The reciprocal relationship between social competence and forms of aggression in children

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Acknowledgements

This graduate thesis was made possible due to data from the Trondheim Early Secure Project (TESS). The process of working with the thesis has been a long journey, which has granted me increased knowledge on the social functioning of young children, as well as on research methodology and statistical procedures. First and foremost, I would like to thank my supervisor Lars Wichstrøm. Your guidance and assistance with analyzing data and making sense of the results has been invaluable. I would also like to thank my friends and family for support and good advice in times of frustration. Finally, I would like to thank Andreas for your patience and help with technical challenges along the way.

Abstract

A considerable amount of research has demonstrated cross-sectional associations between aggression and social competence in childhood. However, because of the lack of longitudinal studies, the question of how these constructs relate to and predict each other over time remains unanswered. The aim of the present work was therefore to explore the longitudinal associations between two forms of aggression (direct and indirect) and social competence. Using an autoregressive cross-lagged model, I analyzed data from 797 children at 6 years of age (1st grade) who were followed up when they were 8 years (3rd grade). The results demonstrated that social competence at age 6 predicted less indirect aggressive behavior (but not direct aggressive behavior) two years later while adjusting for aggressive behavior at age 6. Higher levels of direct aggression at age 6 predicted lower levels of social competence two years later, whereas indirect aggression did not have a significant effect on future social competence. Thus, I found partial support for a reciprocal relationship between aggression and social competence, with the results demonstrating different forms of aggression to relate differently to social competence over time. Implications for prevention efforts and directions for future research are discussed.

The reciprocal relationship between social competence and forms of aggression in children

Substantial evidence points to childhood aggression as a predictor of several maladaptive outcomes and high-risk behaviors, among them substance use and sexual risk behavior (Prinstein & La Greca, 2004), conduct disorder (J. Coie, Lochman, Terry, & Hyman, 1992), and a range of criminal behaviors (Huesmann, Eron, Lefkowitz, & Walder, 1984). In terms of rank-order consistency, longitudinal data have demonstrated childhood aggression to be a highly stable pattern (Ladd & Burgess, 1999; Olweus, 1979). However, on a group level, aggressive behavior have a tendency to decrease sharply over the course of early development (Nagin & Tremblay, 1999; Tremblay, 2000). For instance, evidence suggests that physical aggression peaks at around 3 years of age (Alink et al., 2006), and then decreases considerably into elementary school age (Côté, Vaillancourt, Barker, Nagin, & Tremblay, 2007).

Although an overall decrease is the common pattern, some children obviously deviate from this norm, and remain highly aggressive throughout the first school years. These children are in risk of substantial adjustment difficulties and delinquency in later childhood and adulthood (Brame, Nagin, & Tremblay, 2001; Campbell, Spieker, Burchinal, & Poe, 2006; Nagin & Tremblay, 1999). As a result, much work has been dedicated to identifying factors that contribute to the stability of aggressive behavior ((e.g. Farrington, 1991; Huesmann et al., 1984).

In research on the stability or aggravation of childhood aggression, environmental measures have gained substantial attention as contributing factors, among them authoritarian parenting styles (Casas et al., 2006; Olweus, 1980), selective peer affiliation (Snyder, Horsch, & Childs, 1997), and media violence exposure (Ostrov, Gentile, & Crick, 2006). However, in later years, one has seen an increasing focus on how psychological factors within the child, such as social cognition (Crick & Dodge, 1994; Yoon, Hughes, Gaur, & Thompson, 1999), emotion regulation skills (Davidson, Putnam, & Larson, 2000; Gilliom, Shaw, Beck, Schonberg, & Lukon, 2002), and executive functioning (Hawkins & Trobst, 2000; Morgan & Lilienfeld, 2000) relates to the development of aggression.

The present work is focusing on how the construct of social competence relates to aggressive behavior in childhood. As an essential precondition for successful social interactions, formation of peer networks and friendships, social competence is viewed

as an important component of healthy functioning and adjustment (Ladd, 1999; Parker, Rubin, Erath, Wojslawowicz, & Buskirk, 2006; Rubin, Bukowski, & Parker, 2006).

Although no clear, empirically based definition of social competence exists, most definitions have in common a focus on *effectiveness in interactions* as a central aspect (Rose‐Krasnor, 1997). Operational definitions of social competence are varying across studies, e.g. in terms of peer status (Dodge, 1985), social skills (Cavell, 1990; Gresham, 1986), prosocial behavior (Chen, Li, Li, Li, & Liu, 2000), or social information processing (Dodge, 1986), but most definitions appear to be both theoretically and empirically related (Sørlie, Hagen, & Ogden, 2008). As in the case of aggression, social competence has been demonstrated to be a generally stable construct (Sørlie et al., 2008; Zimmer-Gembeck, Geiger, & Crick, 2005).

As noted, a number of studies demonstrate associations between measures of social competence and aggression in childhood, finding that the two constructs are inversely related (Caprara, Barbaranelli, & Pastorelli, 2001; Sørlie et al., 2008; Webster-Stratton & Hammond, 1998). For instance, aggressive children do not perform as well as non-aggressive children on tasks that require social skills like perspective taking and understanding of the intentions of others (Crick & Dodge, 1994). Childhood aggression is also correlated with measures considered to be indices of social competence, such as peer rejection (Dodge, Coie, Pettit, & Price, 1990; Newcomb, Bukowski, & Pattee, 1993) and social information processing (Yoon et al., 1999).

