sample with the purpose of investigating heredity-environment influences on life situation and self reported health at mid-life in relation to background factors collected during adolescence. 43 pairs of MZ twins, 90 pairs of DZ same sex and opposite sex twins as well 322 controls agreed to participate. A questionnaire was sent out to this group dealing with their present life situation such as *family structure, economy, education and occupation*. Other areas of interest were self reported health and ability to cope with their present life situation. The disadvantages found for MZ female twins at adolescence seem to persist at mid-life and ratings of school adjustment were related to coping ability as grown ups. This first report presents comparisons between twins and controls as well as males and females. To estimate heredity influences intraclass correlations for the twin pairs are calculated and for coping ability such influences seem to be quite conspicuous. Sex specific factors seem to operate regarding coping ability and satisfaction in educational choice and level. Generally, the results indicate some advantages for the males regarding self reported life situation and health. Possible reasons for such sex differences are discussed. This study has been supported by grants from the Swedish Council for Social Research.

Key words: **Twins, Controls, Heredity-environment influences, Longitudinal life situation, Self reported health, Coping ability, Individual development**

INTRODUCTION

Inherited individual prerequisites interact with different environmental factors during puberty and result in varied life situations as adults. To illuminate the phenomena in the growth process it is of essential interest to study how these processes develop and influence the life situation in general and in this study in particular for men and women at the age of 35.

There are substantial sex differences in growth and maturity before and during adolescence. It seems that boys already during the development of the foetus are more sensitive to environmental influences than girls [1]. Girls mature in average two years earlier than boys even though there are substantial within-group variation [13, 16]. The variation tends to be greater for boys than for girls.

Raising a family forms the life situation in the mid-thirties in different ways for men and women. In Sweden it is usual for women to work in a profession even when they have young children. In 1991 eighty per cent of the Swedish women at the age of 15-64 were included in the working force [15]. There are indications that traditional male illnesses, such as heart and vascular diseases, nowadays tend to affect Swedish women in a higher degree [6, 7].

The state of health is an important part of life situation. To be free from illness is not the same as feeling well. WHO (1946) describes health as "...a state of complete physical, mental and social well-being". The ability to handle stress and problems in life can have an affect on self reported health. A difference is shown between the stress hormone secretion of males and females. Males have higher stress hormone secretion during the working day and it decreases at the end of the day. For women there is an increasing stress hormone secretion at the end of the work day. Homework and responsibility for the children causes the feeling of stress [7].

Stress is a state of tension you have to cope with. If the outcome will be negative, neutral or positive depends on the actual situation as well as how well the coping strategy of the individual will work to master the tension [9]. The sense of coherence (SOC) is an integral part of the coping ability of the individual and it is growing during adolescence and the early adulthood. "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" [2].

Results in a longitudinal study of men from childhood, at 10 years of age, to middle age, the age of 50, showed that circumstances at home, such as low income and father's disease affected the children negatively [8]. Those, who were negatively influenced as children, had worse life situation and health as grown ups compared to those, who had experienced a more positive childhood.

The main purpose of this study has been to investigate group comparisons between twins and controls, as well as between males and females concerning life situation, self reported health and coping ability of 35 year old twins and controls in relation to background factors collected during adolescence. Also heredity-environment influences on adult satisfaction are investigated.

MATERIAL AND METHODS

A longitudinal design

This study is based upon a Swedish longitudinal study which started in the middle of the sixties. It was called the SLU study (Skolöverstyrelsens och Lärarhögskolans Utvecklingsstudie). Between 1964 and 1971 a group of 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. It was originally a nationally representative sample of 323 monozygotic (MZ) and dizygotic (DZ) twin pairs as well as 1193 controls. Among the DZ twins there were both same sex and opposite sex pairs. The main purpose was to study physical and mental growth during puberty as well as heredity-environment influences on these growth processes.

Results from the original SLU-study showed substantial sex differences. The twin girls had average lower ability test results on average compared to the controls, while this was not the case for the twin boys. This inferiority of twin girls in comparison to the controls was also found concerning physical development. Twin girls tended to be smaller and weighed less during puberty, while no such differences were found for boys. One plausible explanation to this was the greater selectivity in the male twin sample [3].

A follow-up

After 20 years a follow-up of the SLU-study has been made with the purpose of investigating heredity-environment influences on life situation, self reported health and coping ability in relation to background factors collected during adolescence. A two step design has been applied. The main result of the first follow-up study showed that more women than men were positive to participation in a new study [10]. This is in accordance with results in other longitudinal studies [8].

