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## Monthly Changes in the Composition of Friendship Networks in Early Adolescence

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Short-term stability in adolescents' self-reported friendship networks was examined as a function of (1) participants' gender, (2) friendship status (best vs. secondary), (3) friendship gender composition (same sex vs. opposite sex), and (4) friendship contexts (school only vs. nonschool only vs. multiple). Adolescents ( $N = 102$ ) took part in five monthly telephone interviews in which they nominated their friends and provided specific information for each of them. Results indicated that on average, one-third of participants' nominated friendships in their network were unstable over five months, with girls' perceived networks being more unstable than boys. Best friendship choices were more stable than secondary ones. Girls' reports of their opposite-sex friendships were more unstable than boys', and multicontext friendships (school and nonschool) were more stable than single-context friendships (school only or nonschool only). Results are discussed by highlighting the contribution of short-term assessments in understanding how adolescent networks change over time.

Most researchers recognize that friendships provide a unique socialization context for the acquisition of essential skills and promote personal adjustment (Hartup, 1996; Sullivan, 1953; Youniss, 1980). So far, different features of friendship relations have captured researchers' attention. Indeed, the presence or absence of friendship (Bagwell, Newcomb, & Bukowski, 1998), the

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quality of friendship (Ladd, Kochenderfer, & Coleman, 1996; Parker & Asher, 1993), and the characteristics of friends (Dishion, Andrews, & Crosby, 1995; Rubin, Wojslawowicz, Rose-Krasnor, Booth-Laforce, & Burgess, 2006) were all found to contribute significantly and independently to the child's development. The present study proposed to focus on a neglected aspect of friendship relations: their level of temporal stability.

The notion of stability refers to the maintenance of a relationship over time, whereas "instability," "fluidity," and "change" are terms used to define modifications observed in friendship bonds. More specifically, these modifications correspond to the termination of existing friendships or the formation of new ones (Hardy, Bukowski, & Sippola, 2002). Hence, when we examine children's friendship networks with a temporal perspective, we discover that their network is composed of a number of stable friends, a number of old friends leaving the network (temporarily or permanently), and a number of new friends joining in. The dynamic aspect of friendship relations, especially over short temporal intervals, has rarely been studied, and an empirical examination of this dimension may enhance considerably our understanding of the processes by which friendship networks affect children's development.

Studies describing the stability and change in youths' friendship networks are very scarce in the literature. Taken together, research has reported that children (ages 6 to 10) maintain more than 50% (sometimes even up to 75%) of their friends over a school year and tend to form more new friends than they lose old ones (Berndt & Hoyle, 1985). In contrast, adolescents (ages 11 to 15) appear to preserve less than 65% of their friendships over a school year and tend to lose more friends than they form new ones (Berndt, Hawkins, & Hoyle, 1986; Berndt & Hoyle, 1985; Degirmencioglu, Urberg, Tolson, & Richard, 1998). In sum, youths' social universe represents a system that is constantly in motion in which friendship relations are formed, sustained, or split up on a regular basis. Moreover, these fluctuations may be more pronounced in early adolescence (i.e., between 11 and 13 years) because this period coincides with the transition to high school, along with numerous developmental changes at the cognitive, social, and biological levels (Berndt, 1982; Eccles, Lord, & Buchanan, 1996). In addition, friendship relations bear the most importance in adolescence compared to other periods of the life span. Indeed, during that period, friendship bonds are the most influential (Berndt, 1979), and friendship networks are the largest in size (Claes, 2003). Thus, temporal stability is an aspect of friendship networks that may be especially important to study during early adolescence.

The rationale for examining friendship stability over short temporal intervals is provided by the social learning-interaction theory, which argues

that two key short-term processes are involved in social interactions (Cairns, Leung, & Cairns, 1995). First, interacting individuals influence each other as their behaviors and attitudes become increasingly synchronized over time (interactional synchrony). Second, relationships are more likely to be established when interactions are recurrent in place and time (physical propinquity). Consequently, such short-term mechanisms emphasize the important value of providing explicit descriptions of change in order to understand how relationships develop over time (Cairns, Leung, & Cairns, 1995).

The very few studies conducted on the degree of friendship stability have often employed measurements taken twice within a six-month interval (typically in the fall and spring over the course of a school year) (Berndt & Hoyle, 1985; Bowker, 2004; Degirmencioglu et al., 1998, Wojslawowicz, Rubin, Burgess, Booth-Laforce, & Rose-Krasnor, 2006). Yet studies have recognized that the structure of social relations changes in adolescence whether it is over a short three-week period (Cairns, Leung, Buchanan, & Cairns, 1995) or over a long-term period of one year (Degirmencioglu et al., 1998). Therefore, youths' friendship networks are likely to change within intervals shorter than six months, and thus yearly longitudinal assessments might not be able to track fluctuations in adolescent friendships (Dishion & Medici Skaggs, 2000). For these reasons, it may be more adequate to assess temporal variations by requiring more than two waves of measurement and by using shorter time frames. Short-interval measurements (such as monthly assessments) have not been explored in past research, probably due to methodological limitations. It is certainly intrusive to the schools and time-consuming to administer each month in-class sociometric questionnaires or observe peer interactions. In the present investigation, a new approach was developed in order to deal with these constraints. The new procedure involved the use of brief telephone interviews that were completed on a monthly basis. Telephone surveys have the advantages of being easier to schedule at home (with participants showing greater flexibility in their time) and of being administered rapidly, which will in turn help sustain youths' participation over the time frame covered by the study.