So, how should this correlation be understood? One option is to consider aggressive behavior and social competence as two poles of the same dimension, but the relationship is probably not as straightforward as that. Several authors have pointed out the fact that social competence does not always preclude aggressive behavior, and non-aggressive children are not necessarily socially competent (Arsenio & Lemerise, 2001; Sutton, Smith, & Swettenham, 1999). Furthermore, in their study of at-risk preschoolers, Webster-Stratton and colleagues found that social competence and conduct problems had a shared variance of only 22%, suggesting that the two constructs should be considered separate dimensions of social functioning (Webster-Stratton & Hammond, 1998).

Not ruling out the possibility that the correlation between the two constructs could be due to common factors, e.g. genetics or personality (Edelbrock, Rende, Plomin, & Thompson, 1995; Higley, Suomi, & Linnoila, 1996), in the present inquiry I address the prospect that aggression and social competence could influence each other over time. Although several authors have paid attention to the possible associations between social competence and aggressive behavior, most studies have used cross-sectional designs (e.g. Crick & Dodge, 1996; Dodge et al., 1990; Webster-Stratton & Hammond, 1998), not considering longitudinal associations between the two constructs.

There are several reasons why social competence and aggression might become associated over time. To illustrate, socially competent children might elicit responses in their environment that reinforces their competent behavior and interpersonal adjustment, which further protect against the development of aggressive behavior patterns. On the other hand, aggressive children may trigger responses in their environment that help maintain their maladjustment and also prevent learning and development of social skills. In order to establish the direction of the relationship between the two phenomena, it is vital to analyze longitudinal data on children's aggressive behavior and social competence. However, because such longitudinal studies are lacking, the question of how these constructs relate to and predict each other over time remains unanswered. By using such longitudinal data, the present work is aiming to answer the following questions: Does level of social competence predict changes in aggression over time? Does level of aggression predict changes in social competence, or is there a bi-directional influence?

The influence of social competence on aggression

A major challenge in establishing the interrelatedness of aggression and social competence lays in the multidimensional and complex nature of both constructs. As mentioned, most definitions of social competence have in common a focus on *effectiveness in interaction* as a central aspect (Rose‐Krasnor, 1997). A more specific framework was offered by Dodge (1986), in which social competence was defined as a product of the child's way of processing information. The model presumes that social information processing occurs in four sequential steps, where each step is a necessary part of competent responding. This sequence of processing involves (i) the encoding and interpretation of social cues, (ii) a search for possible

responses, (iii) evaluation of potential consequences and (iv) the selection of a response (Dodge, 1986). When faced with social problems, children low on social competence may resort to aggressive behavior because of their lacking ability to interpret social situations and generate alternative and more adequate courses of action. Children high on social competence, on the other hand, interpret ambiguous situations more correctly and have a larger pool of behavioral responses to choose from when faced with such situations (Dodge, 1986). Competent children's behavior may elicit responses in their environment that reinforce their interpersonal adjustment and keep aggression levels low. Thus, it is conceivable that a child's level of social competence will have an effect on the course and development of childhood aggression.

To this date, few longitudinal studies have explored the effect of social competence on changes in aggression directly. However, several studies have demonstrated childhood peer rejection, which is often seen as an indication of social competence, to predict growth in aggressive behavior (Dodge et al., 2003; Hymel, Rubin, Rowden, & LeMare, 1990). Furthermore, some school-based social competence enhancement programs have showed promising results in terms of preventing aggressive behavior (Fraser et al., 2005; Frey, Hirschstein, & Guzzo, 2000), albeit not always (Quinn, Kavale, Mathur, Rutherford, & Forness, 1999).

In their cross-sectional study of social competence and conduct problems, Webster-Stratton and Hammond (1998) noted that the odds of having problems in both areas, i.e. both conduct problems and low social competence, were higher for children with low social competence than for children with conduct problems. Although no temporal order or causal effect can be drawn from a cross-sectional design, these findings may indicate that social competence problems are antecedent to conduct problems (Webster-Stratton & Hammond, 1998).

The influence of aggression on social competence

On the opposite side, there are also reasons to believe that level of aggression has an effect on the course and development of social competence in children. Aggressive children are often disliked and rejected by more socially competent peers (Cantrell & Prinz, 1985; Dodge et al., 1990), and they tend to draw into cliques with other aggressive children (Cairns, Cairns, Neckerman, Gest, & Gariépy, 1988). Consequently, their aggressive way of behaving is reinforced and they also miss important opportunities to develop and practice more appropriate behaviors and social

skills with competent peers. Thus, one can expect to find a decrease in social competence over time in highly aggressive children.

