

Lea Pulkkinen

Genetic and environmental factors in adolescent behavior



Longitudinal Study of Health and Behavior in Twin Children
FinnTwin12-17

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FinnTwin12

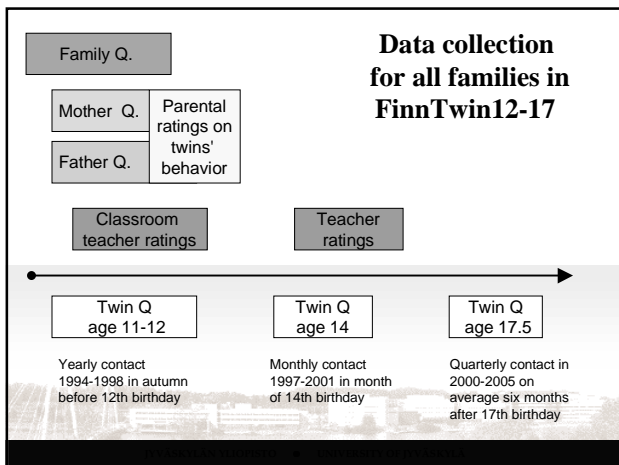
Participants

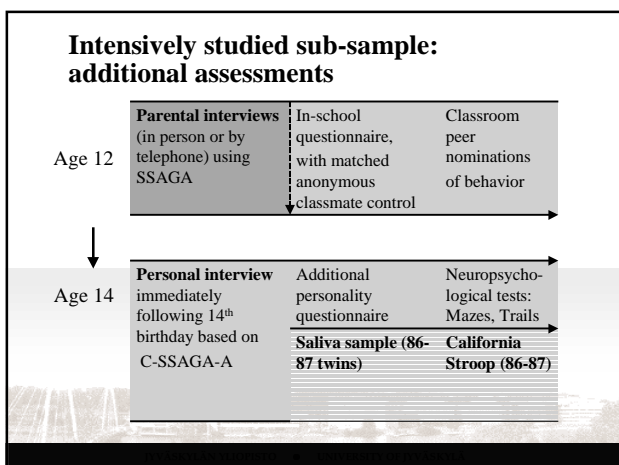
Epidemiological study

- ❖ Five consecutive and complete birth cohorts of Finnish twin children (b. 1983 – 1987)
- ❖ 31 % MZ, 64 % DZ

Intensive sub-study (about 40% of each cohort)

- ❖ Half of the sub-sample is selected at random; this random sample is then enriched with twins at elevated familial risk for alcoholism

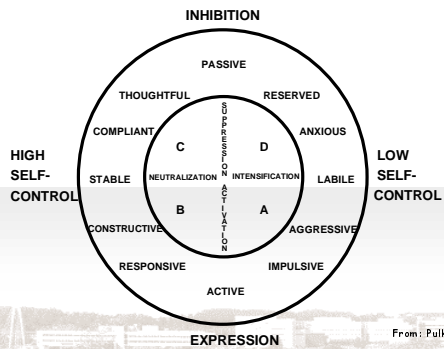




Data collection FinnTwin12-17

| Birth cohort | 11-12 yrs | 14 yrs | 17½ yrs | Families: |
|--------------------------------------|---|---|------------------|-----------------|
| 1983 | 1994 | 1997 | 2000 | N = 600 |
| 1984 | 1995 | 1998 | 2001 | N = 549 |
| 1985 | 1996 | 1999 | 2002 | N = 565 |
| 1986 | 1997 | 2000 | 2003 | N = 503 |
| 1987 | 1998 | 2001 | 2004 | N = 498 |
| | | | | N = 2715 |
| Epidemiological study: | Twin inventories Teacher rating Parental rating & inventories | Twin inventories Teacher rating | Twin inventories | |
| Intensive study: (40 % twins) | Peer nomination Twin inventories Parental interview | Twin interview, inventories & psychological tests | | |

Model of emotional and behavioral regulation



Peer Nominations of Twins and Their Classmates Compared

| Peer Nomination Scales | Females | | Males | |
|--------------------------------------|--------------------|----------------|-------------------|----------------|
| | F | Post hoc | F | Post hoc |
| Externalizing problem behaviors (F1) | 2.20 | | 0.77 | |
| Hyperactivity-impulsivity | 2.56 | | 0.40 | |
| Aggression | 2.14 | | 0.48 | |
| Inattention | 2.37 | | 1.33 | |
| Internalizing problem behaviors (F2) | 0.22 | | 1.69 | |
| Depressive symptoms | 0.33 | | 2.76 ^c | S,OSDZ>SSDZ |
| Social anxiety | 0.20 | | 0.89 | |
| Adaptive behaviors (F3) | 9.79 ^a | OSDZ>S,MZ,SSDZ | 5.45 ^a | OSDZ>S |
| Constructive behavior | 9.03 ^a | OSDZ>S | 4.98 | OSDZ>S,MZ,SSDZ |
| Compliant behavior | 3.67 ^c | OSDZ>S | 2.90 ^c | OSDZ>SSDZ |
| Socially active behavior | 10.54 ^a | OSDZ>S,MZ,SSDZ | 7.98 ^a | OSDZ,SSDZ>S |

