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Paths from Socio-emotional Behavior in Middle Childhood to Personality in Middle  
Adulthood

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### **Abstract**

Continuity in individual differences from socio-emotional behavior in middle childhood to personality characteristics in middle adulthood was examined on the assumption that they share certain temperament-related elements. Socio-emotional characteristics were measured using teacher ratings at ages 8 ( $N = 369$ ; 53% males) and 14 (95% of the initial sample). Personality was assessed at age 42 (63% of the initial sample; 50% males) using a shortened version of the NEO Personality Inventory (NEO-PI); the Karolinska Scales of Personality (KSP); and the Adult Temperament Questionnaire (ATQ). Three models were tested using structural equation modelling. The results confirmed paths 1) from behavioral activity to adult extraversion and openness (NEO-PI), sociability (KSP), and surgency (ATQ); 2) from well-controlled behavior to adult conformity (KSP) and conscientiousness (NEO-PI); and 3) from negative emotionality to adult aggression (KSP). The paths were significant only for one gender, and more frequently for males than for females. The significant male paths from behavioral activity to all indicators of adult activity, and from well-controlled behavior to adult conformity started at age 8, whereas significant female paths from behavioral activity to adult sociability and from well-controlled behavior to adult conscientiousness started at age 14.

*Keywords:* behavioral activity, childhood, gender, longitudinal, middle age, personality traits, self-control, socio-emotional behavior, temperament, vulnerability factors

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We studied links between childhood socio-emotional behaviors and adult personality characteristics on the assumption that they share certain temperament-related elements. By the term ‘socio-emotional’ we refer to the integral role of emotions and emotion regulation in the process of socialization, involving the interaction of an individual’s innate endowments and external influences. Children’s behavior is commonly described in terms of temperament, which “describes our early emotional, motor, and attentional equipment, along with the regulative capacities that allow us to control our reactions and put them to good use” (Rothbart, 2011, p. 7). Pulkkinen’s (Pitkänen, 1969) definition of individual differences in socio-emotional behavior bears some similarity to the definition of individual differences in temperament (Rothbart & Derryberry, 1981); they emerge when (re)activity is modulated by self-control (regulation).

Rothbart and her colleagues have identified three higher-order temperament traits for infants and toddlers: surgency/extraversion, negative affectivity, and orienting/regulation; the latter appears as effortful control in preschoolers and school-aged children (Rothbart & Derryberry, 2002). *Surgency* covers the child’s tendencies toward high activity, approach to other people and new things, positive anticipation, and expression of positive emotions; *negative affectivity* covers the child’s tendencies toward fear, sadness, and frustration or anger; and *effortful control* covers the child’s tendencies toward behavioral constraint, self-regulation, attentiveness, and persistence. Rothbart, Ahadi, and Evans (2000) have also studied temperament in adulthood and identified four to five factors, among them the factors for extraversion, negative affectivity, and effortful control.

In the present study, we used three indicators of socio-emotional behavior at ages 8 and 14, which were behavioral activity, well-controlled behavior, and negative emotionality, and

which we expected to bear similarity to the three higher-order temperament traits for infants and toddlers (Rothbart & Derryberry, 2002). *Behavioral activity*, including children's frequent contacts with others, was expected to bear similarity to surgency, including activity and approach to other people. *Well-controlled behavior*, which included constructive and compliant behaviors in conflict situations, was expected to bear similarity to effortful control, and *negative emotionality*, which was indicated by aggressive and anxious behaviors, was expected to bear similarity to negative affectivity.

Temperament can be seen as the basis upon which personality traits are built. During development, "personality takes on cognitions about the self, others, and the physical and social world, along with attitudes, values, and cognitive strategies" (Rueda & Rothbart, 2009, p. 20). Caspi and Shiner (2008) have identified conceptual similarity of surgency to personality traits for extraversion and openness; negative affectivity to personality trait for neuroticism, and effortful control to personality traits for conscientiousness and agreeableness. In adulthood, high correlations between adult temperament traits and the Big Five factors were found by Evans and Rothbart (2007). Longitudinal data supporting linkages between child temperament and adult personality traits are, however, scarce as remarked by Caspi (1998) and more than ten years later by McAdams and Olson (2010).

In their pioneering work with the Fels longitudinal data, Kagan and Moss (1962) found stability from childhood (age 6 to 10) to early adulthood (mean age 24 years with range 19–29) for males and females in characteristics which represent surgency *versus* social inhibition. Also later, continuity has been found in surgency, labeled varyingly as extraversion, spontaneity or activity *versus* introversion, excessive reserve, shyness or social inhibition, as reviewed by Rothbart (2011); in some aspects of effortful control such as the ability to delay gratification (Ayduk, Mendoza-Denton, Mischel, & Downey, 2002), and in low regulation; irritable children were high in negative emotionality at age 18 (Caspi & Silva,

1995). The age-3 temperament types (Undercontrolled, Inhibited, Confident, Reserved, and Well-adjusted) distinguished by Caspi et al. (2003) were meaningfully linked to the age-26 Big Five traits: for example, Inhibited children had the lowest extraversion score at age 26 and Undercontrolled children were the lowest in agreeableness, conscientiousness, and openness and the highest in neuroticism (Caspi et al., 2003). There are also studies showing predictive links between low self-control in childhood and other adult outcomes than personality traits such as problems in adult physical health, substance dependence, and poor personal finances (Moffitt et al., 2011), and long-term unemployment (Kokko, Pulkkinen, & Puustinen, 2000). Well-controlled behavior in childhood predicted, in turn, a higher achievement level as indicated by the length of education and occupational status (Pulkkinen, Feldt, & Kokko, 2006), and higher income (Viinikainen, Kokko, Pulkkinen, & Pehkonen, 2010) in the early fifties.

As regards the relative stability of personality traits, the study by Hampson and Goldberg (2006) is one of the few studies where the relative stability of the Big Five personality traits from childhood to adulthood, over 40 years, has been examined. They found significant stability in extraversion ( $r = .30$ ) and conscientiousness ( $r = .26$ ) for males and females, but not in neuroticism. A meta-analysis by Roberts and DelVecchio (2000) showed that there is increasing stability from childhood (.31) to college years (.54), to age 30 (.64), and to ages 50 to 70 (.74), and that the stability coefficients are similar in females and males and across nationalities. The meta-analysis by Ferguson (2010) also showed high relative stability of personality constructs (general, nongeneral, and personality disorder) in adulthood without significant gender differences.