As of now, the literature on the predictive value of aggression on social competence is scarce, although a few studies have found aggressive behavior to be associated with later levels of social competence. For instance, longitudinal data demonstrates that children who show a high and stable level of aggression in early childhood (2-9 years of age) have lower social skills at ages 9 through 12 years (Campbell et al., 2006). Also, Campbell and colleagues demonstrated that preschool boys that were identified by theirs mothers as hard to manage at around age 4 were rated as less socially competent than controls at a two-year follow-up (Campbell, 1994). However, none of these studies controlled for baseline social competence and thus poorly inform causal conclusions.

The multidimensionality of aggression

Today, most theorists view aggression as a multidimensional construct that can be further divided into distinct subtypes based on form and function of the behavior (J. Coie & Dodge, 1998; Dodge, 1991). One of the most common distinctions is that between direct (overt) and indirect (covert) aggression. Direct aggression includes overt actions in the form of either physical or verbal attacks. On the other hand, indirect aggression includes covert acts, like hurtful manipulations of relationships and damaging others' social positions through gossip or social exclusion (Card, Stucky, Sawalani, & Little, 2008).

Research has demonstrated moderate to large-sized correlations between direct and indirect aggression (Crick, Ostrov, & Werner, 2006; Crick et al., 1999). For instance, a meta-analysis by Card et al. (2008) found an intercorrelation of .76 between the two constructs. Despite of this, the two forms of aggression consistently show unique associations with maladjustment (Card et al., 2008), suggesting that they should be considered distinct constructs. In line with this, numerous factor-analyses have supported the distinction between direct and indirect forms of aggression (e.g. Crick & Grotpeter, 1995; Loeber & Hay, 1997; Vaillancourt, Brendgen, Boivin, & Tremblay, 2003).

The two subtypes of aggression have also been demonstrated to peak at different points in time. As already noted, evidence suggests that physical aggression declines in frequency from early childhood into elementary school age (Côté et al., 2007), whereas, at least for some children, the frequency of indirect aggressive

behaviors inclines in this developmental period (Côté et al., 2007; Vaillancourt, Miller, Fagbemi, Côté, & Tremblay, 2007). For instance, a Canadian cross-sectional study indicated that, according to maternal reports, the frequency of physical aggression declined from the age of two to age 11, whereas the frequency of indirect aggression increased (Tremblay et al., 1996).

These findings regarding age-related differences in the use of direct and indirect aggression are consistent with the seminal work of Björkqvist and colleagues (1992). In their developmental theory of childhood aggression, direct and indirect forms of aggression are not considered merely distinct strategies, but they also represent different, partly overlapping, phases in childhood development. With the lack of considerable verbal and social skills, young children will have to resort to physical aggression. The development of verbal and social skills will facilitate other forms of expressing aggression, and eventually, when social competence develops sufficiently, the child is fully capable of indirect aggression. That is, the person is able to use social manipulation and other indirect means in order to induce harm, without putting herself in risk of being caught (Björkqvist, Lagerspetz, & Kaukiainen, 1992). Thus, children need to develop the necessary social skills in order to use indirect aggression. This is in line with a socialization theory of aggression which implies that children do not learn to aggress physically, but rather learn alternatives to the physical aggression they use spontaneously in early childhood (Kokko, Tremblay, Lacourse, Nagin, & Vitaro, 2006; Tremblay, 2003). Therefore, if this is true, one can expect high levels of social competence to predict increases in indirect aggressive behavior and possibly decreases in direct aggressive behavior.

Consistent with this, whereas physical aggression is viewed as the most "socially unacceptable" form of aggressive behavior (Tremblay, 2000), indirect aggression is often assumed to be a more sophisticated form of aggressing, requiring higher levels of social skills (Archer, 2001). Indeed, a few studies have demonstrated social competence to correlate more with indirect aggression than with direct aggression (Björkqvist, Österman, & Kaukiainen, 2000; Kaukiainen et al., 1999). However, no study thus far has distinguished between direct and indirect forms when exploring how aggression relates to social competence over time. The present work will both present the predictive value of social competence on changes in direct and indirect aggression, and also the predictive value of direct and indirect aggression on changes in social competence.

Summary and objective of the present study

Having reviewed available literature on the associations between social competence and aggression, two considerable knowledge gaps become apparent. First, there is a considerable lack of longitudinal research in this area. As noted, the majority of studies on social competence and aggression are either cross-sectional (e.g. Crick & Dodge, 1996; Dodge et al., 1990; Webster-Stratton & Hammond, 1998), or they measure the two variables at different points in time, where only one is assumed to predict the other (e.g. Campbell et al., 2006; Hymel et al., 1990). To my knowledge, only one study has examined the reciprocal relationship between social competence and aggression (antisocial behavior) over time, finding a predictive value of social competence on changes in antisocial behavior, but not the other way around (Sørlie et al., 2008). Moreover, this study included adolescents between 13 and 15 years of age. Given the profound changes in aggression and social competence during childhood and adolescence, these findings among adolescents cannot readily be extrapolated to early or middle childhood. Hence, because no study has investigated the reciprocal effects of social competence and aggressive behavior in elementary school-aged children we are presently uninformed about any possible prospective relation.

