A Survival Analysis of Adolescent Friendships: The Downside of Dissimilarity

Amy C. Hartl[1], Brett Laursen[1], and Antonius H. N. Cillessen[2]

[1]Department of Psychology, Florida Atlantic University, and [2]Behavioural Science Institute,
Radboud University

Abstract

The present study examined whether adolescent friendships dissolve because of characteristics of friends, differences between friends, or both. Participants were 410 adolescents (201 boys, 209 girls; mean age = 13.20 years) who reported a total of 573 reciprocated friendships that originated in the seventh grade. We conducted discrete-time survival analyses, in which peer nominations and teacher ratings collected in Grade 7 predicted the occurrence and timing of friendship dissolution across Grades 8 to 12. Grade 7 individual characteristics were unrelated to friendship stability, but Grade 7 differences in sex, peer acceptance, physical aggression, and school competence predicted subsequent friendship dissolution. The findings suggest that compatibility is a function of similarity between friends rather than the presence or absence of a particular trait.

No one likes to lose a friend. For adolescents navigating autonomy from the family, the dissolution of a friendship can be especially challenging (Hartup, 1993). But why do friendships end? High levels of an undesirable characteristic, such as aggression, threaten friendships (Piehler & Dishion, 2007). Dissimilarity also anticipates dissolution (Poulin & Chan, 2010). Previous studies have focused on either levels of individual characteristics or differences between friends (referred to henceforth as *dyadic differences*), which makes it difficult to draw firm conclusions about adolescent friendship dissolution because the two are confounded: The largest dyadic differences occur when individual characteristics are most pronounced (e.g., those with the highest levels of aggression are also the least similar to the bulk of their peers, whose scores fall in the normal range of the distribution). In the present study, we compared dyadic differences in school-related behaviors with individual levels of each behavior to predict the occurrence and timing of the dissolution of friendships originating in middle school.

Most early adolescents have at least one friend, and most of these friendships eventually end (Bukowski, Motzoi, & Meyer, 2009). Roughly half of middle school friendships do not last an academic year (A. Bowker, 2004). The loss can be painful, even debilitating (J. C. Bowker, 2011). Middle school adolescents are especially vulnerable to problems arising from the loss of a friend, because cognitive and emotional changes elevate the significance of friendships at the same time that growing independence from parents heightens interconnections between friends (Laursen & Collins, 2009).

The voluntary nature of friendships allows participants to leave unsatisfactory relationships with few countervailing external pressures. As is the case in voluntary romantic relationships, dissatisfaction with friends is assumed to

Corresponding Author:
Brett Laursen, Department of Psychology, Florida Atlantic University,
3200 College Ave., Fort Lauderdale, FL 33314
E-mail: laursen@fau.edu

arise from an imbalance of relationship rewards and costs (Levinger, 1979). Dissatisfaction may have origins in dissimilarity or in the presence of one or more undesirable attributes in a partner. We review each in turn.

Dissimilarity as a Source of Friendship Dissolution

Evidence for homophily, the tendency for friends to resemble one another (Lazarsfeld & Merton, 1954), suggests that similarity is important for establishing and maintaining friendships. Dissimilarity propagates conflict and negative affect (Laursen, Hartup, & Koplas, 1996). In social-exchange terms (Thibaut & Kelley, 1959), dissimilarity threatens perceptions that relationship participants share equally in the benefits of affiliation. Within a friendship, one partner is apt to bear more costs (e.g., the less aggressive friend) or accrue more rewards (e.g., the less scholastically able friend) than the other. Thus, differences foster negativity and create inequities, both of which take a toll on relationship satisfaction. Dissatisfied friends are inclined to find new, more appealing friends.

Demographic dissimilarity is an important predictor of friendship instability. Mixed-sex and mixed-ethnicity friendships dissolve faster than same-sex and same-ethnicity friendships (e.g., Aboud, Mendelson, & Purdy, 2003). The degree to which friends differ in aggression and victimization (e.g., Ellis & Zarbatany, 2007) also predicts friendship dissolution, as do differences in school achievement (e.g., Flashman, 2012). No studies have compared the relative importance of dyadic difference variables, however, so their unique contributions to adolescent friendship dissolution are unclear.

Individual Characteristics as a Source of Friendship Dissolution

A similarly strong case can be made for the argument that undesirable characteristics place individuals at risk for relationship instability. Poor psychosocial adjustment interferes with friendship maintenance. Adolescents with emotional and behavioral problems are prone to affectively charged interactions, which increases the costs of affiliation (Piehler & Dishion, 2007). Adolescents with poor social skills may neither understand social cues provided by friends nor appreciate the rules of social exchange that govern their interactions (Laursen & Hartup, 2002). As a consequence, support may not be offered when it is needed and expected. Characteristics that make it difficult to initiate and maintain friendships also make it difficult to be tolerated as a friend. Poorly regulated individuals may impulsively break off relationships, but it is probably more likely that their partners

decide to withdraw from the relationship (Hartup & Stevens, 1997).

There is evidence that individual characteristics forecast adolescent friendship stability. Girls have less stable friendships than boys (Benenson & Christakos, 2003). Youth who are aggressive, victimized, and antisocial (Dishion, Andrews, & Crosby, 1995; Ellis & Zarbatany, 2007) and youth who have poor grades (Flashman, 2012) all tend to have short-lived friendships, while high-status prosocial peers tend to have the most stable friendships (J. C. Bowker, Rubin, Burgess, Booth-LaForce, & Rose-Krasnor, 2006). As with dissimilarity, no studies have simultaneously examined the unique contributions that different individual characteristics make to friendship stability.

