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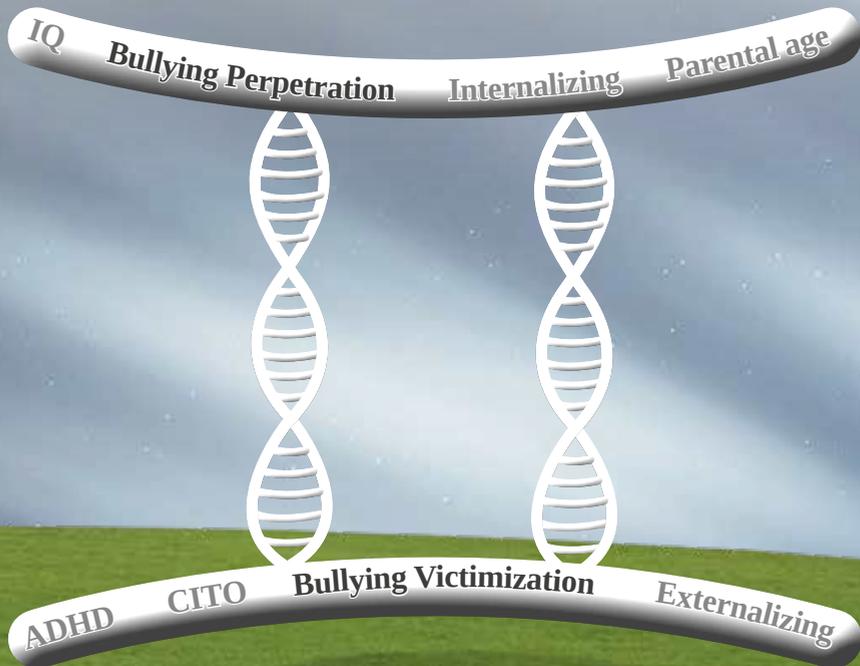
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Chapter 2

Bullying and Victimization: *the Effect of Close Companionship*



This chapter is based on:

Veldkamp, S. A.M., van Bergen, E., de Zeeuw, E. L.,
Van Beijsterveldt, C. E., Boomsma, D. I., & Bartels, M. (2017).
Bullying and victimization: The effect of close companionship.
Twin Research and Human Genetics, 20 (1), 19-27.

Abstract

Peer bullying and victimization is a widespread phenomenon among school-age children and can have detrimental effects on the development of children. To examine whether having a close companion during childhood increases or decreases risk of victimization and bullying this study compared twins to singleton children. A large group of twins ($N=9,909$) were included who were compared to their related non-twin siblings ($N=1,534$) aged 7-12 from the Netherlands Twin Register, thus creating optimal matching between twins and non-twins. Bullying and victimization were each based on a four-item scale filled out by their teachers. Prevalence rates for either bullying or victimization did not differ between twins and singletons. In total, in the past couple of months 36% of children bullied peers moderately to severely, and 35% suffered moderately to severely from victimization. Boys were more likely to bully and were more prone to become a victim than girls. The most notable finding is that female twin pairs placed together in the same classroom did not bully more often, but were victimized less often, thus pointing to a protective effect of having a close companion in the classroom.



Introduction

Peer bullying, a widespread phenomenon among school-age children, can have detrimental consequences on childhood development. Both bullies and victims of bullying suffer more from a variety of problems than their uninvolved peers, including psychosomatic problems (Gini & Pozzoli, 2009), low self-esteem, anxiety, depression, loneliness, and low social self-concept (Hawker & Boulton, 2000). Consequently, this topic has attracted a lot of attention from educational practitioners, mental health services, and academics. This study compares the prevalence rates of bullying and victimization in twins and singletons to learn something about the potentially protective effects of having a close peer companion during childhood.

