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Abstract

Purpose – *The purpose of this paper is to examine naturally occurring episodes of aggressive interaction among adolescents in residential correctional programmes. The aims of our study were twofold. First, the development of a new camera-glasses method, and second, the method's applicability in the study of aggressive adolescents in residential care.*

Design/methodology/approach – *Based on a mobile assessment strategy, the paper developed a new methodology for in-the-field recording of environmental conditions in which aggressive behaviour arises. The authors used glasses with an inbuilt camera worn by research subjects to record observational data. In the particular study presented here the authors used camera-glasses to observe the material and social environments of eight aggressive adolescents in a residential treatment programme and of a contrast group of four non-aggressive adolescents living at home.*

Findings – *The crucial methodological findings are that camera-glasses successfully record the social and physical environments of aggressive adolescents from their perspective in relation to their environment and interlocutors, and that the camera-glasses method does not generate high reactivity. The results show that aggressive adolescents in residential care use direct and reactive forms of aggression, and that their aggressive behaviours occur predominantly in settings with limited adult supervision. In residential care aggressive behaviour is, paradoxically, an effective strategy for individuals to gain regard and social status among peers and to push their interests among staff.*

Research limitations/implications – *An obvious limitation is the reliance on a small sample which limits the generalisation of the results.*

Practical implications – *For residential facilities it is crucial to reduce the occurrence of low supervised social situations in order to minimise peer contagion. Furthermore, staff and educators need to be trained to use deescalating response strategies when dealing with adolescents' aggressive behaviour, precisely deescalating strategies which neither involve acquiescence nor surrender to pressure.*

Originality/value – *Our investigations demonstrate that the camera-glasses method is a promising new assessment technique which has applicability in various fields of adolescent research.*

Keywords *Aggression, Adolescents, Behaviour observation, Camera-glasses, Peer contagion, Residential treatment*

Paper type *Research paper*

Using camera-glasses for the assessment of aggressive behaviour among adolescents in residential correctional care

Substantial effort has been dedicated to the treatment of aggressive adolescents in residential care programmes. Paradoxically, little is known about the shape of everyday life of aggressive youth in residential care and about the effects of interventions. In order to assess the social and

material environments of aggressive adolescents in such facilities, we developed a new approach to behavioural monitoring which enables mobile data gathering in the field. Adolescents wear glasses equipped with an inbuilt camera. This recording device enabled us to assess their interactions, from the adolescents' spatial perspective, in diverse life settings over a whole day (Wettstein and Jakob, 2010). In this paper we discuss our findings in the context of individual and familial pressures and risk factors that impact on children and adolescents in residential care. We first provide an overview of these pressures and risk factors, followed by a detailed discussion of the use of camera-glasses; we then present the specific method used in our study and discuss the main results.

Aggressive adolescents in residential care

Children and adolescents who are referred for placement in residential care because of their aggressive behaviours often have a background of individual and familial risk factors (Baur *et al.*, 1998). They often belong to socially disadvantaged families in which psychological, social and socioeconomic problems accumulated. Additionally, poor child rearing practices, unstable relationships and physical violence may be part of their family history (Schleiffer, 2010; Trede, 1996).

The majority of children and adolescents who live in residential care tend to have an early childhood onset of disorderly and aggressive behaviour (Moffit, 1993) with strong reactive aspects (Dodge and Coie, 1987). *Reactive* aggression is defined as impulsive, hot-blooded behaviour associated with high affect and closely related to diminished capacities of social perception, emotion regulation and behaviour control. By contrast, *proactive* aggression is defined as purposeful, planned, cold-blooded and goal-directed behaviour used by an individual to attain desired aims (Crick and Dodge, 1996).

Patterns of coercive interaction

Families with aggressive children may have developed coercive patterns of interacting (Patterson, 1976). In this pattern aggressive children punish their parents if they do not respond to their demands by having a fit of rage. As a consequence, parents try to avoid such tantrums and begin to fulfil children's demands. Dishion and Patterson (2006) aptly named this mechanism "a dysfunctional grammar of family life". They point out that "repeated over thousands of trials, the child learns to use coercive behaviour to gain control over a disrupted, chaotic, unpleasant family environment" (p. 515). The child learns as a result that aggressive behaviour pays off (Granic and Patterson, 2006).

In the course of their development these children run the risk of transferring these family based, coercive interactional patterns onto social situations in other areas of life, for example in early childhood education or in school. Direct aggression, characterised by direct confrontation of the target, may be a highly effective strategy to control resources during early childhood. But beginning with preschool education such direct aggression would be increasingly valued negatively and socially sanctioned. As a consequence, some children may become excluded from their peer group (Coie and Dodge, 1983; Tremblay, 2004).

