

Interracial friendship and the trajectory of prominority attitudes: Assessing intergroup contact theory

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Abstract

We analyze the trajectory of racial attitude change among White university students, over a 4-year time period, representing an advancement over previous studies' use of longitudinal designs alone to test the causal ordering and nature of the relationship between contact and attitudes. Adding to the literature on intergroup friendships, we examined the impact of two types of intergroup contact (interracial friendships and neighborhood racial context) on two types of racial attitudes: attitudes supportive of affirmative action and feelings of commonality with minorities. Overall, we find that a greater number of interracial friendships is associated with more positive racial attitudes. Women and those with more interracial friendships experience a faster rate of increase in their endorsement of affirmative action policies. Individuals growing up in more racially homogeneous neighborhoods expressed less support for affirmative action and politically conservative students had lower support for both affirmative action and feelings of commonality.

Keywords

intergroup processes, longitudinal methodology, modeling-of-change, prejudice/stereotyping, quantitative models

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Despite decades of efforts to eliminate prejudice, intergroup hostility still abounds in contemporary America. Institutions of higher learning are especially sensitive to this problem and therefore engage in diversity initiatives designed to increase the number of minority faculty and students. It is a major tenet of the academy that a greater diversity presence on campus is the primary mechanism for achieving equality in society and promoting intergroup harmony. Much of the theoretical underpinning for this thinking derives from Allport's (1954) contact hypothesis, also

known as intergroup contact theory. Allport argued that positive attitudes toward diverse others arise naturally out of increasing contact, but only under certain conditions. These conditions

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are status equality, cooperative interdependence, and support from a higher authority.

Intergroup contact theory appears to be supported by a large body of findings (see Tropp, Hawi, van Laar, & Levin, 2012, for an excellent review of this literature). As a result, scholars have turned to isolating the mechanisms by which contact leads to less prejudice, for example, via empathy or access to information about racial issues (McClelland & Linnander, 2006; Pettigrew, 1997). However, various theorists still challenge the validity of the theory, asserting that the correlation between interracial contact and favorable racial attitudes is sometimes weak, may not even be positive (Barlow et al., 2012; Moody, 2001; Taylor, 1998; Weber & Crocker, 1983), and the causal order may be reversed (Binder et al., 2009; Pettigrew, Tropp, Wagner, & Christ, 2011). Disparate findings may be, in part, due to the use of cross-sectional data (Klask & Martin, 2003; Sigelman, Bledsoe, Welch, & Combs, 1996; Sigelman & Tuch, 1997; Sigelman & Welch, 1993). Thus, considerable documentation of a static association between contact and, for example, interracial closeness has been documented (Tropp, 2007) among university students. But without a time ordering of contact and closeness, it is not clear that this association reflects a causal process (Binder et al., 2009). Two notable exceptions are found in the work of Fischer (2011) and Tropp et al. (2012) who utilized longitudinal survey data of college students and found that, after 4 years, a greater number of interracial friendships was associated with lower levels of prejudice. Binder et al. (2009) also utilized longitudinal data to test causal order and, in addition to finding support for the contact hypothesis, also found evidence for the reverse causal order, that the effects of attitudes on contact were at least equal to, or greater than the effects of contact on attitudes. This suggests that a static correlation of contact with attitude is limited in its ability to inform us about causal direction. In fact, the direction of influence could be opposite to that hypothesized. Perhaps developing more favorable attitudes toward minorities is what enhances contact. To the extent that the trajectory of attitude change

can also be shown to be a function of interracial contact, beyond use of longitudinal data alone, confidence in the causal priority of contact is strengthened. A major contribution of this work is that it provides a stronger test of causal order.

The influence of contact on attitudes may also depend on the particular attitude or sentiment in question. Much prior research is based on single-item measures of such sentiments as feelings of closeness to minorities or the perception of discrimination. Davies, Tropp, Aron, Pettigrew, and Wright (2011) conducted a meta-analysis of studies investigating various types of cross-group friendships and intergroup attitudes; one dimension the authors compared was studies utilizing single-item measures to multi-item, higher reliability, measures. The authors found that single-item measures may not accurately represent a complete attitude but may reflect only one element of a complete attitude. For example, a question assessing a student's most recent experience with a minority faculty member may not capture the student's overarching attitudes toward minorities but only the student's attitude toward one given faculty member. A thorough assessment of intergroup contact theory requires a consideration of more general orientations. For example, does increasing contact with minorities also impact willingness to support policies designed to favor minorities on campus (i.e., affirmative action)? Or does contact translate into a sense that minority and majority individuals share common needs and interests (i.e., feelings of commonality)?

Additionally, the influence of intergroup contact on attitudes may depend on how intergroup contact is measured. Previous studies commonly utilize either a microlevel, behavioral measure such as the number of interracial friendships (for an excellent review, see Davies et al., 2011) or a contextual, macrolevel measure such as the racial composition of respondents' geographic area (Oliver & Wong, 2003; Taylor, 1998). The use of only one level of measurement can produce divergent findings (Stein, Post, & Rinden, 2000). Part of the discrepancy can be credited to the nature of the two types of interactions. The most common approach, the microlevel measurement, tallying the races of

the respondent's friends, captures only the respondent's closest friendships while excluding all other probable interracial friendships and interactions that may be occurring throughout the day in less intimate, but still meaningful, interactions. The macrolevel measurement, frequently examining racial composition of respondents' metropolitan area or county, utilizes too liberal a definition of contact that includes fleeting, or no, exchanges between residents. Further, Barlow, Hornsey, Thai, Sengupta, and Sibley (2013) found that, for majority group members, neighborhood composition did not impact attitudes even controlling for gender, socioeconomic status, and other important controls. In short, much is to be gained from using two levels of measurement because the former measure may underestimate the amount of interracial contact while the latter may overestimate the amount of *meaningful* interracial contact and may not matter for majority group members. This study utilizes a microlevel measure (number of interracial friendships) as well as a macrolevel measure of contact (neighborhood racial composition) to strike a better balance of capturing meaningful contact that has the potential to relay information about outgroups and affect attitude change.

This study contributes to the stream of research on (a) intergroup contact theory by building on longitudinal research that seeks to establish causal order (i.e., whether contact impacts attitude or the reverse) and whether contact has a positive impact on attitudes, (b) intergroup friendships, and (c) appropriate modeling strategies for examining the impact of contact on attitudes, over time. We employ a panel study of university students from a major Midwestern university to track the influence of interracial contact on the trajectory of two attitudes over the college career: support for affirmative action and feelings of commonality with minorities. Interracial contact is tapped by a time-varying measure of the number of interracial friendships students maintain at any given time. We employ an analytic technique, the linear mixed-effects model, which properly models the heteroscedasticity and serial correlation attendant to longitudinal data. The study also controls for key baseline factors that could render spurious any

association between contact and attitudes. These include student's gender, political ideology, and personal experience with harassment or discrimination, as well as the racial diversity of their childhood neighborhood of residence.