It still remains an open question whether children with a close peer companion, e.g., twins, are at higher, lower, or similar risk for bullying and victimization. One might, on the one hand, think that these strong companionship dyads are more vulnerable to be victimized than singletons. For example, Hay and Preedy (2006) suggest that the strong relationship in twins might restrict the interaction with other children. Research indeed showed that twins show less prosocial behavior than singletons when they play with an unfamiliar peer (DiLalla, 2006), which could make twins more often the target of peer victimization. On the other hand, it is well known that the presence of friends protect children from being bullied (Hodges, Boivin, Vitaro & Bukowski, 1999; Goldbaum, Craig, Pepler & Connolly, 2003) and it seems that sibling relationships provide protection against peer bullying as well (Lamarche et al., 2006).

To our knowledge, only three studies have been carried out to detect twin-singleton differences and all three only looked at victimization (Barnes & Boutwell, 2013; Oshima et al., 2010; Weissenberg, Landau & Madgar, 2007). The results of these studies are contradictory. Barnes and Boutwell (2013) found that singletons are at higher risk, while Weissenberg, Landau and Madgar (2007) found the opposite effect, and Oshima et al. (2010) reported no effect at all. It should be noted that all these studies were based on unrelated singletons, meaning that the twin and singleton samples may differ on important family-background factors, which hampers twin-singleton comparisons. Furthermore, the latter two studies suffered from low power ($N = 341$ and $N = 72$, respectively). In contrast, we employed a large sample ($N \approx 10,000$) of twins and their non-twin siblings, making them closely matched on family background. Importantly, the three previous studies solely focused on victimization. Our study is the first to examine twin-singleton differences in bullying as well.



For bullying, we might speculate that twins are more involved than singletons. Twins have a pal with whom they could bully together, which is not the case for singletons.

Questions also remain about whether bullying in twins depends on twin-specific characteristics, such as the pair's zygosity and gender composition. Studies so far have shown no effect of zygosity on the proportion of bullies and victims in twins (e.g. Ball et al., 2008; Brendgen et al., 2008; Lamarche et al., 2007; Shakoor et al., 2015). However, it is still unknown whether the prevalence of bullying is affected by the gender composition of the pair (same-gender or mixed gender) and whether this effect changes as children age. Given that children increasingly play with same-sex peers (Rose & Rudolph, 2006), it might be hypothesized that the effect of gender composition is absent in the beginning and is present at the end of primary school.

All the potential twin-specific influences discussed so far are not malleable, but whether a twin pair attends the same or different classrooms is usually a choice. Hence, an important question for education is whether the risk of bullying in twins is related to whether or not they attend the same classroom, and whether that effect differs for monozygotic (MZ) and dizygotic (DZ) twins. The previously mentioned effects for twins may be more pronounced for twin pairs attending same classrooms. Twins in the same classroom always have their close relative by their side who can give them support and can protect them from being bullied. Classroom-sharing might therefore have a protective effect regarding victimization. We hypothesize that this effect might be stronger for MZ twins, since they tend to be more attached to each other than are DZ twins (Tancredy & Fraley, 2006). There is one relatively small study so far that has addressed this classroom-sharing question, suggesting that class-sharing might protect against victimization (Lamarche et al., 2006). In the current study, this previous finding was tested in a 20 times larger sample to overcome power issues. Classroom sharing might also affect the proportion of bullies, because twins in same classrooms can bully classmates together. To our knowledge, previous research has not addressed this issue. This study, therefore, tested classroom-sharing effects in bullying as well.

In previous research, some non-twin specific characteristics have been tested, namely gender and age. Most studies show that boys are more likely to bully than girls (e.g. Bowes et al., 2013; Kokkinos & Antoniadou, 2013; Von Marées & Petermann, 2010). An explanation why boys are more prone to be bullies than girls, is that they are generally more aggressive. Aggression is the overarching concept of which bullying is a subset (Griffin & Gross, 2004).

For victimization findings are less consistent. There is also no agreement about the trend of bullying and victimization during primary school. Some studies show that the prevalence rate of bullying rises as children age (Atik & Güneri, 2013), while others show the opposite or no clear effects at all (e.g. Camodeca, Goossens, Terwogt & Schuengel, 2002; Pellegrini & Long, 2002).