An important issue having considerable bearing on the study of friendship stability involves the definition of friendship. Some experts claim that reciprocity is an inherent condition in defining a friendship (Rubin, Bukowski, & Parker, 1998). Indeed, reciprocity suggests that the friendship is genuine since its existence is acknowledged by two sides: the child and the friend. Nonetheless, the present investigation treated subjective or self-reported friendships (i.e., acknowledged by the child but not necessarily by

the friend), which are important in their own right for the reason that they reflect an individual's own perception of her or his relationships that may be influential regardless of friendship reciprocation. Moreover, it has been argued that because friendships are affective bonds by definition, subjective relationships constitute the most valid indices of their quality (Furman, 1996). Hence, stability in perceived friendships may be more meaningful for adolescents' psychosocial adjustment. In this regard, a recent study has shown that adolescents without reciprocated friendships are able to nominate peers with whom they identify, and those peers may influence their behavior and adjustment (Kiesner, Cadinu, Poulin, & Bucci, 2002). Clearly, children's perceptions can shape the course of their friendships by affecting their own behavior as well as their interpretations of their friends' behavior (Furman, 1996). Finally, students who don't have reciprocated nominations in their classroom could nonetheless have friendships in other classes or out of school, and the use of self-reported nominations therefore allows the study of both school and nonschool networks (Kiesner, Poulin, & Nicotra, 2003; Schneider, Wiener, & Murphy, 1994).

The purpose of this study was to document monthly changes in the composition of adolescents' self-reported friendship networks and to explore a series of factors that could explain these changes. At least three groups of factors can influence the degree of stability in the network: personal characteristics, relationship characteristics, and the environment. The first group of factors regards individual characteristics. As such, the child's gender is a fundamental variable to consider. Some writers suggested that girls' preference for exclusive friendships may serve to maintain their friendships over time compared to boys (Eder & Hallinan, 1978). Indeed, girls are inclined to interact with small intimate groups, which makes them less willing to form new friends because they already have several stable friendships in their network (Berndt, 1982). On the other hand, studies also reported that girls' need for intimacy can make them extremely sensitive to potential distress within their friendships (Benenson & Christakos, 2003). This can lead to intense conflicts that possibly contribute to bringing down girls' level of friendship stability compared to boys. For these reasons, we hypothesized that girls' perceived friendship networks would be less stable than boys'.

The second group of factors that can play a role in friendship stability is related to features of the relationship itself. For example, the composition of adolescent social networks includes multiple levels: (1) the best friendships, (2) the friendship network, and (3) the peer group (Claes, 2003; Degirmencioglu et al., 1998). Degirmencioglu and colleagues (1998) have demonstrated that adolescent friendships are dynamic (not static) at each

level of the network such that stability at one level does not necessarily correspond with stability at another level. Subsequently, it is crucial to disentangle the degree of stability observed at different levels of the social network. The current study examined separately the level of stability in adolescents' best friendship choices and the level of stability in their secondary or other friendship choices. We hypothesized that perceived best friendships would be more stable than perceived secondary friendships in the network because the perceived bond with best friendships is generally stronger (Brendgen, Markiewicz, Doyle, & Bukowski, 2001). Another relationship feature that can influence the level of friendship stability is friendships' gender composition, that is, the congruence between the child's and the friend's gender. Studies have established that adolescents experience a significant increase in the number of self-reported cross-gender friendships over time (Connolly, Furman, & Konarski, 2000; Feiring, 1999). Specifically, it was shown that heterosexual friendships begin to emerge in early adolescence and that they tend to be short-lived at first (Claes, 2003). We therefore presumed that adolescents' cross-gender friendship choices would be less stable than friendship choices with same-sex peers during the early adolescence period.

The last group of factors that can affect friendship stability is the adolescent's social environment. The majority of studies examined peer relationships within one context only: the school. Yet mounting evidence shows that youths can have significant friendship relations in contexts other than school (e.g., neighborhood, leisure activities, etc.) (Kiesner et al., 2003; Mahoney, 2000). This is particularly true in adolescence given that youths gradually spend more time with their peers outside of home and school (Larson & Verma, 1999). More importantly, recent research has demonstrated that each context (school and nonschool) plays a unique role in the child's development. Indeed, a child is exposed to distinct behaviors in each of these experiential niches, and, as a result, each friendship network offers a differing learning experience (Kiesner et al., 2003). Interestingly, a large proportion of friendships may also be taking place both in school and outside of school. Therefore, in addition to the initial school-only and nonschool-only contexts, adolescent friendship networks are likely to include multicontext friendships defined as the simultaneous involvement in both school and nonschool contexts. In this regard, recent research revealed that youths with high friendship quality spent more time in all types of contexts with their friends, such as school or sport-related activities (Thomas & Berndt, 2005). These positive interactions are likely to increase the frequency of activities with friends, and, conversely, sharing activities with friends may enhance friendship quality (intimacy, support),

thereby reinforcing friendship stability (Thomas & Berndt, 2005). Consequently, it is important to consider the ecology of peer relations because the degree of friendship stability may vary depending on the different contexts in which relationships take place. As a result, it was expected that the level of stability in multicontext friendships would be higher than in single-context friendships (school only or nonschool only).

