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Chapter 2: Longitudinal Study of Personality and Social Development:

Insights about Aggression after Five Decades

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Introduction

My insights about aggression after five decades of study are presented below from three perspectives on aggression: description of aggression, continuity of aggression, and developmental processes associated with aggressive behavior. I focus on two studies: a Kindergarten Study which I (then: Pitkänen) conducted in the middle of the 1960s, and its successor, the Jyväskylä Longitudinal Study of Personality and Social Development (JYLS), the baseline study of which was the second part of my doctoral dissertation (Pitkänen, 1969). The description of the JYLS from its inception and the synthesis of its results are presented in a book by Pulkkinen (2017). Below I discuss 28 insights about aggression.

During the first half of the 1960s, I was working as a research assistant at a university and my task was to collect data with children on three needs within the taxonomy of 20 needs by Murray (1938): need of Achievement, Affiliation, and Aggression. A need was a construct which organizes perception and action to transform an unsatisfying situation. It was seen as being sometimes provoked by internal processes, but more frequently by environmental presses. I became skeptical about a need being a unitary construct when I discovered that different measurement techniques produced different results. I wanted to more closely study the variety of expressions of a need, such as aggression which was defined as “To overcome opposition forcefully. To fight. To revenge an injury. To attack, injure, or kill another. To oppose forcefully or punish another” (Hall & Lindzey, 1957, p. 173). I found that Goodenough (1931) had investigated children aged 7 months to 8 years and listed nearly 2,000 different outbursts of anger based on the recordings of mothers. Mandel

(1959), in turn, had listed 2,205 different aggressive responses while observing the behavior of 9 - 16-year-old boys in a boarding school. He classified them into seven categories from which five categories belonged to serious behavior (three sub-categories for more reactive and two sub-categories for more spontaneous aggression). The second category included behaviors in which serious aggression was questionable, and the third category included playful behaviors. Based on factor analysis, he extracted three factors: Hostility comprising severe spontaneous and reactive aggression; body contact including playful aggression; and inhibition or control of aggression.

Other distinctions had been made between, for instance, physical and verbal aggression (Jersild & Markey, 1935), indirect, provoked, and unprovoked aggression (Lesser, 1959); competitiveness and dominance (Kagan & Moss, 1961); and active and passive quality of aggression (Buss, 1961). McNeil (1962) who had studied interrelationships between different expressions of aggression concluded that “future investigations of aggression ought to exercise some caution about viewing expressions of hostility as a unitary phenomenon that can be captured by means of a single global estimate of aggressiveness” (p. 75).

I found several definitions of aggression in the literature, and preferred the simplest definition by Buss (1961, p. 1): Aggression is “a response that delivers noxious stimuli to another person.” A dominant theoretical approach to aggression was the frustration-aggression theory (Dollard, Doob, Miller, Mowrer, & Sears, 1939). According to it, aggression was always a reaction to a frustration. I was critical of it because it neglected proactive aggression. Based on the modification of the S-R theory by Spence (1956), I thought that an individual may learn to anticipate secondary reinforcements of aggressive behavior. He or she may learn to use the delivery of noxious stimuli instrumentally, as a tool

for aiming at one's goals, such as gaining more power. It would explain proactive aggression (Pitkänen, 1966, 1969, pp. 36-39).

I made an attempt to construct a descriptive model of aggressive behavior by outlining dimensions which would explain individual differences in aggression and be closely based on theoretical interpretations of human learning of aggressive behavior. The descriptive model (Figure 1) focuses on the observable characteristics of aggressive acts. Behavior which does not have the characteristics of observable aggressive acts, such as aggressive autonomic responses and aggression in fantasy, were not included in the model.

<FIGURE 1 HERE>

The first dimension in the descriptive model of aggression, called *the intensity of aggressive behavior*, can be defined by the quantity of noxious stimuli delivered by the act in question. The second dimension of the model describes the *motivational sequence of an aggressive act*: either the initiation of an aggressive act (offensive, henceforth: proactive aggression) including, for instance, attacking others for no apparent reason and teasing others, or a response to an aggressive act (defensive, henceforth: reactive aggression). The third dimension describes the direct/indirect *direction of aggression*. A person may target aggression directly at another person (e.g., by hitting) or express aggression indirectly via mediating events or persons, for instance, by gossiping about another person. There are also different *modes of aggression*, such as physical, verbal, and facial expressions of aggression. The qualitative characteristics can be combined into four categories: proactive – direct, proactive – indirect, reactive – direct, and reactive – indirect aggression; each category can be displayed physically, verbally, and facially, and used for the analysis of an aggressive act. For example, a push may be reactive or proactive depending on the sequence of events. It displays aggression directly and physically, and it may be mild or stronger depending on the consequences of the push.

I formulated thirty-two observable aggressive acts to represent different combinations of the dimensions (Pitkänen, 1966, 1969 Appendix A). Kindergarten teachers (26) observed these expressions of aggression in 216 boys' behaviors during a one month period and rated them on how often they noted these behaviors in each child; who had been the target of aggression; and in what kind of context did the aggressive behavior occur. The average age of the boys was 6.1 years (children start school at the age of seven in Finland). This study resulted in several insights about aggression.

Insight 1 is that *the dimensions presented in the descriptive model of aggressive acts are relevant for individual differences*. Aggressive acts could be described in terms of the intensity, direction (direct versus indirect), and sequence (reactive versus proactive) of aggression (Pitkänen, 1969, pp. 52-55). Three main factors were obtained: reactive aggression without proactive aggression; indirect aggression involving both reactive and proactive aggression; and proactive aggression with intensive reactive aggression. The commonly used distinction between physical and verbal aggression did not appear as major differentiating aspects of aggression. Those who express their aggression physically also express it verbally (Knight, Fabes, & Higgins, 1996).

Insight 2 is that *the most differentiating quality of boys' aggressive behavior is proactive aggression*. Proactively aggressive children were rated as most aggressive, and they generally defended themselves if attacked.

Insight 3 is that *reactive aggression may appear in children without proactive aggression*. Reactive aggression for self-defense is to some extent acceptable assertive behavior, if its intensity fits the intensity of the attack.