After the first follow-up a questionnaire was sent to a representative sample among those who agreed to participate in a new study. The aim was to include 600 individuals, half of them women and half of them men. For each sex there should be 50 per cent twins and 50 per cent controls. This study included 320 twins and 322 controls (table 1). More women than men answered which is in accordance with the first follow-up study mentioned above [10].

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

	Male N	Female N
Controls	154	168
MZ	41	54
DZ	104	121

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

	Male N	Female N	Male/Female N
MZ	18	25	–
DZ	20	31	39

To make within pair comparisons both twins in a pair had to answer the questionnaire. The number of complete twin pairs is shown in table 2. It can be seen that more female than male twin pairs participate in the follow-up.

The questionnaire dealt with conditions of living such as civil status, children, housing, education and present occupation. There were also questions about economy, the frequency of contact (with twin sister or brother, parents, friends and relatives) and questions regarding self reported health and coping ability.

In the first follow-up study the participants stated their educational level and occupational status. In addition to report on education and occupation the participants stated in the second follow-up if they were satisfied with the choice and level of their education.

The questions about economy dealt with participants' economic possibilities.

- How does your income suffice for your needs?
- Do you usually have so much money that you can grant yourself something extra?
- Do you save a sum every month?
- Can you with short notice raise a sum of money? (\$ 500)
- Do you think you will have enough money in the future?
- Has the current economic situation in society appreciably affected your private economy?

Concerning the frequency of contact the questionnaire contained questions such as:

- How often do you have contact with your parents?
- How often do you have contact with your twin brother/sister?
- Do you have someone you can talk to about everything?

The self reported health was also estimated by the participants on a scale from 1 very bad to 7 very good. Other questions about the health of the participants dealt with comparing their own health with others' at the same age, if their health prevented them from doing whatever they wanted, if they were taking medicine regularly or having regular medical treatment.

Some of the questions are from the Swedish study of standard of living (ULF), which has also been used in a Swedish investigation of aging twins (the SATSA study), at the Karolinska Institute [12].

Aron Antonovsky [2] has developed a questionnaire with the purpose of investigat-

ing coping ability. He claimed that this ability is decisive in maintaining mental and physical health. A shortened version of this instrument (Sense of Coherence) has been used in the follow-up study [2, 9]. It contains thirteen questions. Each of these was valued from 1 to 7 of the respondents and the sum gave a maximum score of 91.

The mean value of the coping questions has been related to data collected during adolescence. In grade 3 and 6 teacher ratings of school adjustment were collected for the twins and the controls. The teachers rated the pupils in a four grade scale from a “strong no” to a “strong yes” comprising eleven items. Three of the items (in grade 6) were related to the mean value of coping ability for males and females.

- The student seems to need more help than normal to find his/her way around new tasks at school.
- School work seems to be interesting and mainly amusing to the student.
- The student has difficulty to perform a task, gives up easily.

In grade 4 and 6 the SLU participants rated themselves concerning their own school adjustment. They rated themselves as seen by parents, teachers and their classmates on one hand and on the other they rated their own opinion with “yes” or “no” in these respects [4]. The items were factor analysed and two groups emerged [11]. One factor called “Adult-norm adjusted behavior” (see below) has been related to the mean value of coping ability for males and females.

- You are careful with appearance (how you look like)
- You are willing to help.
- You are teasing and troubling.
- You are lazy and easy-going.
- You talk too much when others like silence.
- You are curious.
- You have difficulties with following rebukes.

RESULTS

Group comparisons

Most of the participants, both twins and controls (on average 75%), reported that they were married or lived with a partner. About 70 per cent had two children. Eighty per cent lived in a city and more than 50 per cent lived in a single family house.

In the first follow-up study concerning educational level and occupational status the result showed that male participants had a higher occupational status compared to females. There was, however, no significant sex difference in educational level [5]. In the second follow-up study the participants answered the question if they were satisfied with the choice and the level of their education. About 80 per cent of the participants were satisfied with their choice of education, but on average there were more men who were satisfied compared to women.

The results showed that on average 66 per cent of the participants were satisfied with their educational level. There was also a sex difference to the advantage of males in this respect. More MZ male twins (78%) were satisfied compared to the DZ same sex male twins (68%). Less MZ female twins (58%) were satisfied compared to DZ same sex females (66%). For the control group the difference between males and females was less conspicuous.