However, not all forms of aggressive behaviour lead to such social disadvantage. Direct aggression is easily recognised and attributed. But *Indirect aggression* refers to a behaviour where the identity of the perpetrator may not be known (e.g. anonymously placing "gum on a chair"; Björkqvist *et al.*, 1992). Because indirect aggression is often rather diffuse, it carries a much lower risk of retribution and punishment by adults and peers than direct aggression (Colwell *et al.*, 2002; Werner *et al.*, 2006). It may even offer potential rewards since indirect aggression has been linked with positive attention by the peer group and popularity (Cillessen and Mayeux, 2004; Leadbeater *et al.*, 2006).

In bad company – the influence of deviant friends

Aggressive adolescents, by which we mean those who use direct aggression, are often unpopular and tend to be excluded from normal peer groups. Their choices of friends are therefore limited. They actively seek out those social contexts in which their aggressive behaviour is affirmed and reinforced (Patterson and Yoerger, 1997) and forge friendships with

those peers with whom they share similar backgrounds, values and patterns of social behaviour (Hartup, 1996, 2005). Such peer group affiliation leads to a mutual alignment of group members' unfavourable behaviours, with the effect that the peer group further reinforces aggressive behaviours. The strongest predictor of adolescent delinquency is the delinquency of close friends (Elliot *et al.*, 1985; Vitaro *et al.*, 2000). The adolescents who are particularly prone to be adversely influenced by peers are those in early adolescence who show only moderate behaviour problems (Dishion *et al.*, 2008; Vitaro *et al.*, 1997).

Peer contagion in residential treatment facilities

For aggressive and socially disadvantaged adolescents a referral for placement in a residential treatment programme is often a last resort, when other measures geared at lower behavioural thresholds, such as school-based or outpatient treatment programmes, have failed. The aim of a residential educational programme is to treat aggressive behaviour and correct familial risk factors so that an individual can eventually be reintegrated into his or her original social environment. However, the high concentration of aggressive youth in such corrective institutions brings the risk that the intended effects of interventions are diminished by negative peer group influence or peer contagion. As a consequence, adolescents in correctional residential care become "deviant by design" (Dishion and Dodge, 2005; Dishion *et al.*, 1999, 2008). Studies on educational facilities carried out in the 1960s show that adolescents in residential care were interacting nine times more often with peers than with adults, and that they spent most of their time in unsupervised contexts (Buehler *et al.*, 1966).

Assessing aggressive adolescents' environments

What kind of concepts and methods of investigation are suitable for gathering data on aggressive interactions in natural life settings? In our studies on aggression in educational contexts we rely on the concept of behaviour settings, borrowed from Barker (1968).

The behaviour setting

Barker and Wright (1951) examined the behaviour of children without conduct disorders between the ages of seven and eight years in their natural life settings and over the course of a whole day. Barker (1968) observed that:

> characteristics of the behavior of a child often changed dramatically when he moved from one region to another. […] The behavior of different children within the same region was often more similar than the behavior of any of them in different regions (p. 152).

Based on the observation that physical environments exert a substantial influence over individuals and their behaviour patterns, he developed the concept *behaviour setting*. Behaviour settings consist of a spatiotemporal environment, a *milieu* and the associated constant patterns of behaviour or *standing pattern of behaviour*. Hence, behaviour settings are constant patterns of behaviour that are related to a particular physical milieu. The relative fit between a behaviour pattern (e.g. buying a loaf of bread) and a milieu (e.g. a bakery) is described in terms of synomorphy, as a synomorphous relation. From this perspective, then, an individual's behaviour is shaped by the setting, and to some extent it is predictable by the setting.

Several studies tried to identify settings in which aggressive or delinquent behaviours occur with higher or lesser frequency. Studies examining delinquency in relation to behaviour settings observed a higher frequency of delinquent behaviour among adolescents in unstructured leisure settings or free time (Osgood and Anderson, 2004; Osgood *et al.*, 1996). Wettstein (2008) demonstrated that aggressive behaviour in schools occurs predominantly in settings with limited supervision.