The person-situation controversy was raised in the literature by Mischel (1968) when he criticized the trait concept as a stable and enduring characteristic of individuals and argued that individual behavior is relatively situation-specific.

Insight 4 is that *aggressive behavior is situation-specific*. Situation-specificity of aggression was investigated in the Kindergarten Study (Pitkänen, 1966), and it indicated that aggression displayed in either a proactive or reactive manner was most commonly directed at a boy of the same size in free play periods, both indoors and outdoors. Aggression towards a teacher was rare and indirect, and it was displayed during teacher-directed activity (Pitkänen, 1969, Part I).

Further support to *Insight 4* was received in the JYLS, where the targets of aggression were studied with two sets of Question Series administered to a sample of 8-year-old boys (Pitkänen, 1969, Part II). The Question Series for *reactive aggression* included questions of direct physical (hurts), verbal (says naughty things), and facial (makes faces) as well as indirect physical (takes another's possession) and verbal (tells stories) aggression. For instance: "You certainly know what it is like when somebody hurts you, say, by hitting, pushing or throwing something. What would you do if one of the boys in your class, who is of the same size as you, would hurt you?" The opponent was varied: a boy of the same size, a taller boy, a smaller boy, a girl, a teacher, and parents. In the Question Series for *proactive aggression*, the question took on the following form: "Do you attack a boy of your size or try to hurt him in any way, even if he had done you no harm, just to tease him?" The types of aggression and opponents varied in the same way as for reactive aggression.

As in the Kindergarten Study, the most common target of reactive, direct, physical aggression was a boy of the same size, followed by a smaller boy, a girl, and a taller boy (Pitkänen, 1969, p. 161). Parents were rarely targets, teachers never. Differences between the targets were smaller in reactive verbal and facial aggression. In direct proactive aggression, the frequency of the targets corresponded to that found in reactive physical aggression. Differences were smaller in indirect than in direct aggression.

Reactive physical aggression, the non-verbal type, was more closely studied at the age of 9 with an *Aggression Machine* (PAM) which I developed (Pitkänen, 1973a,b). In the PAM, the inclining side of the apparatus had two parallel rows: one consisting of lamps for stimulus presentation, the other consisting of buttons for participants to press. The lights were programmed by means of a built-in program disc. Each stimulus was recorded on the recording tape along with the pressing of the button. Aggressive attacks/responses were illustrated by pictures and words on a scale of the intensity (do nothing, pushes a little, pinching, slapping, knocking down, pulling hair, hitting with a stick, and punching). The attacker (a boy of the same size, taller boy, smaller boy, girl, father, female teacher) was depicted by a picture on the top of the apparatus. The participant was asked to press the button as a response to an attack. The results confirmed the situation-specificity of aggressive responses.

Insight 5 is that *the concurrent validity of the measure of aggression depends on the context of aggression in which it occurs*. The PAM study indicated that when the attacker was a boy of the same size, the intensity of reactive aggression correlated significantly with teacher ratings of children's general aggressiveness and low self-control (Pitkänen, 1973b). Aggressive responses to other targets did not correlate with teacher-ratings of aggressiveness. This is consistent with Mischel's (1968, p. 36) statement that "behaviors sampled in closely similar situations yield the best correlations." Aggressive behavior most often takes place between same-sized, same-sex peers.

The PAM was later computerized (Juujärvi, 2003; Juujärvi, Kooistra, Kaartinen & Pulkkinen, 2001) and used with both male and female offspring of the JYLS original participants. Results added new insights about situation-specificity of aggression.

Insight 6 is that *situation-specificity of aggression is similar by sex*. The highest intensity was found in responses to the attacks of the same-sized, same-sex peers in boys and girls. Same-sized peers (of the same sex and of the opposite sex), and also taller peers, evoked less situational control in aggressive reactions than a smaller peer or the parent.

Insight 7 is that *reactions to mild provocations differentiate between aggressive and nonaggressive individuals*. It was found that differences between aggressive and non-aggressive children as rated by their teachers occurred particularly, when the attacks were mild: more aggressive children reacted to mild attacks more intensively than less aggressive children.

Insight 8 is that *the predictive validity of the aggression measure depends on the type and context of aggression*. It was found that proactive aggression of any type and reactive physical aggression to attacks of the same-sized, same-sex peer, predicted adult aggression ten years later. This conclusion was based on the predictive validity of the Question Series (Pitkänen-Pulkkinen, 1981) and the PAM (Pitkänen-Pulkkinen, 1980).

Insight 9 is that *the delay of aggressive response indicates self-control*. It was found with the PAM that a longer reaction-time to aggression was associated with higher self-control ten years later (Pitkänen-Pulkkinen, 1980).

Insight 10 is that *most valid information is received from children's aggressive behavior when tests or observations concern (1) proactive behavior of any type and reactive direct physical aggression; (2) aggression towards a same-sex peer of the same-size, and (3) reactions to mild provocations*.

Continuity of aggression from childhood to middle age: The Jyväskylä Longitudinal Study of Personality and Social Development

The Kindergarten Study revealed that only a small percentage of boys were often aggressive in their social interactions. It raised a question of how children handle social conflicts in nonaggressive ways. In the search of the literature in the middle of the 1960s, I found only a few analyses of positive responses (Pitkänen, 1969). The study of prosocial behavior was only started in the late 1970s (e.g., Mussen & Eisenberg-Berg, 1977), and the movement of positive psychology at the beginning of this millennium (Seligman & Csikszentmihalyi, 2000).

While thinking of behavioral alternatives in threatening or conflicting situations, I got an idea which was an extension from an approach/avoidance behavior. From animal experiments, I had learned about fight/flight behavior. I thought, however, that children at a rather young age are cognitively more capable than animals and able to self-reflect about their behaviors, intentions, and emotions, and exercise control over how these are expressed. Inspired by the work of Schachter and Singer (1962) on the interface between emotion and cognition, I concluded that it is a human being's capacity for cognitive control over his or her emotional behavior which makes him or her able to decide between alternative behaviors. With this, I anticipated the role of executive control of the forebrain in human emotional behavior which was not yet known at that time.

I described aggressive and nonaggressive behavior with a two-dimensional impulse control model (Pitkänen, 1969, p. 102). One dimension depicted expression versus inhibition of behavior, and the other dimension depicted cognitive control of behavior (Figure 1). Aggressive behavior was characterized by uncontrolled expression of impulses and the three different ways of how nonaggressive behaviors were depicted by other combinations of these dimensions.

