



## Do peer group norms moderate the expression of genetic risk for aggression?



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### ABSTRACT

**Purpose:** Using a genetically informed design based on 192 Monozygotic and Dizygotic twin pairs assessed in kindergarten, this study examined whether the expression of genetic risk for physical aggression or for relational aggression varies depending on the peer group's injunctive behaviour norms.

**Methods:** Physical aggression and relational aggression, as well as injunctive peer group norms in regard to these behaviours, were measured via peer nominations in the twins' kindergarten classes.

**Results:** Peer groups varied considerably in terms of the level of acceptability of both physical and relational aggression. Bivariate Cholesky modeling revealed a significant gene-environment interaction, indicating that a strong genetic disposition for physical aggression was much more likely to be expressed when peer group injunctive norms were favourable to such behaviour. In contrast, genetic factors essentially played no role in explaining inter-individual differences when peer group norms discouraged physical aggression. Relational aggression was generally less explained by genetic influences and more by environmental influences regardless of peer group norms, but environmental influences became even more important when peer group norms favoured such behaviour.

**Conclusions:** These findings speak to the importance of the peer group in shaping aggression already in young children by either condoning or penalizing such behaviour.

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### Introduction

Aggressive behaviour during childhood is a major risk factor for subsequent developmental maladjustment. For a long time, attempts to understand and prevent childhood aggression have focused on physical aggression. However, already preschool aged children can also seriously hurt their peers through more subtle forms of aggression, for example through spreading vicious gossip and rumors, writing or saying hurtful things, exploiting personal secrets, and ignoring, alienating, and isolating others. While different terms have been used to describe these more subtle forms of aggression (e.g., *relational, social, or indirect aggression*) all refer to attacks on the self-esteem or on the social relationships and reputation of the victim (Archer & Coyne, 2005). Whereas physical aggression is more prevalent among boys, the opposite pattern has been found – albeit not always consistently – for girls (Card, Stucky, Sawalani, & Little, 2008). Many aggressive children seem to use both forms of aggression, however, with correlations ranging between  $r = .4$  and  $.8$ . Despite this overlap, physical and relational aggression

have been found to represent two factorially distinct forms of aggression, whose measurement structure remains stable from the preschool years through early adolescence (Vaillancourt, Brendgen, Boivin, & Tremblay, 2003). Notably, relational aggression is as harmful as physical aggression with victims suffering a host of deleterious effects, including anxiety, depression, and even suicide ideation (Crick & Grotpeter, 1996; Owens, Slee, & Shute, 2000; Paquette & Underwood, 1999). Emphasized by several highly mediatized suicides of young victims of relational aggression, the devastating consequences of relational aggression have led to the inclusion of relational aggression in the legal definition of bullying and the implementation of strict anti-bullying legislations that hold the perpetrators legally responsible for their actions (U.S. Department of Education, 2011; Saint-Cyr, 2012).

#### *Genetic and environmental etiology of physical and relational aggression*

The recognition that aggression can be expressed in different ways has spurred considerable research efforts to understand the etiology of the different forms of aggression. The general pattern emerging from this research is that physical aggression in children is determined both by genetic factors and by environmental influences. Although molecular genetic studies have made considerable advances in identifying

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functional genes for aggressive behaviour (Dick, 2007), the vast majority of empirical evidence for genetic effects on aggression comes from quantitative genetic studies based on twin or adoption designs. The findings suggest that approximately 50% (with estimates ranging between 21 and 58%) of the variance of physical aggression is explained by genetic factors, with the remaining variance explained mostly by environmental factors unique to each child (DiLalla, 2002; Tuvblad & Baker, 2011). The genetic-environmental architecture of relational aggression in children as commonly defined in the literature has been the focus of less than a handful of studies (Brendgen et al., 2008; Brendgen et al., 2005; Tackett, 2009). The findings from these studies suggest significant genetic influences on relational aggression, with estimates ranging from 20% to 49% of explained variance, depending on the reporting source and the age of the participants. Similar to physical aggression, the remaining variance of relational aggression seems to be mostly explained by factors unique to each child.

Although informative, estimations of simple effects of genetic and environmental influences only offer an incomplete picture of the etiology of the two types of aggression. Indeed, the substantial variation in effect sizes may not only be a result of methodological differences between the different studies but also due to the fact that genetic effects may vary depending on environmental circumstances (Shanahan & Hofer, 2005). Beyond the early childhood period, most children spend a large portion of their day in the company of peers in daycare settings or schools. By providing rules and norms for personal interactions as well as social feedback for compliance or lack thereof, peers play an important part in shaping children's behaviour from an early age (Bukowski, Brendgen, & Vitaro, 2006). The peer group - and especially the group's behavioural norms - may thus significantly influence the expression of a child's genetic disposition for physical or relational aggression.