Using Survival Analyses to Identify Sources of Relationship Dissolution

We looked to the marital literature for guidance as to how multiple, correlated predictors can be used to predict relationship dissolution. Survival analyses (also known as event-history analyses) hold several advantages over alternative strategies. Discrete-time survival analyses measure the occurrence and timing of events through an array of logistic regressions, assessing dissolution at multiple time points. In survival analyses, all relationships start at the same time, so new relationships are not confounded with existing relationships. Survival analyses work best when there is heterogeneity in the timing of relationship dissolution because the procedure is designed to identify events spread across more than one time lag (Graham, Willett, & Singer, 2013).

In the present study, discrete-time survival analysis was used to examine the occurrence and timing of adolescent friendship dissolution. All friendships originated in the seventh grade, to maximize the number of middle school friendships lasting more than 1 year. Friendships that begin in the sixth grade are highly unstable, because primary school friendship groups are transformed across the first year of middle school (Cantin & Boivin, 2004). Friendships that begin in the eighth grade are highly unstable because most new friendships do not survive the transition into high school (Eccles, Lord, & Buchanan, 1996).

The study is unique in that it was designed to determine the relative contribution of friend dissimilarity and individual attributes in the prediction of adolescent friendship dissolution. Predictor variables, identified from previous studies of friendship instability, represent attributes associated with interpersonal success and socioemotional difficulties. Sex, age, ethnicity, peer acceptance (being liked), peer rejection (being disliked), leadership,

physical aggression (bodily harm), relational aggression (emotional or interpersonal harm), peer victimization, and school competence all have been found to predict friendship dissolution, either as individual traits or as differences between friends (Poulin & Chan, 2010). We examined the potential role of sex as a moderator of the predictors of friendship dissolution, given pervasive findings of sex differences in mean levels of social and academic adjustment.

Method

Participants

Participants were drawn from a longitudinal study of students who attended public schools in lower-middle and middle-class neighborhoods in a small northeastern U.S. city. Only adolescents who identified at least one new, reciprocated friendship in the seventh grade were included. A total of 410 adolescents (201 boys, 209 girls), ranging from 12 to 15 years old ($M = 13.20$, $SD = 0.46$), met this criterion. Of these participants, 72.4% ($n = 297$) identified themselves as European American, 16.1% ($n = 66$) as African American, 10.0% ($n = 41$) as Latin American, and 1.5% ($n = 6$) as Asian American.

Procedure

Passive consent procedures, consistent with school-system policy, were employed to ensure adequate network coverage for nomination data. Letters were sent to the parents of all students in each grade. Parents who did not wish their child to participate returned a form stating such. Less than 1% did so. Child verbal assent was required for participation. All students (including those who did not complete questionnaires) were included in nomination rosters.

Participants attended two middle schools (Grades 6–8), each with about 300 students per grade. Middle schools fed into a single high school (Grades 9–12), which had about 600 students per grade. Research assistants collected data annually in the spring semester, during one 90-min session in a required English class.

Of the four hundred ten 7th-grade students included in this study, 93% ($n = 383$) participated in data collection in the 8th grade, 76% ($n = 311$) participated in the 9th grade, 67% ($n = 275$) participated in the 10th grade, 64% ($n = 262$) participated in the 11th grade, and 59% ($n = 240$) participated in the 12th grade. With one exception, there were no statistically significant differences between students who participated in data collection from 7th to 12th grade and those who did not on any demographic or study variable: Participants who remained in the study in Grades 10, 11, and 12 had higher school-competence

scores than those who did not (odds ratio range = 1.38–1.46, $p < .05$). Most students (71%, $n = 121$) who discontinued participation did so because they changed schools.

Measures

Friendship nominations. Each year, students completed friendship nominations using rosters that included the names of all students in the grade (Cillessen & Mayeux, 2004). Students responded to the question "Who are your best friends?" by circling the number preceding the name. Unlimited same-sex and other-sex nominations were allowed, but self-nominations were not.

Reciprocated friendships originating in Grade 7 were defined as dyads in which both partners nominated one another as friends for the first time in the seventh grade. Of the 597 students in Grade 7, 465 were present on the day of data collection and agreed to participate. Each participant nominated at least one best friend. Of this total, 410 participated in at least one reciprocated friendship that originated in Grade 7. Of those excluded from analyses, 26 were not involved in any reciprocated friendships in the seventh grade, and 29 were involved only in reciprocated friendships that began prior to the seventh grade. Friendships that began prior to the seventh grade were eliminated because survival analyses require the same starting point for all cases. Independent samples t tests and chi-square tests on demographic and study variables did not reveal any differences greater than chance between students included in the analyses and students who were excluded because they did not have a new friend in the seventh grade.

Most students ($n = 308$) were involved in multiple reciprocated friendships, which yielded a total of 573 friendships originating in the seventh grade. The number of reciprocated friendships represents the total number of friendships that a participant reported that originated in the seventh grade (range = 1–11, $M = 2.80$, $SD = 1.71$). Independent samples t tests revealed no statistically significant sex differences in the number of reciprocated friendships that began in the 7th grade.