Firstly, the current study investigated whether twins are at higher, lower, or similar risk compared to their non-twin siblings for both bullying and victimization. Secondly, this study tested whether the risk for bullying and victimization differs for MZ versus DZ twins, same-sex versus opposite-sex twins, and twins attending the same versus separate classes. Meanwhile, age and gender effects were investigated. Thirdly, it explored whether a possible classroom effect differs for MZ and DZ twins and whether the effect of gender composition changes over time.

Method

Participants

The current study used participants of the Netherlands Twin Register (NTR; Beijsterveldt et al., 2013). The NTR is established by the Department of Biological Psychology at the Vrije Universiteit Amsterdam. The reported project was approved by the medical ethical committee of the Vrije Universiteit Amsterdam (NTR/25-05-2007). Parents of the twins aged 7, 9/10 and 12 are asked for their consent to approach the teachers of the twins and their non-twin siblings with a survey. The survey for the primary school teachers includes items on bullying and victimization since 2010. The current study includes data collected between 2010 and 2015. A subset of the final sample of twins and singletons had data on two (twins: $N=1,579$ individuals; siblings: $N=162$) or three (twins: $N=92$ individuals; siblings: $N=1$) time points due to the longitudinal data collection protocol. Multiple time points were included as multiple cases, while statistically controlling for their non-independence (see section Statistical Analyses).

The twins and siblings were born between 1997 and 2008. The following figures refer to number of data points, not individuals. Surveys of twins were excluded if twin zygosity was unknown ($N=193$), if they were filled out by someone other than the regular teacher ($N=81$), if familiarity with the student was below average ($N=74$), if the survey was filled out by the same teacher while the twins were in separate classes ($N=11$), or if twin-pairs attending the same class were rated by different teachers ($N=108$). This resulted in a total twin-sample of 10,063 cases for the calculation of bullying and victimization scores. This sample included mostly cases for twin pairs for whom data was available for both twins ($N=4,337$ pairs).





Incomplete data ($N=1,389$) were mostly due to only one of the teachers returning the survey (when twins were in separate classes, $N=1,230$). In addition, sibling data ($N=1,534$) were included in order to compare the prevalence rates of bullying and victimization for twins and singletons. Subsequently, surveys were excluded when there were more than two missing values on the bullying and victimization scale, described in the measurement section ($N=167$; $N=154$, respectively). This resulted in a total sample of 9,896 cases for bullying and 9,909 cases for victimization. Only a few twins ($N=73$) and siblings ($N=10$) had a missing value on one of the traits. The age of the twins ranged from 6.52 to 12.94 years ($M=9.49$, $SD=2.01$), for the siblings this was 4.68-13.43 ($M=9.99$, $SD=1.67$).

Measures

Bullying and victimization were measured by four items each, scored on a five-point scale: from 0 (*never*), 1 (*once or twice*), 2 (*two or three times a month*), 3 (*about once a week*) to 4 (*several times a week*). The items for victimization assessed 1) “how often has the child been victimized in the past couple of months? (in general)”, 2) “how often has the child been teased, laughed at, or called names in the past couple of months? (verbal victimization)”; 3) “how often has the child been physically victimized, such as being hit, kicked and pushed in the past couple of months? (physical victimization)”; and 4) “how often has the child been excluded by other children, ignored, or have other students spread false rumors? (relational victimization)”. Bullying was assessed with the same items, but in the perpetration form (see Jansen et al., 2012). The total score of both phenotypes could range from 0 to 16.

The reliability of the questions was good for both bullying ($\alpha = .84$) and victimization ($\alpha = .80$). Sum scores were computed when there was at most one missing item for a scale. Other missing items were imputed by the rounded averaged-item score of the scale for that child. The sum scores had an “L”-shaped distribution, which was divided into three categories to determine the prevalence rates of bullying and victimization. The first category for both bullying and victimization was defined by a sum score of 0 and was labeled as “never bullied/was never victimized”. The second category was defined by a sum score of 1 or 2, ranging from (very) mild to moderately bullied/victimized and was labeled as “moderately bullied/was moderately victimized”. The last category was defined by a score of at least 3 and ranged from substantial to very severe, labeled as “severely bullied/was severely victimized”. A score of 3 means that someone scored “once a week” on one of the four items. In subsequent statistical analyses, raw item data was used to avoid bias in parameter estimates due to non-normality of the sum scores. The four items for bullying and victimization were combined into factor-scores for each child.