Interracial Contact

Intergroup contact theory, or the contact hypothesis as it is sometimes called, is founded on the random-mixing assumption: the greater the opportunity for people to meet, the greater the likelihood that friendships will form. Friendships, which offer personal contact, are expected to increase perceptions and feelings of similarity, which in turn should lead to increased positive affect toward given individuals. It is further assumed that, when friendships are formed between individuals of different racial backgrounds, positive affect will translate into decreased prejudice against the larger groups such individuals represent. Much of the theoretical groundwork for intergroup contact theory is derived from Gordon Allport's (1954) book, *The Nature of Prejudice*. Allport emphasized the important influence of the social situation and proposed three conditions under which interracial contact is most likely to foster *positive* racial attitudes and facilitate the breakdown of in-group preferences: (a) when members are of an equal status, (b) when members of the group are working together toward a common goal, and (c) when the interaction between members of the group is supported by authorities.

Drawing from Allport's research, we can expect that, given that the current study employs a *college* cohort who are of similar age and socioeconomic status and who will have extensive contact with minorities during their 4 years in college, on a campus in which the authorities support intergroup interaction, we would expect a positive trajectory over time in both attitudes toward affirmative action and feelings of commonality. Some research questions whether universities are indeed cooperative, but may instead be competitive (Attle & Baker, 2007; Cialdini, 1993). Yet, others posit universities are a cooperative environment because students have a shared sense of community, work toward a

common goal of graduation, and capitalize on one another's resources and skills (Brown & Ciuffetelli, 2009). We therefore consider universities as fulfilling the requirements of a cooperative environment.

Racial Attitudes and Control Variables

From a social learning perspective, the affective base of prejudice is acquired early in life as part of childhood socialization (Bandura & Walters, 1963; Katz, 1976) and persists into adulthood, shaping racial and ethnic attitudes (Kinder & Sears, 1981). For example, conservative parents teach their children conservative values, beliefs, and general orientations. As individuals move out of parents' homes, away from parental influence, their attitudes may shift in accordance with the views of new friends, employers, experiences, or environments. However, attitude change is a slow process requiring much time—more than 4 years of college. We include political orientation as a control and anticipate that students raised in conservative households will express conservative beliefs and negative attitudes toward both affirmative action and feelings of commonality, controlling for other important predictors. Likewise, students raised in households in racially diverse neighborhoods, with larger interracial friendship networks, and beliefs that they are similar to their minority neighbors, will express more positive racial attitudes than students who were raised in less diverse, (e.g., predominantly White), neighborhoods.

Gender is also included as a control variable, as gender differences have been discovered in previous research. Johnson and Marini (1998) found that females were more willing to be friends with people of other races, to live near them and work with them, and to have their future children associate with them. In relation to racial attitudes, Mills, McGrath, Sobkoviak, Stupek, and Welsh (1995) found that women scored higher than men on a scale of acceptance of others. Women demonstrated greater concern for the well-being of others and for the community as a whole in their support for social welfare programs (Shapiro & Mahajan, 1986; Steeh & Schuman, 1992). Consistent with

prior research, we anticipate that women will have more intergroup friendships, and express more positive attitudes toward minorities than men, controlling for covariates.

Individuals who have had an experience with prejudice due to sexual orientation or physical or mental limitations may be more receptive to information gained from friendships with other minority group members. Allport (1954) has differentiated between *fleeting* contact and *close* contact. Students who report that they have had a personal experience with prejudice have experienced a "close contact." These events have the potential to transform their thinking about members of other racial and ethnic groups such that they will view interracial contact differently than students who have not had such experiences. Bowen and Bok (1998), in their analysis of the College & Beyond Survey, found that students who had meaningful interactions with students of other racial and ethnic groups experienced both higher levels of interracial contact later in life and experienced a more positive shift in racial attitudes. On balance, we expect that people who have had experiences with harassment will have greater empathy, or experience greater closeness, with minority groups and this will be evidenced in their greater support for affirmative action and greater feelings of commonality.

Data and Methods

The Michigan Student Study (MSS) is a 4-year longitudinal study that followed the University of Michigan undergraduate class of 1994 from the time they entered college until their fourth year (Gurin & Matlock, 2004). According to the University of Michigan researchers, the major emphasis of the study is on racial and ethnic diversity but also encompasses students' reactions to academic and social experiences including sexual orientation and gender issues. All students received a survey at their point of entrance to the university in September of 1990. Of all the students who responded to the first survey, all students of color and a representative proportion of White respondents were followed up in surveys during their

freshman (winter 1991), sophomore (winter 1992), and senior years (winter 1994).

The total number of students participating in any of the four waves is 4,796; however, for this study we restrict the sample to students who replied to all four waves. The total number of respondents to waves is: 2,639, 1,278, 1,713, and 1,171 respectively. However, the total number of respondents to all four waves is 488. We limit the sample to White students. Using the aforementioned methods of elimination and mean substitution to replace missing values on interval-level variables yielded a final sample of 305 White students.

Interracial Contact Measures

There are two types of measures used to estimate the respondent's level of interracial contact: a friendship network measure and a racial composition measure.

Friendship network measures how many "other race" friends each of the respondents has. Each respondent was asked to identify the race of his or her six closest friends. Each of these friendships was assigned either a score of 1, if the friend was of a different race, or a score of 0, if the friend was of the same race as the respondent. These points were then added together. Scores range from zero "other race friends" to six. Across the 4-year period, the mean number of interracial friendships varies (0.84, 1.16, 1.24, and 1.16, respectively). Because the distribution of number of interracial friendships over time was right-skewed, we use the natural log of this predictor in the analyses; in particular, we use $\log(\text{number of interracial friendships} + 1)$.

The racial composition measure is the composite score created from summing four questions assessing the proportion of minorities present in four childhood environments: neighborhood, place of worship, high school, and family's current neighborhood. Each question had five response categories: (a) all or nearly all White residents, (b) mostly White residents, (c) half White & half people of color, (d) mostly people of color, and (e) all or nearly all people of color. The four measures were summed together into one composite scale,

the Childhood Racial Environment Scale, with values ranging from 3 to 18. Low composite scores (3–12) indicate that the respondent resided in mostly White environments, higher composite scores (13+) indicate that the respondent spent time in more environments with greater proportions of non-White residents.