Friendship dissolution occurred when at least one member of a reciprocated friendship originating in the seventh grade failed to nominate the other as a friend at a later point in time (Cairns, Leung, Buchanan, & Cairns, 1995). Of the 573 friendships that began in the seventh grade, 32 dissolved but were reconstituted at a later time point.

Peer nominations. In the seventh grade, participants completed a peer-nomination inventory using single-item variables drawn from multiple-item indicators with demonstrated validity and reliability (Cillessen & Mayeux, 2004). The participation rate (78%) was well above the

minimum required for valid nomination data (Bukowski, Cillessen, & Velásquez, 2012). For each question, participants received a roster with the names of all students in the grade. Participants circled the number preceding the name of each student who fit the description provided. Unlimited same-sex and other-sex nominations were allowed, but self-nominations were not. Single-item peer nominations are a widely used, valid measure of behavior, because each informant is considered a unique indicator (Bukowski et al., 2012). For each descriptor, the number of peer nominations a student received was summed and standardized using z scores within school.

Peer acceptance describes the number of liked-most nominations received ("Who are the people in your grade you like the most?"). Peer rejection describes the number of liked-least nominations received ("Who are the people in your grade you like the least?"). Additional nominations addressed physical aggression ("Who are the people in your grade that start fights [with], pick on, or tease [others]?"), relational aggression ("Who are the people in your grade that ignore others when mad at them?"), peer victimization ("Who are the people in your grade that get picked on or teased?"), and leadership ("Who are the people in your grade that are leaders?"). Test-retest stability (from Grade 7 to Grade 8) was adequate (rs = .70–.88). Independent samples t tests revealed that, compared with boys, girls exhibited significantly higher levels of peer acceptance, leadership, and relational aggression (ds = 0.24–0.26), and significantly lower levels of physical aggression ($d = -0.25$). There were no statistically significant sex differences in peer rejection or victimization. Compared with boys, girls' friendships were significantly more similar (i.e., less different) in peer acceptance, physical aggression, and victimization (ds = -0.25 to -0.30), and significantly less similar in leadership ($d = 0.26$). There were no statistically significant differences between the friendships of boys and girls in peer rejection or relational aggression.

Teacher-reported school competence. In the seventh grade, teachers rated each participant on a 4-item measure of school competence (e.g., "Does well on tests") taken from the Multidimensional Self-Concept Scale (Bracken, 1992). Items were rated on a scale ranging from 1 (*not at all true*) to 7 (*very true*). Item scores were averaged and z-scored for standardization. Internal reliability was good (α = .87). Independent samples t tests indicated that girls scored significantly higher than boys on school competence ($d = 0.28$).

Plan of analysis

Discrete-time survival analyses were conducted in a latent-variable framework using Mplus (Version 7.12; Muthén & Muthén, 2014). The analyses were designed to

predict the occurrence and timing of the dissolution of friendships originating in the seventh grade from initial characteristics of each member of the dyad and from initial differences between friends on each characteristic.

What is the likelihood of a friendship dissolving during a specific grade? The *hazard curve* depicts the probability that a reciprocated friendship originating in the seventh grade will dissolve at each grade, given that it had not already dissolved. The discrete-time hazard rate describes the conditional probability that a reciprocated friendship originating in the seventh grade will dissolve in a specific grade, given that it did not dissolve in an earlier grade.

What is the likelihood of a friendship continuing to a later grade? The *survival curve* depicts the probability that a reciprocated friendship originating in the seventh grade will continue at each grade. The discrete-time survival rate describes the proportion of reciprocated friendships originating in the seventh grade that continued at each grade.

Model construction followed a four-step procedure. Figure 1 describes a single-class latent class analysis with binary time-specific event indicators that approximate the conventional discrete-time survival analysis (B. Muthén & Masyn, 2005). Five binary time-specific event indicators were included, one for each annual interval from Grades 7 to 12. For each friendship, the event indicator at each annual interval was coded as reciprocated, dissolved, or previously dissolved. Friendships that did not dissolve by the 12th grade were censored (Graham et al., 2013), and all event indicators were coded as reciprocated.

In the first step of model construction, we evaluated the constant hazard assumption to determine whether the probability of friendship dissolution varied across grades. To this end, an unconditional survival model was estimated, in which hazard rates were allowed to vary freely across grades, and a conditional model was estimated, in which the hazard rates were constrained to be equal across grades. A likelihood-ratio test compared the fit of the unconditional and conditional models (Graham et al., 2013). A statistically significant result would indicate that hazard rates were different across grades and should be allowed to vary.