<FIGURE 2 HERE>

To test the model, data were collected with 8-year-old children (N = 369, 53% males). The sample included 12 school classes which had been randomly drawn from the schools of a town with about 60,000 inhabitants. It was an industrialized university town with a similar social structure as found in Finland in general at that time. This cross-sectional study transitioned to be a longitudinal study when the same individuals were studied again at ages 14, 20, 27, 36, 42, and 50 years of age. It is called the Jyväskylä Longitudinal Study of Personality and Social Development (JYLS).

I chose *peer nominations* and *teacher ratings* at ages 8 and 14 for the assessment of socioemotional behavior, including aggression. At age 8, the items for aggression (12) covered direct and indirect reactive aggression, and direct and indirect proactive aggression, expressed physically, verbally, and facially (see Pitkänen, 1969, Pulkkinen, 1987). At age 14, aggression was assessed with the item “Who attacks without reason, teases others, says naughty things” representing proactive aggression. It was combined on the basis of findings on the relationships between single items at age 8 (Pitkänen, 1969). In addition, reactive aggression was assessed by “Who defends oneself if teased, but does not attack without reason?” Three names were requested as a response, when possible.

The same items were used in teacher ratings formulated as statements, e.g. “May hurt another child...” At age 8, the ratings were made on a scale from 0 (teacher has never observed the characteristic in question in the pupil) to 3 (the characteristic is very prominent in the pupil). At age 14, the teachers were asked to think of 100 same-sex peers, because the participants were spread from 12 school classes (at age 8) to 78 classes (at age 14), and teachers were often asked to rate only one student in a class.

It was found that reactive aggression (without proactive aggression) correlated with constructive (prosocial) behavior positively ($r = 0.61$), whereas proactive aggression

correlated negatively ($r = -0.26, p < .001$ for each; Pulkkinen, 1987). Therefore, the item for proactive aggression was used to indicate aggressive behavior at age 14.

Peer nominations and teacher ratings of aggression correlated highly (0.73) at age 8 for boys, but less so for girls (0.39). At age 14, the sex difference in the agreement was smaller than at age 8 ($r = 0.49$ for boys and 0.41 for girls). It was at the level (0.44) reported by Achenbach, McConaughy, and Howell (1987) in their meta-analysis on cross-informant agreement. Peers and teachers make their observations in the same context, whereas parents see children in a different context ($r = 0.27$).

A *Self-report Scale* on aggression was built for assessing aggression at age 26/27 (Pulkkinen & Pitkänen, 1993; Tuuli is my daughter who had followed her mother's longitudinal research since childhood). The scale was based on the self-rating item of "I get angry often and I become easily involved in quarrels and fights", responses to nine questions such as: "Do you hit another person", and "Do you argue with people." At ages 36, 42, and 50, two inventories were used. One of them, the *Aggression Questionnaire*, included eight items (Kokko & Pulkkinen, 2005). Five items were drawn from the Aggression Questionnaire by Buss and Perry (1992), for instance, "Given enough provocation, I may hit another person." Three items were formulated for the study, for instance for proactive aggression, "I sometimes feel the desire to tease, to annoy or to attack another person without reason." The other inventory was included in the *Karolinska Scales of Personality* (KSP; Schalling, 1986) which consist of 15 scales. The scales for Verbal Aggression, Indirect Aggression, Irritability, Suspicion, and Guilt were combined into a scale for KSP Aggression (Pulkkinen, Feldt, & Kokko, 2005).

Boys were rated by teachers as more aggressive than girls both at ages 8 and 14 ($p < .001$ for each), as also found in many other studies. The difference was more than half a standard deviation [$d = 0.67$ for age 8 and 0.64 for age 14] (Pulkkinen & Pitkänen, 1993).

Peer nomination of aggression in which the participants were asked to nominate only same-sex classmates did not reveal sex differences. In adulthood, sex differences did not exist in aggression, assessed with the self-report scale on aggression at age 26/27 (Pulkkinen & Pitkänen, 1993); the KSP sum scale for Aggression at ages 36 and 42 (Pulkkinen et al., 2005); and the Aggression Questionnaire (Kokko & Pulkkinen, 2005).

It has been argued by some researchers (e.g., Lagerspetz, Björkqvist, & Peltonen, 1988) that girls display indirect aggression more than boys, but this difference has not been consistently shown. In the JYLS, boys were more aggressive than girls both in direct and indirect aggression at age 8 as rated by teachers. A recent meta-analysis by Hyde (2014) also shows that boys are capable of relational (indirect) aggression, not only of direct aggression. In a Finnish twin study with 12-year-old twins, boys scored higher than girls on direct aggression both in teacher and parental ratings, but there was no significant sex difference on indirect aggression in either rating (Vierikko, Pulkkinen, Kaprio, Viken, & Rose, 2003). This suggests that since girls are generally perceived as less aggressive than boys, the *relative* meaning of equally high indirect aggression in girls' behavior may make indirect aggression more characteristic of girls than of boys.

Continuity of aggression was studied in the JYLS by comparing the means of aggression scores across ages (mean-level continuity), if possible, and by studying the relative stability of individuals' aggression scores across ages (differential continuity). The latter shows the stability of the order of individuals. The analyses resulted in several insights.

Insight 11 is that *the level of aggression is very stable in adulthood*. Aggression assessed with the KSP remained the same for men from age 36 to 50 (Pulkkinen, 2017). Also for women, aggression remained the same from age 36 to 42, but diminished from age 42 to 50. It was due to a decrease in indirect aggression and irritability. The stability of mean

scores from age 8 to 14 and then to adulthood could not be studied in the JYLS, because the items and measures were different across ages.

Insight 12 is that *the relative stability of aggression is high in adulthood*. The scores of the KSP Aggression at ages 36 and 42 were highly correlated ($r = 0.82$ for males and 0.67 for females) as well as scores at ages 42 and 50 ($r = 0.78$ for both sexes). The relative stability of the scores in the Aggression Questionnaire was of the same size (Pulkkinen et al., 2005).

