

What Makes You Think You're So Popular? Self-Evaluation Maintenance and the Subjective Side of the "Friendship Paradox"*

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We report on a survey of undergraduates at the University of Chicago in which respondents were asked to assess their popularity relative to others. Popularity estimates were related to actual popularity, but we also found strong evidence of self-enhancement in self-other comparisons of popularity. In particular, self-enhancement was stronger for self versus friend comparisons than for self versus "typical other" comparisons; this is contrary to the reality demonstrated in Feld's "friendship paradox" and suggests that people are more threatened by the success of friends than of strangers. At the same time, people with relatively popular friends tended to make more self-serving estimates of their own popularity than did people with less popular friends. These results clarify how objective patterns of interpersonal contact work together with cognitive and motivational tendencies to shape perceptions of one's location in the social world.

Cognitive social psychologists have spent much of the past two or three decades cataloguing the ways in which people are biased and inaccurate in their perceptions of themselves and others (e.g., Greenwald 1980; Nisbett and Ross 1980; Tversky and Kahneman 1974). One phenomenon that has received a great deal of attention in this literature is people's tendency to make self-serving comparisons between themselves and others, with the consequence that an overwhelming majority judge themselves to be "better than average" on a variety of traits, skills, and socially desirable dimensions (e.g., Alicke et al. 1995; Dunning, Meyerowitz, and Holzberg 1989; Taylor and Brown 1988). This tendency might be called the "Lake Wobegon effect," insofar as it anticipates Garrison

Keillor's fictional town in which "the women are strong, the men are good-looking, and all the children are above average" (Myers 1995). In the present research, we explore the possibility that people give self-serving estimates of their own standing in social networks, such that they perceive themselves to be more popular than they actually are, relative to "typical others" and relative to their own friends. We also investigate how perceptions of relative popularity are (and are not) associated with measures of actual popularity of self and others.

By examining people's estimates of their own popularity in comparison with friends and with typical others, we contribute to an integration of research on social cognition and social networks (e.g., Krackhardt 1987, 1990). In the field of social cognition, the distinction between comparisons with friends and with generalized others is central to Tesser's (1988) "self-evaluation maintenance" model. According to this model, people are more threatened by the success of friends than of strangers in self-relevant domains and therefore show greater evidence of self-serving biases in self versus friend comparisons than in other types of social comparisons. From this line of reason-

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ing, it follows that people are more likely to make self-serving comparisons involving popularity when the target of comparison is a friend than when it is a typical representative of the population.

By distinguishing between two targets of comparison (friends and typical others), it is also possible to extend Feld's (1991) paradoxical demonstration that most people must have fewer friends than do their friends. This "friendship paradox" is a mathematical consequence of the fact that popular people participate in more social circles than do less popular people. It also follows from Feld's analysis that most people in fact are more popular relative to typical others than relative to their friends. Thus, insofar as people are sensitive to objective aspects of social structure, they should show *less* self-serving bias in self versus friend comparisons than in self versus "typical other" comparisons.

Although we have juxtaposed the distinctive contributions of Tesser (1988) and of Feld (1991), the goal of the present paper is not to pit these two approaches against each other to determine which one is right. The two lines of analysis are not in competition because Tesser's theory applies to subjective perceptions of the self relative to one's friends, whereas Feld's observations refer to the objective standing of the average person in relation to his or her friends. Yet a juxtaposition of Tesser and Feld is compelling because, if Tesser's model is supported in the case of popularity estimates, this would mean that people make self-serving estimates of their own popularity in precisely those comparisons in which they are, objectively speaking, worse off: that is, in comparisons with their friends. An examination of self-enhancement in the perception of social networks would be useful in its own right. The friendship paradox adds interest and significance, however, because it raises the possibility that people are motivated to believe that they are above average not only in situations in which they are average, but even in situations in which they are, by definition, below average! (Also see Kruger and Dunning 1999.)

We also introduce a new methodology that allows us to integrate social cognitive work on self-enhancement biases with the

analysis of social networks. Our study is unique in that we have obtained useful (though imperfect) estimates of individuals' actual standing in a very large population as well as their subjective estimates of that standing, relative to both friends and typical others. Because work on motivated social cognition is typically conducted in the laboratory and because social network analyses generally examine relatively small groups (e.g., fewer than 40), not much is known about the role of the self in subjective representations of social networks in large populations. Once obtained, such knowledge should be socially and practically useful because, as Pfeffer (1981) and Krackhardt (1990) argue, accurately perceiving the structure of social networks is central to achieving power and influence in organizations.

Our study integrates theory and research concerning the Lake Wobegon effect, the self-evaluation maintenance model, and the friendship paradox. We review each in turn and then describe the methods and results of a large-scale social network survey.

The Lake Wobegon Effect

The memorable closing from Garrison Keillor's radio show, which is set in a fictional town in which "all the children are above average," vividly illustrates the tension between the desire to see oneself and one's associates as superior to others and the impossibility of this state of affairs in the aggregate (also see Myers 1995). Obviously, not everyone can be above average. Keillor's observation is more than mere satire, however. It reflects individuals' well-documented tendency to overestimate their standing relative to others on a wide variety of valued attributes. For instance, the great majority of people believe that they drive better than the average person (Svenson 1981). Most people also seem to think that they are fairer than the average person (Messick et al. 1985) and that they have better health prospects than the average person (Weinstein 1980). Examples of such patterns are ubiquitous. To cite one recent case, 87 percent of Stanford MBA students recently rated their academic performance to be in the top two quartiles ("It's Academic" 2000). Compared with their

peers, 90 percent of these students also believed that they were either average or above average in terms of quantitative abilities; only 10 percent judged themselves to be below average.

Social cognitive researchers have identified two broad classes of variables as sources of the distortion and bias that affect perceptions of the self and of relevant others. First, cognitive biases reflect individuals' tendencies to rely on simple heuristics and mental shortcuts when they make complicated judgments. Even when such judgments carry significant consequences, people frequently rely on cues such as the "availability," "representativeness," and "vividness" of certain pieces of information, which often are not relevant to the judgmental task (e.g., Nisbett and Ross 1980; Schwarz and Clore 1983; Tversky and Kahneman 1974). Second, desires for self-enhancement and positive self-presentation lead people to make self-serving comparisons between themselves and others. Thus most people believe that they are "better than average" on a wide variety of traits, abilities, and outcomes (Dunning et al. 1989; Taylor and Brown 1988; Weinstein 1980).