Second, most studies on the subject include aggression or antisocial behavior as a one-dimensional construct (Campbell et al., 2006; Sørlie et al., 2008). Based on what we know about the multidimensional nature of childhood aggression, it is conceivable that various forms of aggression relate to social competence in different ways. As noted, a few cross-sectional studies have indicated such differences when it comes to direct and indirect aggression (Björkqvist et al., 2000; Kaukiainen et al., 1999). However, no study to this date has differentiated between direct and indirect forms of aggression when examining *longitudinal* associations with social competence.

The present work addresses these knowledge gaps by examining the longitudinal relations between social competence and forms of aggression in a large sample of children from age 6 to 8 years. The aim of the study is to explore the stability of social competence and direct and indirect aggression in the mentioned age group, as well as examining how the variables influence each other over a two-year interval. Based on available theory and research I expected to find reciprocal influences between social competence and aggression in this age group. I also

hypothesize that direct and indirect aggression would relate to social competence in different ways. Specifically, based on the assumption that indirect aggression is a more sophisticated way of aggressing that requires higher levels of social competence, I expected to find social competence to predict prospective indirect aggression. Furthermore, based on findings that children who use direct/physical aggression are more disliked and rejected by other children, I expected this type of aggression to predict comparatively lower social competence.

Method

Participants and procedure

The present study is based on data from Trondheim Early Secure Study (TESS), a longitudinal population study aimed at early detection of factors associated with the development of psychiatric disorders and psychosocial problems in children (see Wichstrøm et al., 2012). All children born in 2003 or 2004 living in the city of Trondheim, Norway (N=3456) were invited to participate in the study. The parents received the invitation along with the Strength and Difficulties Questionnaire (SDQ; Goodman, 1997), which they were asked to complete and bring when attending the routine health checkup for 4-year olds. As shown in Figure 1, a large majority of eligible participants consented to take part in the study.

All testing and observations were performed at the university clinic at the Norwegian University of Science and Technology (NTNU), and the research procedures were approved by the Regional Committee for Medical and Health Research Ethics. The parents gave their written consent to participate in the study.

In order to increase variability, children with higher scores on the SDQ were oversampled, whereas children with lower scores were undersampled. This was accomplished by dividing the participants' SDQ scores into four strata, using the cut-off ranges 0-4, 5-8, 9-1, and 12-40. Applying a random number generator, defined proportions of parents in each stratum were drawn to participate. Drawing probabilities increased with SDQ scores so that 38.1%, 49.1%, 71.4%, and 89.2% of children in strata 1, 2, 3, and 4, respectively, were selected to participate in the data collection. The sample recruitment procedure is presented in Figure 1.

The participants have been assessed three times; the initial assessment at age 4 (T1), a follow-up at age 6 (T2), and another follow-up at age 8 (T3). Because the applied measure of aggression was not included at T1, the present study utilizes data

from T2 and T3 only. At T2 there were 797 children participating (M_{age} = 6.7 years, SD = .17), whereas 689 children participated at T3 (M_{age} = 8.8 years, SD = .24). See Table 1 for sample characteristics.

To examine selective attrition, t-tests for equality of means for each measure were run. When variances were different according to Levene's test, corrected t-values for unequal variances were used, implying that the *df*s were not always whole digits. Results showed that those who participated at 8 years kicked less ($M_{participation}$ = .13) than those who did not participate ($M_{attrition}$ = .21), $t(236.49) = 2.07$, $p = .04$. Also, those who participated at 8 years hit less ($M_{participation}$ = .14) than those who did not participate ($M_{attrition}$ = .26), $t(228.8) = 2.66$, $p = .008$. Selective attrition was also the case with all three subscales of social competence. The children who participated at 8 years were rated higher in cooperation ($M_{participation}$ = 21.08) than those who dropped out (= 19.8), $t(264.85) = -2.84$, p = .005. Those who participated at 8 years were also rated higher in assertion ($M_{participation}$ = 17.42) than those who did not participate ($M_{attrition}$ =16.26), t (266.24) = -2.87, p = .005. Finally, the children who participated at 8 years were rated higher in self-control ($M_{participation}$ = 19.27) than those who did not participate ($M_{attrition}$ = 17.98), t (271.94) = -3.04, p = .003.

Measures

Aggression. The Instrument for Reactive and Proactive Aggression (IRPA) is a teacher completed questionnaire which assesses the form and frequency of aggressive behavior separate from the function of such behavior (Polman, de Castro, Thomaes, & van Aken, 2009). Regarding forms of aggression, a distinction is made between physical aggression (hitting, kicking, pushing), direct verbal aggression (arguing, name-calling) and covert aggression (gossip, telling lies about others). The teachers rate the frequency of aggressive behavior on a five-point Likert Scale (0 = never, 1 = once or twice, 2 = weekly, 3 = several times a week, 4 = daily). Good discriminant validity and acceptable convergent validity of the IRPA have been demonstrated (Polman et al., 2009). However, the IRPA validation was performed on a preadolescent sample and cannot thus fully inform on the validity among 8 and 10-year olds such as in the present sample. A concurrent study, using exploratory and confirmatory factor analyses, showed that the factorial validity of the verbal aggression could not be established because the verbal aggressive items loaded on both physical aggression and covert aggression (Grimstad, 2014). Hence, only the latter two dimensions were used in the current study. At both assessment points the

internal consistency for the dimension of physical aggression was $\alpha = .80$. The internal consistency for covert aggression was $\alpha = .63$ and $\alpha = .55$ at age 6 and age 8, respectively.