We studied adult personality traits within the Five Factor Approach to personality (Costa & McCrae, 1985); adult temperament using a measure introduced by Rothbart et al. (2000); and so called vulnerability factors with Karolinska Scales of Personality (KSP; af

Klinterberg, Schalling, & Magnusson, 1990) that capture personality dysfunctions such as aggression, anxiety, nonconformity, and detachment which are not profoundly covered in aforementioned personality and temperament trait questionnaires. We hypothesized and tested three separate models focusing on continuity of 1) behavioral activity, 2) well-controlled behavior, and 3) negative emotionality.

Our first hypothesis was that there are paths from *behavioral activity* in childhood and adolescence to adult personality traits for extraversion and openness to experience, the temperament trait for surgency/extraversion, and the KSP sociability (detachment reversed). Temperament trait surgency and personality trait extraversion have been found to correlate positively in adulthood (Evans & Rothbart, 2007), as have extraversion and openness (Digman, 1997), and sociability is an aspect of surgency (Rothbart et al., 2000).

Our second hypothesis was that there are paths from *well-controlled behavior* in childhood and adolescence to adult personality traits for conscientiousness and agreeableness, the temperament trait for effortful control, and the KSP conformity. Effortful control and conscientiousness have been found to correlate positively in adulthood (Evans & Rothbart, 2007), as have conscientiousness and agreeableness (Digman, 1997), and conformity (or compliance) is a subtrait of agreeableness.

Our third hypothesis was that there are paths from *negative emotionality* in childhood and adolescence to adult neuroticism, the temperament trait for negative affectivity, and the KSP vulnerability factors for aggression and anxiety. Negative affectivity and neuroticism have been found to correlate positively in adulthood (Evans & Rothbart, 2007), and neuroticism includes subtraits for anxiety and hostility. The connections of negative emotionality to adult characteristics were expected to be lower than those for behavioral activity and well-controlled behavior, because Hampson and Goldberg (2006) did not obtain stability in neuroticism from childhood to adulthood.

Regarding possible gender-differences in the relative stability of personality from childhood to adulthood, there are few studies focusing on them, as noted by Moffitt, Caspi, Rutter, and Silva (2001). Shortcomings of previous studies include, first, the study of only mean-level differences, which do not give any information about differences in relative stability; second, the use of sample sizes that are neither large nor representative enough to validate gender differences; and third, the study of only one gender. These issues seem rather persistent, as Ferguson (2010) has pointed out in his meta-analysis of the stability of personality characteristics; he states that unfortunately “most studies collapse personality stability coefficients across gender” (p. 5). In their study, Kagan and Moss (1962) found gender differences. For example, behavior disorganization characterized by uncontrolled destructive activity and rages and tantrums when encountering frustration or attack at age 6 to 10 years was linked to adult anger arousal ( $r = .42$  in males and  $.12$  in females); and dependency in childhood was linked to dependency in adulthood ( $r = .30$  and  $0$ , respectively). They concluded that varying coefficients in females and males reflect different traditional cultural standards imposed on females and males. Gender differences were not statistically tested at that time (sample size was 71, 49% female).

On the basis of meta-analyses conducted with adult samples, gender differences could be expected not to exist in the relative stability of adult personality traits. Nor did Hampson and Goldberg (2006) find gender differences in the continuity of personality traits from childhood to adulthood, and Caspi et al. (2003) in the links between the temperament types and subsequent personality traits. Nevertheless, we found with the Finnish sample that neuroticism and extraversion were more stable from age 33 to age 42 in males than in females (Rantanen, Metsäpelto, Feldt, Pulkkinen, & Kokko, 2007). We have also found gender differences when social functioning (stability of career, crime, relationships, drinking) has been used as the criterion (Pitkänen, Kokko, Lyyra, & Pulkkinen, 2008; Pulkkinen, 1998,



2009). In the study of the continuity of aggression we found that aggression at age 8 was connected to adult aggression via aggression at age 14 (Kokko & Pulkkinen, 2005). However in men, aggression at age 8 was also directly connected to adult aggression, explaining the result that the overall stability of aggression from childhood to adulthood was higher in males than in females.

Since we have repeatedly perceived gender differences in the predictive correlations of socio-emotional behavior with adult outcomes, we were interested in whether there were also gender differences in the associations of socio-emotional behaviors with adult personality characteristics, and particularly, whether all effects of the age-8 behaviors on adult traits go similarly in boys and girls through age-14 behaviors. We expected gender differences to exist in the magnitude of associations between childhood/adolescence socio-emotional behaviors, which bear a similarity to temperament but also include specific aspects of coping with conflicts, and adulthood personality traits. We assumed that these associations would be higher in males than in females. The reason for this is that traditionally behavior has been more highly shaped by restrictions in girls' than boys' socialization, so that boys' behaviors express their temperament qualities more strongly than girls' behavior. For the same reason we expected differences to exist in the timing of significant predictions of adult personality traits, which would be seen in the fact that boys' behaviors at age 8 would be more predictive of adult behaviors than girls' behaviors at age 8. The formation of girls' personality was expected to take place during their school years, and therefore more consistent individual differences predictive of adult traits were expected to appear at a later age. It was expected to be seen in that, compared to age 8 behaviors, age 14 behaviors in females would predict adult characteristics more highly.

## **Method**

### **Participants**

Participants were drawn from the ongoing Finnish Jyväskylä Longitudinal Study of Personality and Social Development (JYLS) (Pulkkinen, 2009). In the present study we used data collected at ages 8 (in 1968), 14 (in 1974), and 42 (in 2001). The initial sample size was 369 (53% males); the initial participation rate at age 8 was 100%, because all the pupils belonged to the intended sample of 12 school classes randomly drawn to participate in the study. At ages 14 and 42, follow-up data were collected for 351 and 232 participants (95% and 64% of the initial sample, respectively). Attrition analyses have shown that the participants at age 42 represented the initial random sample well, and that they were representative of their Finnish age-cohort born in 1959 (Pulkkinen, Feldt, & Kokko, 2005).

### **Measures and Procedure**

Socio-emotional characteristics were assessed at ages 8 and 14 by teacher ratings. At age 14, the participants were spread across 78 classes and ratings were sought from about 130 teachers, without pay, which was possible only with a reduced number of items. Therefore the number of items at age 14 was reduced on the basis of careful statistical analyses from the 39 used at age 8 to eight items (Pitkänen, 1969, p. 138, 182).

Personality traits were measured using a shortened, 60-item version of an authorized adaptation of the NEO Personality Inventory (NEO-PI; Costa & McCrae, 1985; Pulver, Allik, Pulkkinen, & Hämäläinen, 1995) in which a tenth of the items are substitutes for the original American items due to differences in culture. The items corresponded to the items in the NEO-FFI (Rantanen et al., 2007). In addition, the Karolinska Scales of Personality (KSP; af Klinteberg et al., 1990), and a short form (77 items) of the Adult Temperament Questionnaire (ATQ; received from M. Rothbart through personal communication, Dec. 2000; Rothbart et al., 2000) were handed to the participants in the context of a personal interview and the participants were asked to return them in a prepaid envelope.