In the second step of model construction, we evaluated the proportionality assumption to determine whether a predictor's effect varied across grades. For each predictor, an unconditional survival model was estimated in which the predictor's effects were allowed to vary freely across grades, and a conditional model was estimated in which the predictor's effects were constrained to be equal across grades. A likelihood-ratio test compared the fit of the conditional and unconditional models. A statistically significant result would indicate that the effects of a predictor differed across grades and should be allowed to vary.
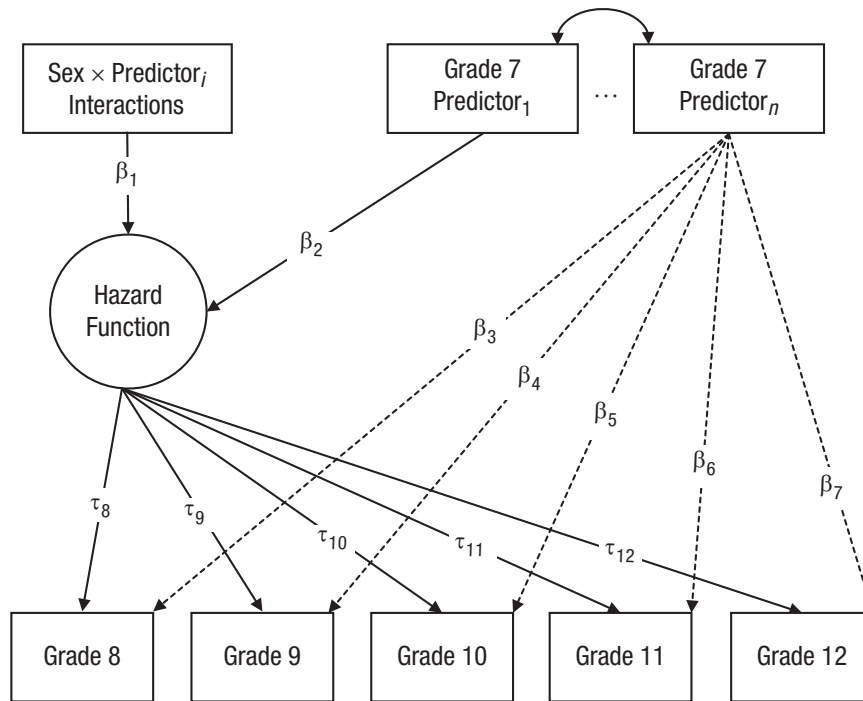
Fig. 1. Measurement model of discrete-time survival analysis with binary time-specific event indicators (Grades 8–12), Grade 7 predictors with time-invariant effects (solid lines) or time-varying effects (dashed lines), and two-way sex-by-predictor interactions. The hazard rate at each grade is $\dfrac{1}{1+e^{\tau X}}$, where τ represents the estimates predicting dissolution from the hazard function, and X represents a grade. The hazard odds ratio of a predictor is $e^{\beta X}$, where β is the log odds ratio of a predictor, and X represents a predictor.

There were two types of predictors: Grade 7 individual characteristics and Grade 7 dyadic difference scores. Individual characteristics included participant scores for sex (0 = male, 1 = female), age (in months), ethnicity (0 = European American, 1 = all others), number of reciprocated friends, peer acceptance, peer rejection, leadership, physical aggression, relational aggression, peer victimization, and school competence. Dyadic difference scores for peer acceptance, peer rejection, leadership, physical aggression, relational aggression, peer victimization, and school competence represent the absolute value of the difference between the *z*-standardized scores of the two reciprocated friends. Dyadic difference scores for age and number of reciprocated friends represent the absolute value of the difference between the raw scores of the two reciprocated friends. Dyadic difference scores for sex were coded as same sex (0; *n* = 499) or different sex (1; *n* = 74). Dyadic difference scores for ethnicity were coded as same ethnicity (0; *n* = 409) or different ethnicity (1; *n* = 164). Table 1 provides descriptive statistics. Table 2 provides correlations among predictors.

In the third step of model construction, we estimated separate models that included either (a) all Grade 7 individual characteristics as predictors or (b) all Grade 7 dyadic difference scores as predictors. The individual-characteristics model included scores for each friend, with their variances, covariances, means, and path estimates constrained to be equal. Likelihood-ratio tests indicated that friends were indistinguishable on each predictor. Figure 1 presents the measurement model. The five annual event indicators (i.e., friendship dissolution at Grades 8–12) were simultaneously regressed on the Grade 7 predictors. Predictors were centered to reduce collinearity. Sex-by-predictor interactions were included in each model to test for sex moderation.

In the fourth step of model construction, we estimated the final model, which included all statistically significant (*p* < .05) predictors from the individual-characteristics model and all statistically significant predictors from the dyadic-difference model estimated in Step 3. Predictors were allowed to covary. For ease of interpretation, results for uncentered predictors are presented here. To compare predictors, we estimated the hazard curve for a hypothetical reference group of same-sex friends in which each member of the dyad has the same score on each predictor (i.e., difference scores equal 0).

Table 1. Means and Standard Deviations for Individual Characteristics and Dyadic Difference Scores at Grade 7

Variable	Individual characteristics		Dyadic difference scores	
	M	SD	M	SD
Sex	.51	.50	.13	.34
Age (months)	170.30	5.52	5.67	4.93
Ethnicity	.72	.45	.29	.45
Number of reciprocated friends	2.80	1.71	2.10	1.75
Peer acceptance	0.15	0.98	0.85	0.77
Peer rejection	−0.04	0.91	0.86	0.83
Leadership	0.10	1.11	0.95	1.29
Physical aggression	−0.04	0.92	0.67	1.05
Relational aggression	0.03	1.00	0.91	0.96
Victimization	−0.07	0.81	0.42	0.78
School competence	−0.01	1.00	0.82	0.70

Note: $N = 410$ participants in 573 friendship dyads. Sex was coded as 0 (male) or 1 (female). Difference in sex was coded as 0 (same sex) or 1 (different sex). Ethnicity was coded as 0 (European American) or 1 (all others). Difference in ethnicity was coded as 0 (same ethnicity) or 1 (different ethnicity). Difference scores for all other variables represent the absolute value of the difference between the scores of both friends in the dyad. Higher values reflect greater dissimilarity. Peer acceptance, peer rejection, leadership, physical aggression, relational aggression, and victimization were standardized using z scores within school. School competence was also z-scored for standardization.