Cognitive and motivational sources of inaccuracy may work together in producing errors. For instance, self-relevant information is retrieved from memory more easily than information that is not as motivationally tinged (e.g., Greenwald 1980; Ross and Sicoly 1979); it is also more likely to serve as an "anchor" in social judgment (Kruger 1999).

Thus, egocentric biases pervade self-other comparisons. It follows that such biases should affect perceptions of relative popularity as well. Indeed, past work has documented that individuals tend to describe themselves as occupying a network position that is more central than the position attributed to them by their peers (Krackhardt 1987; Kumbasar, Romney, and Batchelder 1994). Beyond this basic finding, however, we know nothing about self-assessments of network position. In particular, independent lines of work on self-evaluation maintenance and on the friendship paradox both suggest that an important factor affecting self-perceptions of network position is whether the target of comparison is a friend or a "typical other."

Self-Evaluation Maintenance in Relation to One's Friends: Reflection and Comparison Processes

Work by Tesser (1988) and his colleagues (Tesser and Campbell 1982; Tesser, Pilkington, and McIntosh 1989) demonstrates that in domains that are highly relevant to the self, people may be more threatened by the success of friends than by that of strangers. Insofar as people derive information about self-worth from comparisons with relevant others, local reference points appear to be more motivationally significant than global reference points. It is reasonable to assume that popularity is a highly valued and self-relevant dimension of comparison for most people. Consequently people may rate strangers more favorably in terms of popularity than they rate their own friends, so as to maintain positive self-evaluation. This leads to a prediction that contradicts the objective reality captured by Feld's (1991) friendship paradox, which we review below. In particular, Tesser's work suggests that self-enhancement biases with regard to popularity estimates should be stronger for self versus friend comparisons than for self versus "typical other" comparisons.

Tesser's (1988) model incorporates both "reflection" and "comparison" processes involved in the maintenance of positive self-evaluation. Comparison processes allow one to benefit psychologically by drawing favorable comparisons between the self and relevant others, especially between the self and one's friends. Reflection processes, on the other hand, allow one to share in the positive attributes of close others such as friends. One relatively well-known example is the tendency to "bask in the reflected glory" (BIRG) of others by subjectively taking on the attributes of others with whom one identifies (e.g., Cialdini et al. 1976). Reflection and comparison are generally conceived of as opposing processes because it would seem impossible to enhance the self by simultaneously associating oneself with others and distancing oneself from them (Tesser et al. 1989). It is possible, however, that people might shift from comparison to reflection, depending on the target of comparison. In particular, one could claim superiority over one's friends

but, at the same time, use one's association with these friends to claim superiority over the "typical other." Our survey is unique in that it includes subjective estimates of popularity relative to these targets of comparison as well as objective estimates of the popularity of respondents, their friends, and the typical member of the population. As a result, we can examine the possibility that reflection and comparison processes operate somewhat independently.

The "Friendship Paradox"

The "friendship paradox" is one of a larger set of paradoxes pertaining to any variable that measures the mean (or median)¹ size of an experience, where "size" refers to the number of others with whom the experience is shared. Large experiences raise the mean experience size for many individuals; small experiences lower the mean experience size for only a small number of individuals. Overall, the mean size experienced by most individuals exceeds the true size. For example, most college students experience a mean class size that is larger than the true mean because larger classes are experienced by more students than are smaller classes (Feld and Grofman 1977, 1980; Hemenway 1982). Similarly, the mean organization size experienced by members of the labor force exceeds the average size of organizations in general, because larger organizations have more employees and therefore generate more individual experiences than do smaller organizations (Granovetter 1984). The mean family size of the persons one encounters in the world also exceeds the true average because larger families generate more children for the rest of us to meet.

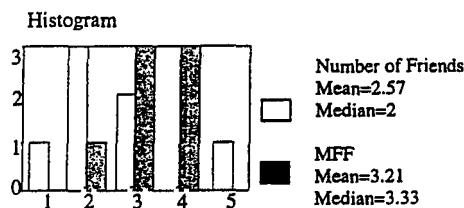
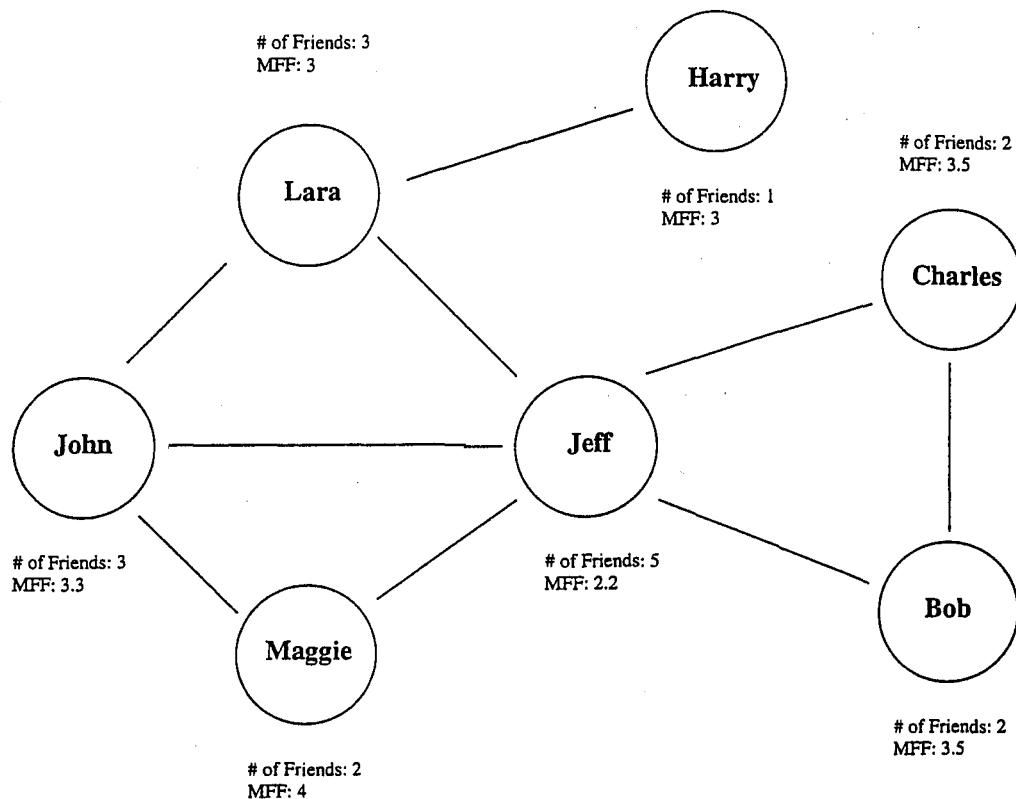
The friendship paradox rests on the fact that the friendship counts of popular people serve as possible standards or reference points for more people than do the counts of less popular people. Figure 1 presents hypothetical network data to illustrate this point. Jeff, who has five friends, appears in five different friendship counts; therefore, he raises