Simultaneously, the factorial level of the model was used to explain the effects of our predictors on bullying and victimization.

Statistical Analyses

Data were prepared in the statistical software R, version 3.2.0 (R core team, 2015) and analyzed in Mplus version 6 (Muthén & Muthén, 1998-2012). To accommodate multiple testing, we used adjusted p-values according to the Holm-Bonferroni method (Holm, 1979). This method is a less strict correction for multiple testing than the Bonferroni method. It is a sequential procedure that uses a less strict rejection criterion for each subsequent comparison to reduce the Type II (false negative) errors. Type II errors arise from decreasing Type I errors in multiple testing.

Twins and siblings came from the same family and thus were well-matched for confounders. To correct for non-independent observations, which results in underestimated standard errors when not taken into account, the analyses were corrected by using tests based on the sandwich or Huber/White variance estimator (Williams, 2000). The subset of children that had data on multiple time points was also be used in the analyses, since the sandwich variance estimator also corrected for this dependency.

The statistical analyses included descriptive statistics on prevalence rates for the total sample, as well as for twins versus singletons, boys versus girls, MZ twins versus DZ twins, and twins attending same versus separate classrooms. Subsequently, main and interaction effects were statistically tested.

Main analyses

To test for differences in prevalence rates for the different subgroups, a regression was performed. First, it was tested whether twins are at higher, lower or similar risk compared to their non-twin siblings for both bullying and victimization.

Second, it was tested whether the risk for bullying and victimization differs for MZ and DZ twins, same-sex versus opposite sex-twins, and whether the risk is lower if twins attend the same or separate classrooms. At the same time, age and gender effects were investigated.

The second model included the main effects of age (both linear and curvilinear), classroom sharing, gender, and zygosity.



One variable that indicates whether the twins are of same- or opposite-sex was added as a covariate to correct for confounding gender effects in the zygosity variable, as DZ pairs can and MZ pairs cannot be of mixed genders. The age predictor variables in the model were entered as mean-centered continuous variables, while the other variables were entered as dichotomous variables.



In previous research, it has been shown that classroom assignment is associated with Social Economic Status (SES) and externalizing problems (van Leeuwen, van den Berg, van Beijsterveldt & Boomsma., 2005). If an effect of classroom sharing were to be found, the model would be extended with the possible confounders SES and externalizing- and internalizing problems to see whether the outcome changes. Data on these variables at age 3, i.e. before children went to school, are present for two-thirds of our full sample (see van Leeuwen et al. (2005) for measurement details).

Interaction Analyses

If a classroom-sharing effect were to be found, a simplified model would be fitted to test whether the effect of classroom sharing differs for being a girl-girl, boy-boy, or opposite-sex twins. To test this interaction effect, the covariates gender composition (same-sex versus opposite-sex), gender, and zygosity were deleted from the main model to test this interaction effect fairly. In addition, the variable that specifies the type of twin pair was added as two dummy variables in the two interaction terms with classroom placement. The first dummy variable was coded 1 for girl-girl twins, and the second coded 1 for opposite-sex twins, leaving the boy-boy twin pairs to represent the reference group.

In the follow-up analyses, we first examined whether gender composition (same-sex versus opposite-sex) interacts with age in predicting bullying and victimization. By adding this interaction term, it was tested whether the effect of being a same-sex versus opposite-sex twin on bullying and victimization changes as children age. In addition, it was tested whether the effect of attending the same versus separate classrooms was different for MZ and DZ twins. The main effects were still included in the model to correct for possible confounding effects.