Racial Attitude Measures

The data included several different measures of racial attitudes that appeared to capture various types of attitudes (e.g., attitudes toward affirmative action, attitudes toward minorities, traditional prejudice, symbolic racism, etc). The results of exploratory factor analysis showed that two main factors, or dimensions, emerged; they were support for affirmative action and feelings of commonality (see Northcutt, 2005, for a complete explanation of the factor analysis results).

The support for affirmative action scale captures students' opinions about the degree to which colleges and universities have a responsibility to correct racial injustices in society. To construct the first response variable, the Support for Affirmative Action Scale, we used exploratory factor analysis (for a comprehensive explanation of factor analysis, see DeMaris, 2002) to discriminate between the various dimensions of support for affirmative action. This process revealed that seven of the nine items administered in the survey loaded together, measuring the latent variable of support for affirmative action. The reliability, measured by the Cronbach's alpha, for this scale is .70. Representative items are as follows: "Despite our concern over racial injustice, colleges and universities do not have a primary responsibility to correct the situation," and "Students of color are given advantages that discriminate against other students at colleges and universities." Response categories were "Strongly agree," "Agree," "Disagree," and "Strongly disagree" and were coded so that higher scores correspond with greater support for affirmative action. Please see Table 1 for means and standard deviations.

The second response variable is the feeling of commonality measure which is the composite

Table 1. Descriptive statistics for study variables.

Variable	Range	Mean	SD
Outcomes			
Support for affirmative action T0	7–26	16.60	3.21
Support for affirmative action T1	7–28	16.32	3.67
Support for affirmative action T2	7–27	16.44	3.80
Support for affirmative action T3	7–28	16.85	3.96
Feeling of commonality T0	4–16	9.60	2.78
Feeling of commonality T1	3–16	10.45	2.72
Feeling of commonality T2	3–16	9.96	2.73
Feeling of commonality T3	4–16	9.96	2.94
Predictors			
Number of interracial friendships T0	0–6	0.84	1.35
Number of interracial friendships T1	0–6	1.16	1.29
Number of interracial friendships T2	0–6	1.24	1.39
Number of interracial friendships T3	0–6	1.16	1.35
Respondent is male	0–1	0.45	0.50
Experienced harassment/discrimination	0–1	0.25	0.43
Political conservatism	1–7	3.99	1.46
Childhood Racial Environment Scale	3–18	5.70	2.14

Note. Maximum $N = 305$ respondents.

score created from summing the responses to the following question:

People often feel that some groups in our society share many common political and economic interests, while other groups have few common interests or are even competing politically and economically. For each of the groups listed below, please indicate how much their interests and your group's interests are similar or different: (1) African Americans, (2) Native Americans, (3) Hispanics, and (4) Asians.

Each question had four response categories: (a) much more similar than different, (b) somewhat more similar, (c) somewhat more different, and (d) much more different than similar. The four measures were summed together into one composite scale, the Feeling of Commonality Scale with values ranging from 3 to 16. The items were reverse-coded so that low composite scores (3–8) indicate that the respondent feels his group's interests are more different than similar to the interests of other groups, whereas higher composite scores (9–16) indicate the opposite. See

Table 1 for means and standard deviations. The Cronbach's alpha for this scale is .87.

Distributions for the two response variables over time appeared approximately normal, with very little skewness.

Experience with Prejudice or Discrimination

Respondents were asked, "Have you ever personally experienced hostility or discrimination because of your religion, racial or ethnic background, sexual orientation, or any other form of prejudice?" This variable is coded so that the value "1" corresponds with the respondent having experienced harassment and "0" representing all those who have not experienced prejudice or who have missing values for that variable. Using this coding, 71 students responded that they had personally experienced discrimination.

Political Conservatism

Respondents were asked to indicate where they would place themselves on the following scale:

“Extremely Liberal,” “Liberal,” “Slightly Liberal,” “Moderate (middle of the road),” “Slightly Conservative,” “Conservative,” “Extremely Conservative,” or haven’t thought much about it. There were 37 respondents who responded that they hadn’t thought much about it. We recoded these values to the midpoint, allowing this measure to be treated as an interval scale. Scores for this scale range from 1 (Very Liberal) to 7 (Very Conservative). The mean is 3.99 and standard deviation is 1.46.

Time

As mentioned earlier, the surveys were administered in fall 1990, winter 1991, winter 1992, and winter 1994. We coded time as the number of years since the baseline survey; the values are 0, .5, 1.5, and 3.5, respectively.

Direction of Causality

Showing that interracial contact affects the trajectory of change in attitudes, beyond simply exhibiting a correlation with attitudes, can provide additional support for the causal priority of contact. Unfortunately, it is not sufficient. Without random assignment to degrees of contact, even longitudinal data cannot establish causal direction. Nevertheless, the causal priority of interracial contact over racial attitudes could be buttressed by showing that a lagged (by one time period) measure of interracial contact affects a later measure of racial attitudes. Hence we attempted to estimate models employing both lagged and contemporaneous interracial contact as predictors of attitudes (see Northcutt, 2005). However, the lagged measure of interracial contact was not significant in any of these models.

We are therefore left with marshaling instead a theoretical rationale for the exogenous status of contact. Although racial attitudes could foster interracial friendships, it is unlikely that one’s *current* attitude toward minorities would be the cause of one’s current number of best friends who are minorities. In fact, we contend that it is much more likely that the causal priority belongs to interracial friendship in this association. We draw

on Davis’s (1985) rules for determining causal order here (p. 14): “Rule 1d: If X is relatively stable, hard to change, or fertile, while Y is relative volatile, easy to change, or has few consequences, run the arrow from X to Y.” We contend that the number of close friendships involving a minority is, like household composition, a “relatively sticky” or stable variable (Davis, 1985, p. 15). It requires considerable time to form and is not easily altered. In contrast, attitude toward affirmative action, like other stands on political issues, is “relatively loose” in Davis’s (1985, p. 15) terminology, and easily subject to short-term change. Hence, following Davis’s scheme, we see the number of interracial friendships as more plausibly causing favorable attitudes toward minorities than vice versa. On the other hand, it is also very likely that the number of interracial friendships and attitudes toward minorities covary because personal attributes link both elements. That is, those who are more open to minorities are more likely both to have minority friends and to espouse positive attitudes. For this reason, we control for attributes most likely to account for this association: gender, political ideology, personal experience with harassment, and racial diversity of the childhood neighborhood.