Mobile data gathering with an observational apparatus

Our aims were to assess the social and material environments of aggressive adolescents in residential care, to generate data on interactions as they unfold in natural settings, and to do so in a way that generated only low reactivity. For this purpose we investigated technical possibilities, which allow in-the-field recordings of interactions through non-participant observation and

through transmission by an apparatus. For example, fixed cameras can be installed in observational situations; this method was used in studies on aggression in kindergartens (Dodge and Coie, 1987) and schools (Wettstein, 2008). Also, in a language acquisition study using his own new-born son as a research subject, Roy equipped each room of his house with high resolution fish-lens cameras which recorded people, objects and activities from a bird's eye perspective; in total the first three years of his son's life were recorded over 24 hours every day (Roy *et al.*, 2006; Roy, 2009).

However, research on aggression is confronted with a major challenge: aggression occurs mainly in settings that are not easily accessible, namely free time and low supervised leisure activities (Osgood *et al.*, 1996). These settings are hardly accessible by using a fixed camera method. Our challenge was, therefore, to develop a new recording method that provides *mobility for data gathering* and has a low impact and low reaction response in the interactions to be observed.

Pepler and Craig (1995) applied the *remote audiovisual observation* method to carry out naturalistic observations of aggressive children's interactions in a school playground. The investigators focused on interactions in the schoolyard which they filmed out of a classroom. A target child wore a wireless microphone, and audio signals were transmitted directly into the camera. This recording method is limited by the scope of the transmitter and depends on a clear line of sight onto the observational situation.

Tapper and Boulton (2002) used a *wireless microphone* and *micro-video camera* to assess direct and indirect forms of aggression in schools. A target child wore a small bag around the waist and a wireless microphone clipped to the clothing while the researcher carried a 25-litre backpack with a concealed video-recorder and receiver. To record a situation, the researcher placed the backpack so that the camera was facing the target child.

The camera-glasses method

The camera-glasses EAGLE I are a new mobile recording system (see Figure 1). Microphone, camera, storage batteries and memory mode are integrated into the frame, and they are lightweight (approximately 52 grams). The camera-glasses can be operated and controlled using two buttons on one side of the frame. The 3.6 mm digital camera (CMOS-Sensor) with 1.3 megapixels and a fixed focus object lens (40 cm to infinite) is completely integrated in the central bar of the glasses frame. The visible camera lens is smaller than a pinhead. People usually perceive the camera-glasses as regular glasses, similar to sports glasses. Sharp-sightedness, reproducing the human field of vision, features in the scope of the *fovea centralis* at a visual angle of 1°, parafoveal at 2-5°, and in peripheral vision at 210°. The diagonal, field viewing angle of the camera-glasses is 48° (vertical field viewing angle 38°, horizontal field viewing angle 31°). The camera records an image which corresponds satisfactorily with the object on which the wearer of the camera-glasses is fixating. The integrated stereo-microphone delivers decent sound quality in the close-up range of up to two meters. With increasing distance and interference from environment noise, however, the quality of audio-recording decreases drastically. In order to improve the recording of peripheral noise sources, an additional external microphone would need to be installed. The recording time is restricted to four hours, due to the life of the lithium-ion storage batteries and the storage capacity of the glasses.

Figure 1 Camera-glasses

The research subjects in our study wore camera-glasses to record whole daily cycles and in various settings (family, free time, school and accommodation). The camera-glasses films what happened from the research subject's spatial perspective and the recordings provide data from the spatial perspective of the wearer of the glasses. As a consequence, the observer's point of view on the physical environment is determined by the wearer of the glasses, the research subject – they share the same perspective onto the environment. The camera-glasses therefore provide a first person perspective which other methods cannot capture. In our application of the camera-glasses method the wearer of the camera-glasses is as much a research instrument as a research subject. The adolescent operates in a largely unexplored field of investigation and the camera-glasses register data in ways that are similar to a robotic apparatus which is capable of moving in fields that are otherwise inaccessible to an investigator.

However, it is important to keep in mind that the camera-glasses method enables researchers to observe what was going on from the same spatial perspective as that of the wearer but not from the same psychological perspective. The wearer's idiosyncratic perception and subjective experience is not recorded by the camera-glasses.

The aims of the present study

We applied the camera-glasses technique in an exploratory study of aggressive adolescents in a residential correctional facility and of a contrast group of non-aggressive adolescents. All adolescents spent time in three or four areas of life. Those in residential care lived in group accommodation, attended in-house special education programmes, and spent their free time mostly on the grounds of the facility. Every other weekend they spent at home with their families. By contrast, the adolescents of our contrast group lived with their families, attended regular school, and where they spent their free time was not pre-determined.

We used the camera-glasses technique to capture the course of an entire day from the adolescents' spatial perspectives. We focused on naturally occurring *aggressive interactions* between adults and adolescents, in particular those in which the social and physical environments seem to have a significant impact. We recorded whole ongoing, reciprocal processes of interactions that constituted aggressive behaviour events in diverse settings.