An average of 1.0% (range: 0.0–5.6%) of reports were missing. Little's test revealed that data were missing completely at random, $\chi^2(74) = 87.45$, $p = .14$. Missing data on predictor variables were handled with full-information maximum-likelihood estimation with robust standard errors, which allowed friendships with incomplete data to be included in the models.

The same pattern of statistically significant results emerged in supplemental analyses that (a) excluded reciprocated friendships originating in the seventh grade ($n = 198$) that became unilateral (i.e., only one friend nominated the other) before dissolving (i.e., neither friend nominated the other), (b) included the 29 participants ($n = 33$ friendships) who were involved only in friendships that began prior to the seventh grade, and (c) included the 26 participants ($n = 48$ friendships beginning in the eighth grade) who were not involved in friendships that began in the seventh grade. Results did not change when participants who were outliers on the number of friend nominations were (a) limited to seven friendships (3 standard deviations above the mean) and (b) omitted from analyses.

Results

Hazard and survival curves describing friendship dissolution

Figure 2 depicts the hazard and survival curves. The hazard curve indicates that friendships that started in the 7th grade were at greatest risk for dissolution during the subsequent year (8th-grade hazard rate: 76%). The risk of dissolution was somewhat smaller during the 2nd and 3rd year (9th- and 10th-grade hazard rate: 62% and 64%, respectively), with rates declining during the 4th year (11th-grade hazard rate: 47%) and 5th year (12th-grade hazard rate: 30%). A likelihood-ratio test (Graham et al., 2013) revealed that the hazard rate for friendship dissolution declined significantly over time, $\chi^2(4) = 25.33$, $p < .001$. As a consequence, hazard rates were allowed to vary across grades in subsequent analyses.

The survival curve indicated that fewer than 1 in 4 friendships that started in Grade 7 were maintained across the next school year (8th-grade survival rate: 24%). Fewer than 1 in 10 friendships that started in Grade 7 survived the transition from middle school to high school (9th-grade survival rate: 9%). Only 1% of friendships that began in the 7th grade continued to the 12th grade.

Multivariate survival models predicting adolescent friendship dissolution

Likelihood-ratio tests were used to evaluate the proportionality assumption and determine whether a predictor's effect varied across grades. There were no differences between the conditional and unconditional models for any of the individual characteristics, χ^2s(4) = 1.65–7.98, ps = .09–.80, or dyadic difference scores, χ^2s(4) = 0.71–9.16,

Table 2. Correlations Between Individual Characteristics and Between Dyadic Difference Scores at Grade 7

Variable	1	2	3	4	5	6	7	8	9
1. Age (months)	—	−.03 [−.13, .07]	.06 [−.06, .16]	.01 [−.08, .11]	−.03 [−.12, .05]	.16* [.04, .28]	.09 [−.01, .19]	.00 [−.07, .07]	−.22** [−.32, −.12]
2. Number of reciprocated friends	−.01 [−.10, .07]	—	.34** [.25, .44]	.04 [−.06, .14]	.26** [.17, .35]	.15* [.04, .26]	.21** [.10, .30]	−.08 [−.17, .01]	.04 [−.06, .14]
3. Peer acceptance	−.01 [−.10, .08]	.27** [.18, .36]	—	.06 [−.07, .16]	.61** [.56, .67]	.18** [.10, .27]	.35** [.25, .44]	−.27** [−.37, −.23]	.11* [.02, .20]
4. Peer rejection	.01 [−.07, .10]	−.03 [−.11, .07]	.02 [−.06, .10]	—	.10 [−.07, .23]	.53** [.44, .62]	.65** [.57, .72]	.49** [.35, .62]	−.11* [−.21, −.01]
5. Leadership	−.09* [−.15, −.03]	.12* [.03, .22]	.41** [.33, .48]	.17** [.06, .27]	—	−.02 [−.10, .06]	.22** [.06, .35]	−.18** [−.25, −.15]	.33** [.26, .39]
6. Physical aggression	.12* [.03, .21]	.09* [.01, .18]	.13* [.04, .22]	.44** [.34, .55]	.01 [−.05, .08]	—	.70** [.62, .77]	.08 [−.02, .18]	−.42** [−.51, −.33]
7. Relational aggression	.08 [−.01, .16]	.00 [−.08, .08]	.16** [.06, .24]	.57** [.48, .65]	.21** [.08, .31]	.62** [.54, .69]	—	.11* [.04, .19]	−.23** [−.34, −.12]
8. Victimization	−.04 [−.09, .03]	−.06 [−.14, −.02]	−.11* [−.16, −.07]	.35** [.18, .48]	−.12* [−.16, −.09]	.01 [−.03, .05]	.05 [−.03, .12]	—	−.08 [−.17, .02]
9. School competence	.13* [.03, .23]	.00 [−.09, .09]	.06 [−.03, .14]	−.02 [−.10, .06]	−.03 [−.12, .06]	.12* [.04, .21]	.08 [−.01, .17]	−.04 [−.11, .03]	—