Results

Descriptive statistics

Table 1 presents the prevalence rates of bullying and victimization for the total sample, for twins versus singletons, boys versus girls, MZ versus DZ twins, and twins in same versus separate classes. As can be seen, 36.2% of the total sample (including twins and siblings) has bullied others, while 34.8% has been victimized in the past couple of months.

Table 1. Prevalence Rates of Bullying and Victimization

	Bullying				Victimization			
	N	Never (%)	Moderate (%)	Severe (%)	N	Never (%)	Moderate (%)	Severe (%)
Total sample	11,430	63.8	20.3	15.9	11,441	65.2	22.2	12.6
Twins vs. Sibs								
Twins	9,896	63.7	20.2	16.1	9,909	65.4	22.0	12.6
Singleton	1,534	64.1	21.1	14.8	1,532	63.6	23.3	13.1
Gender								
Boys	4,985	56.2	22.9	20.9	4,988	62.2	23.1	14.6
Girls	4,911	71.4	17.5	11.2	4,921	68.7	20.8	10.5
Zygoty								
MZ	3,725	65.2	19.3	15.5	3,735	67.3	20.9	11.8
DZ	6,171	62.8	20.7	16.4	6,174	64.3	22.7	13.0
Class								
Same class	5,111	64.5	19.7	15.8	5,116	68.1	20.6	11.3
Different class	4,677	62.8	20.8	16.4	4,684	62.2	23.7	14.1

Main analyses

Twins did not differ significantly from singletons with respect to bullying ($\beta = -.015$, $SE = .017$, $p = .384$) and victimization ($\beta = .018$, $SE = .018$, $p = .313$).

Table 2 shows that there was a significant main effect of gender indicating that boys were more likely to bully than girls. Also, a curvilinear age effect was found. The negative beta of the quadratic term implies that the curve for the age effect regarding bullying has an inverted U-shape. The raw data showed that bullying peaks around 9 years old. No other predictors approached significance.

Table 2. Influences of the (Non) Twin-Specific Factors on Bullying ($N=9,788$)^a

Covariates	Coding		β	SE	p-value	α -level ^b
	0	1				
Gender	Male	Female	-.460	.030	<.001	.008
Zygosity	MZ	DZ	.020	.038	.601	
Class	Different	Same	-.030	.030	.315	
Same-sex	Same	Oposite	.055	.037	.139	.013 (NS)
Age	Continuous variable		.008	.008	.284	
Age squared	Continuous variable		-.018	.004	<.001	0.10

Note. SE = Standard Error. OR = Odds Ratio. NS = not significant.

^a $N=108$ missing values on class-variable.

^b Corrected α -level according to the Holm- Bonferroni method (Holm, 1979).

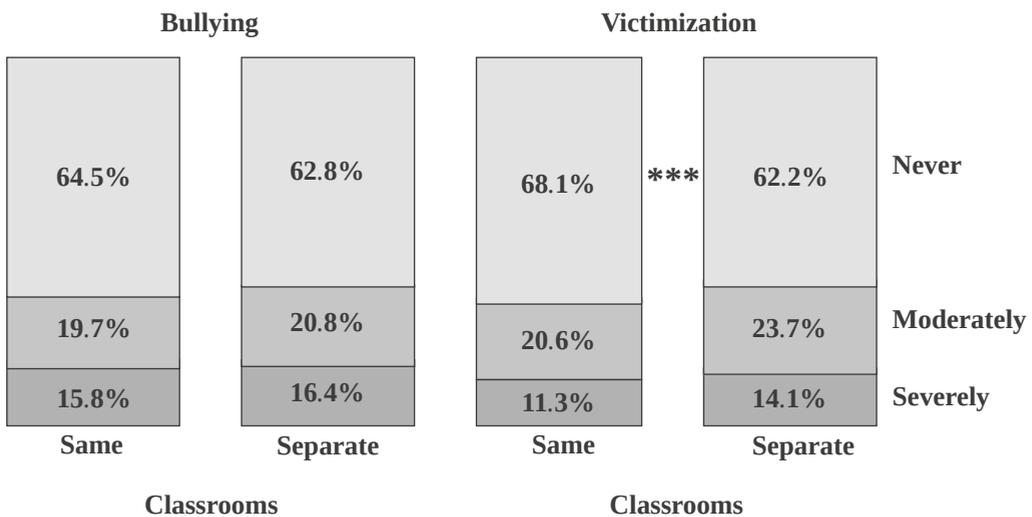


Figure 1. Prevalence rates of bullying and victimization for twins attending same and different classes. Twins in the same classroom do not bully more often (left panel), but are bullied less often than those in separate classrooms (right panel). Follow-up analyses showed that this effect only holds for girl-girl twin pairs.