the average (mean) number of friends' friends possessed by all five of his friends. By contrast, because Harry has only one friend, Lara, he contributes to lowering the average number of friends' friends only for Lara. As a result, Lara and Jeff are the only members of this network whose own number of friends is not exceeded by the average number of their friends' friends. In other words, each individual (except Lara and Jeff) is less popular than his or her friends are. Feld proves that, apart from exceptional circumstances—such as cliques, in which all members have the same number of ties—*most people have fewer friends than their own friends have.*

A second, related aspect of the friendship paradox is that the disparity in popularity between oneself and one's friends is greater than the disparity between the self and "typical" or generalized others. As shown in Figure 1, the central tendency of the distribution of mean number of friends' friends lies to the right of that of the "number of friends" distribution. This difference reflects the fact that popular people increase the counts of many people's "friends of friends," whereas less popular people affect fewer such counts. As a result, one's own friends represent an objectively higher standard of comparison than does the typical population member. In the example illustrated by Figure 1, three individuals have more friends than the mean number possessed by any individual. By contrast, only Jeff has more friends than his friends' mean number of friends.

Insofar as perceptions of network structure are influenced by actual structure, people should show less self-enhancement when they draw comparisons between themselves and their friends than when they draw comparisons between themselves and typical others. Thus, given the prediction that people are motivated to see themselves as more popular relative to their friends than relative to the typical others (see Tesser 1988), the mathematical realities captured by the friendship paradox provide a useful (and rare) objective baseline for investigating self-enhancement tendencies in perceptions of relative popularity.

¹ Throughout the following discussion, statements that refer to the mean number of experiences pertain to the median number as well.



Note: MFF refers to the mean number of friends of friends. It is rounded to nearest integer in histogram.

Figure 1. Hypothetical Friendship Network

OVERVIEW OF RESEARCH

Friendship estimates regarding self and others provide fertile ground for observing how people reconcile the actual experience of being unpopular relative to their friends with the desire to see themselves as popular and to compare favorably with their friends on valued dimensions. In particular, in the present study, we investigate the operation of *comparison* and *reflection*, two psychological strategies specified by Tesser's (1988) model of self-evaluation maintenance, in the real-world context of a large social network. Insofar as people are motivated to use comparison processes as a way of maintaining positive self-evaluations, Tesser's model predicts that they should show greater evidence of self-serving estimates of popularity when

they are comparing themselves with their friends than when they are comparing themselves with typical others, even though this pattern would be directly opposite to the network realities demonstrated by Feld's (1991) friendship paradox. Insofar as people are motivated to bask in their friends' reflected popularity, they should also rate themselves as more popular when their own friends are more rather than less popular, independent of their own objective popularity.

To investigate these issues, we collected actual and perceived friendship counts in the course of survey interviews. Respondents were asked to nominate friends; we then used these nominations to assess actual friendship patterns of self and others in the network. Respondents were also asked whether they believed they possessed more or fewer

friends than did their own friends, and more or fewer friends than did typical students. This approach allowed us to investigate self-serving biases in estimates of relative popularity in relation to friends and others in a large-scale social network.

METHODS

We obtained data from the Quality of Life Survey conducted at the University of Chicago in 1995. A stratified random sample of the 3,430 undergraduate students was drawn; the probability of a student's inclusion was equal to the proportion of the college population made up by his or her class. Six hundred and thirty-six of the 1,005 students sampled completed the survey, resulting in a response rate of 63 percent. Interviewers administered the survey in person over a period of three months.

Survey Items Generating Friendship Counts

In the context of comprehensive questioning about campus social life, two principal network "name-generating" questions were asked, following the methodologies of Burt (1984) and Fischer (1982), among others:

1. List on this card up to seven undergraduate students with whom you currently spend the most time. These should be people with whom you *choose* to spend time although the time itself could may be spent doing anything.
2. Now please think of an undergraduate you know personally whom you guess has more friends than anyone else you know.

Throughout this paper, we use the term *friendship nominations* to refer to citations made in response to question 1, and "*most friends*" nominations to refer to answers to question 2. We use the terms *friendship nominee* and "*most friends*" nominee to refer to the persons named in response to each of these respective questions.

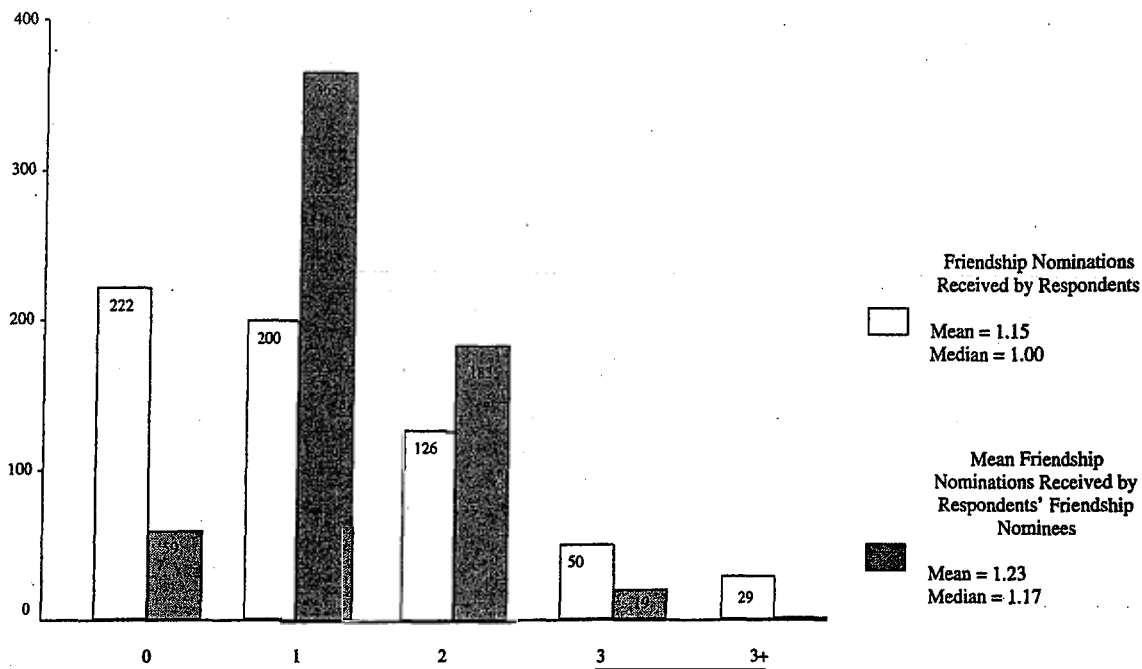
The Quality of Life Survey was unique in that it used a sample from a large population to gather data on the social network connecting *all* members of that population. Given that a central objective of this research was to