Statistical Analysis

Our research questions are addressed with growth-curve analyses, using the linear mixed-effects model, or LMEM (Fitzmaurice, Laird, & Ware, 2004). As these techniques are not as well known as Ordinary Least Squares, or OLS regression, we provide a brief summary of their rationale. Growth-curve analysis is primarily oriented toward the exploration of two aspects of longitudinal data. First, one describes the nature of the trajectory of the response variable over time. Normally this involves some form of parametric function of time. As an example, with a linear function, the trajectory in the response is characterized by an intercept and a slope for the effect of time. More complex functions are also possible. Second, interest centers on how individuals’ attributes differentially affect their trajectories. In terms of the current study, for example, we expect support for affirmative action to demonstrate a positive linear

growth trajectory over time. And we expect that this pattern will be more pronounced for females than males.

Longitudinal data analysis typically proceeds by employing each measurement occasion for each individual as a separate observation (Fitzmaurice et al., 2004; Singer & Willett, 2003). Given any structural model for the mean of the outcome variable, OLS assumes that prediction errors for all observations are homoscedastic and uncorrelated. These assumptions are unrealistic for panel data. Model errors for the same respondents over time are most likely heteroscedastic and serially correlated, due to common dependence on the same analytic unit. Misspecification of the error structure can lead to biased inferences and inefficient estimation of regression parameters (Fitzmaurice et al., 2004). There are a couple of possible solutions. One is to model a more complex error structure directly using a *covariance pattern model* (Fitzmaurice et al., 2004). An equivalent but conceptually more appealing approach—the LMEM—is to allow one or more of the regression coefficients to be random effects. The resulting error term in the model is then inherently heteroscedastic and serially correlated, as a result of the random parameter elements.

As an example, suppose that y_{ij} is the value of the outcome for respondent i at time j , T_j is the value of time at time $j = 1, 2, \dots, J$, W_{ij} is a time-varying covariate that varies across both respondents and time periods, and B_i is a between-subjects covariate that varies across respondents, but not over time. An OLS model for y_{ij} would be:

$$y_{ij} = \beta_0 + \beta_1 T_j + \beta_2 W_{ij} + \beta_3 B_i + \varepsilon_{ij}.$$

All regression parameters are considered fixed effects and the error term ε_{ij} is assumed to have constant variance, σ^2 , and covariance, 0, across both respondents and time periods. In contrast, the LMEM is:

$$y_{ij} = \beta_{0i} + \beta_{1i} T_j + \beta_{2i} W_{ij} + \beta_3 B_i + \varepsilon_{ij}, \quad (1)$$

with

$$\begin{aligned} \beta_{0i} &= \beta_0 + b_{0i}, \beta_{1i} = \beta_1 + b_{1i}, \text{ and} \\ \beta_{2i} &= \beta_2 + b_{2i}. \end{aligned} \quad (2)$$

The parameters of time-varying factors, β_{0i} , β_{1i} , and β_{2i} are specified as being random, varying over respondents, rather than fixed in the population, as in (1). Each is the sum of a fixed effect, e.g., β_1 , representing the average parameter value across respondents, plus the deviation, for example, b_{1i} , of the i th respondent's parameter value from the average. This corresponds conceptually to the notion that growth trajectories—represented by these random parameters—vary from individual to individual.

Substituting the definitions in (2) into (1) we have:

$$\begin{aligned} y_{ij} &= (\beta_0 + b_{0i}) + (\beta_1 + b_{1i})T_j + (\beta_2 + b_{2i})W_{ij} \\ &\quad + \beta_3 B_i + \varepsilon_{ij} \end{aligned}$$

which becomes:

$$\begin{aligned} y_{ij} &= \beta_0 + \beta_1 T_j + \beta_2 W_{ij} + \beta_3 B_i + \\ &\quad (b_{0i} + b_{1i} T_j + b_{2i} W_{ij} + \varepsilon_{ij}). \end{aligned} \quad (3)$$

The term in parentheses in (3) is the model error. It is readily shown that this error is both heteroscedastic and serially correlated, by virtue of its complex form (Singer & Willett, 2003). Thus, allowing certain parameters to be random automatically accommodates the complexity in the error structure that accrues with panel data. Following the recommendation of others (Fitzmaurice et al., 2004) we estimate model effects using restricted maximum likelihood estimation (REML). REML provides estimates of fixed and random effects that are less biased in relatively small samples, compared to full maximum likelihood (ML). As REML estimates are asymptotically normally distributed, χ^2 ratios are used throughout to test the significance of effects.

Unlike models estimated with ML, nested models estimated with REML cannot be compared using deviance statistics. Therefore we rely on the Akaike and Bayesian information criteria (AIC and BIC, respectively) for model comparison purposes. For both indices, smaller values are indicative of better fitting models.

Sample Selection and Missing-Data Issues

Our analytic sample of 305 students measured on all four occasions (the “responders”) represents a subset of the 2,029 White students in the baseline survey. To what extent does the selectivity of the analytic sample bias our results? Ideally, a sample-selection model approach would be employed to answer this question (DeMaris, 2004). Unfortunately that could not be entertained here. Selection models require the predictors in the substantive model to be a proper subset of those in the selection model (Greene, 2003). But the number of interracial friendships is a time-varying predictor reflective of all four measurement occasions. Therefore, it cannot be a subset of the variables measured only at baseline. Instead we rely on a comparison of the responders with the 1,724 non-responders on all study variables’ values at baseline. Only one factor significantly differentiates these groups: a higher proportion of the responders were females (55%) while a higher proportion of the nonresponders were males (55%). As gender per se is not a predictor of either attitude, it is unlikely that this imbalance biases our results.

Missing data were not much of a problem for our explanatory variables. There were no missing data on gender or the number of interracial friendships. Fewer than 8% of respondents were missing on any other predictor. These were replaced with valid sample means. For the response variables, 284 respondents had complete data on support for affirmative action in all four waves, but only 222 respondents had complete data for feeling of commonality. Rather than suffering a further reduction in sample size by limiting analyses to these cases, we employed instead the available-case strategy (Fitzmaurice et al., 2004). In this approach, observations are retained in the analysis so long as they contribute at least

one wave of information to the data. Hence, respondents contribute anywhere from one to four waves of data, depending upon missing values. We therefore employed a total of 1,198 person-periods for the analysis of support for affirmative action and 1,096 person-periods for the analysis of feeling of commonality. Final models were reestimated using multiple imputation (Schafer, 1997) to replace all missing values. No differences emerged when compared to the available-case analyses.