### **Variables**

At age 8, teachers rated each item (the items are listed in the Appendix) for each participant (in comparison with children of the same age and gender) on a scale ranging from 0 (does not apply at all to the pupil in question) to 3 (is very typical of the pupil in question). At age 14, teachers rated each item for the participant on a scale ranging from 0 (least prominent) to 100 (most prominent) when compared to a hundred other pupils of the same age and gender that they knew.

*Behavioral activity.* At age 8, an average score of three teacher-rated items was formed for behavioral activity. Cronbach's alpha was .77. At age 14, activity was comprised of an average score of the following two teacher-rated items: "Is energetic, always on the go, often has contact with others" and "Does not move much, stands alone, is silent" (reversed score). Cronbach's alpha was .84.

*Well-controlled behavior.* At age 8, well-controlled behavior was computed as an average score of three subscales, constructiveness, compliance, and thoughtfulness. Cronbach's alpha across all eight items was .91. At age 14, well-controlled behavior was an average score of three items: constructiveness ("Tries to solve annoying situations reasonably, negotiates, conciliates, strives for justice"); compliance ("Is peaceable, patient, adjustable"); and thoughtfulness ("Is reliable, keeps promises, does not get excited"). Cronbach's alpha was .77.

*Negative emotionality.* At age 8, negative emotionality consisted of an average score of teacher ratings for three subscales, aggressiveness, anxiety, and low control. Cronbach's alpha for negative emotionality across all 13 items was .86. At age 14, negative emotionality (3 items) consisted of an average score of aggressiveness ("Attacks without reason, teases others, says naughty things"), anxiety ("Is fearful, helpless in others' company, target of teasing, unable to defend"), and low control ("Is impulsive, lacks concentration, changes moods"). Cronbach's alpha was .65.

*Adult personality traits.* Twelve items measured each of the Big Five personality traits. Cronbach's alphas were as follows: neuroticism .86; extraversion .79; openness to experience .80; conscientiousness .78; and agreeableness .79.

*Vulnerability traits.* Vulnerability traits were measured using the KSP. Four vulnerability scales were formed (Pulkkinen et al., 2005): *Aggression* included the subscales for Verbal Aggression, Indirect Aggression, and Irritability. *Anxiety* included the subscales for Somatic Anxiety, Muscular Tension, and Psychic Anxiety. *Sociability* was formed by reversing the vulnerability factor for Detachment (reversed scoring). *Conformity* was formed from two subscales: Socialization and Social Desirability. Cronbach's alphas for the four vulnerability scales were .78, .93, .79, and .86, respectively.

*Temperament traits.* Temperament was assessed using the ATQ. *Surgency* included the subscales for Sociability and Positive Affect. *Effortful control* included the subscales for Activation Control, Attentional Control, and Inhibitory Control. *Negative affectivity* included the subscales for Fear, Sadness, and Discomfort. Cronbach's alphas for the scales were .81, .79, and .81, respectively.

## **Data Analysis**

The hypothesized paths from childhood and adolescent socio-emotional behaviors to adult personality patterns (separate models for behavioral activity, well-controlled behavior, and negative emotionality) were investigated using structural equation modeling (SEM) with robust maximum likelihood (MLR) as a method of estimation. To investigate expected gender differences in the hypothesized paths we used a two-group option (males and females) to compare the data of men and women. For comparison, we ran the hypothesized models also for the whole sample to see what happens if the data of men and women are merged as is often done (meta-analysis by Ferguson, 2010). These analyses were conducted using the Mplus statistical package (Version 6.0; Muthén & Muthén, 1998–2010) including the missing

data method, which estimates the models by utilizing all available data without imputing data.

In the SEM models, the latent factors for behavioral activity, well-controlled behavior, and negative emotionality at ages 8 and 14 consisted of the questions and subscales described in the variables section. Also the latent factors for vulnerability and temperament traits at age 42 consisted of the subscales described in the variables section, except for Sociability. For the latter and the personality traits, latent factors were based on two parcels that were constructed from the items measuring each trait using an item-to-construct balance method (Little, Cunningham, Shahar, & Widaman, 2002, p. 166). Parcels were used to reduce the amount of variables in already complex SEM models in relation to sample size.

As a default in the two-group models where the data of men and women were compared, the factor loadings, the factor correlations, and the measurement errors of the factor indicators were set to equal between men and women while the regression paths from age 8 and 14 latent factors to age 42 latent factors were first estimated freely for men and women. Then regression paths that were statistically non-significant ( $t < |1.96|$ ) in both genders were deleted. Finally, in each SEM model the gender equality of the remaining regression paths was tested one path at a time using a scaled  $\chi^2$  difference test (Satorra & Bentler, 2001).

## Results

At ages 8 and 14 boys were significantly higher in negative emotionality than girls,  $p < .001$  for both ages,  $d = 0.61$  at age 8 and  $d = 0.58$  at age 14. Girls, in turn, were higher in well-controlled behavior,  $p < .001$  for each age;  $d = -0.38$  at age 8 and  $d = -0.49$  at age 14. Differences did not exist in behavioral activity. At age 42, women were significantly higher than men in sociability ( $d = -0.67$ ), openness ( $d = -0.52$ ), agreeableness ( $d = -0.39$ ), and negative affectivity ( $d = -0.72$ ).

Three path models were constructed (Figures 1-3). In each of them, age 8 behavior was set to predict age 14 behavior, and paths were estimated from both ages to the hypothesized adult personality characteristics. Model fit was reasonably good for all models: comparative fit indexes (CFI) and Tucker-Lewis indexes (TLI) were generally above 0.90 (a value recommended by Hu & Bentler, 1999) and root mean square error of approximation (RMSEA) under 0.08 (a value recommended by Steiger, 1990). In addition, in all models all factor loadings and factor correlations were significant at  $p < .001$  level.

Age 8 activity predicted activity at age 14 equally in females and males,  $\chi^2_{diff}(1) = 0.51$ ,  $p = .477$  (Figure 1). Only in females was age 14 activity was significantly linked to adult sociability. In males, significant links were from age 8 activity to adult sociability, surgency, extraversion, and openness; these connections from age 8 were not significant for females. The magnitude of the path coefficient for sociability differed between the genders significantly for age 8,  $\chi^2_{diff}(1) = 7.26$ ,  $p = .007$ , but not for age 14,  $\chi^2_{diff}(1) = 2.54$ ,  $p = .111$ . The magnitude of path coefficients did not differ between genders for extraversion, openness, and surgency,  $\chi^2_{diff}(1) = 0.95$ ,  $p = .330$ ;  $\chi^2_{diff}(1) = 2.23$ ,  $p = .136$ ; and  $\chi^2_{diff}(1) = 1.65$ ,  $p = .199$ ; respectively.