Note: ^ap<.001; ^bp<.01; ^cp<.05

Alcohol use in adolescence

| Variable | A | C | E |
|------------------|---------------------|---------------------|---------------------|
| Females (95% CI) | 0.18 (0.10-0.29) | 0.76 (0.68-0.83) | 0.06 (0.02-0.10) |
| Males (95% CI) | - set to zero | 0.76 (0.68-0.83) | 0.24 (0.17-0.32) |

A = additive genetic effect
 C = shared environment
 E = specific environment
 (Rose et al., 2001)

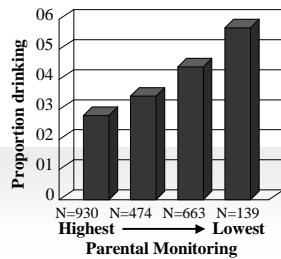
Likelihood of drinking at age 14
Results of Logistical Regression

| | OR | 95 % | CI |
|----------------------------|------|------|------|
| Female | 1.68 | 1.34 | 2.10 |
| Opposite sex | 1.26 | 1.01 | 1.58 |
| Pubertal Development | 1.50 | 1.34 | 1.66 |
| Lowest Parental Monitoring | 3.13 | 2.05 | 4.77 |
| Poor Home Atmosphere | 1.72 | 1.30 | 2.29 |
| High Behavioral Problems | 2.56 | 1.85 | 3.53 |
| High Emotional Problems | 0.64 | 0.47 | 0.86 |

(Rose et al., 2001)

Likelihood of drinking at age 14
Results of Logistical Regression

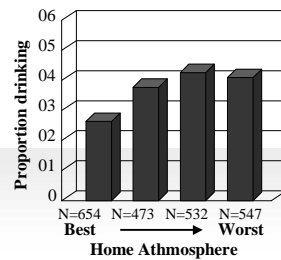
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| Opposite sex | 1.26 |
| Pubertal Development | 1.50 |
| Low Parental Monitoring | 3.13 |



(Rose et al., 2001)

Likelihood of drinking at age 14
Results of Logistical Regression

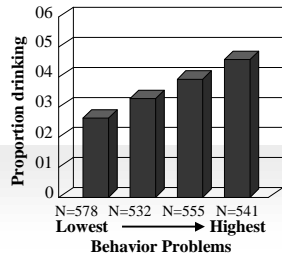
| | OR |
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| Poor Atmosphere | 1.72 |



(Rose et al., 2001)

Likelihood of drinking at age 14 Results of Logistical Regression

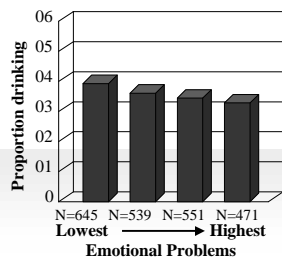
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(Rose et al., 2001)

Likelihood of drinking at age 14 Results of Logistical Regression

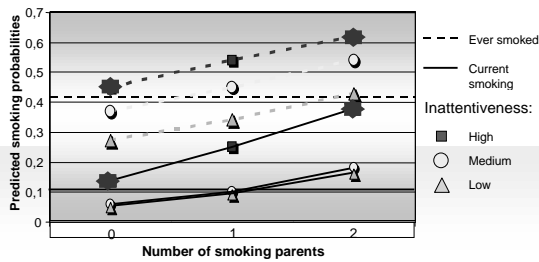
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| Behavioral problems | 2.56 |
| Emotional problems | 0.64 |



(Rose et al., 2001)

Adolescents' inattentiveness and smoking in the context of parental smoking

Satu Barman



(Barman, Pulkkinen, Kaprio, & Rose, resubmitted)

Children of smoking parents

What protects these children from smoking?

| | OR (95% CI) for daily smoking |
|---------------------|-------------------------------|
| Parental monitoring | 0.18 (0.10–0.34)*** |
| Unjust atmosphere | 1.71 (1.06–2.74)* |