Results

Descriptive statistics on all study variables are shown in Table 1. Average trajectories in the response variables can be seen by comparing the means across waves. The trajectory of support for affirmative action is fairly flat, showing only a slight overall increase between Waves 1 and 4. The trajectory for feeling is, however, more clearly irregular. Its average value rises sharply from 9.6 to 10.45 in the first half year, and then declines thereafter. Number of interracial friendships demonstrates, not surprisingly, some increase over the 4-year period, with a mean of just less than one minority friend (0.84) at baseline to just over one minority friend (1.16) in the senior year. The variable’s distribution remains right-skewed in all waves, as evidenced by the mean being within one standard deviation of the minimum value of zero (Agresti & Finlay, 1997). Just under half of respondents are male, only a quarter has experienced harassment or discrimination, and average ideology is midway between Liberal and Conservative. The mean score on neighborhood composition of 5.7 suggests that the typical respondent’s neighborhood is relatively racially homogeneous.

Table 2 presents the results for LMEMs of support for affirmative action. A preliminary decomposition revealed that 65% of the variability in support for affirmative action lies between respondents, whereas 35% lies within respondents, over time. Model 1 describes the trajectory over time. Based on the trend in Table 1, we modeled the response as a linear function of time. The intercept of 16.42, labeled “initial status,” represents mean support for affirmative

action at baseline, and is significantly different from zero. The slope of time is positive and significant and suggests that each additional year adds about a tenth of a point to the response, on average. The variance components are all significant. Their meanings are as follows: σ_e^2 represents variability in the response over time unexplained by the linear function of time. That is, individuals' scores vary over time for reasons other than just linear growth. On the other hand, σ_0^2 and σ_1^2 represent, respectively, variability in intercepts and slopes across respondents. This suggests that individual growth trajectories in support for affirmative action vary significantly around the average trajectory of $16.42 + .11 \times \text{Time}$.

Model 2 adds the log number of interracial friendships. This factor has a significant positive effect on support for affirmative action, as hypothesized. The effect of time is no longer significant. As the number of friendships tends to grow with time (see Table 1), this suggests that part of time's positive effect is due to its correlation with interracial friendship formation. The additional significant variance component, σ_2^2 , suggests that the effect of interracial friendships also varies across respondents.

Model 3 adds the cross-product of time with log number of interracial friendships to the model. This tests the hypothesis that the growth over time in support for affirmative action is stronger for those with more interracial friendships. The interaction effect is positive and significant. The effect of time is now approximately zero and nonsignificant; however, this is for those with no interracial friendships. For those who maintain at least one minority friend over time, the effect of time is $.13 (-.01 + .20 \times \log[2])$ and significant ($p = .02$). Thus, as expected, for those with at least one minority friend, there is a steady appreciation in support for affirmative action over time. The interaction term does not exhibit any variability across respondents and is therefore modeled as fixed. Of the total variability in the response over time, R_e^2 shows that 23% is accounted for by the time-varying, or within-subjects, part of the model.

Model 4 adds the between-subjects predictors to the model. Tests of interactions of both time and log interracial friendships with the between-subjects factors (not shown) revealed only one significant interaction effect: Being Male \times Time. This is also included in Model 4. As predicted, the more Conservative and those growing up in more racially homogeneous neighborhoods show less support for affirmative action at any given time. Also, as expected, the growth in support for affirmative action with time is weaker for males. Model 4 estimates the total impact of passing time as: $.08 + .22 \times \text{Log Friendships} - .23 \times \text{Male}$. Figure 1 shows the nature of the interaction effect. Expected support for affirmative action is plotted against time separately for males and females who maintain one (the mean number of interracial friends) versus four (the 95th percentile of the distribution) interracial friendships over the college career, at average values of the other predictors. As is evident, the growth trajectory is flattest for males with only one such friend, and steepest for females with four friends. Holding other factors constant, the gap in support for affirmative action between males and females, and between those with one versus four friends, is clearly seen to increase over time. The discriminatory power of the model is tapped with an analogue of R^2 , $R_{y,y}^2$, which represents the squared correlation of the model-predicted response and the actual response across all respondents and times. According to this measure, about 13% of the variability in support for affirmative action is accounted for by Model 4.

Table 3 similarly presents LMEMs of feeling of commonality with minorities. In this case, the decomposition of variability in the response showed most of the variability to be within subjects over time. Sixty-three percent of the variability is within subjects, whereas 37% lies between them. Model 1 again employs a simple linear function of time to model growth in the response. Not surprisingly, the trajectory appears flat, with a slope close to zero. To account for the rising and falling pattern observed in Table 1, we substituted a linear spline function with a knot at .5 in Model 2.

Table 2. Restricted maximum likelihood estimates (standard errors) for linear mixed-effects models of support for affirmative action.

Predictors	Model 1	Model 2	Model 3	Model 4
Within-subjects				
Initial status	16.42*** (.18)	16.19*** (.19)	16.31*** (.20)	18.34*** (.71)
Time	.11* (.05)	.10 (.05)	-.01 (.08)	.08 (.09)
Log number of interracial friendships		.39* (.16)	.15 (.20)	.08 (.20)
Log Number of Interracial Friendships x Time			.20* (.10)	.22* (.10)
Between-subjects				
Respondent is male				-.31 (.34)
Experienced harassment/discrimination				-.60 (.40)
Political conservatism				-.73*** (.12)
Racial composition of neighborhood				.22** (.08)
Male x Time				-.23* (.11)
Variance components				
σ^2_ϵ	3.87*** (.22)	3.67*** (.24)	3.66*** (.24)	3.63*** (.23)
σ^2_0	8.09*** (.83)	7.06*** (.87)	7.11*** (.88)	5.99*** (.77)
σ^2_1	.35*** (.08)	.36*** (.08)	.35*** (.08)	.34*** (.08)
σ^2_2		.98* (.57)	1.03* (.58)	1.21* (.60)
Model fit/discriminatory power				
AIC	5876.00	5869.90	5854.40	5819.30
BIC	5890.80	5895.90	5894.40	5845.40
R^2_ϵ			.23	
$R^2_{y\hat{y}}$.13

Note. $NJ = 1,198$ person-period observations.

* $p < .05$; ** $p < .01$; *** $p < .001$.