In sum, the goal of the present study was to test a new camera-glasses technique and to assess the life environments of aggressive adolescents in residential care. The specific questions we addressed were:

1. Are the camera-glasses a device capable of capturing the environments of aggressive adolescents with a low degree of reactivity?
2. With whom do adolescents interact?
3. What forms and functions of aggression arise?
4. Do particular features of the behaviour setting impact on the frequency of aggressive behaviour?

To achieve these objectives, we recruited a sample of early adolescents aged between 11 and 15 years. We chose this particular age because in early adolescence young people face multiple pressures as a result of their conduct problems, strains in the family and the onset of puberty.

Method

Participants

The 12 adolescents participating in this study were between the ages of 11 years and nine months and 15 years and six months ($M = 13$ years and two months, $SD =$ one year and two months) and from a small town in Switzerland. In order to develop the camera-glasses technique, we tested the method by recruiting a *nonclinical sample* of four adolescents, two boys and two girls, who were living with their families and had no behaviour problems (according to teachers' reports).

After fine-tuning the method we recruited a *clinical sample* of eight adolescents, four boys and four girls, with severe behaviour disorders from a residential correctional facility. These adolescents presented with histories that included traumatic life-events (such as severe illness or death of a parent) and individual factors (aggression and other, comorbid conditions or disorders). Recruitment was based on the following criteria: the adolescent had a high frequency of aggressive behaviour (according to staff reports), did not wear glasses, had an IQ >85, came from a German, French, Italian or Spanish speaking family, and was willing to participate in the study.

The adolescents in our sample lived in a residential care facility that specialises in the treatment of aggressive and socially impaired youth. They were housed in open, mixed-aged group accommodation. The facility aimed at reintegrating these adolescents back into their families and into general education. Seven or eight children and adolescents lived in shared accommodation under the care of a special needs educator who was permanently on site. These educators took on an essential part of what was usually parental control. Each child or adolescent also had an individual caregiver who was their primary contact person and who largely adopted a quasi-paternal or -maternal role. However, residential treatment also included its own specific relationships, such as group sessions and the formal individual interview. In addition, many residential youth also visited external therapy services, and all were allowed to visit their family or a contact-family at home.

Measures and procedures

Observation through camera-glasses. We fitted each research subject with a set of camera-glasses. As a result the wearer produced a visual record from his/her perspective of whole daily cycles in diverse settings such as their family, free time, school and the group accommodation house.

Legal and ethical issues. Such visual recording of whole daily cycles is a vast intrusion into the private sphere of research subjects and all those involved with them. Therefore, legal and ethical issues had to be considered very carefully. Public authorities, the adolescents, their families, educators, teachers and peers were all informed comprehensively about the project and had to give permission. A letter provided details of the study and was sent to all parents, together with a consent form. The adolescents were informed that due to data protection laws neither their teachers nor their educators would be told anything of the content of the film recordings, and that they would not get into trouble of any kind because of the contents of recordings.

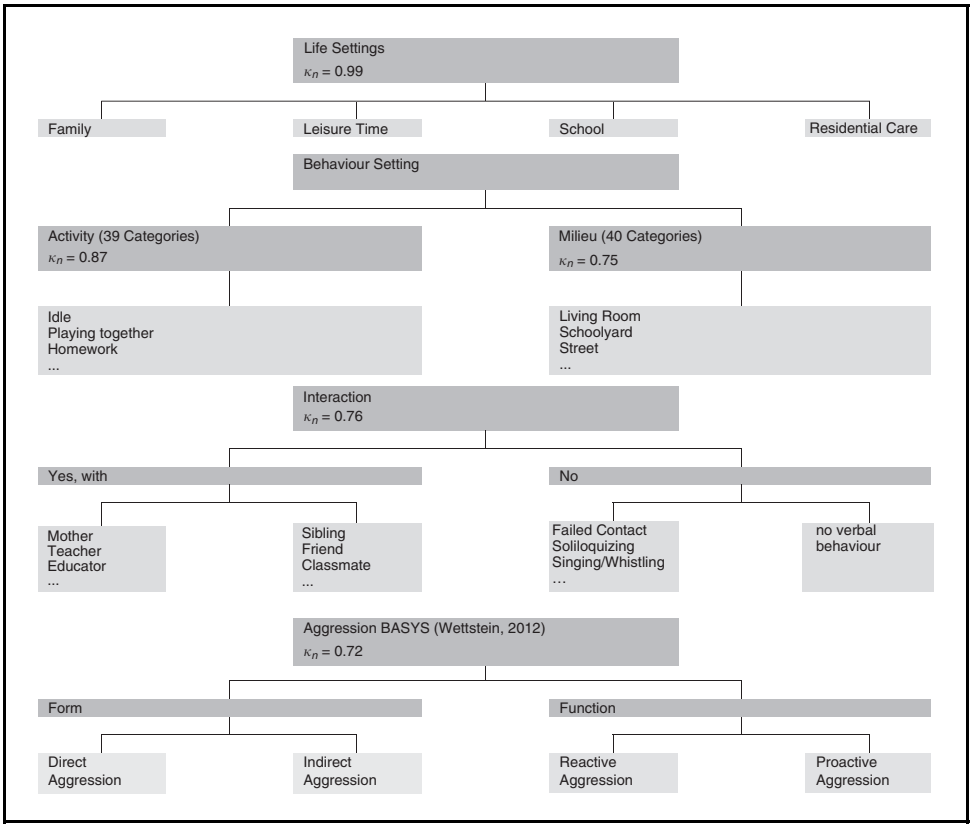
In order to investigate free time activities comprehensively, including those outside the grounds of the facility, we would need to give prior notice in the newspaper to reach all persons potentially involved. However, we considered that such notice would further stigmatise our adolescent research subjects, and we therefore refrained from investigating this setting.