Finally, it was of interest to learn whether the degree of friendship stability would vary as a function of the network size. The size of friendship networks has seldom been considered when examining the question of friendship stability. Interestingly, Claes (2003) pointed out that a small circle of friends is often characterized by high intimacy among friends, which can lead to higher friendship stability over time. By contrast, the larger a friendship network is, the more changing friendships may be (Claes, 2003). Hence, it was expected that youths who keep a small number of friends would report a more stable network compared to those with a large network. Furthermore, if the size of friendship networks was found to vary from one month to another, it would be reasonable to expect that the level of friendship stability might also fluctuate on a month-to-month basis. Indeed, fluctuations in early adolescent relationships are likely to occur within very short periods of time, especially in a context of school transition (Berndt, 1982; Eccles et al., 1996). It is well known that school transitions constitute a period in which adolescents experience a high level of readjustment in their network. In particular, studies demonstrated that entry into a new social environment may result in the breakup of old friendships and, at the same time, provide opportunities to form new relations (Hardy et al., 2002). Consequently, it can be expected that a few months after experiencing a transition to high school, youths would adapt to their new social environment and spend gradually more time with their friends as the school year progresses. Therefore, it was hypothesized that adolescents' perceived friendship bonds would become stronger and more stable from one month to another.

To date, stability and change in adolescents' perceived friendship networks assessed with short time intervals have not been studied. The degree of friendship network stability was thus assessed over a five-month period by means of monthly telephone interviews. Following prior research that looked at friendship stability by assessing changes in the size of friendship networks (e.g., Hardy et al., 2002), the first objective of this study was to describe monthly changes occurring in the size of networks. The second objective was to specifically examine who the friends were and to assess youths' overall level of friendship network stability over the five months based on the identity of friends. The third objective was to examine the following variables that could contribute to explain the level of friendship stability: (1) participants'

gender, (2) friendship status (best vs. secondary), (3) friendship gender composition (same sex vs. opposite sex), and (4) friendship contexts (school only vs. nonschool only vs. multicontext). A related aim was to examine the link between network size and the level of friendship network stability. Finally, friendship network stability was examined over time on a month-to-month basis. Given the differences between girls' and boys' friendships consistently reported in the literature (Berndt & Hoyle, 1985; Benenson & Christakos, 2003; Hardy et al., 2002), gender differences were examined for each of the research questions above.

## Method

### *Participants*

Participants in the current study were part of a larger longitudinal research project following 390 adolescents. Considering the resources available for the project, the authors predetermined to reach a subsample of approximately 100 participants who would be involved in more intensive measures (i.e., home visits and monthly telephone interviews). Thus, participants were randomly asked to take part in monthly telephone interviews until 100 or so participants accepted and were included in the current report. Approximately 60% of adolescents who were contacted to take part in telephone interviews actually agreed to participate.

Accordingly, the telephone interview sample consisted of 109 adolescents (56 girls:  $M$  age = 12.6 years,  $SD$  = .39) from varied socioeconomic status in the greater region of Montreal, Canada. They were in their first year of high school at the time of the study. Written parental consent was obtained for each student prior to participation. More than 90% of the children and their parents were born in Canada, and 67% of the children lived with their biological parents. Of the 109 students, 102 (51 girls) provided complete data on all measurement occasions and formed the final sample for analyses (7 students completed only three interviews or less). Preliminary analyses indicated that participants from the analytic sample did not differ from adolescents who were part of the larger sample in terms of demographic information (adolescents' age, family income, first language, and family structure), depressive symptoms (Kovacs, 1985), and behavior problems (teacher report), but they had higher school grades compared to the nonanalytic sample ( $M$  grades = 75.3 and 71.9, respectively, on a scale from 0 to 100,  $t(338) = 2.64$ ,  $p < .01$ ).

### *Procedure*

In this short-term longitudinal study, participants took part in monthly telephone interviews. These interviews were conducted from February to June

on weeknights between 6:30 p.m. and 8:30 p.m. At the beginning of each interview, interviewers assured participants about the confidentiality of their responses and asked them to complete the interview in a room where they had privacy. Interviewers ended each interview by scheduling the subsequent phone call. Great logistical efforts were expended to make sure that intervals between each interview were always one month or less ( $M = 28.9$  days,  $SD = 3.66$ ; minimum = 18.0, maximum = 42.3). At the end of the school year, a gift certificate for the purchase of a compact disc was offered to participants who completed all the interviews.

### *Measures*

*Friendship nomination by telephone interview.* The telephone interview has often been used as a method to assess various problems, such as anxiety disorders, among different populations (Paulsen, Crowe, Noyes, & Pfohl, 1988); adolescents' report of sexual behavior (Minnis & Padian, 2001); and youths' report of behavior problems (Dishion & Medici Skaggs, 2000; Webster-Stratton & Spitzer, 1991). These studies suggest that phone interviews constitute a low-cost, low-intrusive, and efficient way of getting information from a target population (Dishion & Medici Skaggs, 2000; Webster-Stratton & Spitzer, 1991). A pilot study was conducted beforehand with 30 adolescents ( $M$  age = 12 years) who were not part of the sample in order to test the feasibility and course of the interview as well as youths' understanding of the questions.