It is commonly argued with a reference to Olweus (1979) who conducted a meta-analysis of longitudinal studies on male aggression, available in the 1970s, that there is continuity of aggression from childhood to adulthood. A series of studies with the JYLS data has shown that there are age, methodological, sex, and cultural limitations to this argument.

Insight 13 is that *childhood aggression does not significantly correlate with self-reported adult aggression in Finland*. Correlations between age 8 peer nominations and teacher ratings on aggression with self-reported aggression at age 26/27 were not significant (Pulkkinen & Pitkänen, 1993). This finding was confirmed by a comparative study with two U.S. samples. The comparison was started between the JYLS and the Columbia County Longitudinal Study, CCLS (Kokko, Pulkkinen, Huesmann, Dubow, & Boxer, 2009). There were several identical items on peer-nominated aggression at age 8 in these studies, because I had formulated items for the JYLS in 1968 to match with those used in previous studies, when possible. Items common with the study by Walder, Abelson, Eron, Banta, and Laulicht (1961) made it possible to carry out a comparative study on aggression 40 years later when the participants of both studies had reached middle age (48 years in the CCLS and 42 in the JYLS). The comparison indicated a higher continuity of physical aggression in the USA than in Finland from childhood to adolescence, and to adulthood. The model explained 49% of adult male physical aggression in the U.S. sample (24% of female aggression), but only 12%

of male (8% of female) aggression in the Finnish sample. The path coefficients between the adolescence and adulthood were in the JYLS half of those in the CCLS (.67 for males and .53 for females in the CCLS, and .33 and .29 in the JYLS, respectively).

For the re-examination of the country differences in continuity of physical aggression, corresponding items and measurement points were carefully chosen. Adolescent aggression was omitted, because the continuity from childhood to adolescence and from adolescence to adulthood might explain the continuity between childhood and adulthood. Furthermore, another U.S. sample (Child Development Project, CDP; Dodge, Bates, & Pettit, 1990) was added to the comparison (Kokko, Simonton, Dubow et al., 2014). In childhood, the intensity of overall aggression was assessed using peer nominations, and in adulthood the measures of actual physical aggression committed by the participant were used. Adult measures were from age 26/27 for the JYLS and from age 30 for the CCLS; for the CDP, from ages 21-26. The results showed that there was no significant continuity of aggression from age 8 to adulthood in the Finnish sample, but there was continuity in the U.S. samples. The analyses were continued by analyzing continuity of aggression with different socioeconomic backgrounds.

Insight 14 is that *a lack continuity of physical aggression from childhood to adulthood is independent of socioeconomic background in Finland but dependent on the socioeconomic background in the USA*. It was found for the U.S. samples that when the socioeconomic status of the participants' parents was considered, continuity of aggression existed in males and females with non-professional backgrounds, but not in participants with professional backgrounds. This difference was not found in the Finnish sample. The similarity of the findings between the two U.S. samples was notable, because the participants represented different age cohorts (born in the 1950s, CCLS, and in the 1980s, CDP) were located in different parts of the country and had been assessed with different methods by

different research teams. Explanations for country differences were sought from higher equality of income, schools, and opportunities for education in Finland as compared to the USA. Income inequality is associated with social problems (Wilkinson, 2011). Continuity of aggression from childhood to adolescence and from adolescence to adulthood was studied with several models in which the amount of shared variance varied.

Insight 15 is that *there is a successive continuity of aggression from childhood to adolescence and from adolescence to adulthood independent of the method of assessment in males, but with methodological limitations in females*. It was found in the study by Pulkkinen and Pitkänen (1993) for both males and females that aggression assessed at age 8 with peer nomination correlated significantly with peer-nominated aggression at age 14 which, in turn, correlated with self-reported aggression at age 26/27. In contrast, this chain was significant only for boys in teacher ratings. Teacher ratings of girls' aggression did not show continuity.

Successive continuity in aggression from childhood through adolescence to adulthood was confirmed with a LISREL model by Kokko and Pulkkinen (2005). In this study peer-nominated items and teacher-rated items at ages 8 were separately standardized over the entire sample and then averaged across methods. Adult aggression was assessed at ages 36 and 42 with the Aggression Questionnaire. Earlier aggression explained 15% of the variance of adult aggression for males and 4% for females. Aggression at age 8 was associated with aggression at age 14, and age 14 aggression was linked to a latent variable for aggression in adulthood, covering the ages of 36 and 42. It was notable that male aggression at age 8 also directly contributed to adult aggression, not only via age 14. Further analyses revealed continuity of aggression from age 8 to adulthood only in those males, who were high in aggression at ages 8 and 14.

Insight 16 is that continuity of male general aggressiveness from childhood to adulthood is only found in men who are very aggressive both in childhood and adolescence.

Analyses with the standardized averaged scores (Kokko & Pulkkinen, 2005) indicated for males (but not for females) that the participants who were above the 75th percentile in aggression at ages 8 and 14 were higher in adult (age 36) aggression than the participants who were below 75th percentile in aggression at both ages. Being above the 75th percentile in aggression at age 8, but below it at age 14, did not predict adult aggression.

Insight 17 is that the increase of shared variance of aggression in childhood and adolescence by using several methods of assessment and measurement points increases the predictability of adult aggression on the basis of youth aggression. In the study by Kokko and Pulkkinen (2005), a latent variable was formed to capture the shared variance of two measures and measurement points (peer nominations and teacher ratings of aggression at ages 8 and 14). This latent variable was a significant stability estimate with the latent variable for adult (ages 36 and 42) aggression in a LISREL analysis.

Developmental processes associated with aggressive behavior

Continuity from one-time point of time to another in phenotypically similar behaviors such as aggression, was described above. This kind of continuity is called by Kagan (1980) homotypic continuity. He distinguishes it from heterotypic continuity, which means continuity between phenotypically different behaviors. In order to interpret the connection between phenotypically different behaviors as continuity, the behaviors must be theoretically related. Gottfredson and Hirschi (1990) argue in their general theory of crime that individuals possessing high self-control prior to the age of responsibility for crime would be less likely to engage in criminal acts than individuals who lack self-control indicated by being impulsive, short-sighted, and risk-taking. In my theoretical framework (e.g., Pitkänen, 1969; Pulkkinen, 1982, 1995, 2017), aggression is an indicator of low self-control. When I

started to study connections between aggression and criminal behavior, I assumed that aggression and criminal behavior share low self-control and that there is continuity between them. Several analyses focused on this were completed with the JYLS data. The results have shown continuity from aggression to crime, but only for the most aggressive individuals and for the most serious crimes.