The term “(Time – .5)” equals zero until the half-year point, after which it equals Time – .5. This term allows the slope to change direction after the half-year point, and its coefficient represents the amount of change in the slope (Fitzmaurice et al., 2004). As is evident, the

effect of time in the first 6 months is positive and significant (1.31). After that, the slope declines significantly (by 1.46). The slope after the 6-month point is thus $1.31 - 1.46 = -.15$ and is significant ($p < .03$). In sum, Model 2 shows initial average feeling of commonality to

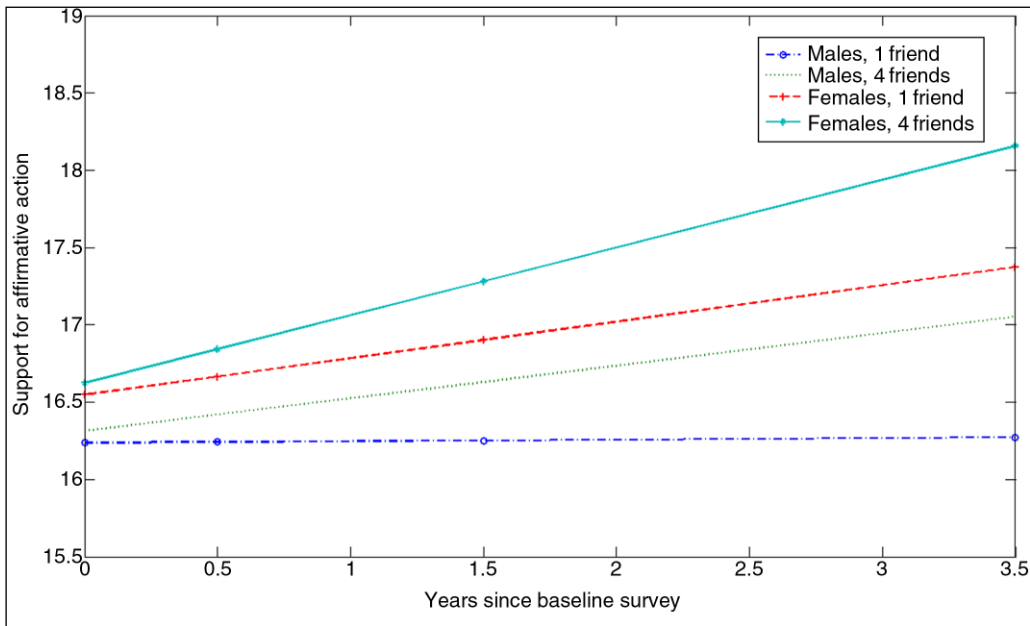


Figure 1. Expected support for affirmative action as a function of gender and number of interracial friendships.

be estimated as 9.69. Through the first 6 months it increases at a rate of 1.31 points per year, on average. After that point it declines at a rate of about .15 points per year. The variance components suggest significant variability in initial status and growth in the response through the first follow-up. The change in the slope of time after 6 months is modeled as a fixed effect. Significant variability also exists within subjects, net of what is accounted for by the trend over time.

Model 3 adds the log number of interracial friendships. Again, as expected, the effect is positive and significant. This suggests that, although the trend in feeling of commonality over time is nonmonotonic, interracial friendships enhance those feelings at any given time. Of the total variability in feelings within subjects, 18% is accounted for by the time-varying factors in the model.

Model 4 adds the between-subjects factors to the model. As before, tests of interactions of both time and log interracial friendships with the between-subjects factors (not shown) were conducted. None were significant. Of the added

factors, only political Conservatism is significant. As with support for affirmative action, those espousing a more conservative ideology register a lower average sense of commonality with minorities. Discriminatory power is considerably weaker, compared to the case of support for affirmative action. Only 4% of the variability in feeling of commonality is accounted for by the full model.

Discussion

We investigated the impact of intergroup contact (interracial friendships and neighborhood racial context) on two types of racial attitudes: support for affirmative action and feelings of commonality with minorities. We also had a secondary aim of utilizing stronger, and more appropriate, statistical methods such as growth-curve modeling to clarify inconsistent findings related to causal ordering of these constructs in prior cross-sectional and longitudinal studies. The use of stronger, more appropriate methods emerged as a concern during prior work (Northcutt, 2005) which

Table 3. Restricted maximum likelihood estimates (standard errors) for linear mixed-effects models of feeling of commonality.

Predictors	Model 1	Model 2	Model 3	Model 4
Within-subjects				
Initial status	10.06*** (.14)	9.69*** (.17)	9.53*** (.18)	10.24*** (.53)
Time	-.01 (.06)	1.31*** (.33)	1.14*** (.34)	1.15*** (.34)
(Time - .5) ₊		-1.46*** (.36)	-1.28*** (.37)	-1.29*** (.37)
Log number of interracial friendships			.39** (.15)	.37* (.15)
Between-subjects				
Respondent is male				-.39 (.24)
Experienced harassment/discrimination				.05 (.29)
Political conservatism				-.23** (.08)
Racial composition of neighborhood				.06 (.06)
Variance components				
σ_{ϵ}^2	4.27*** (.27)	4.16*** (.26)	4.14*** (.26)	4.14*** (.26)
σ_0^2	3.43*** (.51)	3.44*** (.51)	3.40*** (.50)	3.23*** (.49)
σ_1^2	.31*** (.09)	.33*** (.09)	.34*** (.09)	.34*** (.09)
Model fit/discriminatory power				
AIC	5213.80	5198.00	5193.30	5188.00
BIC	5228.70	5212.90	5208.20	5202.9
R_{ϵ}^2			.18	
$R_{\gamma, \hat{\gamma}}^2$.04

Note. NJ = 1,096 person-period observations.

* $p < .05$; ** $p < .01$; *** $p < .001$.

revealed that less appropriate methods for examining attitude change over time, although commonly utilized in research on racial attitudes, can produce nonsignificant findings or even counterintuitive findings. The import of using suitable methods, such as growth-curve modeling, cannot be understated. A major contribution of this work is to illustrate a more suitable method for the analysis of attitude change over time.

Consistent with prior literature, we found support for several hypothesized trends. First, a greater number of interracial friendships at any given time was associated with more positive attitudes toward minorities (Davies et al., 2011; Fischer, 2011; Tropp, 2007). This effect obtains regardless of whether the attitude in question is support for affirmative action or a feeling of commonality with minorities. Second, at least with respect to support for affirmative action, women

and those with more interracial friendships experienced a faster rate of increase in their endorsement of these policies over the college career. This too is consistent with previous literature (Hughes & Tuch, 2003; Johnson & Marini, 1998; Jones, 2005; Shapiro & Mahajan, 1986). Third, those growing up in more racially homogeneous neighborhoods expressed less support for affirmative action at any given time. This coincides with other research showing that individuals who live in more racially homogenous areas have more negative views of out-group members and perceive higher levels of competition than individuals who live in more racially heterogeneous areas (Oliver & Wong, 2003). Fourth, in line with previous research, we found that greater political Conservatism was associated with lower support for affirmative action and feelings of commonality at any given time (Sidanius, Pratto, & Bobo, 1996).