Social competence. The teacher version of The Social Skills Rating System (SSRS; Gresham & Elliott, 1990) measures social competence in the domains of cooperation, assertiveness, and self-control. The system consists of 30 items, which are all rated according to frequency of occurrence on a three-point Likert Scale (0 = never, 1 = sometimes, 2 = very often). At age 6, the internal consistency was $\alpha = .84$, $\alpha = .78$, and $\alpha = .83$ for the subscales of cooperation, assertion and self-control, respectively. At age 8, the internal consistency was $\alpha = .86$, $\alpha = .80$, and $\alpha = .86$, respectively. As with the US version (Gresham & Elliott, 1990), the Norwegian version of the SSRS has been demonstrated to be a valid and reliable measure of social competence, both in terms of internal consistency, test-retest reliability, factor structure, and convergent validity (Ogden, 2003).

Results

The means and standard deviations of each measure are presented in Table 2, and correlations between the study variables are presented in Table 3. The mean values in Table 2 demonstrate that absolute levels of both aggressive behavior and social competence were quite stable from age 6 to age 8. As seen in Table 3, physical aggression and covert aggression were moderately correlated at both assessment points. Moreover, covert aggression at 6 years showed modest correlations with physical aggression at 8 years, and vice versa. At age 6, social competence showed modest negative correlations with both physical and covert aggression. At age 8, social competence and covert aggression was still modestly correlated, but the relation with physical aggression had increased into a moderate correlation. Finally, social competence at 6 years was modestly correlated with physical and covert aggression at age 8, and vice versa.

In order to study the longitudinal relationship between social competence and the two forms of aggression, I used autoregressive cross-lagged modeling (ACLM) within a structural equation framework using Mplus version 7.2 (Muthén & Muthén, 2012). In ACLM, each variable is regressed on both its own lagged score and the lagged score of the other variable(s) at the previous measurement point (Berrington,

Smith, & Sturgis, 2006). The auto-regressive parameters tell us about the rank order stability over time. The cross-lagged parameters, on the other hand, provides information about how much variation in one variable at assessment point 1 is able to predict the other variable between assessment point 1 and assessment point 2. If the analyses show significant cross-lagged coefficients running in both directions, this can be taken as support of a reciprocal relationship between the two variables (Berrington et al., 2006).

By using this type of modeling I was allowed to examine the reciprocal relationship between the study variables over time while adjusting for the autocorrelation, i.e. in this case the stability of social competence and aggression, respectively. In this case, measures of both aggression and social competence at age 8 were regressed on the measures of the same variables at age 6. Aggression and social competence at each time point were allowed to correlate. The autoregressive model was constructed by using latent measures of social competence and aggression. In this model the loadings of each item were set to be equal at 6 and 8 years.

Recall that the attrition was selective according to both aggression and social competence. To adjust for this, and presupposing that data was missing at random (MAR) and not completely at random (MCAR), missing data were handled with a full information maximum likelihood procedure. Moreover, due to the stratification of the sample, analyses were performed on data weighted with the inverse of the drawing probability (i.e. cases high on SDQ are weighted down whereas low scorers on the SDQ are weighted up) so that true population estimations are provided. Due the potential skewness of the aggression variables a robust maximum likelihood estimator was used, which is robust to deviation from normality and provides correct standard errors. This model fitted the data well, χ^2 (191) = 301.39, $p < .001$, RMSEA = .026, CFI = .965, TLI = .956, SRMR = .050.

A path-diagram of the autoregressive cross-lagged associations between social competence and forms of aggression is presented in Figure 2. The results demonstrate that social competence in 3rd grade was significantly predicted by social competence in 1st grade. Physical aggression in 1st grade significantly predicted physical aggression in 3rd grade, but covert aggression in 1st grade did not significantly predict covert aggression in 3rd grade. The results also demonstrate that physical aggression in 1st grade significantly predicted unique variance in social competence in 3rd grade,

over and above the variance predicted by social competence in 1st grade. Finally, social competence in 1st grade significantly predicted unique variance in covert aggression in 3rd grade, over and above the variance predicted by covert aggression in 1st grade.

Discussion

Previous research has strongly indicated a relationship between children's aggression and their (low) social competence. The aim of the present study was add to this research by uncovering the directionality of this relationship, and also explore whether different forms of aggression related differently to social competence in this age group.

First, the results demonstrated close correlations between the two forms of aggression at both 6 and 8 years, a finding consistent with previous notions (Crick et al., 2006; Crick et al., 1999). In other words, children who are physically aggressive have a tendency to engage in covert aggression as well. The findings also demonstrated mild to moderate negative correlations between social competence and both forms of aggression at 6 years, 8 years, and between assessment points. That is, children high in aggression tend to be less socially competent, and vice versa.