Information about criminal records (both from the government register for convicted crime and local police records including also petty offences and arrests for which the person was not necessarily prosecuted) were examined at age 20. The criminal age of responsibility, that is the age at which individuals can be accused of crimes, is 15 years in Finland. The government register was searched every 5 years up to age 46, because only certain offenses remain permanently on the register. Half of the convicted men had committed their first offence before the age of 21. Criminal behavior was highly concentrated in the same individuals (Pulkkinen, 1988): half of all criminal offenses for men up to age 20 were committed by 4.1% of males (8 men out of the whole male sample, $N = 196$) in Finland (5.5% of males in England). For convicted crime by age 32, the concentration of crime was even higher (Hämäläinen & Pulkkinen, 1995).

Insight 18 is that childhood aggression correlates with male criminality, but reactive aggression without proactive aggression does not predict criminal offenses. Peer-nominated aggression at age 8 correlated with the total number of arrests up to age 26 at $r = 0.33$ for males and 0.12 for females, and peer-nominated aggression at age 14 at $r = 0.35$ for males and 0.10 for females (Pulkkinen & Pitkänen, 1993). Different types of offenses were most highly predicted by physical, indirect, and proactive aggression in childhood such as teasing others. Reactive aggression without proactive aggression at age 14 did not correlate with arrests up to age 20 (Pulkkinen, 1983, 1987).

Insight 19 is that *the correlation between childhood aggression and crime is explained by highly aggressive individuals. If they are removed, the longitudinal relationship between aggression and criminality completely disappears.* A correlation coefficient does not disclose the linearity of the relationship between aggression and crime. The non-linearity of the relationship was demonstrated by Pulkkinen and Pitkänen (1993) by comparing Low-, Medium-, and High-aggressive groups formed at age 8, in the number of their arrests up to age 26. The High-aggressive group had more arrests than the Medium- and Low-aggressive groups which did not differ from each other. This finding also applied to problem drinking. In terms of correlation coefficients, the significant correlation between aggression at age 8 and the number of arrests up to age 26, it dropped to zero (0.03) when the most aggressive men (above the 75th percentile) were removed (Pulkkinen, 1998). Magnusson and Bergman (1988) had also found that the connection between childhood aggression and crime disappeared when highly aggressive men were removed from the sample.

Insight 20 is that *high aggression in childhood predicts multi-type and serious offenses.* Eight men had committed three types (alcohol, violence, theft) of offenses by age 20; they had been rated as much more aggressive at age 8 than the rest of them (Pulkkinen, 1983). The seriousness of criminality was indicated by the legal consequences of a crime: convicted (n = 32), arrested (n = 62), and non-criminals (n = 102) in the study by Hämäläinen and Pulkkinen (1995). The men, who had committed crimes of which they were convicted by age 32, had the highest scores in different types of aggression at age 8 and in proactive aggression at age 14. The most prominent characteristic of the convicted men was indirect aggression indicated by teasing smaller peers and venting one's anger by kicking objects. This was consistent with the finding by Megargee (1966) that the assaultive characteristic in criminals is connected with inhibitions of overt aggression. For women, a grouping was made into non-criminals (n = 145) and criminals (comprising 22 arrested and 6 convicted women).

The criminal women had also received higher scores than non-criminals in aggression at age 14, both in teacher ratings and peer nominations, and in indirect aggression as rated by teachers at age 8.

Insight 21 is that *high aggression in childhood is associated with committing offenses in early adolescence and persistent offending in males*. This conclusion was based on two studies. First, the following “onset groups” of convicted crime were formed for males in the study by Hämäläinen and Pulkkinen (1995): ages 15-16; ages 17-20; and ages 21-32. The men who had committed the first recorded crime during middle adolescence scored higher on aggression at age 8 than the men who had committed their first recorded crime later. Furthermore, peers had rated the recidivists as more aggressive at age 8 than the occasional criminals.

In the second study, four male groups were formed at age 42 (Pulkkinen, Lyyra, & Kokko, 2009): (1) adolescent-limited offenders (offences existed only in youth, from age 15 to 20); (2) persistent offenders (offences had been committed in youth and adulthood); (3) adult-onset offenders (offenses only in adulthood), and (4) non-offenders. The persistent and adult-onset offenders had been more aggressive at ages 8 and 14 than the non-offenders and the adolescent-limited offenders. The persistent and adult-onset offenders did not differ from each other in teacher-rated aggressive behaviors at ages 8 and 14, neither did the non-offenders and the adolescent-limited offenders in childhood aggression or in adult social functioning. The adolescent-limited offenders were better adjusted to adult life than the other offender groups, with lower drinking and lower disinhibition scores and with higher self-worth and contentment with their achievements (Pulkkinen et al., 2009). Heavy drinking, which was also predicted by aggressive behavior (Pitkänen, Kokko, Lyyra, & Pulkkinen, 2008), was associated with persistent and adult-onset offending. Aggressive behavior in

childhood predicted heavy drinking via problem behaviors in adolescence (Kokko & Pulkkinen, 2000; Pulkkinen & Pitkänen, 1994).

A person-oriented approach to the predictors of crime

Predicting of adult outcomes on the basis of childhood behavior is expected to be more valid when the effects of several variables are simultaneously considered compared to the effects of a single variable, such as aggression. Magnusson (2014, p. 328) who has advocated a holistic view of human development has demonstrated with his research team that “partialing out the effect of other frequently used person variables in the prediction of adult problems documented in official registers, not one of the single variables demonstrated a unique prediction coefficient above 0.10.” The unique contribution of single variables such as aggression to the total variance of criminality was less than 1 percent. A person-oriented approach made it possible to consider several relevant predictors simultaneously.

Insight 22 is that *childhood aggression is the predictor of crime in the interaction with poor school success in adolescence*. A logit analysis was performed to assess the independence of the effect of aggressiveness on later offences (Hämäläinen & Pulkkinen, 1996). It was found that if childhood aggression leads to poor school success in adolescence, the risk of crime increases. Childhood aggression had not independent effect on crime; the effect was in interaction with poor school success.