In the path model for all participants [males and females combined,  $\chi^2(56) = 95.98$ ,  $p = .001$ , CFI = .97, TLI = .96, RMSEA = .044], the connection from age 8 to age 14 behavioral activity remained significant ( $\chi^2 = .43$ ,  $p = .000$ ), but the connections to sociability disappeared where there was gender difference in timing. Also the connection to openness disappeared – it was significant only for males – and connections to surgency and extraversion which were significant for males only, diminished to .15 ( $p = .012$ ) and .13 ( $p = .044$ ), respectively.

Well-controlled behavior (Figure 2) at age 8 was significantly linked to well-controlled behavior at age 14 in males but not in females. However only in females, age 14 well-

controlled behavior was significantly connected to adult conscientiousness, and only in males, age 8 well-controlled behavior was significantly connected to adult conformity. Gender differences in the magnitude of the paths were not significant,  $\zeta_{diff}^2(1) = 1.65, p = .198$  for the path from age 8 to 14;  $\zeta_{diff}^2(1) = 3.16, p = .075$  for conscientiousness; and  $\zeta_{diff}^2(1) = 1.31, p = .252$  for conformity.

In the path model for all participants,  $\zeta^2(80) = 168.70, p = .000, CFI = .94, TLI = .92, RMSEA = .055$ , the connection from age 8 to age 14 well-controlled behavior was significant ( $\zeta^2 = .23, p = .001$ ). The connection from age 14 to adult conscientiousness, which was significant only for females, diminished to  $.16 (p = .009)$ . The connection from age 8 well-controlled behavior to adult conformity was significant ( $\zeta^2 = .35, p = .000$ ), and a new connection appeared between age 8 well-controlled behavior and agreeableness ( $\zeta^2 = .18, p = .016$ ).

Negative emotionality (Figure 3) at age 8 was associated with negative emotionality at age 14 significantly in males only, and the magnitude of this path differed significantly between genders,  $\zeta_{diff}^2(1) = 3.70, p = .054$ . The age 14 negative emotionality was further connected to adult aggression significantly in males but not in females. In females, a significant path emerged from negative emotionality at age 14 to adult negative affectivity, but it was negative. Gender differences did not exist in the magnitude of these latter two paths,  $\zeta_{diff}^2(1) = 0.39, p = .531$  for aggression; and  $\zeta_{diff}^2(1) = 2.96, p = .085$  for negative affectivity.

In the path model for all participants,  $\zeta^2(110) = 307.98, p = .000, CFI = .89, TLI = .87, RMSEA = .070$ , the connection from age 8 to age 14 negative emotionality was significant ( $\zeta^2 = .51, p = .000$ ). The connection from age 14 negative emotionality to adult aggression disappeared, and instead a path from age 8 negative emotionality to adult aggression emerged

( $r^2 = .17, p = .003$ ). Furthermore, the connection to adult negative affectivity ( $r^2 = -.25, p = .000$ ) was from age 8, not from age 14.

### **Discussion**

The Jyväskylä Longitudinal Study of Personality and Social Development offered a rare opportunity to study continuity from childhood socio-emotional characteristics to adult personality across 35 years. This was carried out on the assumption that temperament characteristics defined by activity and self-regulation (Rothbart & Derryberry, 1981) would be common elements in children's socio-emotional behavior and adult personality. By definition, socio-emotional behavior develops in the interaction of the child's temperament and social experiences, and individual differences in it can be described in terms of behavioral activity and self-control (Pitkänen, 1969; Pulkkinen, 1995). Our hypotheses on continuity from childhood behaviors to adult personality characteristics were confirmed by SEM, particularly, for behavioral activity and well-controlled behavior. The paths were, however, significant only for one gender, and more frequently for males than for females. The significant male paths from behavioral activity to adult surgency, extraversion, openness, and sociability, and from well-controlled behavior to conformity started at age 8, whereas significant female paths from behavioral activity to adult sociability and from well-controlled behavior to adult conscientiousness started at age 14.

Hampson and Goldberg (2006) found the highest stability coefficient from childhood to middle age in extraversion and the second highest in conscientiousness. In neuroticism the stability was zero. Although their coefficients, constructs, and measures are not directly comparable to those of the present study, there is similarity in the findings. Our results were also in accordance with the review of results by Rothbart (2011).

Caspi, Roberts, and Shiner (2005) argued that rank-order stability of personality traits does not differ by gender. In the present study, the gender differences in significant paths



suggest that temperament differences in activity were more observable by teachers in 8-year-old boys' than girls' behavior at school. Possibly differences were due to socialization experiences as proposed by Kagan and Moss (1962). Boys' well-controlled behavior at age 8 predicted adult conformity. The significant paths in females, which started at age 14, show that sociability and conscientiousness develop in girls during their school years.

There was no link from childhood/adolescence to adulthood which was significant for both genders. However, when these paths to adult personality were tested rigorously one path at a time, the  $\chi^2$  difference tests showed that in most cases the *magnitude* of these paths did not differ significantly between men and women. This was most probably due to the sample size of our study. It was relatively high (232 participants) for a longitudinal study that had lasted for 34 years, but it was sufficient to confirm only very robust gender differences in path magnitudes. The small effect size was also found problematic by Roberts, Caspi, and Moffitt (2001) in their study of gender differences in personality development.

There was an unexpected negative path from adolescent negative emotionality to adult negative affectivity, particularly, in females. There are transient errors in the measurements of longitudinal studies that attenuate observed stability in personality characteristics, as Chmielewski and Watson (2009) showed, but one explanation to the negative path can also be found in differences between the contents of the measures. In adulthood, negative affectivity was assessed by non-aggressive negative affect, i.e., fear, sadness and discomfort (Rothbart et al., 2000), which was narrower than the content of negative affectivity in childhood including anger and frustration (Rothbart & Derryberry, 2002). Negative emotionality of the present study was matched with negative affectivity in childhood. Most aggressive individuals may not become adults who are high in non-aggressive negative affect.