Table 3 shows that for victimization both gender and classroom-sharing appeared to be significant predictors. Boys were more often victim than girls.

Table 3. Influences of the (Non) Twin-Specific Factors on Victimizationg ($N=9,800$)^a

Covariates	Coding		β	SE	p-value	α -level ^b
	0	1				
Gender	Male	Female	-.236	.029	<.001	.008
Zygoty	MZ	DZ	.052	.037	.164	
Class	Different	Same	-.128	.030	<.001	.010
Same-sex	Same	Oposite	.069	.037	.059	.017 (NS)
Age	Continuous variable		.006	.008	.430	
Age squared	Continuous variable		-.028	.005	<.001	0.13

Note. SE = Standard Error. OR = Odds Ratio. NS = not significant.

^a $N=109$ missing values on class-variable.

^b Corrected α -level according to the Holm- Bonferroni method (Holm, 1979).

As for bullying, a curvilinear age effect was also found for victimization. The negative beta of the quadratic term implies that the curve for the age effect regarding victimization has an inverted U-shape. The raw data showed that the score peaked around age 9, so this pattern for victimization mirrors that of bullying. With respect to the twin-specific factors, the significant main effect of classroom sharing indicates that twins attending the same class were less often victim than those in separate classes. This effect is shown in Figure 1. Due to a possible non-random assignment of twins to same or separate classrooms, we redid the analysis taking SES and preexisting differences in externalizing-, and internalizing problems into account. After controlling for these possible confounders, classroom placement still had an effect of similar magnitude ($\beta = -.138$, $SE = .036$, $p < .001$). The other predictors, zygoty and gender composition, were not significant. In the follow-up analysis, we explored possible interaction effects.

Interaction results

The subsequent analysis showed that for boy-boy twins there is no effect of classroom sharing ($\beta = -.002$, $SE = .044$, $p = .967$). Compared to boy-boy twins, the effect of classroom sharing does not differ for opposite sex twins ($\beta = -.062$, $SE = .055$, $p = .261$), but does for girl-girl twins ($\beta = -.335$, $SE = .057$, $p < .001$), indicating that the classroom effect only holds for girl-girl twin pairs. This effect can also be seen in Table 4.

The second interaction term showed that the effect of gender decomposition (same versus opposite) does not change as children age with respect to bullying ($\beta = -.019$, $SE = .016$, $p = .216$) and victimization ($\beta = -.011$, $SE = .016$, $p = .475$). The third interaction term showed that the effect of classroom sharing does not differ for MZ and DZ twins for bullying ($\beta = -.090$, $SE = .064$, $p = .159$) and victimization ($\beta = -.019$, $SE = .064$, $p = .772$).

Table 4. Victimization Rates for Girl-Girl, Boy-Boy and Opposite Sex Twin Pairs in Same versus Separate Classrooms

		Victimization		
		Never (%)	Moderate (%)	Severe (%)
Girl-girl	Separate	66.5	22.8	10.7
	Same	73.8	18.1	8.1
Boy-boy	Separate	60.0	24.1	15.8
	Same	63.8	22.5	13.7
Opposite sex	Separate	60.1	24.2	15.7
	Same	66.5	21.4	12.1

Discussion

The goal of this study was to advance knowledge about protective and risk factors for bullying and victimization. By addressing important questions about twin-singleton differences and the influences of twin-specific characteristics we examined whether having a close companion during childhood increases or decreases risk of victimization and bullying. We report no twin-singleton difference, but do show that girl-girl twins are bullied less often when placed in the same classroom. Gender composition of the twin pair (same versus opposite sex), and twins' zygosity (MZ versus DZ), had no effect.