The structured interview lasted approximately 15 minutes. During the first phone interview, the interviewer told the adolescent that there was no good or bad answer to the questions. This instruction was established to minimize participants' desirability (e.g., adolescents may want to prove that they have a large number of friends). Afterward, the interviewer proceeded by asking the participant to nominate every friend he or she had in any context, whether at school, in the neighborhood, in activities outside of school, or any other context. Adolescents generated their friends' names (first and last names) by free recall. In other words, they named their friends from memory, and no cues or lists of names were provided to them (Cairns, Leung, Buchanan, & Cairns, 1995). This method was employed to encourage participants to designate only individuals whom they truly considered friends. Students were allowed to name as many friends as they wished. Once they finished naming their friends, they were asked to select their three best friends among the list of nominated friends. Indeed, most youths admit having a few best friends, not just one (Berndt, 1999). Next, participants were asked to specify their friend's gender and the context(s) in which they see each other: "What is your relationship with this person? Is it

(a) a friend from school? [yes/no]; (b) a friend from your neighborhood? [yes/no]; (c) a friend from a sport or leisure activity? [yes/no]; (d) a family friend? [yes/no]; (e) If none of the above, who is this person for you?" By requiring a yes/no answer to each context, participants were able to nominate friendships taking place in only one context (school only, nonschool only) or in multiple contexts (school and nonschool).

The same procedure was followed in subsequent interviews. However, from the second interview onward, the interviewer had in his possession the complete list of nominated friends identified by the participant during the previous interview. As a result, the interviewer just had to check off the names of friends who were nominated again by the adolescent and added on the list new friends who were nominated for the very first time. For friends who were nominated in the previous interview but were not nominated again in the present interview, the interviewer asked the participant to specify whether: (1) he or she forgot to nominate the friend in question or (2) they were not friends anymore. These prompts permitted us to clarify if a friendship relation was really over or simply forgotten. As such, prompts were used on average three or four times for each interview. Among the prompted names, 68.8% were classified as forgotten friends, whereas 31.2% were intentionally omitted. As for new friends nominated for the first time, specific questions about gender and contexts were asked for each of them.

*Coding of the level of global stability in friendship networks.* Our aim was to develop an index that would allow us to quantify an individual's level of friendship network stability for the overall five-month period covered by the study. In this regard, for each participant a list of nominated friends was derived and compared at each of the five assessment waves. Calculation of the stability index for each participant was achieved in three steps. Table 1 illustrates an example of coding and calculation of the stability index for one participant. In the first step, a score was assigned to each friend nominated from February to June: 0 = the friend was not nominated, 1 = the friend was nominated in the network.

In the second step, we computed the number of friendship renominations, defined as the number of times each friend was renamed by the participant in subsequent waves. For instance, if a friend was nominated at one wave only, his or his score would be 0 (the friend was not renamed in other waves); if the friend was nominated at each of the five waves, his score would be 4 (the friend was named in February and renamed from March to June). Therefore, the total number of friendship renominations was calculated for each friend over the five months.

In the third step, the global stability index was obtained by summing the number of friendship renominations divided by the total number of friends

**Table 1.** Coding and Calculation of the Global Stability Index

Nominated friends	February	March	April	May	June	Total number of renominations
1. Tom	1	1	1	1	1	4
2. Philip	1	1	0	0	0	1
3. Ellen	1	1	0	1	1	3
4. Jack	0	1	0	1	0	1
5. Martha	0	0	1	0	0	0
6. William	0	0	1	1	1	2
					Global stability index =	$11/6 = 1.83^a$ $1.83/4 = .46^b$

*Note.* 0 = was not nominated in the network; 1 = was nominated in the network.

<sup>a</sup> Sum of the total number of friendship renominations divided by the number of nominated friends, i.e., stability index varying between 0 and 4.

<sup>b</sup> The 0–4 stability index is then transformed into a percentage score varying on a continuum between 0 (no stability in the network) and 1 (perfect stability in the network).

nominated over the five months. This initial stability index varied on a continuum between 0 and 4. This index was then transformed into a proportion varying on a continuum from 0, representing no stability in the network (i.e., the adolescent did not nominate any of the same friends from one wave to another) to 1, representing perfect stability in the network (i.e., the adolescent nominated the exact same friends in all assessment occasions).

Subsequently, participants’ overall friendship network was divided so that best and secondary friendships would be differentiated. Stability indexes for best friendships and secondary friendships were thus calculated separately. Following the first calculation step described above, a score was assigned to each nominated friend (0 = never nominated as best friend, 1 = nominated as best friend at least once over the five months). The stability index for best friendships was then obtained by averaging the number of times best friends were renominated in the network (either as best or secondary friends) over the five months. Likewise, the stability index for secondary friendships (i.e., those who were never nominated as best friends over the five months) was computed by averaging the number of times secondary friends were renominated in the network over the five months. Next, stability indexes for same-sex, opposite-sex, school-only, nonschool-only, and multicontext friendships were derived following the same calculation steps.

*Coding of the level of monthly stability in friendship networks.* The previous coding procedure was based on the computation of a single stability

**Table 2.** Coding and Calculation of Monthly Stability Indexes

Nominated friends	February	March	April	May	June	
1. Tom	1	1	1	1	1	
2. Philip	1	1	0	0	0	
3. Ellen	1	1	0	1	1	
4. Jack	0	1	0	1	0	
5. Martha	0	0	1	0	0	
6. William	0	0	1	1	1	
	S2		S3		S4	
	S5		S4		S5	
Total number of renominations <sup>a</sup>	3		1		2	
Monthly stability indexes <sup>b</sup>	$3/4 = .75$		$1/6 = .17$		$2/5 = .40$	
	$3/4 = .75$		$3/4 = .75$		$3/4 = .75$	

Note. 0 = was not nominated in the network; 1 = was nominated in the network.

<sup>a</sup> Number of times each friend is renominated by the participant by comparing two consecutive waves.