Note: $N = 410$ participants in 573 friendship dyads. Correlations between individual characteristics ($N = 410$ participants) are given above the diagonal. Correlations between dyadic difference scores ($N = 573$ friendships) are given below the diagonal. Dyadic difference scores represent the absolute value of the difference between friends. Higher values reflect greater dissimilarity. Peer nominations for peer acceptance, peer rejection, leadership, physical aggression, relational aggression, and victimization were summed and standardized using z scores within school. Teacher-reported school competence was also z-scored for standardization. Values in brackets are 95% confidence intervals.
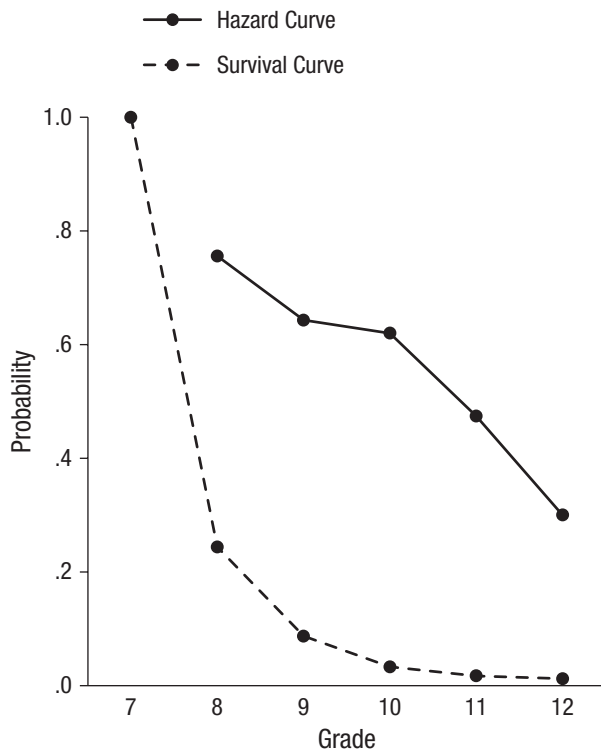*$p < .05$, two-tailed. **$p < .001$, two-tailed.

Fig. 2. Probability of friendship continuation (survival curve) and conditional probability of friendship dissolution (hazard curve) across Grades 8 through 12 for friendships originating in Grade 7. $N = 410$ participants in 573 friendship dyads.

ps = .06–.95. As a consequence, predictor effects were fixed to be equal across grades in all subsequent analyses. Separate survival models were initially conducted for individual characteristics and for dyadic difference scores to identify predictors of the occurrence and timing of friendship dissolution. The final model included all statistically significant predictors from these two preliminary models.

Results for the model that included all Grade 7 individual characteristics as predictors indicated that only the number of reciprocated friendships originating in seventh grade significantly predicted the occurrence and timing of friendship dissolution. Across grades, the odds of friendship dissolution increased with each additional reciprocated friendship that an adolescent reported. Statistically significant sex-by-predictor interactions did not arise at levels greater than chance.

Results for the model that included all Grade 7 dyadic difference scores as predictors indicated that differences between friends in sex, peer acceptance, physical aggression, and school competence significantly predicted the occurrence and timing of friendship dissolution. Across grades, the odds of friendship dissolution were higher for different-sex friends than for same-sex friends, and the odds increased with each standard-deviation difference between friends in peer acceptance, physical aggression,

and teacher-reported school competence. Statistically significant sex-by-predictor interactions did not arise at levels greater than chance.

Figure 3 depicts the odds ratios for the predictors in the final model. Results indicated that differences between friends in sex, peer acceptance, physical aggression, and school competence were statistically significant predictors of friendship dissolution. The number of reciprocated friends was not statistically significant, $\beta = 0.04$, $SE = 0.03$, $p = .25$. Across grades, the odds of friendship dissolution were 3.90 times higher for different-sex friends than for same-sex friends, $\beta = 1.59$, $SE = 0.42$, $p < .001$; 23% higher for every 1 standard deviation that friends differed in peer acceptance, $\beta = 0.21$, $SE = 0.11$, $p < .05$; 43% higher for every 1 standard deviation that friends differed in physical aggression, $\beta = 0.36$, $SE = 0.14$, $p < .05$; and 35% higher for every 1 standard deviation that friends differed in teacher-reported school competence, $\beta = 0.30$, $SE = 0.13$, $p < .05$. Fitted hazard curves for each of the statistically significant predictors are presented in Figure 4. These curves illustrate each predictor's effect on the occurrence and timing of friendship dissolution compared with the reference group.

Discussion

The present study confirms what short-term longitudinal studies suggest, namely that adolescent friendships are fleeting. New to this study is the comparison of friend dissimilarity and individual attributes as predictors of friendship dissolution. The findings suggest that differences in social and academic behavior anticipate the dissolution of friendships across middle school and high school. Different-sex friendships were at greatest risk. Friends who differed on peer-nominated acceptance, peer-nominated physical aggression, and teacher-rated school competence had relationships that dissolved sooner than friends who were similar on these attributes. Of particular note, when individual characteristics were considered alongside differences between friends on these same characteristics, the former did not predict the occurrence or timing of the end of the friendship.