compare a student's popularity with that of his or her friends, one must be able to estimate the friendship counts of each of the respondent's friendship nominees. Yet because respondents constituted only 18.5 percent of the total student population, only a relatively small minority of friends and friends of friends were surveyed. The key step in acquiring friendship counts for the friendship nominees involved eliciting both the first and the last names of nominees. This step transformed the network data into population-level data and thereby made it possible to estimate the number of such nominations received by *any* student, even if he or she was not a respondent.

To illustrate this process, suppose that the complete campus friendship network could be represented as a 3,430 x 3,430 matrix in which the cells of the matrix indicate whether student *i* considers student *j* to be his friend. The column sum of this matrix then would register the number of friendship nominations received by the corresponding student. The Quality of Life Survey obtained a random sample from this matrix, a 636 x 3,430 matrix in which cell entries indicate whether respondent *i* nominates student *j* as a friend, where *j* could be either a respondent or a nonrespondent. Using this matrix, which represents a random slice of the complete campus network, we may estimate a student's popularity as a column sum of the matrix. Similarly, a respondent's mean number of friends of friends may be estimated by taking the average of the column sums of a respondent's friendship nominees.

The distributions obtained for each of these variables are presented in Figure 2; a parallel set of distributions for responses to the "most friends" question is shown in Figure 3. This procedure does not produce unbiased measures of a student's popularity. First, because an artificial upper limit (7) was placed on the number of friends a respondent may name, the number of persons nominated almost surely underestimates the number of friends a student would list if he or she encountered no constraints (see Holland and Leinhardt 1973). Nevertheless, this limit restricts only indirectly the number of nominations a student could *receive*, because there is no effective limit to the number of respon-

WHAT MAKES YOU THINK YOU'RE SO POPULAR?



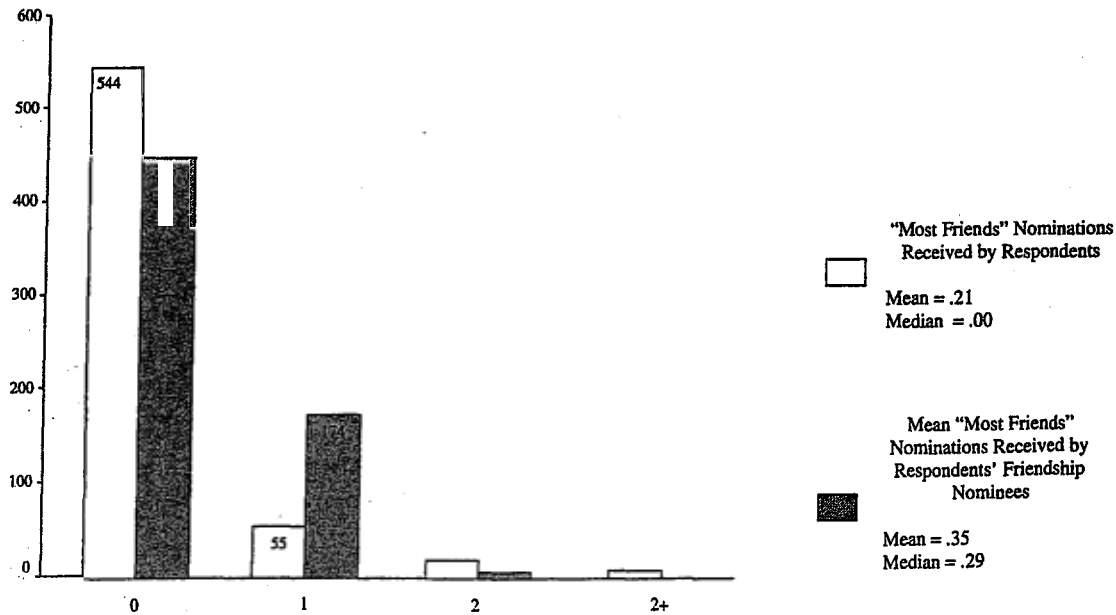
Note: "Mean friends of friends" has been rounded to the nearest integer. A mean of 3+ indicates that the number was 3.5 or greater.

Figure 2. Friendship Nominations Received by Respondents and by Their Friendship Nominees

dents who could cite a given student as a friend.

A related issue concerns estimation of the friendship counts for those students who received no friendship nominations. It might appear that, in order to estimate the number of nominations a student would have received had the full population completed

the survey, one should multiply the number of nominations received by the reciprocal of the sampling fraction (5.4). Thus a respondent who received two friendship nominations from survey respondents could be estimated as having approximately 11 friends. This approach does not work, however, for the large number of students who



Note: "Most friends" nominations have been rounded to the nearest integer.

Figure 3. "Most Friends" Nominations Received by Respondents and by Their Friendship Nominees

received no nominations on either of the two name generators. Because of the mathematical properties of zero, multiplying such students' friendship counts by the sampling fraction would not improve estimates of their true friendship count; in fact it would distort the distribution of estimated friendship counts.

Thus we do not view the counts of friends and of friends' friends as unbiased estimates of the true counts. Rather, because of the extreme difficulty of forming such unbiased estimates in the context of a such a large social network, the variables constructed here represent an adequate solution because they should generally relate to the underlying counts of interest. All things being equal, a student who makes or receives many friendship or "most friends" nominations will have more friends than one who does not.