Insight 23 is that *norm-breaking behavior independent of aggression is more predictive of crime than aggression with poor school success*. This result was obtained in the logit analysis by Hämäläinen and Pulkkinen (1996). Norm-breaking behavior indicated by disobedience at age 8 and truancy, sanctions at school, and substance use at age 14 had a stronger main effect on arrests than aggression in interaction with poor school success.

Insight 24 is that *low self-regulation without aggression predicts criminality*. This conclusion was based on several findings: first, the effect of norm-breaking on arrests

mentioned above. Second, a cluster without aggression (inattentiveness, non-prosociality, and hyperactivity-impulsivity) at age 8 was scored as high in the arrest rate, both up to age 20 and 26 as the Multi-problem cluster (Pulkkinen & Tremblay, 1992). Third, the arrest rate in a cluster for poor school motivation, low school success, and lack of concentration (without aggression) was the same (33%) as the arrest rate in a mild multi-problem cluster (29%) including aggression (Pulkkinen, 1992). For females, the highest arrest rate (40%) was found in a cluster for lack of concentration and poor school motivation and success, which did not include aggression (Pulkkinen, 1992). A fourth study was an unpublished study by Kooistra, Tolvanen, Mäkiaho, and Pulkkinen (2001). The results obtained with latent growth curve modelling showed that low self-control (moody, poor concentration) and poor (and worsening) school success explained 53% of the variance of criminal convictions in men. Criminal convictions in women were mainly predicted by low self-control; the model explained 44% of the variance. These results indicate that low self-regulation, not including aggression, is also predictive of criminal behavior. These findings are in concordance with the general theory of crime by Gottfredson and Hirschi (1990).

Insight 25 is that *low constructive behavior in childhood has an independent effect on criminality*. Constructive behavior (also called non-prosociality) was indicated in the JYLS by low scores in constructive behavior rated by teachers on items for active coping with a problem (“Tries to act reasonably even in an annoying situation”), positive thinking and active confrontation (“Thinks that if one negotiates, everything will be better”), and consideration of others with helpfulness and empathy (“Sides with smaller and weaker peers”). Evidence comes from three studies. First, non-prosociality was a common element in the male cluster for Inattentiveness, where aggression was low, and in the cluster for Multi-problem behavior, where aggression was high; both clusters had later higher arrest rates than the other clusters (Pulkkinen & Tremblay, 1993). Second, constructive behavior (and high

self-regulation more generally) correlated negatively with the number of arrests up to age 26 in men and women (Pulkkinen & Hämäläinen, 1995). Third, in the logit analysis by Hämäläinen and Pulkkinen (1996) low prosociality at age 8 had an independent effect on arrests at age 27 besides the effects of norm-breaking behavior, and aggression with poor school success. The result confirms the argument by Gottfredson and Hirschi (1990) on the protective effect of self-control on crime; constructive behavior indicates high self-control. Furthermore, it has been shown by Kokko and Pulkkinen (2000) that high constructive behavior is a protective factor against long-term unemployment. In this study prosociality (containing constructive behavior, stability of mood, lack of disobedience towards the teacher) protected highly aggressive participants from becoming unemployed long-term up until the age 36. Other results on the positive role of childhood self-control (Pulkkinen, 2014) and constructive behavior (Pulkkinen, 2017) in adult social functioning are summarized elsewhere.

Insight 26 is that *a severe multi-problem pattern including high aggression predicts arrests for criminal offences*. This conclusion was based on two comparative studies. First, patterns of social adjustment were studied with the JYLS and a Canadian sample of 6 – 10-year old boys (Pulkkinen & Tremblay, 1992). Aggressive behavior assessed with teacher rating divided into three clusters: (1) Multi-problem (formed by aggression, inattention, restlessness, and non-prosociality); (2) Bully; and (3) Uncontrolled behavior. The multi-problem boys of the JYLS scored highest on the arrest rate up to age 26: 33% of the Multi-problem boys had been arrested, 18% of the Undercontrolled, and 8% of the Bullies.

The second comparison was made with seven clusters extracted in the Swedish study by Magnusson and Bergman (1988) by using similar clustering variables in the JYLS (Pulkkinen, 1992). In both samples of males, aggressiveness at age 8 appeared in four clusters: restlessness at age 8 (Cluster 3); poor concentration at age 14 (Cluster 5);

restlessness, poor concentration, poor school motivation, and poor success at age 14 (Cluster 6, called Mild Multi-problem); and all of these plus poor peer relations (Cluster 7, called Severe Multi-problem). The highest arrest rate up to age 26 was found in the Severe Multi-problem cluster; almost half (45%) of the men were arrested. About 30% had been arrested in Clusters 6 and 5, and 24% in Cluster 3. The inclusion of adolescent school variables in this clustering improved the prediction of the arrest rate compared to the study by Pulkkinen and Tremblay (1992). In general, the more elements of low self-control with high intensity (such as aggression, lack of concentration, lack of prosociality, poor school attendance) were included in the cluster, the more likely the membership in the cluster was associated with criminal offending in adulthood.

Insight 27 is that *aggression may be associated with an educational career in women*. Five clusters were extracted for females from the same clustering variables as for males in the JYLS (Pulkkinen, 1992). Aggressiveness (at age 8) only appeared in one specific cluster where other problems did not appear. The Aggressiveness cluster did not predict high arrest rate (13%) up to age 26, but it did predict educational career; 39% of the women in this cluster had an educational career (26% on the average). An educational career meant that at least half of the last seven-year-period was spent for education. It turned out that there were two different routes to studying between ages 20 and 26. One group was formed by women who had been successful at school and attended higher education. They had been rated verbally as more aggressive than girls on average at age 8. Teachers had also rated them socially active and energetic at age 14. The other group was formed by physically aggressive girls who were less motivated towards school attendance, and the youngest mothers were found among them. There were, however, women among them who began their occupational training at a later age, and therefore they were on an educational career.