The questionnaire about life situation contained some questions about the economy of the participants. The answers showed, throughout that MZ female twins differ from the other groups. They reported more negative economic possibilities compared to other twins and controls. MZ female twins differ particularly from MZ male twins, who reported on average the best economic situation compared to the other participants. The satisfying economic situation can be related to a higher occupational status for males.

Life situation of most individuals is influenced by the social network in the environment. In this study there was a significant sex difference concerning the frequency of contact with parents, as well as the frequency of contact with twin sister/brother. Women, both twins and controls, generally have more frequent contact with their parents ($p < 0.01$). Female twins, MZ and DZ of same sex, (40%) reported that they had contact with their twin sisters several times a week. Fewer male twins, MZ and DZ of same sex, (19%) stated that they had frequent contact with their twin brothers. Opposite sex pairs seemed to have less frequent contact within pairs compared to same sex twin pairs.

In answer to the question Do you have someone you can talk to about everything? more men than women stated that they had nobody to talk to, if they needed. Fourteen per cent of monozygotic male twins, 24 per cent of opposite sex male twins and 21 per cent of male controls had no one to talk to about everything (table 3). In this respect opposite sex twins show the greatest difference between males and females.

Concerning self reported health a high percentage felt good to very good. Male participants seemed to report better health than females. MZ male twins reported the best health. None of them said that they felt bad or very bad. This is in accordance with results in the first follow-up where participants answered questions concerning seasonal mood and "mid-winter blues" [10]. Male twins seemed to be more independent of seasonal variations than other participants.

Similar results were found in the questionnaires which dealt with participants' health situation. They compared their own health with others at the same age, as well as if their health prevented them from doing whatever they wanted. In particular MZ men reported that they felt well and they were the smallest percentage taking medicine regularly and having regular medical treatment.

In table 4 the mean value for the coping ability scale is showed for males and females. It is obvious that MZ males and DZ same sex male twins have a higher mean value compared to MZ female and DZ same sex female twins. The females of DZ opposite sex pairs tended to have a little lower mean value compared to males. For the controls there was no difference between males and females.

In table 5 teacher ratings at adolescence have been related to average coping ability at mid-life. The pupils rated by the teachers to be "in need of support" and showing "lack of persistence" tend to have lower average coping ability as grown ups. There is, however, a significant difference between the ratings "yes" and "no" only for the item "in need of support". "Having an interest in school work" on the other hand, tends to

Table 3 - Percentage of participants who reported that they had “No one to talk to about everything”

Zygosity	Male		Female	
	N	%	N	%
Controls	151	21	166	7
MZ male	42	14	52	4
DZ same sex	53	8	69	9
DZ opposite sex	45	24	49	8

Table 4 - Mean value of coping ability

	Males			Females			Diff.
	N	M	s	N	M	s	
Controls	152	5.1	0.8	157	5.1	0.9	0.0
MZ	41	5.6	0.8	50	5.1	0.9	0.5**
DZ same sex	53	5.5	0.7	68	5.1	0.8	0.4**
DZ opposite sex	47	5.1	0.8	51	5.0	1.0	0.1

show a positive relation to coping ability at mid-life for males, but not for females. Males compared to females showed higher average coping ability at mid-life in relation to teacher ratings at adolescence except for the rating “No” concerning to have interest in school work. Generally the relationship between teacher ratings and coping ability is stronger for males than for females.

In table 6 twins and controls have been separated concerning coping ability at mid-life in relation to teacher ratings at adolescence. The mean differences of coping ability for male and female controls are small. For the twins, however, significant differences can be seen both for males and females. It is evident that male twins showed higher coping ability than female twins. Male twins showed the strongest relationship between teacher ratings and coping ability but also for female twins such a relationship can be seen.

In the study of the relation between self-ratings of school adjustment collected during adolescence and coping ability at mid-life, no significant relationship is found. One explanation for this is reliability and validity problems in these types of ratings during adolescence [4].