Our findings differ from previous studies in one interesting way. We expected that racial attitudes would increase linearly over time with increased intergroup contact. This hypothesis was supported with respect to support for affirmative action but not for feelings of commonality. The trend for feeling of commonality over time was distinctly non-monotonic. The first 6 months of university experience were associated with a significant increase in average commonality, followed by a significant reversal in this trend. Hence, after the 6-month point, there was a linear decline in feeling of commonality for the remainder of the study period. This is the finding that warrants closer examination in future studies. What happens during the college experience that initially influences White students to believe they are more similar to minority students and, subsequently, that they are more different? Is this evidence of interracial contact having a saturation point? Or is this evidence of something aside from racial attitudes? For example, students exposed to new knowledge that individuals are located within a social structure, may not be viewing their social distance from minority groups as a negative attribute but simply acknowledging that their own political and socioeconomic goals are intricately linked with their racial and ethnic group membership and these likely vary from others who are located in different positions in the social

structure. Although unable to fully account for why feelings of commonality would increase, and then decrease, as college students spend more time together, that the trajectory of attitude change is different between the two types of racial attitudes adds an interesting footnote to the debate on the impact of intergroup contact on attitudes.

An additional strength of this study is the use of two levels of measurement of intergroup contact—interracial friendships and neighborhood contexts. Not commonly used in research studies, this strategy captures the multidimensional nature of race and intergroup relations. Individuals' racial attitudes do not form in isolation, or even in dyads, but rather are shaped by racialized social structures and contexts in which they live, work, and worship. Contexts have characteristics, for example, bus stops or open-air markets that provide opportunities for individuals to interact or listen to others' daily concerns. These environments contain the people whose stories we learn that, in turn, shape our opinions and behaviors. Any examination of racial contact and attitude change should examine the context in which friendships occur as well as the personal attitudes contact shapes.

Our study is not without limitations. The sample of students is limited to White students and is from the mid-1990s. Since that time, the racial climate in the United States has grown increasingly diverse. The baseline racial attitudes may be slightly higher, or lower, but there is no reason to suspect that the causal processes that shape racial attitudes vary significantly from when these surveys were conducted. Although attrition in a panel study resulted in a smaller sample size, the benefits of longitudinal data allowed for a unique examination of the trajectory of attitude change unavailable in cross-sectional data commonly used to investigate intergroup contact theory. A final limitation is that this study did not examine the reverse causal path—that racial attitudes impact interracial friendships. Although not an aim of this study, future research would benefit from examining both causal paths simultaneously using growth-curve modeling.

In conclusion, our contribution to the understanding of how interracial contact influences racial attitudes (i.e., intergroup contact theory) is that we are confirming findings from previous

literature, but with stronger, and more appropriate statistical methods. Alleviating concern that increased intergroup contact may lead to the opposite intended goal, negative racial attitudes, for administrators hoping to foster a more positive and diverse climate is a valid contribution that cannot be understated. Further, we add to the literature on intergroup friendships by showing that the number of friendships, especially for women, is important for a change in attitudes. And, finally, our selection of methods, utilizing both longitudinal data and growth-curve modeling, allows us to assert more confidently that intergroup contact does increase interracial tolerance over time.

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References

- Agresti, A., & Finlay, B. (1997). *Statistical methods for the social sciences* (3rd ed.). Upper Saddle River, NJ: Prentice Hall.
- Allport, G. W. (1954). *The nature of prejudice*. Garden City, NJ: Doubleday Anchor Books.
- Attle, S., & Baker, B. (2007). Cooperative learning in a competitive environment: Classroom applications. *International Journal of Teaching and Learning in Higher Education*, 19(1), 77–83. Retrieved from <http://www.isetl.org/ijtlhe/pdf/IJTLHE121.pdf>
- Bandura, A., & Walters, R. H. (1963). *Social learning and personality development* (Vol. 14). New York, NY: Holt, Rinehart and Winston.
- Barlow, F. K., Hornsey, M. J., Thai, M., Sengupta, N., & Sibley, C. G. (2013). The wallpaper effect: The contact hypothesis fails for minority group members who live in areas with a high proportion of majority group members. *PLOS ONE*, 8(12), 1–8. doi:10.1371/journal.pone.0082228
- Barlow, F. K., Paolini, S., Pedersen, A., Hornsey, M. J., Radke, H. R. M., Harwood, J., & ... Sibley, C. G. (2012). The contact caveat: Negative contact predicts increased prejudice more than positive contact predicts reduced prejudice. *Personality and Social Psychology Bulletin*, 38(12), 1629–1643. doi:10.1177/0146167212457953
- Binder, J., Zagefka, H., Brown, R., Funke, F., Kessler, T., & Mummendey, A. (2009). Does contact reduce prejudice or does prejudice reduce contact? A longitudinal test of the contact hypothesis among majority and minority groups in three European countries. *Journal of Personality and Social Psychology*, 96(4), 843–856. doi:10.1037/a0013470
- Bowen, W. G., & Bok, D. (1998). *Shape of the river*. Princeton, NJ: Princeton University Press.
- Brown, H., & Ciuffetelli, D. C. (2009). *Foundational methods: Understanding teaching and learning*. Toronto, Canada: Pearson Education.
- Cialdini, R. B. (1993). *Influence: The psychology of persuasion*. New York, NY: Morrow.
- Davies, K., Tropp, L. R., Aron, A., Pettigrew, T. F., & Wright, S. C. (2011). Cross-group friendships and intergroup attitudes: A meta-analytic review. *Personality and Social Psychology Review*, 15(4), 332–351. doi:10.1177/1088868311411103
- Davis, J. A. (1985). *The logic of causal order*. Newbury Park, CA: Sage.
- DeMaris, A. (2002). Covariance structure models. In M. Wiederman & B. E. Whitley (Eds.), *Handbook for conducting research on human sexuality* (pp. 289–325). Hillsdale, NJ: Erlbaum.
- DeMaris, A. (2004). *Regression with social data: Modeling continuous and limited response variables*. Hoboken, NJ: John Wiley & Sons.
- Fischer, M. J. (2011). Interracial contact and changes in the racial attitudes of White college students. *Social Psychology of Education*, 14(4), 547–574. doi:10.1007/s11218-011-9161-3
- Fitzmaurice, G. M., Laird, N. M., & Ware, J. H. (2004). *Applied longitudinal analysis*. Hoboken, NJ: Wiley.
- Greene, W. H. (2003). *Econometric analysis* (5th ed.). Upper Saddle River, NJ: Prentice Hall.
- Gurin, G., & Matlock, J. (2004). *Michigan Student Study: Opinions, expectations, and experiences of undergraduate students, 1990–1994*. ICPSR04027-v1. Inter-University Consortium for Political and Social Research. Retrieved from [https://www.icpsr.umich.edu/icpsrweb/ICPSR/studies/4027?keyword=student+attitudes&permit\[0\]=AVAILABLE](https://www.icpsr.umich.edu/icpsrweb/ICPSR/studies/4027?keyword=student+attitudes&permit[0]=AVAILABLE)
- Hughes, M., & Tuch, S. A. (2003). Gender differences in Whites' racial attitudes: Are women's attitudes really more favorable? *Social Psychology Quarterly*, 66(4), 384–401. doi:10.2307/1519836
- Johnson, M. K., & Marini, M. M. (1998). Bridging the racial divide in the United States: The effect of gender. *Social Psychology Quarterly*, 61, 247–258. Retrieved from <http://www.jstor.org/stable/2787111>
- Jones, J. M. (2005). *Gender differences in views of job opportunity: Fifty-three percent of Americans believe opportunities are equal*. Gallup Poll News Service. Retrieved