Aggression in the framework of socioemotional development

In the 1960s when the baseline data of the JYLS were collected, I described aggression and nonaggression with the two-dimensional impulse control model (cf. Figure 2). During five decades, results have confirmed that the individual differences in socioemotional behavior which the model depicted formed a basis for their differences in further development. The model has been updated during the course of the longitudinal study theoretically and by including different developmental paths to the model (Pulkkinen, 2017). In the revised model, entitled the model for Unfolding of Socioemotional Behavior, self-regulation has two components: behavior regulation and emotion regulation. Low behavior regulation is seen in the Undercontrolled style of life which ignores social norms, whereas high behavior regulation is seen in the Overcontrolled style of life. High emotion regulation characterized by the anticipatory appraisal of a situation and behavior is seen in the Resilient style of life, whereas low emotion regulation characterized by reactions to unwanted emotions aroused by a situation is seen in the Brittle style of life.

Different types of aggression are located in the two-dimensional framework of socioemotional development in Figure 3(cf. Pulkkinen, 2017, Figure 4.1, p. 50). It means that individuals characterized by different lifestyles are likely to express reactive aggression in different ways: First, direct reactive aggression is most likely associated with impulsive, undercontrolled behavior. Second, reactive aggression may be displayed in a controlled way, associated with high emotion regulation in conditions where constructive behavior is not effective and self-defense is deemed necessary (Pulkkinen, 1996). Third, reactive aggression may also be associated with low emotion regulation of Brittle individuals when emotional arousal exists but behavior is inhibited. Negative emotions may be expressed to another person in indirect ways, such as by damaging property. Proactive aggression involves low behavior regulation, seen in an individual's low socialization to social norms, and low emotion regulation, seen in a low understanding of another person's suffering while aiming at

one's own goals, for instance, by bullying. The combination of low behavior regulation and low emotion regulation also increases the likelihood of intensive reactive aggression with negative emotions (anger). Proactively aggressive individuals generally defend themselves intensively. Most nonaggressive, overcontrolled individuals with inhibited behavior may react aggressively to aggression tests, which lower their inhibitory control of behavior. Their responses to projective tests may be unrealistic in respect to overt behavior (Olweus, 1969; Pitkänen, 1969) without indicating inhibited emotions.

<INSERT FIGURE 3 HERE>

Aggressive behavior in childhood tends to be patterned with other problems in adolescence which leads to the accumulation of problems in social functioning, such as an unstable career line, heavy drinking, financial problems, and poor relations (Rönkä & Pulkkinen, 1995). Aggression affects an individual's social functioning in various spheres of life, not only in antisocial behavior. In a marital relationship, aggressiveness is a risk factor for a divorce (Kinnunen & Pulkkinen, 2003). In work domain, aggression is a risk factor for long-term unemployment (Kokko & Pulkkinen, 2000). In general, the JYLS findings have shown that children with aggressive behavior were at a heightened risk of having a relatively higher orientation to peers than to parents; problems in adjustment to school; early onset of substance use; and norm-breaking behaviors. It tended to lead to the style of life called Undercontrolled (Pulkkinen, 1982, 2017). The Undercontrolled style of life was a risk for criminal offences, heavy substance use, and other problems in social functioning. These risks were also found in individuals with the Brittle style of life, particularly in women.

Insight 28 is that aggressive behavior in childhood increases an individual's risk for following a path to the Undercontrolled style of life in adulthood, and this development is associated with parenting. A parent-centered parenting style tended to cause problems with the development of self-regulation, as seen in the Undercontrolled and Brittle

styles of life (Pulkkinen, 1982, 2012, 2017). It included, for instance, the parents' lack of knowledge of the child's whereabouts, low interest in his/her school and other activities, conflicts in relationships, physical punishment, little support and empathy for the child, and inconsistent and unjust sanctions in child rearing. A lower socioeconomic status was associated with the Brittle lifestyle. Also, unsteady living conditions were found in the background of the Brittle lifestyle. Proactive and indirect aggression was most highly associated with criminal behavior; offenders had more difficult living conditions than non-offenders (Pulkkinen, 1983, 2012). The opposite styles of life entitled Overcontrolled and Resilient had been promoted by child-centered parenting which encouraged the development of high self-regulation. Higher socioeconomic status of the family of origin was associated with the development of the Resilient lifestyle.

Conclusion

Aggression can be displayed in numerous ways. The sampling of aggressive acts for the measures of aggression may be random if certain empirical facts about individual differences in aggression are not considered. My insights about aggression presented above concerned, first, the observable aspects of aggressive behavior, and they can be applied to the analysis of the construct validity of a measure of aggression. The analysis of the aspects of aggression revealed qualitative dimensions which are significant for individual differences besides the quantity (intensity) of aggression. They are proactive and reactive sequences of aggression and direct and indirect ways of displaying aggression. Aggressive behavior is situation-specific, which means that individuals choose their responses considering the status of the partner. Aggressive acts are most often displayed towards a partner who is of the same sex as the actor and of the same age, and in situations where the external control of behavior is low. Proactive aggression, such as teasing others, and particularly physically aggressive reactions to mild provocations affect other people's perceptions of a person's general level of

aggressiveness. Most valid information (concurrently and predictively) is received with a measurement technique which captures these aspects and considers the target of aggression having the same status as the actor, such as the same-sex and same-size among children.

The second set of insights concerned the continuity of aggression across time. The commonly known argument that childhood aggression predicts adult aggression is valid only with strict limitations: the intensity of childhood aggression predicts physical aggression among individuals with lower social class background in conditions where social inequality is high. Continuity is not found in the conditions of high social equality and among individuals with higher social class background. Generally, continuity of aggression is successive: from childhood to adolescence, and from adolescence to adulthood, but with methodological limitations for females. Significant predictability of aggression across ages is based on the stability of very high aggression (above the 75th percentile): individuals who remain very high in aggression across two time points tend to be very aggressive also in the next time point. High childhood aggression which does not continue to adolescence does not predict adult aggression. The increase of shared variance by forming a latent variable for aggression from several measurement techniques and measurement points increases the stability of aggression from youth to adulthood.