Habituation. Adolescents generally take to technical innovations with great interest. In order to cool this interest and to normalise the camera-glasses as an ordinary object of daily use, the team of investigators introduced the camera-glasses during school hours in a manner that was as boring and exhaustingly thorough as possible. During a habituation period for both adolescents and their interaction partners, each adolescent wore the camera-glasses for four days before recording began.

Data gathering. Following the habituation period, the adolescents wore the camera-glasses for three days and continuously recorded all aspects of their daily life – from getting up in the morning to going to sleep at night in their accommodation groups, in their families, at school and during their free time. Because of limited battery power, camera-glasses wearers had to change the batteries every four hours.

The observational system. The recording of whole daily cycles produced a large amount of data which we managed by analytically reducing it into a system of categories. We applied an inductive process of determining categories and developed a theory-based observational system (see Figure 2).

Figure 2 The observational system



With this observational system we assessed the following categories: life settings, activity, milieu, interaction and aggression.

1. *Life settings.* The observational system distinguishes whether the adolescents are in their families, at school, at their accommodation/home or have free time. For the residential group free time refers only to free time spent on the grounds of the facility.

2. *Activity.* These categories distinguish among the adolescents' different activities.

3. *Milieu*. In addition to distinguishing activities, the observational system categorises the specific spatiotemporal environments in which these occur, e.g. in the classroom, lounge, etc. Based on Barker (1968) we defined the combination of activity and milieu as a behaviour setting.

4. *Interaction.* Social interaction is generally defined as the reciprocal actions and responses of two or more people present in a social situation (Käsermann and Foppa, 2002). When interactions were observed, we differentiated the persons involved in interactions. When no interaction was observed, we coded for other kinds of verbal behaviour such as self-talk or whether there was a failed attempt at interaction.

5. *Aggression.* Aggression was assessed through the Behaviour Observation System for the Analysis of Aggressive Behaviour (BASYS) (Wettstein, 2008, 2012). BASYS differentiates between direct and indirect forms of aggression and between reactive and proactive functions of aggressive behaviour.

Additional methods. Semi-structured interviews and a roaming space analysis were used to gather data on each adolescents' subjective perception and experience. For a detailed discussion of these methods see Wettstein *et al.* (2013).

Results

We coded 258 hours of recordings by using the computer softwares ELAN (Hulsbosch, 2009) and Videograph 4.1.2.1.x3 (Rimmele, 2007), and an event-sampling procedure (Fassnacht, 1982, 1995). In order to assess inter-rater reliability of coding, a second observer coded randomly selected video recordings, representing 12 per cent of the total sample. The inter-rater reliability in Cohen's kappa (κ_n) was $\kappa_n = 0.99$ for life-settings, $\kappa_n = 0.87$ for activities, $\kappa_n = 0.75$ for milieus, $\kappa_n = 0.76$ for interactions and $\kappa_n = 0.72$ for aggression. A descriptive statistical analysis was carried out for all codes. Because of the small sample size we used the Mann-Whitney *U*-test (two-tailed) for the significance test. All main results are presented in Table I.