Our finding that twins are not at a higher or lower risk than singletons for bullying and victimization is in agreement with one of the three studies about twin-singleton differences regarding victimization (Oshima et al., 2010). Our finding, however, is inconsistent with the results of Weissenberg, Landau and Madgar (2007) and Barnes and Boutwell (2013), which showed higher risk and lower risk for twin respectively. The comparisons between the studies, though, is hampered by the use of unrelated singletons, which do not match on important family background factors. The first two studies (Oshima et al., 2010; Weissenberg, Landau & Madgar, 2007) had power problems as well.

Our study reduces both limitations by using large groups of twins and their non-twin siblings. Given the large sample size and the non-significant result, it can be concluded that no twin-singleton differences exist in prevalence rates regarding bullying and victimization. This finding supports the generalizability of twin studies regarding bullying and victimization to the non-twin population.

We, furthermore, showed that boys were significantly more likely to bully and to be victimized than girls and that the risk for both bullying and victimization peaks around 8-9 years. With respect to gender, this result is in line with the body of the literature on bullies (e.g. Bowes et al., 2013) and victims (e.g. Sentse, Kretschmer & Salmivalli, 2015; Takizawa, Maughan & Arseneault, 2014). For age, the existing literature was less clear. Some studies showed that the victimization decreases as children age (e.g. Sapouna, 2008), while others showed the opposite (Atik & Güneri, 2013). Bullying seems to be more stable. The current study, however, found a significant curvilinear age effect for both traits, showing that the risk for both traits peaks around 8-9 years. Although the effect of gender is large, the effect of age is rather small.

The risk for bullying and victimization is not influenced by twins' zygosity and the gender composition of the twin pairs. This is in line with previous studies that show no effect of twins' zygosity on involvement in bullying; either as bully or victim (e.g. Ball et al., 2008). For traits related to bullying, such as reactive and proactive aggression, also no zygosity differences exist (Lamarche et al., 2007). Regarding gender composition, Lamarche et al. (2006) found that 6-year-old twins of opposite sex are bullied more often. Our results, however, suggested that for both bullying and victimization same- versus opposite sex twins do not differ. Their study included 246 twin pairs, while we had the advantage of a nearly 20 times larger sample. In addition, they did not correct for multiple testing. For related phenotypes such as social independence, friendship, and behavior problems, no effect of gender composition has been found as well (Laffey-Ardley & Thorpe, 2006), which supports our results.

We hypothesized that the effect of gender composition is absent in the beginning and present at the end of primary school, given that children increasingly play with same-sex peers (Rose & Rudolph, 2006). We, however, found no interaction and concluded that the effect of gender composition does not change as children age.

The most notable finding of our study is that twin pairs that attend the same classroom do not bully more or less than separated pairs, but they seem to be less victimized.





This effect is restricted to girl-girl twin pairs, independent of zygosity, as it does not hold for boy-boy twin pairs or twin pairs of opposite sex. We know of only one study that investigated classroom effects regarding victimization (Lamarche et al., 2006). This study seemed to indicate that classroom sharing has a protective effect against victimization, however, their study and the effect size of the classroom effect were probably too small to reach significance. With our large sample, the difference in victimization scores did reach significance. The finding that girl-girl twins in the same classroom are bullied less often seems to indicate that classroom sharing has a protective effect for victimization. DiLalla and Mullineaux (2008) showed a protective effect of classroom sharing on peer problems as well; their peer-problems scale included one item (out of 4 items) about victimization. The protective effect of classroom sharing on victimization might be explained by, for instance, children's self-esteem. It is known that victims of bullying often suffer from low self-esteem (O'Moore & Kirkham, 2001). Girl twins in the same classroom might feel more self-confident by having a sister by their side, and are consequently less vulnerable for bullies. Another possible explanation might be the existence of sibling gender composition differences in the sibling relationship quality. The sibling relationship quality is best for girl-girl dyads (Buist, 2010), which might explain why the protective classroom effect is only present for girl-girl twin pairs. It is known that MZ twins are more likely than DZ twins to rate their co-twin as their best-friend (Foy, Vernon & Jang, 2001), but apparently this did not lead to a more pronounced classroom effect for MZ twins.