<sup>b</sup> The total number of renominations divided by the number of friends named in the two months under consideration. This monthly stability index varies on a continuum between 0 (no stability in the network) and 1 (perfect stability in the network).

index that captured the global level of friendship network stability over five months. Subsequently, in order to test if the level of friendship stability varies on a month-to-month basis, we derived a monthly stability index. Its calculation was similar to the calculation of the global stability index except for the following: friendship renomination scores were computed by comparing two consecutive waves (instead of five waves). Therefore, four monthly stability indexes were obtained: February—March (S2), March—April (S3), April—May (S4), and May—June (S5). (See Table 2 for an example of calculation of monthly stability indexes for one participant.)

## Results

### *Overview of the Statistical Analyses*

The following series of analyses were conducted. First, repeated measures analyses of variance (ANOVAs) were used to examine gender and time effects on the size of friendship networks. Second, the level of global stabil-

ity in friendship networks was assessed over the five waves. Third, a correlation was used to verify the link between the size of friendship networks and the level of friendship stability. Fourth, repeated measures ANOVAs were conducted to analyze the effects of participants' gender, friendship status, friendship gender composition, and friendship contexts on friendship stability. Those analyses addressed which factors contribute to changes in friendship networks. A last series of analyses were performed on the level of month-to-month friendship stability.

### *Monthly Changes in the Size of Friendship Networks*

Over the five-month period, the mean number of nominated friends varied between 3 and 27 ( $M = 11.95$ ,  $SD = 6.29$ ). A time  $\times$  gender repeated measures ANOVA was performed on the mean size of friendship networks. Preliminary analyses showed that assumptions regarding normal distribution, homogeneity of variances, and sphericity were met. The results of the repeated measures ANOVA revealed significant effects of time ( $F[4, 400] = 23.89$ ,  $p < .001$ ,  $\eta^2 = .19$ ) and gender ( $F[1, 100] = 7.26$ ,  $p < .01$ ,  $\eta^2 = .07$ ), with girls nominating a larger network than boys. However, the time  $\times$  gender interaction was not significant ( $F[4, 400] = 1.72$ , *ns*). Subsequent matched-samples *t* tests were conducted to further examine the main effect of time on the mean network size. To protect against inflated Type 1 error, a Bonferroni correction was used for interpretation of test results with a corrected critical alpha of  $p < .0125$  ( $.05/4$ ). The results showed that the mean size of friendship networks significantly increased between the first two assessments ( $t[101] = 1.97$ ,  $p < .001$ ), but no significant change was observed thereafter. It should be noted that the apparent increase in network size between Time 1 and Time 2 could be entirely due to the prompting procedure, which did not start until the second phone interview. (In the first interview, the interviewer was not able to prompt participants about possibly forgotten friends.)

### *Level of Global Stability in Friendship Networks*

The average stability index was computed for the 102 participants. Results indicated that the mean level of friendship network stability was  $.66$  ( $SD = .18$ ), or, inversely, the mean level of change or instability in friendship networks was  $.34$ . Thus, although a large proportion (two-thirds) of friends was renamed by participants across each assessment wave, a considerable proportion (one-third) was not renominated across each assessment wave (being either newly formed or lost from one wave to another).

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*Correlation between the Size of Friendship Networks and the Level of Friendship Stability*

The result of the correlation between the mean network size and the level of friendship stability revealed a significant negative association ( $r = -.34, p < .001$ ). Therefore, as the size of friendship networks grew larger, friendship networks became more unstable. Consequently, the mean network size was used as a control variable in the next analysis implicating the level of friendship network stability.

*Factors Contributing to the Level of Stability in Youths' Friendship Networks*

*Participants' gender.* A simple analysis of covariance (ANCOVA) was performed on the level of friendship network stability as dependent variable, with participants' gender as between-subjects factor and the mean network size as covariate. Preliminary evaluation of the assumptions indicated that normality of the distribution, homogeneity of variances, linearity, and homogeneity of regression were all met. The results of the ANCOVA revealed that the mean network size had a significant main effect on the level of network stability ( $F[1, 99] = 9.62, p < .01, \eta^2 = .09$ ). Yet adolescents' gender did not have a significant effect on the level of network stability after controlling for the mean network size ( $F[1, 99] = 2.83, ns$ ). We noted, however, that when the mean network size was not controlled for in the analysis, adolescents' gender did have a significant effect on the level of network stability ( $F[1, 100] = 6.12, p < .05, \eta^2 = .06$ ), with boys having more stable friendship networks than girls. The observed and adjusted means of the level of stability as a function of gender, along with the respective standard deviations and standard errors, are presented in Table 3.

*Friendship status.* A  $2 \times 2$  repeated measures ANOVA was conducted on the level of stability with participants' gender as between-subjects factor and friendship status (best vs. secondary friendships) as within-subjects factor. The analysis was performed with a reduced sample ( $N = 99$ ) because 3 participants omitted to designate their best friends in one interview. The results revealed a significant main effect for friendship status ( $F[1, 97] = 180.50, p < .001, \eta^2 = .65$ ), with best friendships showing a higher level of stability than secondary friendships. No effect of gender ( $F[1, 97] = 1, 16, ns$ ) or gender  $\times$  friendship status interaction ( $F[1, 97] = .92, ns$ ) was found. The same results were obtained after controlling for the size of the network in the analysis: main effect for friendship status ( $F[1, 96] = 28.24, p < .001, \eta^2 = .23$ ) and no effect for gender and for gender  $\times$  friendships status inter-

**Table 3.** Means with Respective Standard Deviations of the Global Stability in Friendship Networks as a Function of Participants' Gender, Friendship Status, Friendship Gender Composition, and Friendship Contexts