Reactivity and compliance

Our adolescent research subjects talked about their camera-glasses during 1.3 per cent of the total observation period. This equals a total of 4.1 per cent of all recorded conversations. The contrast group talked about the camera-glasses for 2.6 per cent of the time and the residential group for 4.9 per cent. In 53.2 per cent of these cases the wearer of the camera-glasses initiated talk about the camera-glasses. The residential group initiated the topic in 47.8 per cent of cases, the contrast group in 30.3 per cent.

Compliance among all wearers of camera-glasses was very high. The only exception was the setting "family" among the residential group. These adolescents often did not keep to prearranged recording times.

Interaction partners

All adolescents were involved in social interactions for 32 per cent of the whole observational period. The residential group was interacting significantly more often with adults than the contrast group which interacted significantly more often with peers.

Forms and function of aggression

There is also a significant difference between the two groups with regard to aggression; residential adolescents are more often perpetrators or victims of aggression than the contrast group. No significant gender differences could be found.

Table I Social interaction and aggression within the nonclinical and the clinical group

	Nonclinical group			*Clinical group*				
	Boys	*Girls*	*M (SD)*	*Boys*	*Girls*	*M (SD)*	*p*	*r*
Interaction Peers/total interaction in %	57.24	77.61	67.42 (17.21)	47.25	47.83	47.54 (*13.89*)	*0.048*	*−0.59*
Interaction Adults/total interaction in %	31.57	20.32	25.94 (9.18)	43.43	45.84	44.64 (11.96)	*0.016*	*−0.69*
Aggression Frequency "perpetrator" per hour	0.72	0	0.36 (0.6)	2.02	1.17	1.59 (0.95)	*0.048*	*−0.59*
Aggression Frequency "victim" per hour	0.06	0	0.03 (0.06)	0.27	0.28	0.27 (0.17)	*0.016*	*−0.69*
Direct aggression Frequency per hour	0.63	0	0.31 (0.51)	1.9	1.3	1.6 (0.76)	*0.028*	*−0.64*
Indirect aggression Frequency per hour	0.15	0	0.07 (0.15)	0.32	0.13	0.22 (0.28)	*ns*	–
Reactive aggression Frequency per hour	0.18	0	0.09 (0.18)	0.98	0.76	0.87 (0.64)	*0.008*	*−0.74*
Proactive aggression Frequency per hour	0.54	0	0.27 (0.42)	0.96	0.35	0.65 (0.65)	*ns*	–

Notes: $n = 12$. *p*, differences between groups; *r*, estimated effect size, following Rosenthal (1991, p. 19). Two-sided significance test, α, 5 per cent

Direct and indirect aggression. The residential group displayed significantly more often direct aggression than the contrast group. There was no significant difference with regard to indirect aggression. The analysis of the ratio of direct and indirect aggression for each group shows that the residential group used 7.27 times more often direct forms of aggression than indirect forms, while the contrast group used direct forms 4.43 times more often. Among both groups there was no significant gender difference in the use of direct and indirect forms of aggression.

Reactive and proactive aggression. The residential adolescents show significantly more often reactive-aggressive behaviours than those of the contrast group. Additionally, the residential group used proactive aggression 2.44 time more often than the contrast group. Again, there is no significant gender difference. The ratio for the residential group shows that they used reactive aggression 1.34 times more often than proactive aggression, whereas the contrast group used proactive aggression three times more often than reactive aggression. Among both groups there was no significant gender difference for that ratio.

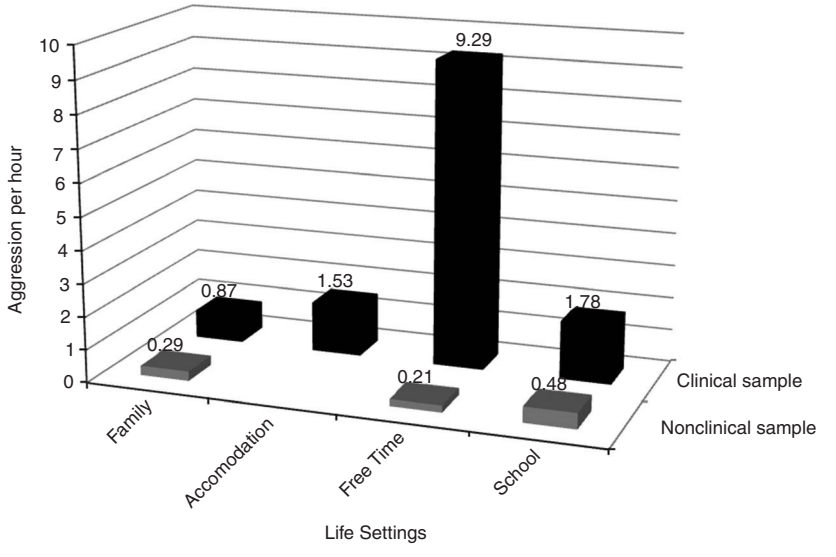
Aggression in different life settings

A means analysis of incidents of aggression differentiated according to the four life settings shows that for residential adolescents the setting "free time" under limited supervision is particularly significant (see Figure 3). Fewer aggressive events occurred in the "school" and "house group" settings. The lowest frequency of aggression was recorded in the setting "family". This is a marked difference to our contrast group where hardly any aggressive events occurred in the setting "free time".