The fact that all paths from childhood/adolescence to adulthood were only significant for one gender and that there were differences in the timing of connections, cannot be ignored. We cannot conclude that it is advisable to merge the data of men and women in the study of links between childhood socio-emotional behavior and adult personality indicators. We conducted data analyses with the whole sample, and found that information about the connections between childhood behaviors and adult personality characteristics were essentially reduced, and developmentally interesting phenomena disappeared. Since the paths were significant only for one gender, the combination of the gender data either attenuated the paths (when the means for the males and females did not differ, i.e., in behavioral activity), or disattenuated the paths (when the means of these two subgroups differed, i.e., in well-controlled behavior and negative emotionality). Furthermore, gender differences in the timing and quality of connections disappeared. Our findings suggest tentatively that continuity from middle childhood socio-emotional behaviors to adult personality is higher in males than in females, and more highly related to early temperament in males than in females. Other studies are needed to confirm the present findings.

Teacher ratings, the concurrent validity of which was confirmed with peer nominations (Pitkänen, 1969), were used for the assessment of socio-emotional behavior in childhood and adolescence, whereas self-reports were used for adult personality. In the 1960s there were no self-report measures available for the assessment of children's socio-emotional behavior. The use of different informants weakens connections, but on the other hand, it may also confirm the existence of connections independent of the informant. It is also in the interest of educationalists and parents to know whether children's observable behavior is predictive of adult personality.

A limitation of the present study is that modern measures were not available for the study of childhood personality in 1968, when the JYLS was initiated. Neither the Big Five

approach to personality nor measures for assessing these traits were available. Also Rothbart's Early Childhood Behavior Questionnaire (ECBQ) and the theory of surgency/extraversion, negative affectivity, and effortful control were formulated in the 1990s. However, the founding author's theoretical ideas ran along similar lines to Mary Rothbart's ideas so that we could expect that there would be common temperament-based elements in children's socio-emotional behavior and in their adult personality.

A strength of this study was that the sample was drawn randomly and it was representative of the age cohort in middle age. Another strength was that the framework model for behavioral activity and self-control (Pitkänen, 1969) existed from the inception of the longitudinal study. Therefore, data collection covered broad aspects of children's socio-emotional behavior allowing for the study of continuity also in positive aspects of behavior, often neglected in earlier studies. The present study contributes to the literature in many respects. First, long-term longitudinal studies on this topic are scarce and therefore new findings are needed with a random sample of participants, as in the present study. Second, the results obtained confirmed and expanded previous findings on continuity from behavioral characteristics to personality. Third, the wide array of personality measures used in adulthood offered the opportunity to study this continuity in terms of broader constructs rather than single variables.

### References

- af Klinteberg, B., Schalling, D., & Magnusson, D. (1990). Childhood behavior and adult personality in male and female subjects. *European Journal of Personality, 4*, 57–71.  
doi:10.1002/per.2410040105
- Ayduk, O., Mendoza-Denton, R., Mischel, W., & Downey, G. (2000). Regulating the interpersonal self: Strategic self-regulation for coping with rejection sensitivity. *Journal of Personality and Social Psychology, 79*, 776-792.

doi:10.1037//0022-3514.79.5.776

Caspi, A. (1998). Personality development across the life course. In W. Damon, & N.

Eisenberg (Eds.), *Handbook of child psychology: Social, emotional, and personality development* (5<sup>th</sup> ed., Vol. 3, pp. 311–388). Hoboken, NJ: John Wiley & Sons, Inc.

Caspi, A., Harrington, H. L., Milne, B., Amell, J. W., Theodore, R. F., & Moffitt, T. (2003).

Children's behavioral styles at age 3 are linked to their adult personality traits at age 26. *Journal of Personality, 71*, 496–513. doi:10.1111/1467-6494.7104001

Caspi, A., Roberts, B. W., & Shiner, R. L. (2005). Personality development: Stability and change. *Annual Review of Psychology, 56*, 453–484.

doi:10.1146/annurev.psych.55.090902.141913

Caspi, A., & Silva, P. A. (1995). Temperamental qualities at age three predict personality traits in young adulthood: Longitudinal evidence from a birth cohort. *Child Development, 66*, 486–498. doi:10.2307/1131592

doi:10.2307/1131592

Caspi, A., & Shiner, R. (2008). Temperament and personality. In M. Rutter, D. Bishop, D.

Pine, S. Scott, J. Stevenson, E. Taylor, & A. Thapar (Eds.), *Rutter's child and adolescent psychiatry* (5th ed., pp. 182–199). London, England: Blackwell.

doi:10.1002/9781444300895.ch14

Chmielewski, M., & Watson, D. (2009). What is being assessed and why it matters: The impact of transient error on trait research. *Journal of Personality and Social Psychology, 97*, 186–202. doi:10.1037/a0015618

doi:10.1037/a0015618

Costa, P. T. Jr., & McCrae, R. R. (1985). *The NEO Personality Inventory Manual*.

Odessa, FL: Psychological Assessment Resources.

Digman, J. M. (1997). Higher-order factors of the Big Five. *Journal of Personality and Social Psychology, 73*, 1246–1256. doi:10.1037/0022-3514.73.6.1246

doi:10.1037/0022-3514.73.6.1246

Evans, D. E., & Rothbart, M. K. (2007). Developing a model for adult temperament.

*Journal of Research in Personality*, 41, 868–888. doi:10.1016/j.jrp.2006.11.002

Ferguson, C. J. (2010). A meta-analysis of normal and disordered personality across the life span. *Journal of Personality and Social Psychology*, 98, 659–667.

doi:10.1037/a0018770

Hampson, S. E., & Goldberg, L. R. (2006). A first large cohort study of personality trait stability over the 40 years between elementary school and midlife. *Journal of*

*Personality and Social Psychology*, 91, 763–779. doi:10.1037/0022-3514.91.4.763

Hu, L., & Bentler, P. M. (1999). Cut-off criteria for fit indices in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*,

6, 1–5. doi:10.1080/10705519909540118

Kagan, J., & Moss, H. W. (1962). *Birth to maturity: A study in psychological development*.

New York, NY: John Wiley and Sons, Inc.