#### *Peer group norms and aggressive behaviour*

Two types of norms have been discussed that may influence an individual's behaviour. According to Cialdini, Kallgren, and Reno (1991), descriptive norms refer to how most group members behave and are typically operationalized based on the overall prevalence (i.e., the mean level) of a behaviour in a given group. In contrast, injunctive norms refer to what group members are expected to do, irrespective of the prevalence of this behaviour, and are operationalized based on the group's level of approval or disapproval of the behaviour. An additional important aspect refers to norm salience, i.e., the degree to which norms are made explicit to group members. Descriptive norms can be made explicit through information about the prevalence of the behaviour in the group, whereas injunctive norms can be made explicit through rewards or sanctions (e.g., by conferring a higher or lower social standing to the individuals engaging in a given behaviour).

Studies show that peer groups such as school classes vary considerably with respect to both descriptive norms (i.e., the mean level) of physical aggression and relational aggression and with respect to the injunctive norms (i.e., the level of acceptability) of these behaviours (e.g., Henry et al., 2000; Mercer, McMillen, & DeRosier, 2009; Werner & Hill, 2010). Not surprisingly, physical aggression shows greater increases when descriptive or injunctive classroom norms favour such behaviour (Henry et al., 2000; Mercer et al., 2009). Examining injunctive classroom norms in third through eighth graders, a study by Werner and Hill (2010) also indicates that relational aggression is specifically influenced by relational aggression norms but not physical aggression norms. Although the authors did not examine whether the reverse was true for physical aggression, these findings nevertheless suggest that the effect of peer group norms on aggressive behaviour may be specific to the form of aggression. Furthermore, one study investigating the unique effects of descriptive versus injunctive norms on generalized aggression found that it is not so much the descriptive peer group norms that predict children's aggressive behaviour. Rather, aggressive

behaviour seems to increase most in classrooms where the injunctive aggression norm is highly salient and favourable towards aggressive behaviour (Henry et al., 2000).

Despite their importance for understanding child behaviour, peer group norms have yet to be examined as a potential moderator of the expression of genetic risk for aggressive behaviour. An important clue that such a gene-environment interaction may indeed exist comes from the only (to our knowledge) genetically informed study linking peer group norms with another problem behaviour, namely adolescent smoking (Boardman, Saint Onge, Haberstick, Timberlake, & Hewitt, 2008). That study, which included adolescent twins in grades seven through eleven from different schools, examined the moderating role of both descriptive peer group norms (based on the mean level of smoking in each twin pairs' school) and injunctive peer group norm salience (based on the school-specific correlation between popularity and smoking). Again, only injunctive norm salience - but not descriptive norms - was found to be of relevance. Specifically, genetic effects on smoking were much stronger when injunctive peer group norms were favourable to smoking than when they were not. Indeed, genetic effects on smoking were reduced when normative pressures discouraged smoking, although this effect did not reach statistical significance. These findings suggest that highly salient injunctive peer group norms can either facilitate (if norms are favourable) or restrict (if norms are unfavourable) the manifestation of a genetic disposition toward a problem behaviour. An important next step is to test whether a similar process of gene-environment interaction can be found for injunctive peer group norm salience in regard to physical or relational aggression.

#### *The present study*

Using a genetically informed design based on twins raised together, the main goal of the present study was to examine whether the effect of genetic influences on physical or relational aggression, respectively, varies depending on the peer group's injunctive norm salience in regard to these behaviours. Based on the evidence reviewed above, we expected that genetic effects on physical or relational aggression would be stronger (i.e., genetic vulnerabilities would be more readily expressed) when the respective peer group injunctive norms favour these behaviours. This hypothesis was tested with a sample of Monozygotic (MZ) and Dizygotic (DZ) twins assessed in kindergarten. This developmental period is of specific theoretical and practical interest given that relational aggression shows a significant increase during the pre-school and early elementary years while physical aggression, although on the decline for most children, is still relatively frequent (Côté, Vaillancourt, LeBlanc, Nagin, & Tremblay, 2006; Vaillancourt, Miller, Fagbemi, Côté, & Tremblay, 2007). Moreover, because kindergarten (i.e., the first year of education prior to grade 1) is strongly encouraged or even compulsory in many countries, the peer group becomes an important social context for most children at this age. By the same token, peer norms are still more fluid and modifiable during the early elementary school years than later on, and are thus likely amenable to positive teacher influence and other intervention efforts to curb aggressive behaviour in the classroom (Henry et al., 2000).

## **Methods**

### *Sample*

The 192 twin pairs (MZ males = 53, MZ females = 59, DZ males = 40, DZ females = 40) participating in this study were part of a population-based sample of 448 MZ and same-sex DZ twin pairs from the greater Montreal area who were recruited at birth between November 1995 and July 1998. Zygosity was assessed at 18 months based on physical resemblance via the Zygosity Questionnaire for Young Twins (Goldsmith, 1991). For a subsample of these same-sex twin pairs ( $n = 123$ ), a DNA sample was evaluated with respect to

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