Aggression in different behaviour settings

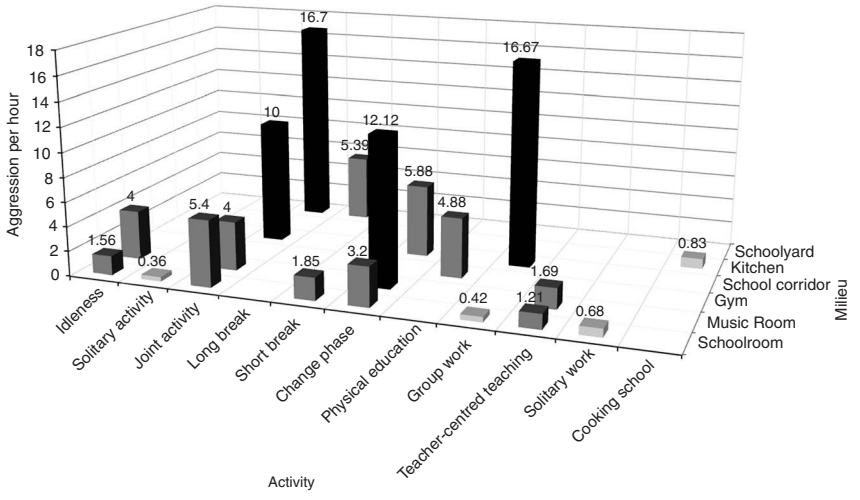
The analysis of milieu in relation to activity (behaviour setting) for the different life-settings indicates that aggression occurs in the main during those periods of time when the adolescents are either not at all or only poorly supervised by an adult. For example, Figure 4 shows the life setting "school" for the residential group. During times of transitions in the music room we observed an average of 12.12 aggressive behaviour acts. Likewise, we observed a higher frequency of aggression in the milieu "joint activities in the corridor or yard".

Figure 3 Frequency of aggressive events in the four life settings



Notes: Clinical sample, aggressive adolesents in residential treatment; nonclinical sample, contrast group of non-aggressive adolescents living at home

Figure 4 Behaviour settings



Notes: Results of the analysis activity x milieu for the life setting school among the residential group. Values represent mean frequency of aggressive behaviour acts per hour, differentiated by different school milieus

Discussion

In this study we were concerned with four questions:

1. Is it possible to capture the environments of aggressive youth by means of camera-glasses in way that generates low reactivity?
2. With whom do these adolescents interact?
3. Which forms and function of aggression occur?
4. Are there particular features of the behaviour setting in which these interactions take place which impact on the frequency of aggressive behaviour?

Our analysis shows that the camera-glasses successfully record the social and physical environments of aggressive adolescents without generating high reactivity. We used the camera-glasses with adolescents of the same residential treatment facility over a period of two years. As a consequence, the adolescents and those they interacted with were familiar with them and integrated them into their daily experience. While conversations about the camera-glasses did not diminish, their contents changed. The camera-glasses as a new medium and at the start their function was a dominant topic, but this changed over time to conversations about their use, such as who had already used them and who would still do so.

In a study of residential care Buehler *et al.* (1966) found that children and adolescents in residential education or treatment have little contact with adults and are primarily interacting with their peers; this means that they are exposed to negative peer influence. By contrast, our findings overall provide evidence of more interaction with adults and more supervision. This is a positive finding because aggressive adolescents' involvement with adults lowers their risk of negative peer influence.

The residential group displayed direct and reactive aggressive behaviour significantly more often than the contrast group. In relative terms they used indirect forms of aggression less often. It is possible that these aggressive adolescents lack the social competence necessary to use indirect forms of aggression effectively.