As one indicator that these variables are useful for the purposes at hand, their distributions capture the friendship paradox in the manner described by Feld. In Figure 2, the distribution of the mean friendship nominations received by a respondent's friendship nominees is centered at a point to the right of the distribution of friendship nominations received by the respondents themselves. Thus 54 percent of respondents received fewer friendship nominations than did their friends, and only 39 percent received more nominations than their friends, a statistically significant difference (signed-rank $Z = 3.86, p < .001$).

This pattern is even stronger for the "most friends" nominations, as illustrated in Figure 3. In this case, 68 percent received fewer such nominations than did their friendship nominees; only 14 percent received more (signed-rank $Z = 9.98, p < .001$). Thus, although our measures do not assess a student's "true popularity" (a goal that would be virtually unattainable without great expenditure), the variables representing the friendship counts of respondents and their friendship nominees are clearly useful in capturing the phenomenon of interest.

Survey Items Tapping Self Versus Other Comparisons of Popularity

After they completed the name generators, respondents were asked to compare

themselves with their friends and with typical others in terms of popularity. The following two questions were asked:

3. On average, do you think that you have many more, more, as many, fewer, or many fewer friends than the people you listed [in response to question 2]?
4. Do you think that you have many more, more, as many, fewer, or many fewer friends than the typical University of Chicago student?

Responses to question 3 capture self versus "friends" comparisons; responses to question 4 reflect comparisons with "typical others." Each response was translated into a 5-point scale (1 = many more; 5 = many fewer).

RESULTS

Two sets of findings are presented here. First, we discuss the degree to which estimates of self-other differences in popularity are subject to self-enhancement biases that are at odds with reality. Second, we discuss factors that significantly increase or decrease estimates of relative popularity.

Perceptions and Reality of Relative Popularity

According to the friendship paradox, as illustrated above, most people have fewer friends than do their friends. Thus, if subjective perceptions of popularity reflect objective reality, people should be less likely to engage in favorable self-other comparisons with their friends than with typical others. Past work by Tesser (1988), however, indicates that there are motivational reasons why people would be more threatened by self versus friend comparisons than by self versus "typical other" comparisons. Self-evaluation maintenance theory predicts that perceptions of relative popularity should be stronger precisely where the "friendship paradox" dictates that relative unpopularity is actually greater.

The results presented in Table 1 are quite clear in their significance for understanding the role of the self in perceptions of social networks. First, for both comparisons, we see evidence of a strong tendency to report being

more popular than others to an extent that is surely at odds with reality. For example, 35.7 percent of respondents said they had more friends than the typical student, whereas only 23.5 percent said they had fewer friends. This produces a mean response (3.17) that is statistically different from an even weighting of responses (t -test for difference from the value of 3 = 4.48, $df = 629$, $p < .001$). Thus we have replicated the Lake Wobegon effect and have extended it to the domain of friendship estimates.

Furthermore, in a manner consistent with Tesser's model and representing a sharp denial of the reality captured by the friendship paradox, the tendency to report a higher friendship count than others is stronger when the respondent's own friends are the point of comparison. In virtually any population, the majority of individuals have fewer friends than do their own friends (Feld 1991). We found, however, that 41.7 percent of those who responded to the survey claimed to have more friends than their own friends; this figure is almost three times greater than the proportion who reported having fewer friends than their own friends (16.1%). Again, the mean response (3.33) differed significantly from the neutral midpoint of the scale (t -test for difference from value of 3 = 8.97, $df = 623$, $p < .001$).

When we compared respondents' likelihood of reporting that they had more friends than their friendship nominees (41.7%) with their likelihood of reporting that they had more friends than the typical student (35.7%), we obtained a statistically significant difference ($t = 4.135$, $df = 622$, $p < .001$). This result stands in direct contrast to the objective state of affairs revealed by the friendship paradox, but it is quite consistent with self-evaluation maintenance theory. It seems that the desire to say that one is more popular than others, although strong regardless of the target of comparison, is particularly powerful when one compares oneself with one's own friends. And this is the very comparison point by which most people are actually less popular than others.

Two methodological issues reinforce our confidence in the conclusion that respondents, contrary to reality, were more likely to make self-serving comparisons in relation to

friends than in relation to typical others. The first pertains to the wording of the two questions. If students interpreted "typical" in question 4 to refer to the median, rather than to the mean, this interpretation would provide a stronger basis for reporting a high friendship count for the "typical other" comparison relative to the "friends" comparison. That is, the positive skew in friendship nominations received, as seen in Figure 2, reflects the fact that most students have fewer friends than the *mean* for this variable, but the definition of the median implies that the same numbers of students are above and below the *median*.² Thus, if respondents understood "typical" to denote the median, equal numbers of respondents should report more and fewer friends than the typical student. By contrast, the wording of question 3 is less ambiguous: it asks the respondent to compare himself or herself with the "average" of his or her friendship nominees.³ Thus, even if the "typical other" comparison were not objectively more favorable, the difference in question wording suggests that respondents should describe themselves as less unpopular when using this reference point.

Second, respondents to the survey apparently were somewhat more popular than nonrespondents. Whereas the mean of

² Skewness, which should affect the accuracy of self-other comparisons, has been neglected by the literature on such judgments. Positive skewness, which is typical of distributions of social resources such as income and has been found for various measures of popularity or centrality (e.g., Coleman 1961; Killworth and Bernard 1978/79; Laumann et al. 1994), entails that most people are below the population mean. Conversely, when negative skewness is present, it is incorrect to say that most people cannot exceed the average: most people cannot exceed the median, but it is quite possible for most to be above average. For example, if 10 percent of drivers score a 1 and 90 percent score a 5 on a five-point scale of driving ability, most drivers in fact are better than average. Similarly, in a distribution with sufficient negative skewness, it is possible for most—but not all—Lake Wobegon children to be above average.

³ Moreover, even if respondents were more closely attuned to the median of their friends' friendship counts, this fact would not provide a sound basis for denying that they were less popular than their friends. Whereas 48.9 percent of respondents had fewer friends than the majority of their friendship nominees, only 41 percent had more friends (t -test for difference in proportions = 2.096, $df = 620$, $p = .036$).