	Global stability indexes					
	Total		Girls		Boys	
	M	SD	M	SD	M	SD
Friendship network <sup>a</sup> (n = 102)	.66	.17	.62 (.63)	.18 (.02)	.70 (.69)	.18 (.02)
Status (n = 99)						
Best friendships	.86	.17	.85	.17	.86	.17
Secondary friendships	.55	.21	.52	.21	.58	.21
Gender composition (n = 63)						
Same-sex friendships	.62	.17	.60	.15	.65	.70
Opposite-sex friendships	.59	.26	.51	.23	.70	.27
Contexts (n = 75)						
School-only friendships	.63	.23	.56	.24	.71	.19
Nonschool-only friendships	.59	.33	.57	.35	.62	.31
Multicontext friendships	.72	.24	.69	.24	.76	.23

Note: <sup>a</sup> The mean size of friendship networks was used as covariate. Adjusted means with respective standard errors are in parentheses.

action. The means and standard deviations of the level of stability in best and secondary friendship choices are depicted in Table 3.

*Friendship gender composition.* A 2 × 2 repeated measures ANOVA was performed on the level of stability with participants' gender as between-subjects factor and friendship gender composition (same sex vs. opposite sex) as within-subjects factor. The analysis was performed with participants who had friends from both genders (N = 63). The results revealed a significant effect of participants' gender (F[1, 61] = 7.02, p = .01, η<sup>2</sup> = .10) as well as a significant interaction effect between participants' gender and friendship gender composition (F[1, 61] = 6.77, p = .01, η<sup>2</sup> = .10). To break down the interaction, two simple ANOVAs were conducted separately for same-sex and opposite-sex friendships. No effect of gender was found for the level of stability in same-sex friendships (F[1, 61] = 1.40, ns), but a significant effect of gender was found for the level of stability in opposite-sex friendships (F[1, 61] = 9.59, p < .01, η<sup>2</sup> = .14), with boys' opposite-sex friendships being more stable than girls'. The same results were obtained after controlling for the size of the opposite-sex network in the analysis: main effect for gender (F[1, 60] = 8.74, p < .01, η<sup>2</sup> = .13) and

no effect for the opposite-sex network size ( $F[1, 60] = .26, ns$ ). The means and standard deviations of the level of stability in same- and opposite-sex friendships are shown in Table 3.

*Friendship contexts.* A  $2 \times 3$  repeated measures ANOVA was performed on the level of stability with participants' gender as between-subjects factor and friendship contexts (school only, nonschool only, multicontext) as within-subjects factor. The analysis was performed with adolescents who had friendships in school-only, nonschool-only, and multiple contexts ( $N = 75$ ). The results revealed a significant effect of context ( $F[2, 128] = 6.23, p < .01, \eta^2 = .08$ ) and gender ( $F[1, 73] = 4.58, p < .05, \eta^2 = .06$ ), but no interaction was found ( $F[2, 128] = 1.08, ns$ ). Matched-samples  $t$  tests were used to further examine the main effect of context on the level of stability. The results showed that the level of stability in multicontext friendships was considerably higher compared to the level of stability in school-only and in nonschool-only friendships (respectively,  $t[74] = -3.08, p < .01$ , and  $t[74] = -3.06, p < .01$ ). Moreover, the level of stability in school-only friendships did not differ significantly from the level of stability in nonschool-only friendships ( $t[74] = 1.02, ns$ ). The means and standard deviations of the level of stability in school-only, nonschool-only, and multicontext friendships are depicted in Table 3.

### *Level of Monthly Stability in Friendship Networks*

Finally, we tested if the level of friendship stability varied on a month-to-month basis. A  $2 \times 4$  repeated measures ANOVA was performed on the level of monthly stability in friendship networks as the dependent variable with adolescents' gender as between-subjects factor and time as within-subjects factor. The results showed a significant effect of gender ( $F[1, 100] = 6.19, p < .05, \eta^2 = .06$ ), with boys showing higher monthly friendship stability than girls. However, no significant effect of time was found ( $F[3, 279] = 2.30, p = .08$ ). Although there was a trend suggesting a stability increase over time, the actual differences in levels of month-to-month stability were very small ( $M_{S2} = .76 [SD = .20]$ ,  $M_{S3} = .78 [SD = .18]$ ,  $M_{S4} = .80 [SD = .17]$ ,  $M_{S5} = .81 [SD = .19]$ ).

## **Discussion**

For a long time, children's peer relationships were conceptualized as a relatively static system, and the rare attempts to document their dynamic nature were mostly based on yearly assessments. Our intent in the current study was to further explore the idea that instability in friendship networks is

common, even within very short periods of time (Cairns, Leung, Buchanan, & Cairns, 1995). Moreover, we hypothesized that friendship instability was not random and would vary according to (a) youths' gender, (b) friendship status, (c) friendship gender composition, and (d) the contexts in which friendships take place. In order to achieve this, we used a monthly telephone interview device that turned out to be effective given the absence of missing data for 102 of the 109 participants.

Prior studies examining friendship stability were mostly based on two waves of measurement. Hence, traditional measures of stability simply summarized the proportion of friendships existing at Time 1 that continued to exist at Time 2 and, by doing so, failed to consider the flux in adolescent networks created by newly emerging relationships. Consequently, the global stability index proposed in this study was developed to calculate the level of friendship stability over five assessment waves. This global index varied on a continuum between 0 (no stability in the network) and 1 (perfect stability in the network). Therefore, by considering both friendship loss and formation in its computation, the global index carried the advantage of capturing the overall quantity of change in a friendship network in comparison with more traditional indexes.