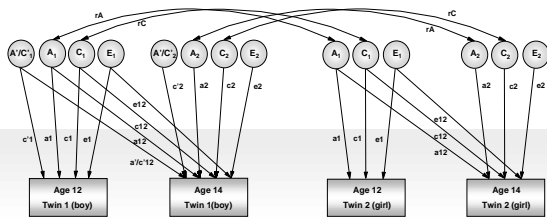
Adjusting for age 12 smoking experimentation:

| | OR (95% CI) for daily smoking |
|---------------------|-------------------------------|
| Age 12 smoking | 24.6 (5.33–113.50)*** |
| Parental monitoring | 0.21 (0.08–0.60)** |
| Unjust atmosphere | 2.43 (0.89–6.64) ns. |

Adjusted for family type (single parent vs. two parent families) and child gender. Corrected for the clustered twin design.

(Barman, Pulkkinen, Kaprio, & Rose, in preparation)

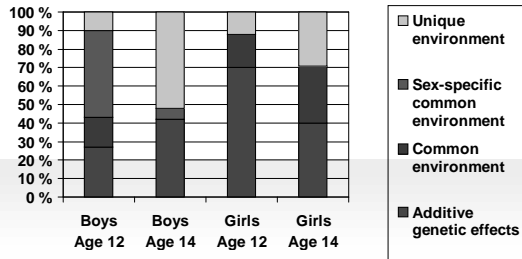
Bivariate Cholesky decomposition model of genetic and environmental continuity and change



Note. A is correlated (r_A) 1.0 for MZ, 0.5 for DZ twins; C is correlated (r_C) 1.0 for both MZ and DZ twins; A–C= is fitted, and thus correlated only for the same-sex male twin pairs (thus not depicted here) 1.0 for MZ, 0.5/1.0 for DZ twins.

Vierikko, Pulkkinen, Kaprio, & Rose (submitted for publication)

Aggression at ages 12 and 14



Vierikko, Pulkkinen, Kaprio, & Rose (submitted for publication)

Genetic and environmental factors in continuity of aggression from age 12 to 14

Genetic and environmental correlations

| | rA | rC | rE | rC' |
|-------|------------------|---------------------|------------------|---------------------|
| Boys | .40 (.17-.58) | - | - | 1.00 (1.00-1.00) |
| Girls | - | 1.00 (1.00-1.00) | .18 (.06-.31) | - |

Vierikko, Pulkkinen, Kaprio, & Rose (submitted for publication)

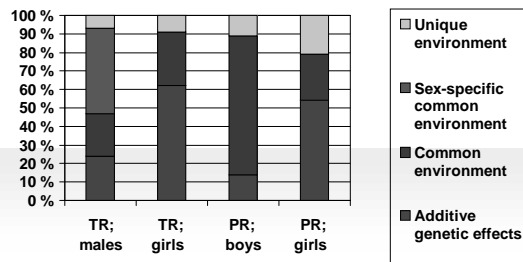
Genetic and environmental factors in the correlation between aggression and hyperactivity-impulsivity

Genetic and environmental correlations

| | rA | rC | rE | rC' |
|-------|------------------|---------------------|------------------|------------------|
| Boys | .70 (.63-.76) | 1.00 (1.00-1.00) | .59 (.53-.64) | .81 (.73-.89) |
| Girls | .70 (.63-.76) | .69 (.53-.80) | .59 (.53-.64) | - |

Vierikko, Pulkkinen, Kaprio, & Rose (in press)

Genetic and environmental effects on teacher- and parent-rated aggression



Vierikko, Pulkkinen, Kaprio, Viken, & Rose (2003)

Parameter Estimates for Effects on Depression

| | Males | | | Females | | |
|---------|---------------|-----|-----|---------|-----|-----|
| | A | C | E | A | C | E |
| Teacher | .28 | .39 | .34 | .42 | .39 | .20 |
| | Males/Females | | | | | |
| | A | C | E | | | |
| Parent | .43 | .19 | .38 | | | |
| Peers | .71 | 0 | .29 | | | |
| CDI | .45 | 0 | .55 | | | |

(Happonen et al., 2003)

Correlations

| | Peer nomination | | | Teacher | | | Parent | | |
|------------|-----------------|------|-----|---------|------|-----|--------|------|-----|
| | OSDZ | SSDZ | MZ | OSDZ | SSDZ | MZ | OSDZ | SSDZ | MZ |
| Aggression | .33 | .51 | .76 | .46 | .59 | .82 | .53 | .55 | .74 |
| Depression | .42 | .39 | .77 | .49 | .54 | .57 | .36 | .42 | .43 |
| Adaptation | .42 | .37 | .79 | .44 | .60 | .82 | .37 | .46 | .83 |

Friendship associations of twins