- from <http://www.gallup.com/poll/17614/gender-differences-views-job-opportunity.aspx>
- Katz, P.A. (1976). The acquisition of racial attitudes in children. In P.A. Katz (Ed.), *Toward the elimination of racism* (pp. 125–154). New York, NY: Pergamon.
- Kinder, D. R., & Sears, D. O. (1981). Prejudice and politics: Symbolic racism versus racial threats to the good life. *Journal of Personality and Social Psychology*, 40(3), 414–431. doi:10.1037/0022-3514.40.3.414
- Klak, T., & Martin, P. (2003). Do university-sponsored international cultural events help students to appreciate “difference”? *International Journal of Intercultural Relations*, 27(4), 445–465. doi:10.1016/S0147-1767(03)00033-6
- McClelland, K., & Linnander, E. (2006). The role of contact and information in racial attitude change among White college students. *Sociological Inquiry*, 76(1), 81–115. doi:10.1111/j.1475-682X.2006.00145.x
- Mills, J. K., McGrath, D., Sobkowiak, P., Stupec, S., & Welsh, S. (1995). Differences in expressed racial prejudice and acceptance of others. *Journal of Psychology*, 129, 357–359.
- Moody, J. (2001). Race, school integration, and friendship segregation in America. *American Journal of Sociology*, 107(3), 679–716. doi:10.1086/338954
- Northcutt, M. J. (2005). *Re-visiting the contact hypothesis: College students' attitudes and patterns of interaction*. Retrieved from http://rave.ohiolink.edu/etdc/view?acc_num=bgsu1131651056
- Oliver, J. E., & Wong, J. (2003). Intergroup prejudice in multiethnic settings. *American Journal of Political Science*, 47(4), 567–582. doi:10.2307/3186119
- Pettigrew, T. F. (1997). Generalized intergroup contact effects on prejudice. *Personality and Social Psychology Bulletin*, 23(2), 173–185. doi:10.1177/0146167297232006
- Pettigrew, T. F., Tropp, L. R., Wagner, U., & Christ, O. (2011). Recent advances in intergroup contact theory. *International Journal of Intercultural Relations*, 35(3), 271–280. doi:10.1016/j.ijintrel.2011.03.001
- Schafer, J. L. (1997). *Analysis of incomplete multivariate data*. London, UK: Chapman & Hall.
- Shapiro, R. Y., & Mahajan, H. (1986). Gender differences in policy preferences: A summary of trends from the 1960s to the 1980s. *Public Opinion Quarterly*, 50(1), 42–61. doi:10.1086/268958
- Sidanius, J., Pratto, F., & Bobo, L. (1996). Racism, conservatism, affirmative action, and intellectual sophistication: A matter of principled conservatism or group dominance? *Interpersonal Relations and Group Processes*, 70(3), 476–490. doi:10.1037/0022-3514.70.3.476
- Sigelman, L., Bledsoe, T., Welch, S., & Combs, M. W. (1996). Making contact? Black–White social interaction in an urban setting. *American Journal of Sociology*, 101, 1306–1332. Retrieved from <http://www.jstor.org/stable/2782356>
- Sigelman, L., & Tuch, S. A. (1997). Metastereotypes: Blacks' perceptions of Whites' stereotypes of Blacks. *The Public Opinion Quarterly*, 61(1), 87–101. Retrieved from <http://www.jstor.org/stable/2749513>
- Sigelman, L., & Welch, S. (1993). The contact hypothesis revisited: Black–White interaction and positive racial attitudes. *Social Forces*, 71(3), 781–795. doi:10.2307/2579895
- Singer, J. D., & Willett, J. B. (2003). *Applied longitudinal data analysis: Modeling change and event occurrence*. New York, NY: Oxford University Press.
- Steeh, C., & Schuman, H. (1992). Young White adults: Did racial attitudes change in the 1980s? *American Journal of Sociology*, 98, 340–367. Retrieved from <http://www.jstor.org/stable/2781865>
- Stein, R. M., Post, S. S., & Rinden, A. L. (2000). Reconciling context and contact effects on racial attitudes. *Political Research Quarterly*, 53(2), 285–303. doi:10.1177/106591290005300204
- Taylor, M. C. (1998). How White attitudes vary with the racial composition of local populations: Numbers count. *American Sociological Review*, 64, 512–535. Retrieved from <http://www.jstor.org/stable/2657265>
- Tropp, L. R. (2007). Perceived discrimination and interracial contact: Predicting interracial closeness among Black and White Americans. *Social Psychology Quarterly*, 70(1), 70–81. Retrieved from <http://www.jstor.org/stable/20141768>
- Tropp, L. R., Hawi, D. R., van Laar, C., & Levin, S. (2012). Cross-ethnic friendships, perceived discrimination, and their effects on ethnic activism over time: A longitudinal investigation of three ethnic minority groups. *British Journal of Social Psychology*, 51(2), 257–272. doi:10.1111/j.2044-8309.2011.02050.x
- Weber, R., & Crocker, J. (1983). Cognitive processes in the revision of stereotypic beliefs. *Journal of Personality and Social Psychology*, 45(5), 961–977. doi:10.1037/0022-3514.45.5.961