Kokko, K., & Pulkkinen, L. (2005). Stability of aggressive behavior from childhood to middle age in women and men. *Aggressive Behavior*, 31, 485–497.

doi:10.1002/ab.20063

Kokko, K., Pulkkinen, L., & Puustinen, M. (2000). Selection into long-term unemployment and its psychological consequences. *International Journal of Behavioral Development*,

24, 310–320. doi:10.1080/01650250050118295

Little, T. D., Cunningham, W. A., Shahar, G., & Widaman, K. F. (2002). To parcel or not to parcel: Exploring the question, weighing the merits. *Structural Equation Modeling*,

9, 151–173. doi:10.1207/S15328007SEM0902\_1

McAdams, D. P., & Olson, B. D. (2010). Personality development: Continuity and change over the life course. *Annual Review of Psychology*, 61, 517–542.

doi:10.1146/annurev.psych.093008.100507

Moffitt, T. E., Arseneault, L., Belsky, D., Dickson, N., Hancox, R. J., Harrington, H. L.,

- ...Caspi, A. (2011). A gradient of childhood self-control predicts health, wealth, and public safety. *PNAS*, 108, 2693–2698. doi:10.1073/pnas.1010076108
- Moffitt, T. E., Caspi, A., Rutter, M. & Silva, P. A. (2001). *Sex differences in antisocial behaviour: Conduct disorder, delinquency, and violence in the Dunedin Longitudinal Study*. New York, NY: Cambridge University Press.
- Muthén, L. K., & Muthén, B. O. (1998-2010). *Mplus User's guide* (6th ed.). Los Angeles, CA: Muthén & Muthén.
- Pitkänen, L. (1969). *A descriptive model of aggression and nonaggression with applications to children's behaviour*. Jyväskylä, Finland: University of Jyväskylä.
- Pitkänen, T., Kokko, K., Lyyra, A.-L., & Pulkkinen, L. (2008). A developmental approach to alcohol drinking behaviour in adulthood: A follow-up study from age 8 to age 42. *Addiction*, 103 (Suppl. 1), 48–68. doi:10.1111/j.1360-0443.2008.02176.x
- Pulkkinen, L. (1995). Behavioral precursors to accidents and resulting physical impairment. *Child Development*, 66, 1660–1679. doi:10.2307/1131902
- Pulkkinen, L. (1998). Levels of longitudinal data differing in complexity and the study of continuity in personality characteristics. In R. B. Cairns, L. R. Bergman, & J. Kagan (Eds.), *Methods and models for studying the individual* (pp. 161-184). Beverly Hills, CA: Sage.
- Pulkkinen, L. (2009). Personality - a resource or risk for successful development. *Scandinavian Journal of Psychology*, 50, 602–610. doi:10.1111/j.1467-9450.2009.00774.x
- Pulkkinen, L., Feldt, T., & Kokko, K. (2006). Adaptive behavior in childhood as an antecedent of psychological functioning in early middle age: Linkage via career orientation. *Social Indicators Research*, 77, 171-195. doi:10.1007/s11205-005-5558-8

- Pulkkinen, L., Feldt, T., & Kokko, K. (2005). Personality in young adulthood and functioning in middle age. In S. Willis and M. Martin (Eds.), *Middle adulthood: A lifespan perspective* (pp. 99–141). Thousand Oaks, CA: Sage Publications.
- Pulver, A., Allik, J., Pulkkinen, L., & Hämäläinen, M. (1995). A Big Five Personality Inventory in two non-Indo-European languages. *European Journal of Personality*, *9*, 109–124. doi:10.1002/per.2410090205
- Rantanen, J., Metsäpelto, R-L., Feldt, T., Pulkkinen, L., & Kokko, K. (2007). Long-term stability in the Big Five personality traits in adulthood. *Scandinavian Journal of Psychology*, *48*, 511–518. doi:10.1111/j.1467-9450.2007.00609.x
- Roberts, B. W., Caspi, A., & Moffitt, T. E. (2001). The kids are alright: Growth and stability in personality development from adolescence to adulthood. *Journal of Personality and Social Development*, *81*, 670–683. doi:10.1037/0022-3514.81.4.670
- Roberts, B. W., & DelVecchio, W. F. (2000). The rank-order consistency of personality traits from childhood to old age: A quantitative review of longitudinal studies. *Psychological Bulletin*, *126*, 3–25. doi:10.1037/0033-2909.126.1.3
- Rothbart, M. K. (2011). *Becoming who we are: Temperament and personality in development*. New York, NY: Guilford Press.
- Rothbart, M. K., Ahadi, S. A., & Evans, D. E. (2000). Temperament and personality: Origins and outcomes. *Journal of Personality and Social Psychology*, *78*, 122–135. doi:10.1037/0022-3514.78.1.122
- Rothbart, M. K., & Derryberry, D. (1981). Development of individual differences in temperament. In M. E. Lamb & A. L. Brown (Eds.), *Advances in developmental psychology* (Vol. 1, pp. 37–86). Hillsdale, NJ: Erlbaum.
- Rothbart, M. K., & Derryberry, D. (2002). Temperament in children. In C. Hofsten, & L. Bäckman (Eds.), *Psychology at the turn of the millennium: Social, developmental, and*

*clinical perspectives* (Vol. 2, pp. 17–35). East Sussex, England: Psychology Press.

Rueda, M. M., & Rothbart, M. K. (2009). The influence of temperament on the development of coping: The role of maturation and experience. In E. A. Skinner, & M. J. Zimmerman-Gembeck (Eds.), *Coping and the development of regulation: New Directions for Child and Adolescent Development* (Vol. 124, pp. 19–31). San Francisco, CA: Jossey-Bass.

Satorra, A., & Bentler, P. M. (2001). A scaled difference chi-square test statistic for moment structure analysis. *Psychometrika*, 66, 507–514. doi:10.1007/BF02296192

Steiger, J. H. (1990). Structural model evaluation and modification: An interval estimation approach. *Multivariate Behavioral Research*, 25, 173–180.

doi:10.1207/s15327906mbr2502\_4

Viinikainen, J., Kokko, K., Pulkkinen, L., & Pehkonen, J. (2010). Personality and labour market income: Evidence from longitudinal data. *Labour*, 24, 201–220.

doi:10.1111/j.1467-9914.2010.00477.x



Figure 1. Continuity in behavioral activity from childhood through adolescence to adulthood, model fit:  $\chi^2(110) = 159.24$ ,  $p = .002$ , CFI = .97, TLI = .96, RMSEA = .049. Note:  $f$  = female,  $m$  = male; Ext1, Ex2 = parcels for extraversion; Ope1, Ope2 = parcels for Openness; Soc1, Soc2 = parcels for sociability.