Differences are detrimental to friendships. Gender boundaries make mixed-sex friendships particularly tenuous. Grade school friendships are strictly sex segregated (Rose & Rudolph, 2006). The borders between same-sex groups begin to dissolve in middle school, but other-sex friendships are still highly atypical, and pressure to conform to same-sex structures remains considerable. Sexual feelings and jealousy may arise, creating conflict (Furman & Shaffer, 2011). It is also likely that some portion of mixed-sex friendships briefly pass through a romantic phase prior to relationship dissolution.
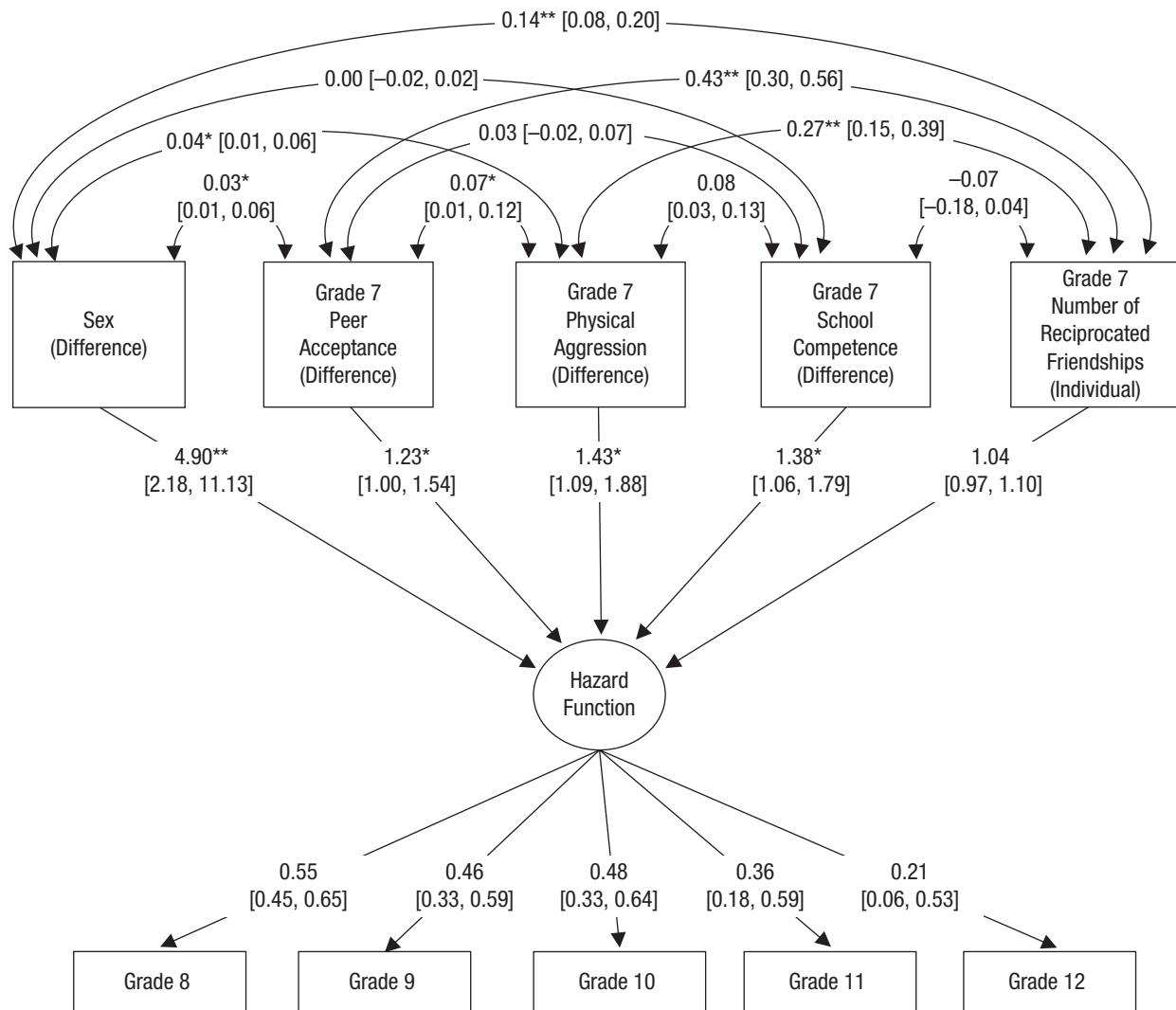
Fig. 3. Final discrete-time survival model of the dissolution of friendships originating in the seventh grade. Values shown are unstandardized odds ratios for predictors and hazard rates of friendship dissolution at Grades 8 through 12; 95% confidence intervals are given in brackets. Double-headed arrows and estimates along these arrows represent covariance between predictors. All predictors were dyadic difference scores, except the number of reciprocated friendships originating in Grade 7, which was an individual characteristic. Separate scores for the number of reciprocated friends originating in Grade 7 were entered into the model for each member of the dyad, but because these scores were constrained to be equal, the variable is depicted only once. Asterisks indicate significant paths (*p < .05, two-tailed; **p < .001, two-tailed).

Differences in peer acceptance may give rise to differences in perceived social benefits. Given a choice, most individuals prefer to bask in the glory of high-value affiliates (Sprecher & Regan, 2002). Status differentials may anticipate relationship dissolution because the more highly accepted partner grows dissatisfied with the affiliation benefits provided by the less accepted partner. Better-accepted partners may incur reputational costs from association with a less accepted partner, as well as the loss of benefits that are foregone in interactions with a friend who may be lacking in social skills (Allen, Porter, McFarland, Marsh, & McElhaney, 2005). The absence of

congruent findings for peer rejection is puzzling. We can only speculate that acceptance is the more salient construct because it reflects differences in the availability of alternative relationship partners, an important factor in decisions about relationship investment and continuity (Rusbult & Van Lange, 2003).