The third set of insights concerned aggression as a predictor of criminal behavior. Childhood aggression correlates positively with criminal arrests in males, but the correlation is formed by very aggressive males: only aggression above the 75th percentile predicts arrests, convictions, and multi-type offending. Aggression does not have an independent effect on criminal behavior; the effect is formed by the interaction of high aggression and poor school motivation and achievements. High aggression tends to be associated with other problem behaviors which together are highly predictive of criminal behavior, but aggression is not necessary in this pattern. Norm-breaking behavior in

adolescence without aggression accounts for criminal behavior. Also, low self-regulation indicated by lack of concentration and low constructive behavior (non-prosociality) account for criminal behavior. These results support the view that high self-regulation protects an individual against antisocial development.

When I started the study of aggression I was skeptical about interpreting aggression as a need. I extend this skepticism also to the interpretation of aggression as a personality trait. My view is that aggression is a vulnerability trait which causes risks for social and personality adjustment if it exceeds a critical threshold. Aggression primarily is a natural self-defensive reaction, but human beings can learn to regulate self-defensive behavior and avoid the expression of aggression. In unfortunate living conditions (sometimes also for neurological and temperament reasons), this learning process may remain poor or external pressures may become overwhelming, which may cause an excessive use of aggression for self-defense, and additionally for other purposes such as gaining power over other people.

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Figure 1

A descriptive model of aggression (Source: Pitkänen (1969: Figure 1, p. 29). Reproduced with permission).

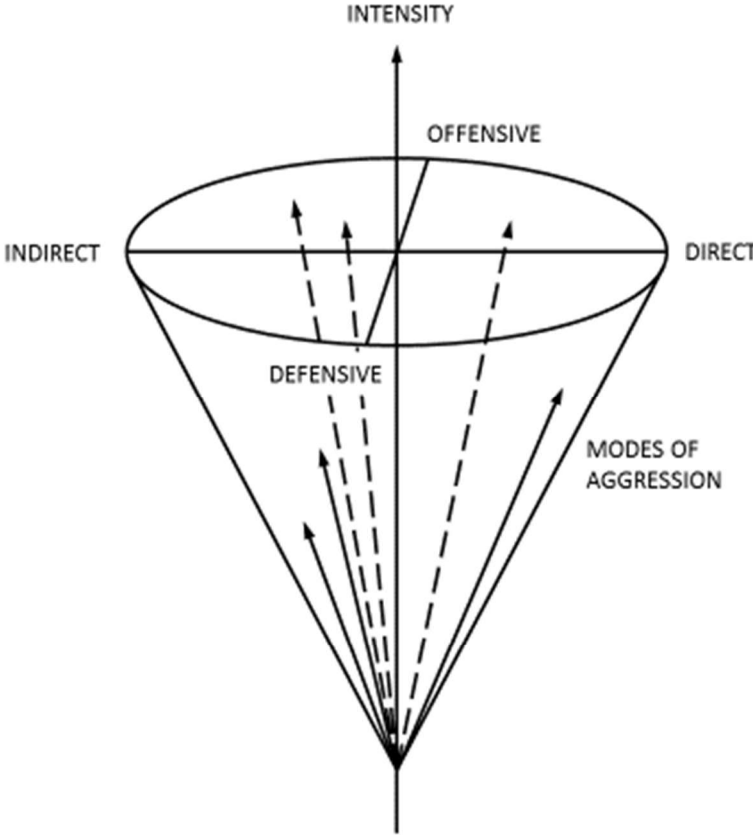


Figure 2

A two-dimensional impulse control model (Source: Pitkänen (1969: Figures 3 and 4, pp. 102 and 107 combined).

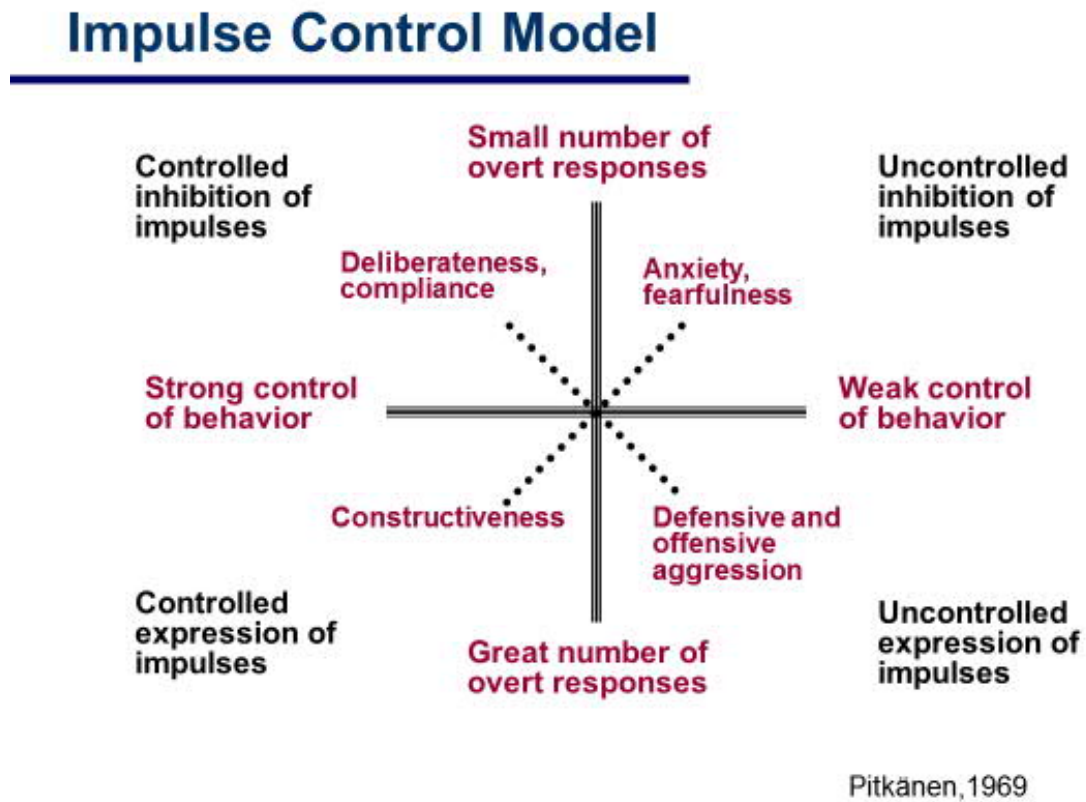


Figure 3

Different types of aggression in the framework of socioemotional behavior.