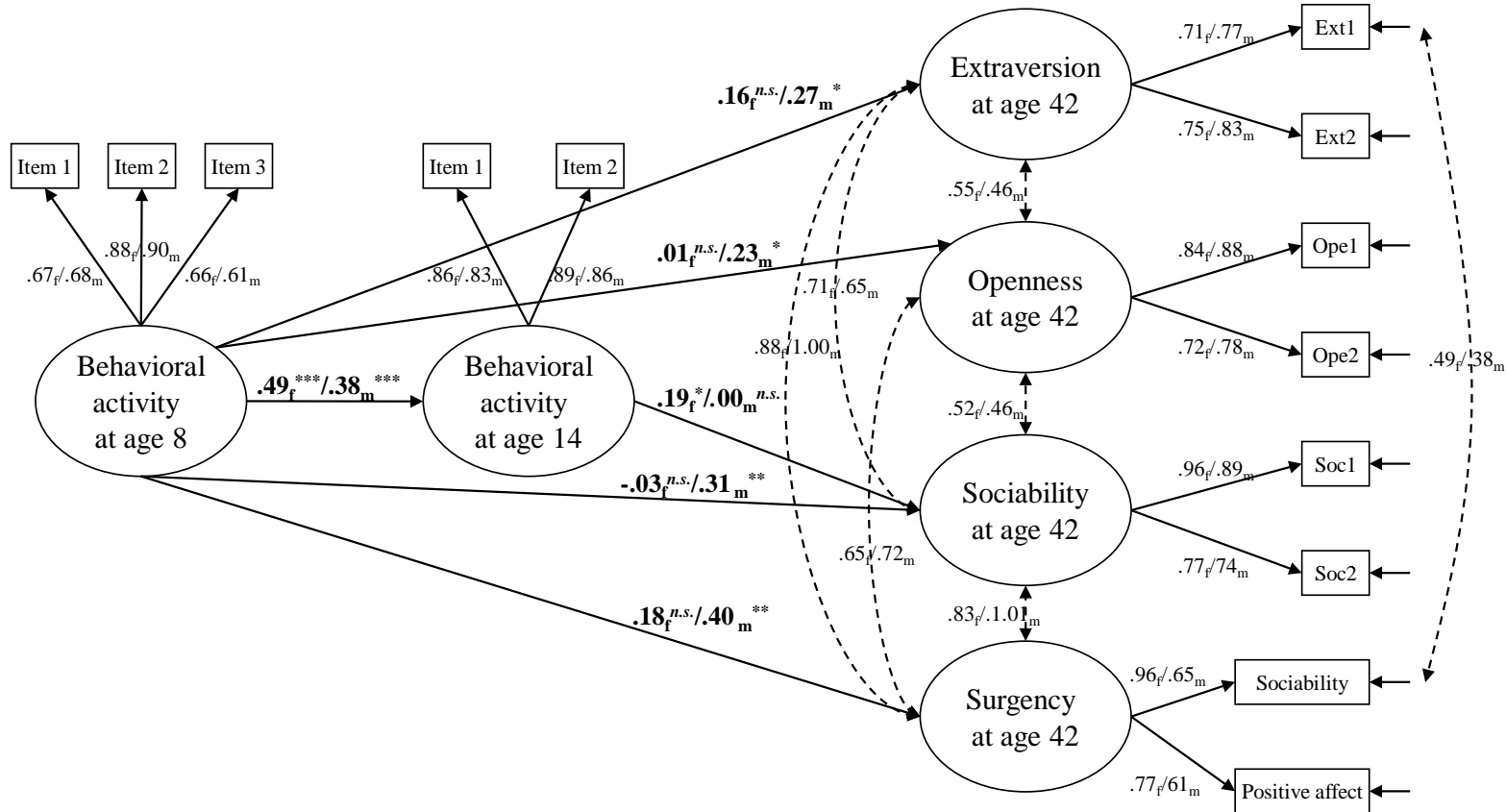


Figure 2. Continuity in well-controlled behavior from childhood through adolescence to adulthood, model fit:  $\chi^2(131) = 204.78, p = .000, CFI = .95, TLI = .94, RMSEA = .055$ . Note: \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ ;  $f$  = female,  $m$  = male; Cons = Constructiveness, Comp = Compliance, Though = Thoughtfulness, Agr1, Agr2 = parcels for agreeableness, Con1, Con2 = parcels for conscientiousness.