As regards to the prospective relations between social competence and aggression, two major findings are of special importance. First, physical aggression at 6 years predicted lower social competence at 8 years, over and above the variance explained by social competence at 6 years. This finding is consistent with previous research showing that high and stable levels of aggression in early childhood is associated with lower social skills later in childhood (Campbell et al., 2006). The notion that children high in physical aggression often are disliked and rejected by their peers (Dodge et al., 1990) can provide an explanation of these findings. The rejection may lead to reduced social interaction with other competent children, and thus fewer opportunities to learn, develop and practice adequate social skills. Also, the notion that physically aggressive children have a tendency to draw into cliques with other aggressive children (Cairns et al., 1988) can help explain how their pattern of antisocial behavior is reinforced and becomes more and more resistant to change. However, these explanations were not explicitly tested in the present study and future research including peer rejection, exclusion and peers groups is needed to shed light on this issue.

The other major finding in this study was that social competence at age 6 had a predictive value on indirect aggression at age 8, over and above the variance predicted by the initial measurement of indirect aggression. I did not find the same predictive value of social competence on direct aggression. That is, high levels of social competence predicted reductions in indirect aggression, but appeared unrelated to changes in direct aggression. This finding is inconsistent with the developmental theory by Björkqvist and colleagues, which postulates that the development of social competence will reduce the use of physical aggression (Björkqvist et al., 1992). A possible explanation of this finding is that physically aggressive behavior, like hitting and kicking, is more closely related to impulsive, reactive ways of acting than is covert aggression. Conceivably, social competence has a stronger effect on more systematic and intended aggressive behavior such as gossiping or excluding others. Thus, high levels of social competence will not necessarily protect against the triggering of impulsive, physical aggression, but rather against the planning of more indirect, planned aggressive acts.

Implications

The fact that social competence at age 6 predicted unique variance in indirect aggression at age 8 underscores the importance and value of including social skills training in early prevention programs aimed at reducing antisocial behavior in children. As noted, some research has demonstrated promising results of early social competence intervention programs, not only by enhancing social competence itself, but also by reducing incidences of aggressive behavior (Fraser et al., 2005; Frey et al., 2000). The results of the present study indicate that to intervene as early as in preschool age can be of important value. Also, the results support previous notions of aggression as a multidimensional construct (Card et al., 2008; J. Coie & Dodge, 1998). Knowing more about subtypes of aggression in children can help the development of more targeted interventions in order to reduce such behavior.

Limitations of the current study

Despite several strengths of the present study, including access to a large and representative sample of children and the use of autoregressive cross-lagged modeling to examine reciprocal relations, some limitations need to be acknowledged. First, the variables in this study, aggressive behavior and social competence, were both based on teachers' perceptions, and therefore subject to bias and error, including their relationship being inflated due to the teachers rating both phenomena. Hence,

including other sources of information, such as parents and the children themselves may have altered the findings. It is important to acknowledge that parents may not always be aware of their children's aggressive behavior towards peers and children may underreport own aggressive behavior. Thus, although the results may have been different if parent and self-report were included, they would not necessarily be more accurate. As researchers have pointed out, teachers might be capable of more differentiated perceptions and better able to judge qualitative aspects of children's behavior than are peers or observers (J. D. Coie & Dodge, 1988; Ladd & Profilet, 1996). Still, a number of investigators have suggested that peer reports are a more valid measure than teacher reports for the assessment of aggression in school-age children. Elementary school children are often mature enough to be sensitive to the presence of adults, and therefore unlikely to engage in aggression when a teacher is present (J. Coie, Dodge, & Kupersmidt, 1990; Crick & Grotpeter, 1995). Including peer assessments of aggression and social competence could therefore have provided more robust measures of the two constructs.

Second, the present inquiry only measured aggressive behavior and social competence at two points in time. Because the prevalence and quality of both social competence and aggression is changing in this period in childhood, more studies with even wider time-spans are necessary. However, as noted, the present study is one of very few investigating longitudinal, bi-directional influences between social competence and aggression, and thus an important contribution.

Third, 108 children dropped out between the first assessment point at 6 years and the next assessment point at 8 years. Analyses showed that attrition was predicted by certain aggression items (hitting and kicking), as well as by scores on all three subscales of social competence (cooperation, assertion, and self-control). That is, those who participated at 8 years were both less aggressive (on the mentioned items) and more socially competent than those who dropped out. It is possible that the results would be somewhat different without this attrition. These concerns notwithstanding, I applied a full information maximum likelihood approach to handle missing data, so that to some extent the potential effect of selective attrition on the results was taken care of. Also, the internal consistency of covert aggression at 8 years was lower than desired (.55). This was due to the item "excluded others", which appeared less related to the rest of the items at this age. Because of this, some associations might have been underestimated or missed.

Furthermore, although the longitudinal design of the study eliminates questions regarding direction of causality, it does not rule out an alternative explanation that some third variable accounts for the associations between social competence and aggression. Finally, because the majority of the participants in the current study were of Norwegian ethnicity (93%), generalization to other cultures and populations should be done with caution.