Altogether, the findings suggest that there is a significant level of short-term instability in adolescents' self-reported friendship networks. Results showed that participants' friendship networks displayed a level of stability of 66% and, conversely, a level of instability of 34%. Thus, even though a large proportion of friendships remained stable, a sizable amount of change (i.e., friendship loss and formation) was found in adolescents' choice of nominated friends. In this regard, the level of friendship instability found in this study appears to confirm earlier findings that dynamic (not static) processes are well present in adolescent networks (Degirmencioglu et al., 1998) and that potentially important fluctuations can be observed in friendship networks when we exploit short-interval measurements (Cairns, Leung, Buchanan, & Cairns, 1995).

Three groups of factors were shown to contribute to friendship stability. First, evidence of gender differences in the level of friendship network stability was mixed. Boys' friendship choices appeared to be more stable than girls, but when the size of friendship networks was controlled for, boys and girls no longer differed in their level of network stability. It should be noted that youths' reports of their network size was found to be negatively associated with the level of stability in their friendship network. This finding corroborates prior research demonstrating that as friendship networks get larger, they usually become less cohesive, which lead to a lower level of stability (Degirmencioglu et al., 1998). This result therefore suggests that

girls' perceived larger network might be less cohesive than boys' network, thus making it more difficult for girls to sustain their friendships over time.

Second, features of the relationship itself, such as friendship status, were related to friendship stability. As expected, adolescents' perceived best friendships were found to be more stable than their secondary friendship choices. In other words, over the five-month period, participants were more likely to renominate their best friends in their network (either as best or secondary friend) than their secondary friends (i.e., those who were never nominated as best friends). Claes (2003) reported that the proximal network is composed of a small number of intimate friends with whom the child interacts frequently, feels close to, and shares things. In contrast, the exchange network is composed of a larger number of friends with whom the child interacts episodically, usually during leisure activities or during the weekend (Claes, 2003). Therefore, compared to secondary ones, best friendships are characterized by higher friendship quality (i.e., higher intimacy and sharing), which may in turn contribute to higher levels of stability. In sum, best friends are more likely to be renominated in the network than secondary friends.

Contrary to expectations, same-sex friendship choices were not found to be more stable than opposite-sex friendship choices. However, an examination of the mean levels indicated that the degree of stability in same-sex friendships was slightly higher than the one in opposite-sex friendships, although the difference did not reach the level of significance. Perhaps this is a product of the small sample of participants who had friends from both genders ( $N = 63$ ). On the other hand, girls' reports of their opposite-sex friendships were revealed to be more unstable than boys'. Several reviews have documented that in early adolescence, females show a greater interest in affiliating with members of the opposite sex, and their opposite-sex relationships emerge earlier compared to their male counterparts (Epstein, 1986). Richards and colleagues (1998) have demonstrated that girls spend more time with and thinking about opposite-sex peers, whereas boys spend little time thinking about peers when they are not with them. Consequently, girls' greater social and cognitive attention to the opposite sex may lead them to consider more frequently the standing of their opposite-sex friendships (i.e., whether this boy is still a friend or not). Girls' perception of their opposite-sex relationships might therefore be more likely to be changing because girls devote more time analyzing them.

Third, we found that the environment in which friendships take place influence their level of stability. The hypothesis that multicontext friendship choices would be more stable than single-context friendship choices was supported. No difference was found in the level of stability in school-

only and in nonschool-only friendships, which suggests that school and nonschool contexts may constrain friendship stability to a similar degree. Alternatively, what revealed itself to be crucial was the simultaneous involvement in diverse friendship contexts. Youths' reports of friendships taking place simultaneously in multiple contexts—that is, in school and outside of school—were significantly more stable than those taking place in one single context (school only or nonschool only). This result provides some evidence for the process of physical propinquity in which individuals who recurrently interact with each other are prone to establish close relationships (Cairns, Leung, & Cairns, 1995). Dubois and Hirsch (1990) recognized that extending school-based friendships to nonschool settings could promote friendship intimacy. The inverse is also plausible: Friendships that are already stable in one context may extend to other contexts over time. Thus, convergent with Thomas and Berndt's (2005) study, multi-context relationships can be seen as either a cause or a consequence of frequent interaction and closeness. Accordingly, although the direction of causality cannot be ascertained, results clearly indicate that friendship contexts are linked to the level of stability. Overall, the present study highlights the importance of considering concurrently school and nonschool ecologies in adolescents' friendship relations because each context may bring its unique experience for the youths.

A typical way of examining friendship network stability in the literature has been to assess the degree to which the number of friendships or the size of the friendship network changed over time (Hardy et al., 2002). Such analysis of friendship stability may lead to erroneous conclusions that adolescent networks are quite stable. In this study, we examined friendship stability by considering changes in friends' actual identity. By doing so, we observed that there was considerable instability in participants' friendship nominations despite relative stability in the size of their network.

Did the level of friendship stability fluctuate from one month to another? The global stability index did not permit us to answer that question because its computation captured the overall level of stability over a five-month period. Thus, monthly stability indexes were calculated. The results indicated that the level of monthly friendship stability did not increase significantly over the five-month period. However, an examination of the means suggests that the level of monthly friendship stability consistently increased over time, from one month to another, although the differences were very small. It should be noted that assessments started in February, nearly six months into the school year. It seems likely that assessments beginning from September to June would have revealed sharper increases in stability over time. Consequently, more research is needed in

order to determine whether increasing time spent in the company of friends fosters friendship stability.