Table 1. Frequency Distributions: Self-Other Comparisons

	Self vs. Typical Other Comparison		Self vs. Friends Comparison	
	Number	%	Number	%
Many More = 5	58	9.3	43	6.8
More = 4	202	32.4	184	29.2
As Many = 3	263	42.1	254	40.3
Fewer = 2	87	13.9	132	21.0
Many Fewer = 1	14	2.2	17	2.7
Total	624	100.0	630	100.0
Mean	3.33		3.17	

friendship nominations received for all students was 1.06, the mean was 1.15 for respondents and .92 for nonrespondents (Mann-Whitney $Z = 3.421$, $p < .001$).⁴ This suggests that it is not inaccurate for many respondents to see themselves as more popular than the typical student. This point, however, provides no basis for a heightened tendency to report greater popularity than one's friendship nominees. As demonstrated by our illustration of the friendship paradox, most respondents clearly have fewer friends than do their friendship nominees, but they fail to realize it.

Factors Increasing and Decreasing Bias in Estimates of Relative Popularity

We have shown that social cognitive biases limit the accuracy of self versus other comparisons of relative friendship counts, but the presence of bias does not indicate *no* corre-

spondence between a student's actual popularity relative to others and his or her perception of that reality. Above, we compared the aggregate distributions of perceptions of relative popularity and showed how they appear to ignore the friendship paradox. In this section we investigate these issues at the individual level by exploring the relationship of variables that measure the actual popularity of self and others to respondents' perceptions of relative popularity.

Descriptive statistics and a correlation matrix for the variables used in this analysis are provided in Table 2. We consider three variables that tap a respondent's popularity: the number of friendship nominations that he or she made, the number of friendship nominations that he or she received, and the number of "most friends" nominations that he or she received. In addition, we include two popularity variables for a respondent's friendship nominees: the mean number of friendship nominations received and the mean number of "most friends" nominations received. In calculating the latter variables, we exclude a

⁴ We found no significant difference between respondents and nonrespondents on the number of "most friends" nominations received.

Table 2. Descriptive Statistics and Correlation Matrix

Variable	Mean	SD	Min.	Max.	[A]	[B]	[C]	[D]	[E]	[F]
Self vs. Friends Comparison	2.67	.91	1	5	—					
Self vs. "Typical Other" Comparison	2.83	.93	1	5	.44*	—				
Number of Friendship Nominations Made	6.27	1.38	0	7	.17*	.34*	—			
Number of Friendship Nominations Received	1.15	1.20	0	7.00	.12*	.18*	.19*	—		
Mean Number of Friendship Nominations Received by Friendship Nominees	1.23	.62	0	3.67	.07†	.13*	.15*	.38*	—	
Number of "Most Friends" Nominations Received	.21	.66	0	6.00	.13*	.26*	.12*	.34*	.17*	—
Mean Number of Friendship Nominations Received by "Most Friends" Nominees	.35	.33	0	1.86	.04	.16*	.08†	.13*	.35*	.09*

† $p \leq .10$; * $p \leq .05$

respondent's own nominations from the friendship count of his or her friends. We do not regard any of these variables as unbiased estimates of the popularity of a respondent or his or her friends. Yet, insofar as these measures are related significantly to true popularity, exploring their association with perceived popularity is a useful exercise that is uniquely available with the data at hand.

The results of three repeated-measures regression models are summarized in Table

3.⁵ In each model we regress responses to the self versus friends and the self versus "typical other" comparisons onto the popularity variables. We use the repeated-regression format

⁵ Because the dependent variables are categorical, OLS regression is technically inappropriate. We found substantially the same results, however, using ordinal logit models (see Winship and Mare 1984). We report the OLS results because their interpretation is more straightforward.

Table 3. Repeated-Measures Regression Analyses of Self vs. Friends and Self vs. "Typical" Comparisons

Independent Variables:	Model 1: Friendship Nominations Variables		Model 2: "Most Friends" Nominations Variables		Model 3: Friendship and "Most Friends" Variables	
	Self vs. Typical Comparison	Self vs. Friends Comparison	Self vs. Typical Comparison	Self vs. Friends Comparison	Self vs. Typical Comparison	Self vs. Friends Comparison
Number of Friendship Nominations Made	.217 ^a (.028)**	.084 ^a (.029)*	.210 ^a (.027)**	.087 ^a (.028)**	.206 ^a (.027)**	.080 ^a (.029)**
Number of Friendship Nominations Received	.073 (.021)*	.062 (.056)			.030 (.032)	.042 (.034)
Mean Number of Friendship Nominations Received by Friendship Nominees	.092 (.062)	.032 (.064)			.012 (.063)	.018 (.067)
Number of "Most Friends" Nominations Received			.292 ^a (.052)**	.151 ^a (.054)**	.274 ^a (.054)**	.126 ^a (.127)**
Mean Number of Friendship Nominations Received by "Most Friends" Nominees			.359 ^a (.104)**	.052 (.109)	.342 ^a (.110)**	.028 ^a (.116)
Constant	1.602 (.184)**	2.691 (.189)**	1.654 (.174)**	2.738 (.184)**	1.642 (.180)**	2.720 (.189)**
Adjusted R ²	.118	.022	.165	.027	.164	.027
N	618	618	618	618	618	618

Notes: The models were run with two sets of dependent variables in a repeated-measures regression format, using the GLM command in SPSS. In each model, the first dependent variable is the respondent's answer to the "typical" comparison ("Do you think that you have many more, more, as many, fewer, or many fewer friends than the typical University of Chicago student?"). The second is the respondent's answer to the "friends" comparison ("On average, do you think that you have many more, more, as many, fewer, or many fewer friends than the people you listed [among the respondent's friends nominations]?") The distribution of these variables is presented in Table 1.

^aAn adjusted *F*-test for a difference in the effect of the covariate on one of the dependent variables from the effect on the other dependent variable was significant ($p \leq .05$).

* $p \leq .05$; ** $p \leq .01$; (two-tailed *t*-tests)

to determine whether these variables differed in their effects on each of the two types of comparisons.