It is not difficult to understand why differences in physical aggression and differences in school competence predict friendship dissolution. Differences in physical aggression produce unequal relationship costs. The less aggressive friend is apt to be on the receiving end of partner aggression (Crick & Nelson, 2002). Even when it
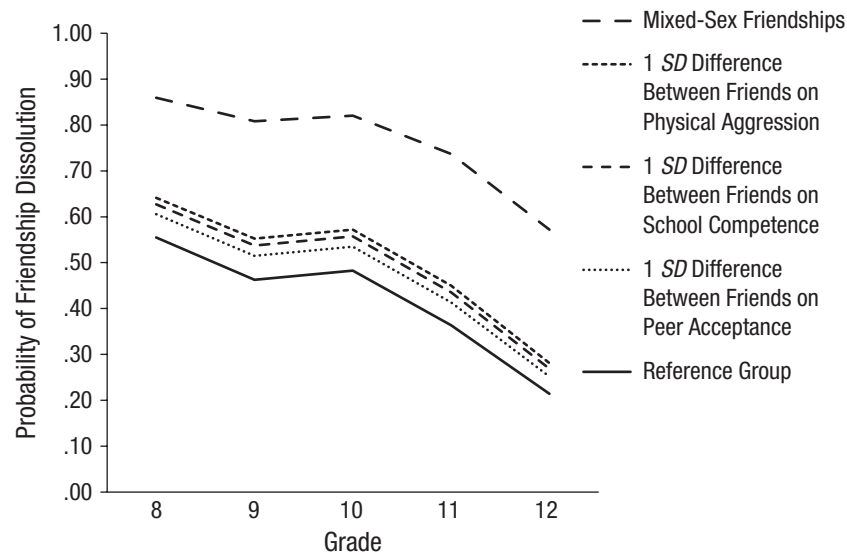
Fig. 4. Fitted hazard curves for significant predictors of friendship dissolution across Grades 8 through 12 for friendships originating in Grade 7. Each curve illustrates the effect of a one-unit increase for that predictor in the final model on the risk of friendship dissolution. The reference group is a hypothetical sample of same-sex friends placed in dyads in which each member has the same score for each predictor (i.e., dyadic difference scores equal 0). $N = 410$ participants in 573 friendship dyads.

is delivered in a good-natured fashion, most people do not enjoy being the target of aggression. In contrast, differences in school competence create unequal relationship rewards. The less academically capable friend may rely on his or her more successful friend for tutelage (DeLay et al., 2014). The friend with higher ability may resent the investment in instruction with no academic return from the friend with lower ability.

After accounting for friend dissimilarity, individual attributes did not predict friendship dissolution. Although caution is warranted in interpreting null effects, the results suggest that previous findings that emphasized undesirable individual traits as factors in friendship dissolution overlooked the confound of elevated individual traits with heightened dyadic differences. We are not the first to suggest that the characteristics of an individual are important primarily in relation to the characteristics of the interaction partner (Hinde, 1995). We cannot rule out the possibility, however, that individual characteristics predict relationship dissolution at extreme or clinical levels of maladjustment.

Our study is not without limitations. Between 5% and 10% of friendships were reconstituted after dissolving. All friendships in the present study were considered equivalent, but we know that some friendships are more important than others (Hartup, 1996), which may help to explain friendships that come and go. The relative magnitude of different predictors may vary as a function of the relative importance of the relationship. It did not

appear to be the case, however, that adolescents who reported the most friends adopted the least-stringent criteria for friendship or were the most socially skilled, although null findings must be interpreted with care given that the number of friends was a significant predictor in the individual-characteristics model. The statistical power to test a large number of predictors was limited, so only the strongest effects were identified. There was insufficient power for multilevel survival analyses to examine the effect of the nesting of friendships within peer networks. Participants with complete data scored higher on teacher-rated school competence in Grade 7 than those with incomplete data, which suggests that school-competence findings should be interpreted with caution. Single-item measures may not fully capture the constructs they purportedly represent. Acceptance and popularity were so highly correlated that both could not be included in the same model. It will be up to future scholars to identify the unique contributions of each to friendship dissolution. Participant attrition and low teacher-response rates during high school precluded the testing of time-varying predictors. Finally, friendship nominations were collected at annual intervals, which is an imprecise measure of relationship beginnings and endings. Shorter assessment periods may be required to capture the effect of accumulating individual adjustment difficulties.

We conclude that friend compatibility and friendship stability are a function of similarity and not the presence

or absence of a particular individual attribute. Adolescents may want to affiliate with different others (Thomas & Bowker, 2013), but they are more likely to enjoy successful long-term friendships with similar others.

Author Contributions

All authors contributed to the study concept and design. The data were collected by A. H. N. Cillessen. A. C. Hartl analyzed the data under the supervision of B. Laursen. A. C. Hartl and B. Laursen drafted the manuscript, and A. H. N. Cillessen provided critical revisions. All authors approved the final version of the manuscript for submission.

Declaration of Conflicting Interests

The authors declared that they had no conflicts of interest with respect to their authorship or the publication of this article.

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