Directions for future research

One of the strengths of the current study was that it distinguished between direct and indirect forms of aggression when exploring longitudinal associations with social competence. Because our results showed that social competence relates to the two forms of aggression in different ways, it is conceivable that such differences would be found with other subcategories of aggression as well. Future research should therefore examine longitudinal associations between social competence and other subtypes of aggressive behavior, for example reactive and proactive aggression. It could also be fruitful to deconstruct the concept of social competence, for instance by looking at how specific social skills, empathy, or peer relations relates to the two forms of aggression over time.

Summary and conclusion

To summarize, the present study aimed to explore the longitudinal associations between social competence and forms of aggression in children. Results demonstrated a predictive value of physical aggression on subsequent social competence. Indirect aggression did not have the same predictive value on social competence. On the other side, social competence predicted reduced covert aggression, but did not have an effect on subsequent physical aggression. Findings suggest that social competence can protect against covert aggressive acts, but not against physical aggression, perhaps because physical aggression is more impulsive and reactive in nature. Also, early physical aggression appears to be a risk factor for lowered social competence, possibly because this group of aggressive children is particularly vulnerable to rejection by other children and thereby has fewer opportunities to learn and practice social skills. The results indicate that early intervention to enhance social competence may be warranted in order to reduce aggressive behavior in young children.

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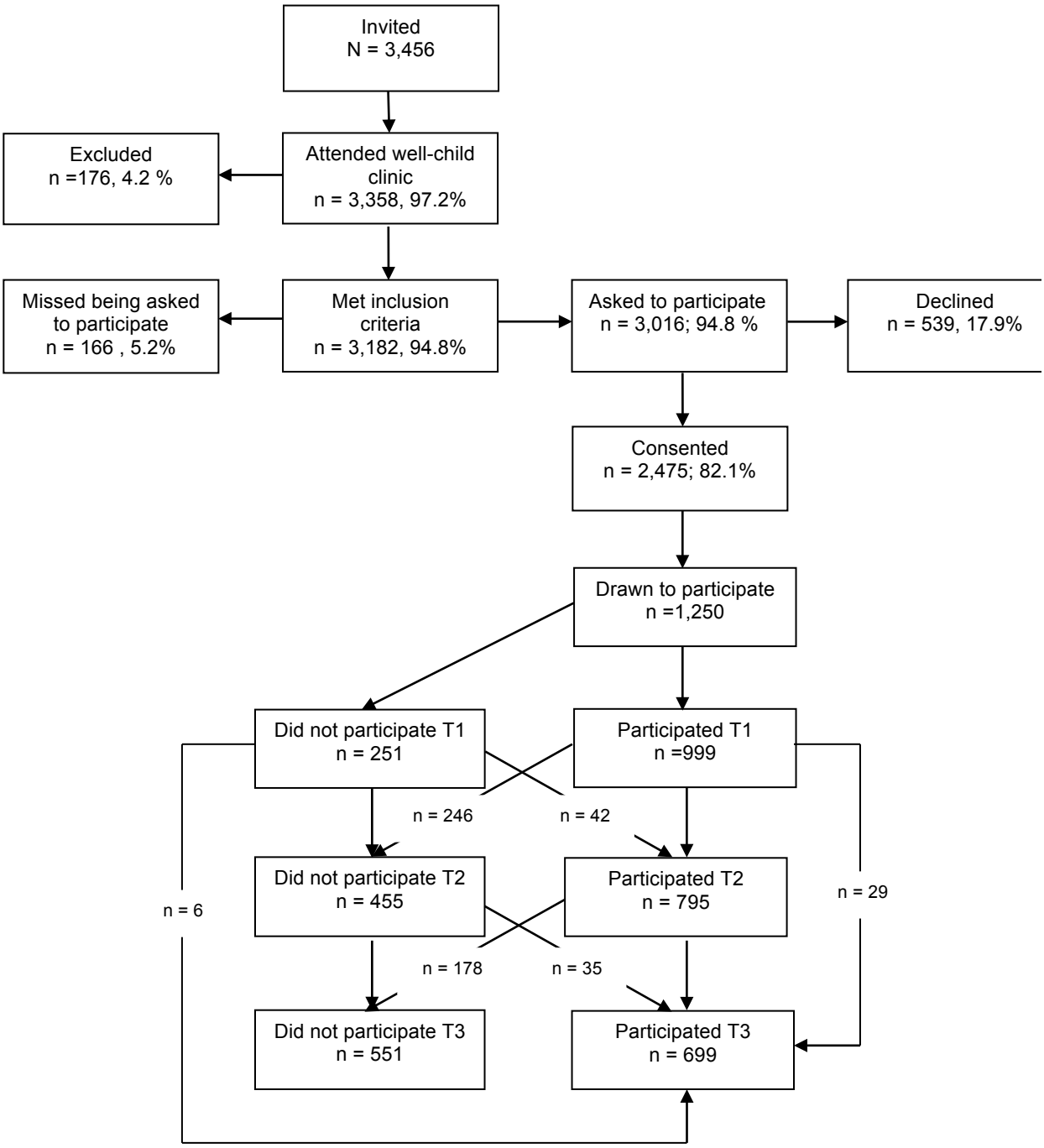