Furthermore, specific behaviour is only adaptive in relation to a specific environment. In a regular classroom a young person's direct aggressive behaviour may lead to increasing exclusion from

their peer-group. And indeed, the members of our contrast group tended to resort to indirect, less obvious acts of aggression which are less likely to be attributable and therefore have a lower risk of negative social consequences. For those young persons living in residential care, however, the situation is reversed. Here direct aggression leads to higher social status among their peers. Consequently, they have a much lesser need to resort to less obvious, indirect forms of aggression. However, their aggressive behaviour is more reactive which indicates a disturbance in the ways in which they process social information. It may also be an averse reaction to a negative experience of their residential environment.

There were no gender differences regarding forms or functions of aggression. This finding may be due to our small sample size, the method or particular features of our clinical sample. Aggressive girls are not referred for treatment until their behaviours are highly problematic, so they represent a high deviation from the norms for girls.

The examination of behaviour settings indicated that aggressive behaviour occurs predominantly in settings with limited supervision. In particular, the poorly supervised setting "free time in residential care" fosters peer contagion. A residential treatment facility has a high concentration of aggressive youth. As a consequence, positive role models in the peer group are lacking and aggressive behaviour amounts to the common ground. Aggressive behaviour which in ordinary settings would lead to social exclusion is, to the contrary, in a residential facility a means to gain social status.

The interviews, which we conducted in support of the data generated by the camera-glasses, reveal that the adolescents in residential care are involved in a twofold socialisation process (Wettstein *et al.*, 2013): one involving their adult educators and carers, the other their aggressive peers. The adolescents reported that they were faced with contrary expectations and forced to choose sides. If they stuck to the rules and norms required by the adults in their environment, their peers despised them. But if they met their peers' expectations and rebelled against the rules and norms, they ran into trouble with the adults.

A surprising finding is that the adolescents showed little aggressive behaviour when spending time in their families; and in their families they were also not exposed to much aggression. Upon closer examination of the family setting, however, it turns out that they were not involved in much social interaction. They spent most of their time alone, watching TV or using a computer. Our video recordings convey the impression that many parents had withdrawn from bringing up their child and delegated their child's education to the treatment programmes and facility. Given that the aim of treatment is not only to effect change in the aggressive individual but in the family environment as well, such parental disengagement is highly problematic. It would appear that the treatment programmes we observed unfortunately did not reach the families of those in treatment. These adolescents' successful reintegration back into their families was in doubt.

In sum, while residential treatment programmes are designed to educate aggressive adolescents in non-aggressive behaviour, a residential facility provides a social context in which aggressive behaviour is, paradoxically, an effective strategy for individuals to gain regard and social status among peers and to push their interests among staff. Therefore, in order to minimise peer contagion it is critical to reduce the occurrence of low supervised social situations in residential facilities. Furthermore, staff and educators need to be trained to use deescalating response strategies when dealing with adolescents' aggressive behaviour, precisely deescalating strategies which neither involve acquiescence nor surrender to pressure.

Strengths and limitations of the camera-glasses method

The present study reveals several positive features of the method. First, camera-glasses are a successful tool for the assessment of naturally occurring aggression. Second, we demonstrated that the camera-glasses method enables in-the-field capture of data with low reactivity. Third, compliance among both the residential and contrast groups was high in all life settings except one, the family setting among the residential group. Such low compliance in this setting can be attributed to the residential group's attempt to keep this pressured and delicate environment safe.

Despite the strengths of the present study, some limitations need to be pointed out. An obvious limitation is its reliance on a small sample which the generalisation of our results. Our very small sample size is a consequence of the considerable time invested in the development of the camera-glasses technique. Moreover, this is an exploratory study and in order to develop a system of categorisation which was as encompassing as possible, we involved clinical and nonclinical cases with a wide case variation. Our research subjects were not randomly selected. This purposeful selection of a clinical sample further limits generalisation of results. Also, the two factors "expression of aggressive behaviour" and "residential home vs family home" are confounded.

Nevertheless, we suggest that the camera-glasses method has wide and effective applicability in other areas of adolescent research, because it enables immediate observation and behaviour-related description of social interactions in the field.

Implications for theory and practice

- The camera-glasses technique allows an apparatus-based observation of daily life situations without generating high reactivity.
- The camera-glasses provide a first person perspective which other methods cannot capture. The wearer of the camera-glasses is as much a research instrument as a research subject. The adolescent operates in a largely unexplored field of investigation and the camera-glasses register data in ways that are similar to a robotic apparatus which is capable of moving in fields that are otherwise inaccessible to an investigator.
- The results show that adolescents in residential care are involved in a twofold socialisation process: one involving their adult educators and carers, the other their aggressive peers.
- Aggressive behaviour occurs predominantly in settings with limited supervision. Therefore, in order to minimise peer contagion it is critical to reduce the occurrence of low supervised social situations.

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