Within-pair comparisons

Within-pair similarity for MZ and DZ twins concerning satisfaction in educational choice and level is illustrated in table 7. The intraclass correlations show different trends for males and females. MZ male twins tend to be more similar than DZ male same sex

Table 5 - Average coping ability for males and females at mid-life in relation to teacher ratings at adolescence

	In need of support						Teacher ratings						Lack of persistence								
	Yes			No			Yes			No			Yes			No					
	N	M	s	N	M	s	N	M	s	N	M	s	N	M	s	N	M	s			
Males	61	5.1	0.9	140	5.4	0.8	-0.3*	154	5.4	0.8	47	5.1	0.9	0.3	52	5.1	0.8	149	5.4	0.8	-0.3
Females	45	4.8	1.0	171	5.1	0.9	-0.3*	183	5.1	0.9	34	5.1	1.0	0.0	31	4.8	1.0	185	5.1	0.9	-0.3

* p < 0.05

Table 6. Average coping ability for twins and controls at mid-life in relation to teacher ratings at adolescence

	In need of support						Teacher ratings						Lack of persistence									
	Yes			No			Yes			No			Yes			No						
	N	M	s	N	M	s	N	M	s	N	M	s	N	M	s	N	M	s				
<i>Controls</i>																						
Males	18	5.2	0.9	51	5.1	0.9	0.1	57	5.1	0.9	12	5.2	0.8	-0.1	10	5.3	1.0	59	5.1	0.9	0.2	
Females	11	5.3	0.7	66	5.1	1.0	0.2	69	5.1	1.0	8	5.4	0.7	-0.3	7	5.3	0.9	70	5.1	0.9	0.2	
<i>Twins</i>																						
Males	43	5.0	0.9	89	5.6	0.7	-0.6 ***	97	5.5	0.7	35	5.1	0.9	0.4 *	42	5.1	0.8	90	5.6	0.7	-0.5 **	
Females	34	4.6	1.0	105	5.2	0.9	-0.6 **	114	5.0	1.0	26	5.1	0.9	-0.1	24	4.7	0.9	115	5.1	1.0	-0.4*	

* p < 0.05 ** p < 0.01 *** p < 0.001

Table 7 - Intraclass correlation for MZ and DZ twins regarding satisfaction in educational choice and level

	MZ				DZ same sex				DZ opposite sex Male/Female	
	Male		Female		Male		Female		N	r
	N	r	N	r	N	r	N	r		
Choice	17	.48	21	.08	19	.03	27	.52	32	.23
Level	18	.38	23	.14	19	.21	30	.44	37	.07

Table 8 - Intraclass correlation for MZ and DZ twins regarding contact with twin sister/brother

	MZ				DZ same sex				DZ opposite sex Male/Female	
	Male		Female		Male		Female		N	r
	N	r	N	r	N	r	N	r		
Contact	18	.56	25	.71	20	.86	30	.84	39	.79

twins regarding satisfaction with their educational choice and level. For female twins there is an opposite pattern, with MZ female twins being less similar than DZ female same sex twins concerning satisfaction with educational choice and level. The low intraclass correlations for DZ opposite sex twins also indicate the presence of specific sex differences in these respects.

Regarding economic possibilities, MZ male twins showed more corresponding answers within pair than other twin categories. That is true for the items dealing with adequacy of income, if they could grant themselves something extra, if they thought they will have enough money in the future and if the current economic situation in society had affected their economy. A fairly high within pair similarity ($r = .6$) is found for MZ female twins ratings regarding their possibilities to save money each month.

In table 8 it can be seen that the within-pair comparisons concerning contact with twin sister/brother showed high within pair concordance. It is interesting to note that DZ twins seem to rate their frequency of twin contact more similarly than MZ twins. This is more evident for males but can also be seen for females.

Self-reported health was estimated by the participants. MZ twin pairs reported more correspondence compared to other twin categories. MZ female twins showed the highest within-pair similarity concerning taking medicine regularly and having regular medical treatment.

Table 9 shows the within-pair concordance for coping ability for twins. MZ twins, both male and female, correlate higher compared to DZ twins. This indicates that some hereditary factors are operating concerning coping ability. MZ male twins show the highest correlation, while opposite sex pairs show practically zero correlation in coping ability. The low correlation for the same sex male DZ twins should be noticed. In the group comparisons male MZ and DZ same sex twins had a significantly higher mean value for coping ability compared to other participant groups.