Table 3 reveals several important results. First, as indicated by the relative R^2 for each pair of equations, estimates of popularity are at least somewhat responsive to reality, although such sensitivity depends on the target of comparison. For instance, Model 1 indicates that both people who nominate a larger number of friends and those who receive many nominations see themselves as more popular than others, according to either comparison. In addition, these effects, which are more robust for the former variable, are significantly stronger for the self versus "typical other" comparison than for the self versus friends comparison.⁶ The greater difficulty in accounting for self versus friends comparisons using our study variables adds credence to the notion that such assessments are governed by defensive motives to maintain positive self-evaluations. Such motives may be associated with individual differences that were not measured here (e.g., Paulhus and Reid 1991). Thus answers to the self versus friends comparison not only evince greater inaccuracy, as shown in relation to the friendship paradox; they also seem to be relatively unaffected by actual friendship patterns.

The results involving mean friends of friends are noteworthy as well. From the standpoint of accuracy in social perception, respondents whose friendship nominees receive many nominations should themselves display a *reduced* tendency to say that they have more friends than their friendship nominees. Even if respondents operated under a self-enhancement bias, this would not elimi-

nate the possibility that the bias might be weakened by contrary evidence. Model 1, however, shows no such negative effects for the self versus friend comparison. Thus the self-serving tendency to report having more friends than do one's friendship nominees seems to be insensitive to friends' popularity.

A third pattern observed in Table 3 concerns the type of nominations used to construct popularity measures. Compare the results for Model 1 with those for Model 2; the latter replicates Model 1 once variables based on friendship nominations are replaced by those based on "most friends" nominations. Again we see that respondents who make and receive more nominations are more likely to regard themselves as relatively popular, and that the number of nominations received by a given respondent's friends has no bearing on the self versus friends comparison. Further, we see that these effects are more robust than those in Model 1. Thus, when variables based on both types of nominations are included in Model 3, only those based on the "most friends" nominations have significant effects. The fact that results based on the "most friends" nominations relate more strongly to perceptions of relative unpopularity comports with the fact (shown in Figures 2 and 3) that these nominations capture the "friendship paradox" more fully.

Thus far we have seen that respondents who make and receive more nominations are more likely to view themselves as relatively popular, and that these effects are stronger when the target of the comparison is the typical student rather than the respondent's friends, and when the popularity measures are constructed with the "most friends" nominations rather than the friendship nominations. We have also seen that the actual popularity of one's friends apparently exerts no diminishing effect on the tendency to see oneself as more popular than they are.

Finally, another pattern that runs through Table 3 deserves mention: independent of their own popularity, students appear to see themselves as more popular than the *typical student* when they have popular friends. Although the mean of friends' friends does not exert a negative effect on responses to the self versus friends comparison, it has a

⁶ One might interpret the significance of the effect of the number of nominations made as showing that people who wish to see themselves as popular nominate many people (who might not be "real" friends) and also report high relative popularity. If this were true, such desires would be reflected in a heightened tendency to make unreciprocated nominations (e.g., Breiger 1976). Yet we find that, with controls for the covariates presented in Table 4, the number of unreciprocated nominations is associated with a *diminished* tendency to report having more friends than one's friendship nominees. That is, respondents who made unreciprocated nominations apparently were aware that these friendships were not real.

positive but insignificant effect ($t = 1.50$, NS) on the self versus "typical other" comparison.⁷ The coefficients for the "most friends" nominations displayed in Models 2 and 3 are even stronger. The mean "most friends" nominations received by one's friendship nominee exerts no significant effect—and certainly not a negative effect—on the tendency to see oneself as having more friends than do one's friends. This variable, however, has a strong *positive* effect on self versus "typical other" comparisons. With controls for a student's actual popularity in terms of the number of nominations he or she received, students are significantly more likely to say that they have more friends than the typical student when their friendship nominees are popular.

This interesting result is consistent with balance theory and with the "reflection" processes discussed in relation to the self-evaluation model (Tesser 1988). From the perspective of balance theory, people tend to perceive valenced similarities among people who share visible connections (Heider 1958). Thus, if my friends are popular, I am (by association) also popular. In addition, the patterns observed in Table 3 are quite consistent with the process of BIRGing (Cialdini et al. 1976) in that students appear to be assuming their friends' popularity levels as their own.⁸ Students apparently use their friends' popularity in a strategic, if not self-conscious, fash-

ion. Although friends' popularity does not reduce their tendencies to say they are more popular than their own friends (most say this, in defiance of the truth), it enhances their predilection for saying that they are more popular than the typical student. That is, students may shift from reflection to comparison, depending on the target of comparison.

DISCUSSION

If the objective side of the friendship paradox is that most people actually have fewer friends than do their own friends (Feld 1991), the subjective side is that most people, contrary to reality, cling to the belief that they have more friends than their own friends. This fits with a relatively large body of research indicating that people make self-serving comparisons between themselves and others (e.g., Alicke et al. 1995; Codol 1975; Dunning et al. 1989; Messick et al. 1985; Taylor and Brown 1988; Weinstein 1980). It also advances our understanding of the ways in which people might choose to compare themselves with close others such as friends (e.g., Tesser 1988).

Past research distinguished between "reflection" and "comparison" in the maintenance of self-esteem, suggesting that they are "antagonistic social psychological processes" (Tesser et al. 1989:442). That is, people often must choose between sharing in their friends' successes, on the one hand, and elevating themselves relative to their friends, on the other. We have found evidence that people might engage in both processes in the same situation when making different types of judgments.

First, we observed strong self-enhancement when people were asked to compare themselves with others on dimensions of popularity, whether those others were friends or strangers. Thus, self-serving estimates of friendship may be added to a growing list of motivational biases in social cognition (e.g., Dunning et al. 1989; Taylor and Brown 1988; Weinstein 1980). In addition, we found that self-enhancement was greater in self versus friend comparisons than in self versus "typical other" comparisons. This finding supports Tesser's model of self-evaluation maintenance, which holds that people may be more

⁷ One might suspect that the effect of mean friends of friends on "typical other" comparisons is present because students could name only seven friends on the survey. Thus students in large friendship circles might be less likely to be mentioned in the first seven nominations, and this might create an artifactual association between having popular friends and judging oneself to be popular. We examined this possibility by observing the correlation between number of nominations received and mean friends of friends while varying the point of truncation. By truncating after seven nominations, then six, five, four, and so on, we see that the correlations level off before reaching the actual truncation point of the survey: .38, .37, .34, .32, .31, .16, and -.01. This pattern suggests that the effect of mean friends of friends is not artifactual.