In sum, we observed that three general types of factors were associated with the level of friendship stability in early adolescence: (a) personal characteristics (adolescents' gender), (b) relationship features (friendship status, friendship gender composition), and (c) environmental factors (friendship contexts). Certainly, other factors not assessed in the present study could be involved in influencing friendship stability in early adolescence. As noted, early adolescence represents a significant period for psychosocial development because numerous changes occur at the biological, cognitive, and social levels (Berndt, 1982). For instance, individual variability in pubertal development may influence friendship network stability. Several reviews report that early-maturing girls are exposed to social contexts that differ greatly from their same-age peers such that they tend to associate with older peers (Archibald, Graber, & Brooks-Gunn, 2003; Ge et al., 2003). Their high levels of deviance may thus be associated with friendship instability.

Accordingly, the wide range of factors potentially influencing friendship stability presumes that individual differences exist in the level of stability observed in the composition of adolescent friendship networks. This assumption implies that youths vary from one another in their level of friendship stability, that is, some people should have a perfectly stable network, others should have a very unstable network, and still others should display a level of stability in-between.

Yet a central question remains: Is stability in friendship networks a good or a bad thing with respect to adolescent psychosocial adjustment? It would seem reasonable to speculate that individual differences in the level of friendship network stability may, in the long run, contribute uniquely to the quality of a child's psychosocial adjustment. The theoretical basis for this view is drawn in large part from Coyne's (1976) interactional model of depression. This model illustrates that individuals with relationship difficulties may experience an increase in depressive feelings, and their depressive state may in turn maintain or exacerbate their relationship problems. Thus, it seems plausible to expect that relationship difficulties, such as difficulties maintaining enduring friendships, may be associated with adolescents' depressive feelings, especially since other dimensions of friendship relations have been shown to influence adolescents' depressive symptoms such as friendlessness (Bagwell et al., 1998), peer rejection (Kiesner, 2002), and affiliation with deviant peers (Brendgen, Vitaro, & Bukowski, 2000).

Importantly, it may be valuable to examine the relation between friendship instability and depressive symptoms over short monthly intervals. Such

monthly analysis would allow us to explore the directionality of this relation as theorized by Coyne (1976), thus providing a more informative picture of the concurrent link between these variables as they unfold over time. It can be presumed that stable friendships may be positive for adjustment because they provide social support, particularly during periods of stress and transition (Berndt, 1989; Ladd, 1990). It can also be the case that friendship stability is harmful for adjustment when it reflects a rigid environment in which people fail to change relationships as their needs and interests change (Cairns, Leung, & Cairns, 1995). Moreover, stability in perceived friendships may represent a more critical variable in adolescents' psychosocial adjustment. Indeed, research has documented that individuals' perceptions of support reduce stress, even when individuals do not actually receive any type of support from their friends. Perceptions of supportive friendships are sufficient to increase people's confidence that they have the resources needed to cope with a stressor (Cohen & Wills, 1985). In brief, the relation between individual variations in perceived friendship stability and psychosocial adjustment should receive further empirical attention, and this question is currently the object of another study under way.

Finally, we learned that girls' perceived friendship networks were larger than boys'. This result seemingly contradicts the conventional view that girls prefer to interact in smaller and more exclusive groups of peers than boys prefer (Benenson, 1990; Berndt, 1982). However, it is possible that girls have a large number of friends who do not belong to the same group of peers, whereas boys have a smaller number of friends who are all linked to the same group. In this regard, a study performed by Benenson's (1990) observed that males' peer relations tend to form a cohesive group, whereas females' peer relations tend to form small and diverse groups that are less connected to one another. In sum, gender differences in stability appear to be entirely accounted for by the tendency of girls to name larger networks.

Limitations of the current study include the use of nonreciprocal nominations to measure friendship networks. When participants provide information on the characteristics of their own network, there is a possibility that they present a self-enhancing picture of their relationships (Cairns, Leung, & Cairns, 1995). Finally, it should be noted that reports of opposite-sex friendships could have been confounded with romantic relationships, which were not directly assessed in this study. It is known that romantic bonds in early adolescence are especially short-lived, so friendship stability may have been affected.

The study of stability and change in friendship networks constitutes a huge theoretical and methodological challenge. Theoretical contributions

of the present study include the description of monthly changes in the composition of adolescent perceived friendship network as well as the description of the level of stability in different types of friendships. The originality of the present study stems from the fact that very few investigations have examined change in friendship networks using multiple assessments within a school year and through very short spacing of measurement. The current investigation has illustrated that telephone interviews are an effective method for collecting longitudinal data across several time points, especially given the small attrition rate attained. Importantly, the method used to code and calculate the level of stability constitutes an innovative contribution to friendship stability research. Future research could expand on these findings by clarifying the psychometric features of the phone interview approach. New studies should also consider other aspects of friendship stability, such as the frequency of interaction leading to formation of a friendship bond or the growth of a friendship based on its quality. Lastly, monthly assessments represent an arbitrary choice of interval measurements. It would be interesting to capture adolescents' dynamic networks across weekly or even daily intervals, applying methods such as the experience sampling method (Csikszentmihalyi & Larson, 1987), and to explore patterns of short-term change earlier in the school year. The approach of studying change using short-interval assessments is likely to contribute greatly to an understanding of the short-term interactional processes by which children's and adolescents' friendship networks evolve over time and affect their development.

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