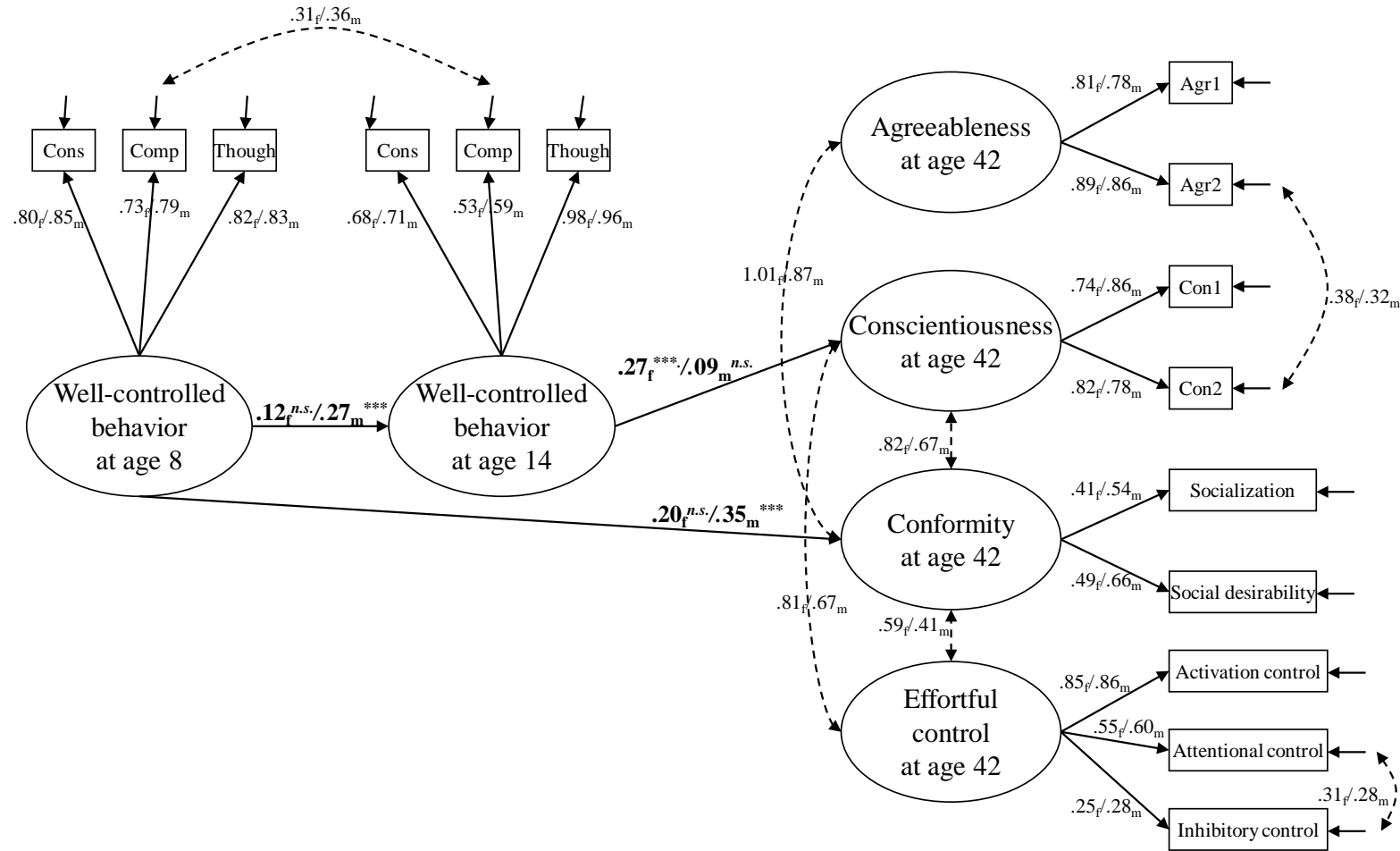
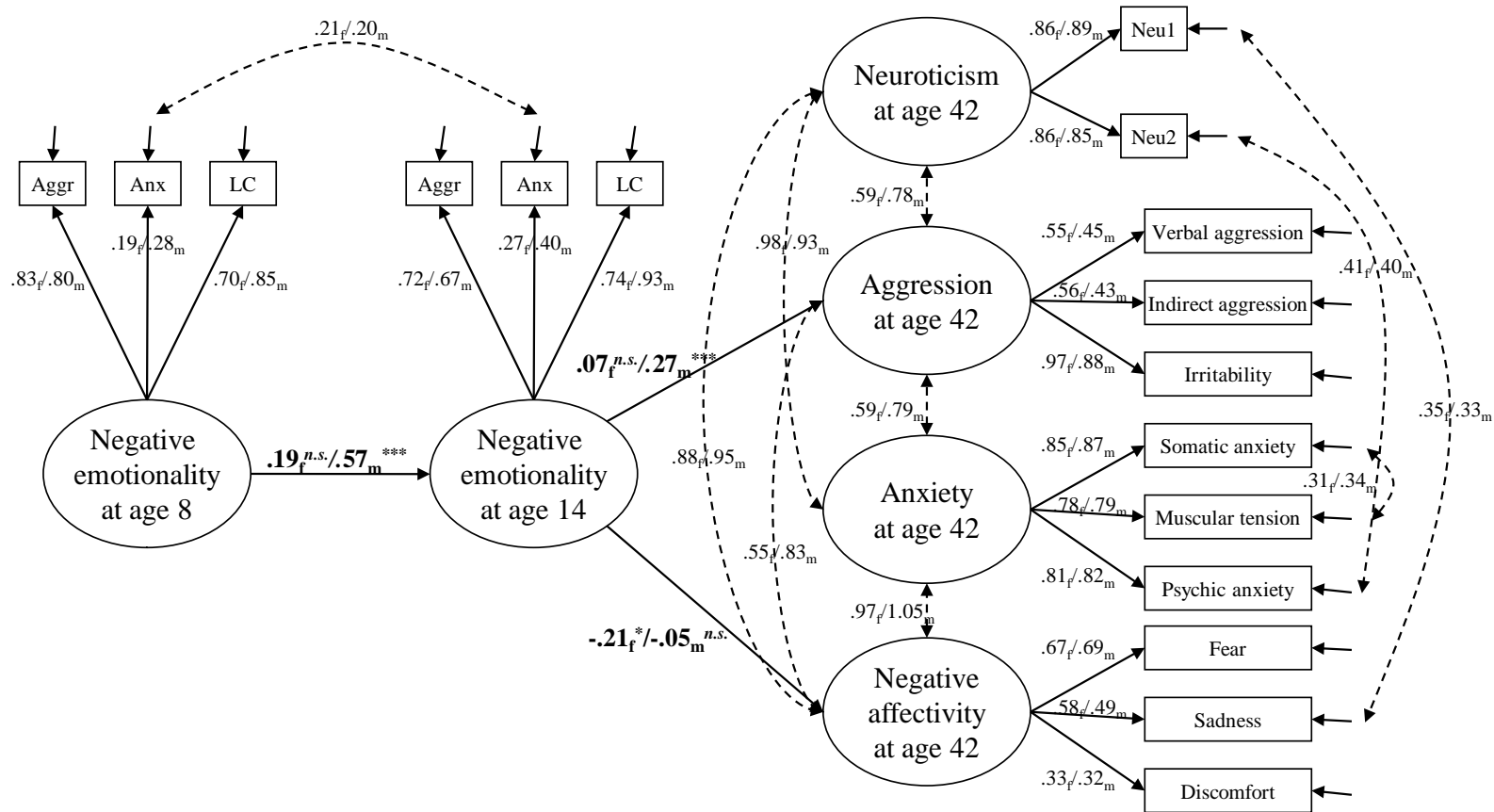


Figure 3. Continuity in negative emotionality from childhood through adolescence to adulthood, model fit:  $\chi^2(244) = 417.97, p = .000$ , CFI = .91, TLI = .89, RMSEA = .062. Note: \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ ; <sub>f</sub> = female, <sub>m</sub> = male; Aggr = Aggressiveness, Anx = Anxiety, LC = Low control, Neu1, Neu2 = parcels for neuroticism.



## Appendix

### Teacher-Rated Items for Behavioral Activity, Well-Controlled Behavior, and Negative Emotionality at Age 8

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Item

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#### **Behavioral activity**

Always busy and plays eagerly with other children during breaks and after school hours

Always silent and does not care to be busy (reversed scored)

Is too withdrawn and timid (reversed scored)

#### **Well-controlled behavior**

##### *Constructiveness*

Is considered reliable

Tries to act reasonably even in annoying situations

Thinks that if one negotiates, everything will be better

Sides with smaller and weaker peers

##### *Compliance*

Never quarrels with others

Dislikes squabbling company and leaves it for something else

Is peaceable and patient

##### *Thoughtfulness*

Always tries to be friendly to others

#### **Negative emotionality**

##### *Aggressiveness*

Hurts another child when angry, e.g. by hitting, kicking, or throwing something

Quarrels with other children even for a slight reason

Easily starts sulking (his/her look reveals that he/she is angry although he/she does not say a

word

Kicks pieces of furniture or other objects when angry at something

Attacks somebody without any reason

Says naughty things to other children even if these had done nothing wrong to him

Teases smaller and weaker peers when angry at something

Takes other children's possessions

*Anxiety*

Easily starts crying if others treat them nastily

Is afraid of other children

Easily cries, say at the dentists's

*Low control*

Sometimes very touchy and sometimes a really nice chum

Is inattentive and lacks concentration in his or her work

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