⁸ Whereas BIRGing would entail seeing oneself as popular when one's friends are popular, behavior consistent with balance theory also would entail seeing oneself as unpopular when one's friends are unpopular. Unfortunately, our data do not provide a basis for distinguishing between the two.

threatened by the success of friends than by that of strangers under conditions of high personal relevance (Tesser 1988; Tesser and Campbell 1982; Tesser et al. 1989). The central message in this line of research is that we feel the need "to keep up with the Joneses" precisely because they are our neighbors. Our results are particularly compelling in light of the "friendship paradox" (Feld 1991). Although most people have fewer friends than their friends have, and although this *relative unpopularity* is weaker in relation to the "typical" member of a population, perceptions of *relative popularity* are significantly greater in reference to the comparison with friends.

Second, people appear to engage in reflection processes by incorporating their friends' friends into their own friendship counts. Our finding of a positive association between friends' popularity and estimates of one's own popularity compared with that of "typical others" fits with Heider's (1958) balance theory in that people assume similarity in terms of popularity between themselves and their friends. This finding also may be another example of "basking in the reflected glory" of others with whom one shares an affiliation or identification (Cialdini et al. 1976), although this strategy is available only to people with friends who are successful or popular. In sum, our data suggest that people, given the opportunity, manage to satisfy seemingly incompatible needs for reflection and comparison. Specifically, people want to be more popular than their friends, but they also want to benefit from their friends' popularity.

For a number of reasons, evidence of self-serving biases in comparisons with one's friends would be surprising or unexpected. First, the objective side of the friendship paradox identified by Feld (1991) suggests that such comparisons generally are false. Ironically, the comparisons in which people are worst off (in terms of standards of comparison) are those on which they exhibit the strongest biases.

A second reason to expect greater self-enhancement in self versus "typical other" comparisons than in self versus friend comparisons is that people might be more comfortable in expressing their own superiority

relative to strangers than to people whom they know and like. For instance, some experimental evidence indicates that people are less likely to exhibit self-serving biases in attributing dyadic outcomes when they are comparing themselves with friends than with strangers (e.g., Campbell et al. 2000; Sedikides et al. 1998).

Third, past research suggests that people are more likely to exhibit Lake Wobegon effects when the targets of social comparisons are ambiguous or ill-defined, such as "typical others" (e.g., Alicke et al. 1995; Codol 1975; Dunning et al. 1989; Kruger 1999). For instance, Codol (1975) found that people are more likely to draw favorable self-other comparisons with undifferentiated others than with specific individuals. Even more relevant to the present research, Alicke et al. (1995) demonstrated that people are more likely to rate themselves as better than average when they are comparing themselves with generalized others (such as the typical college student) than when they are comparing themselves with specific others (such as an individual acquaintance or the person sitting next to them).

Although none of these studies directly investigated the Lake Wobegon effect in self-other comparisons involving friends versus typical others, they all suggest that people would show more inflated estimates of relative popularity when they compare themselves with generalized others than when they compare themselves with their friends. By contrast, we found that people evince even greater self-enhancement when comparing themselves with their friends than when comparing themselves with abstract, generalized others. This indicates the need to further integrate research on "better than average" effects with work on self-evaluation maintenance, so as to understand the subtle ways in which processes of comparison and reflection are used to maintain positive evaluations of the self.

Finally, although we have stressed motivational factors in accounting for friendship estimates of self and others, and although a good deal of past research corroborates this view, it is possible that some of our results could be explained by cognitive factors or by some combination of cognitive and motiva-

tional factors. For instance, advantages in availability or ease of retrieval may accrue when people attempt to recall their own friends as opposed to the friends of others, thereby generating the tendency to overestimate their own popularity (see Tversky and Kahneman 1974). In addition, because information-processing capacity is limited, people may curtail their searches for social contacts after a certain number of mental operations. As a result, self versus friend estimates may appear to be more self-serving than self versus "typical other" comparisons because people include both friends and friends of friends when calculating their own popularity, but include only friends of friends, and not friends of friends of friends, when estimating their friends' popularity. The observed difference between the two comparisons also could reflect the fact that the self versus friend comparison may provide more opportunity for strategic comparisons. Thus, if people are motivated to search for targets that afford downward comparison (e.g., Wills 1981), such a search may be more difficult in the case of generalized or typical others because unpopular strangers are unavailable for comparison. This process would reflect cognitive and motivational factors that yield self-enhancing results when combined (see Greenwald 1980; Kruger 1999; Ross and Sicoly 1979). Future research is necessary to identify the precise mechanisms responsible for our results.

CONCLUSION

The present research affords an opportunity to compare subjective representations of social structure with objective features of relational patterns within that structure. Feld (1991) proved that most people have fewer friends than do their friends. Our research demonstrates that people are relatively insensitive to this reality. In fact, self-enhancement was even greater in self versus friend comparisons than in self versus "typical other" comparisons. This finding supports the notion that people are threatened more by the success of friends than of strangers (e.g., Tesser 1988), although Feld's friendship paradox dictates that the former comparison provides an objectively less favorable basis

for self-evaluation. Thus an exploration of the "subjective side" of the friendship paradox increases the irony: people have fewer friends than their friends have, but they believe they have more friends than their friends.

Although our results suggest that cognitive representations of network structure depart considerably from actual structure (also see Bernard et al. 1984), estimates of popularity are not entirely unrelated to reality. For instance, perceptions of network ties reflect long-term rather than short-term interaction patterns (Freeman and Romney 1986). Similarly, perceptions of cliques represent simplified but not inaccurate characterizations of actual cliques (Freeman 1992; Freeman and Webster 1994). In our study, we found evidence that people who make and receive more (fewer) friendship nominations tend to see themselves as more (less) popular, particularly when the target of comparison is the typical other. We also found, however, that people with popular friends perceive themselves to be more popular than the typical student, independent of their own popularity.

Taken as a whole, our results suggest that people may shift from "comparison" to "reflection" when forming estimates of their network position, depending on the target of comparison. These results augment a growing literature that seeks to understand how individuals develop mental representations of social network structure (e.g., Freeman 1992; Freeman and Romney 1986; Freeman and Webster 1994; Krackhardt 1987; Krackhardt and Kilduff 1999; Kumbasar et al. 1994). The goal of that research, and of ours, is to understand how objective patterns of interpersonal contact work together with cognitive and motivational tendencies to shape perceptions of one's location in the social world.

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