Figure 1. Flowchart of sample recruitment

Table 1

Sample characteristics at age 6

Characteristic		%
Gender of child	Male	50.1
	Female	49.9
Gender of parent informant	Male	18.9
	Female	81.1
Ethnic origin of biological mother	Norwegian	93.0
	Western countries	2.7
	Other countries	4.3
Ethnic origin of biological father	Norwegian	91.0
	Western countries	5.8
	Other countries	3.2
Biological parents' marital status	Married	52.1
	Cohabitating > 6 months	9.5
Informant parent's socio-economic status	Leader	5.7
	Professional, higher level	25.7
	Professional, lower level	39.0
	Formally skilled worker	26.0
	Farmer/fisherman	0.5
	Unskilled worker	3.1
	Master degree or similar	20.3
	PhD completed or ongoing	4.4
	Hospitalized	10.0

Table 2

Means of aggression and social competence at 6 and 8 years

	Item	M	SD
6 years			
Aggression	Kicked	.13	.38
	Pushed	.32	.62
	Hit	.14	.41
	Pinched	.05	.27
	Bit	.00	.06
	Name calling	.28	.6
	Destroyed or hid others' things	.02	.15
	Argued	.69	.83
	Gossiped or told lies about others	.05	.24
	Did sneaky things	.05	.27
	Excluded others	.22	.48
Social competence	Cooperation	21.08	4.9
	Assertion	17.42	4.47
	Self-control	19.27	4.76
8 years			
Aggression	Kicked	.09	.34
	Pushed	.23	.5
	Hit	.11	.38
	Pinched	.03	.22
	Bit	.00	.04
	Name calling	.27	.56
	Destroyed or hid others' things	.03	.19
	Argued	.62	.79
	Gossiped or told lies about others	.06	.26
	Did sneaky things	.04	.2
	Excluded others	.19	.47
Social competence	Cooperation	21.62	5.15
	Assertion	18.4	4.72
	Self control	19.87	5.1

Table 3

Correlations between study variables

Variable	Correlations					
	1.	2.	3.	4.	5.	6.
1. Physical aggression 6 years	-					
2. Covert aggression 6 years	.44	-				
3. Social competence 6 years	-.39	-.27	-			
4. Physical aggression 8 years	.58	.33	-.31	-		
5. Covert aggression 8 years	.34	.43	-.3	.54	-	
6. Social competence 8 years	-.37	-.26	.64	-.42	-.37	-

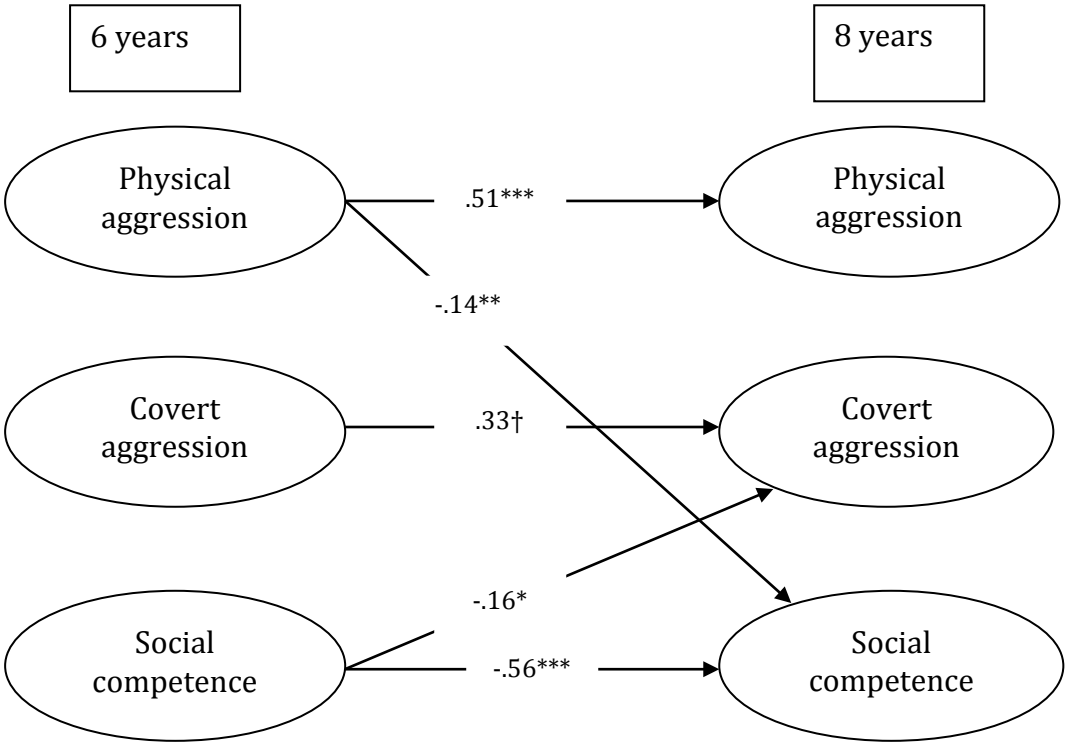

Figure 2. Autoregressive cross-lagged associations between forms of aggression and social competence at 6 and 8 years. † = $p < .1$, * = $p < .05$, ** = $p < .01$, *** = $p < .001$.