Table 9 - Intraclass correlation in coping ability for MZ and DZ twins

	MZ				DZ same sex				DZ opposite sex Male/Female	
	Male		Female		Male		Female		N	r
	N	r	N	r	N	r	N	r		
Coping ability	18	.49	23	.36	19	.07	29	.13	37	.03

DISCUSSION

The original SLU-study results highlighted sex differences during puberty regarding ability test results and weight. It was especially the twin girls who showed lower results and one purpose of the follow-up study has been to investigate whether such differences during puberty remains at mid-life.

Generally, men have a higher occupational status and also tend to have a little higher educational level compared to women. Occupational status and educational level have a close connection. More men than women stated that they were satisfied with their educational choice and level. The greatest difference concerning that type of satisfaction was between MZ male and female twins. Males were the most satisfied and females the least satisfied group. The inferiority of twin girls in different respects during puberty thus seems to influence also their life situation as adults.

Economic possibilities mostly depend on educational level and occupational status. Male participants reported more positive economic possibilities compared to females which can be seen in relation to education and occupation. MZ female twins differed especially in this respect from MZ male twins, who reported on average the best economic situation of the participants.

Other sex differences in this study are the frequency of contact. Compared to the males, the women (both twins and controls) have significantly more contact with their parents. Female twins have more frequent contact with their twin sisters compared to male twins frequency of contact with their twin brothers. More men than women said that they had nobody to talk to about everything. If we look at the twin categories we can see that the greatest difference is between DZ opposite sex male and female twins. This result indicates the preference of women to maintain a social network. This is in accordance with results of other Swedish studies. During 1968 to 1991 the Institute of Social Research in Stockholm [14] has analysed the public development of the Swedish welfare state. Results have showed that men more often than women are socially isolated and are without social support. Social conditions as well as material circumstances seem to be risk factors for declining health later in life. This can, however, not be seen in 35 year old people.

In this study male participants compared to female were healthier than their female counterpart. One explanation can be that more men than women were satisfied with their educational choice and level, as well as their economic possibilities. At the age of 35 traditional illnesses, such as heart and vascular diseases, have not appeared.

Coping ability can also be related to health factors. The highest mean value of coping

ability was reported by MZ male twins as well as DZ same sex male twins. The development of coping ability seems to be influenced by specific sex factors.

Results from the original SLU study showed sex differences and those seem to persist in the follow-up study. Female twins, especially MZ pairs showed inferiority concerning satisfaction in educational choice and level as well as economic possibilities. The ability to cope with problems at mid-life seem to be a little higher for the male twin group. One explanation of these sex differences could be that there was a higher mortality at birth for twin boys, an effect of selective survival. Furthermore the SLU sample was taken from the Swedish compulsory school and more boys than girls belonged to remedial classes and were not included in the sample. More women than men answered the questionnaire which was in accordance with the first follow-up study. It is in general easier to recruit females for this kind of research.

The mean value of the coping ability has also been related to data collected during adolescence. The relation between teacher ratings of school adjustment and coping ability as adult was stronger for twins than for controls. It was more evident for male twins, but can also be seen in female twins. Negative teacher ratings seem to be connected with lower coping ability at mid-life. In an educational perspective it is important to get knowledge about the development of coping ability related to individual requirements. In particular teacher ratings of pupil need of support seem to be related to coping ability for the males. This is interesting since this judgement from the teacher is what often signifies special educational treatment. Antonovsky [2] enhanced that the stronger the Sense of Coherence of the parents the more probable it is, that they form experiences for their children, which are of such a kind that the Sense of Coherence of the child will be strengthened. Also in school educational situations should be organized which may develop the coping ability of children.

Similarity within twin pairs has been studied. MZ male twins showed greater concordance within pair regarding satisfaction in educational choice and level compared to DZ male same sex pairs. For the females the results were reversed. In accordance with a study of gender differences in educational and occupational careers [5], the result can be interpreted as specific sex influences operating on these types of variables.

The within pair comparisons concerning economic questions showed mostly low correlations. Intraclass correlations showed high concordance regarding frequency of contact within pairs. However, the answers of MZ male twin pairs were less similar within pair than the other twin categories. MZ female pairs also showed lower concordance within pairs compared to DZ female same sex twin pairs regarding contact within pairs. MZ twin pairs are experienced as very similar by others and the result can be interpreted as an expression for the need to distance themselves from each other and develop in independent individuals.

MZ male and female twin pairs showed similarity within pairs regarding coping ability, while there were practically no within pair correlation for DZ same sex and opposite sex pairs. This can be interpreted as hereditary factors operating in the development of coping ability.

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