The result that girl-girl twins in the same classroom tend to be less victimized should be interpreted against the background of non-random classroom assignment. For example, the class assignment could have been influenced by preexisting cognitive, emotional, behavioral differences between the twins or other external factors. Indeed, van Leeuwen et al. (2005) showed that Dutch twin pairs from high SES families are more often separated. In addition, they showed that classroom assignment in the Netherlands is based on early childhood externalizing but not internalizing symptoms. However, after controlling for SES and preexisting differences in externalizing-, and internalizing problems at age 3, we showed that classroom sharing still had a protective effect of similar magnitude. This indicates that the protective effect of classroom sharing on victimization holds when taking factors linked to non-random classroom assignment into account.

To further investigate classroom assignment, we looked at data of a small subsample ($N=66$ twin pairs) that answered the question "Who decided to separate the twins?". The answer options "school", "parents" and "parents in agreement with the school" were each chosen by one-third of the sample.

This indicates that assignment of twins to same or separate classrooms is not systematic. We can conclude that the decision is at least not entirely based on child specific characteristics.

Notably, from all twin-specific factors discussed, classroom sharing is the only malleable factor. Classroom sharing is a malleable factor for schools that are large enough to have parallel year groups. Schools may have a set policy regarding classroom placement of twins (Saudino, Ronald & Plomin, 2005), depending on national context and beliefs of the principle and teachers. Nevertheless, most young twins and their parents prefer not to be separated (Gordon, 2015; Staton, Thorpe, Thompson & Danby, 2012). The protective effect of classroom sharing regarding victimization for girl-girl twins should be taken into account when twins enter primary school. We, furthermore, showed that twins in the same classroom do not bully more often. This is in line with our earlier findings that twins in the same classroom do not differ from twins in separate classrooms for other phenotypes as well, such as academic achievement, problem behavior (van Leeuwen et al., 2005; Polderman et al., 2010), and academic motivation (Kovas et al., 2015). Taken together, the placement of twins in the same classroom might be beneficial regarding victimization and is not harmful for other important behavioral outcomes.

While interpreting the results of our study it is important to acknowledge that bullying and victimization is based on teacher ratings and thus applies to the daily school setting. It is known that teachers do not necessarily rate bullying behavior in the same way as parents and children themselves do (Rønning et al., 2009), with agreement correlation in the range of .18 - .19 for bullying and .11 - .22 for victimization. Using teacher reported data is, however, not necessarily a disadvantage, since the view of teachers might be more objective.

Future research might investigate the extent to which twin separation at school entry is random. A true Randomized Control Trial (RCT) in which researchers decide whether a twin pair will be separated or not will face ethical resistance. We can, however, ask the teacher whether their school have a set policy regarding classroom assignment of twins. For the subset of schools that are large enough to have parallel year groups and that have set policies, whether a twin pair attends the same or different classes ought not to be related to child characteristics. Therefore, such a prospective study comes closer to a randomized trial. Follow-up research could also focus on the protective effect of these girl-girl twins attending same classrooms and try to uncover the underlying mechanisms. To speculate, this protective effect might be due to girl-girl twins feeling more self-confident when studying in the same classroom, which might not be the case for boy-boy and opposite-sex twins.



It is well known that more self-confidence makes children less prone to be a victim of peer bullying. Although further research is needed to elucidate the mechanisms, this finding in itself offers an important new perspective on the question if twin pairs should be separated or not.

To conclude, we demonstrate that assigning twins to the same classroom seems to have a protective effect for girl-girl twins, but not for boy-boy or opposite sex twins. Importantly, girl-girl twins in the same classroom do not bully more often. Our result indicates that it might be beneficial to keep girl-girl twins together when entering primary school.

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