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**Discrimination as a Frame-of-Reference Effect in Overlapping Friendship Communities  
of Ethnically Diverse Youth**

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### Abstract

**Objectives:** To what extent is the frame of reference of overlapping friendship communities important for young people's feelings of discrimination and subjective wellbeing? That is, do youth feel better or worse to the extent that they feel less or more discrimination than their friends? **Methods:** Participants ( $N=898$ ;  $M_{age}=14.13$ ;  $SD_{age}=3.37$ ; 46% females; 46% Whites; 20% Indigenous; 34% other minorities) were high school students of three ethnically diverse, low SES public schools in New South Wales, Australia. Cross-sectional data were collected to measure felt discrimination, mental health, subjective wellbeing, social support and nominations of close friends. A state-of-the-art method of clustering links was used to identify overlapping friendship communities, and multiple membership multilevel models were run to examine whether community level discrimination moderated the link between individual level discrimination and wellbeing. **Results:** When the community level discrimination was low, there was no wellbeing related cost or benefit of individual level discrimination. But when the community level discrimination was high, individuals in those communities who themselves felt low discrimination had better wellbeing than individuals who themselves felt high discrimination. **Conclusions:** We provide evidence for a frame-of-reference effect involving discrimination. Individuals' relative standing in their friendship communities with high group-level discrimination reliably predicted the individuals' wellbeing levels, regardless of ethnicity. The results highlight the importance of identifying overlapping friendship communities for understanding the dynamics of discrimination and wellbeing of ethnically diverse youth.

*Keywords:* discrimination, wellbeing, friendship communities, context, Indigenous psychology

## **Discrimination as a Frame-of-Reference Effect in Overlapping Friendship Communities of Ethnically Diverse Youth**

According to the ecological theory of contextual influences, the larger ecological system within which a human being grows consists of microsystems, including relationships between the individual and the immediate social environment (e.g., school and family), and the macrosystem, which includes larger patterns of culture, such as economy, geographical constraints, social customs and bodies of knowledge (Bronfenbrenner, 1986; Bronfenbrenner & Ceci, 1994). Friendship networks of young people may serve as important microsystems that can have a profound impact on their wellbeing (Bagwell et al., 2005; Ciarrochi, Morin, Sahdra, Litalien, & Parker, 2017; Parker, Ciarrochi, Heaven, Marshall, Sahdra et al., 2015; Schachner, Juang, Moffitt & van de Vijver, 2018). Although there is no universally accepted operationalization of a friendship community, a community is assumed to have more internal than external links (Girvan & Newman, 2002). However, overlap between different communities is pervasive in human social networks (Palla, Derényi, Farkas & Vicsek 2005; Ahn, Bagrow & Lehmann, 2010), making the friendships-level microsystem of young people quite complex but nevertheless an important immediate social context within which they function.

In multicultural societies, friendship networks may mimic geographic ethnic enclaves with sporadic cross-enclaves links. Members of marginalized groups, such as ethnic minorities, have a lot to benefit from their friendship networks consisting of individuals who share their language, cultural heritage and history, including experiences of discrimination against their groups by the mainstream society (Rogers, Niwa & Way, 2017; Sahdra & Ross, 2007). But they may also have a lot to lose if feelings of being marginalized make it hard for them to befriend members of the majority group. Positive inter-group relationships can only

arise when there is opportunity for healthy contact between people of different groups. Theories of inter-ethnic relationships (e.g., Allport, 1954; Pettigrew, 1988) suggest that contact within cooperative contexts may diminish prejudice and discrimination, and their downstream pernicious effects on wellbeing. If youth in mixed ethnic friendship groups engage in healthy contact, that might buffer against a potential negative impact of feelings of discrimination on the youth's wellbeing.

Other theories focusing on relative positioning of the self in social groups (e.g., Festinger, 1964; Frank, 2012) would suggest that individuals' relative standing in their friendship groups—whether they feel more or less discrimination than their friends—might also affect their wellbeing. One's social frame of reference or relative position in one's social group, rather than objective standing, is especially important to wellbeing across a range of variables (see Frank, 2012, for a review). The same might be true for discrimination. That is, individuals might experience greater wellbeing if they feel less discriminated against than do their friends, and lower wellbeing if they feel more discrimination than do their friends. We examined these ideas in the context of an ethnically diverse sample of youth from Australian high schools.

### **Discrimination in Australia**

Australia is home to some of the world's oldest continuous cultures of Indigenous and Torres Strait Islands peoples. White Australians are the majority group in contemporary Australia, but the country benefits from migration from all over the world, with overseas migration representing about 60% of Australia's population growth and migrants contributing an estimated \$10 billion to the Australian economy in their first 10 years of settlement (Department of Immigration and Citizenship, 2012). Australia is classified, along with the USA, Canada and New Zealand, as a traditional country of immigration (Kymlika, 2007). In such an increasingly multicultural context, inter-ethnic relations are not always positive.

Social psychologists have argued that contemporary racism is subtler than it has been in the past because overt racism has become socially unacceptable, even illegal in many developed nations (e.g., Pettigrew & Meertens, 1995). However, recent research with Aboriginal Australians suggests that experiences of racism are common, frequent, and overt, that is, the form of racism prevalent in Australia is often blatantly old-fashioned rather than merely subtle or modern in nature (Mellor, 2003). Members of other ethnic minorities, not just Australia's First Peoples, may also feel discriminated against due to their cultural background. According to one estimate, one in five Australians report that they have experienced race-hate talk (Dunn, Forrest, Pe-Pua, Hynes & Maeder-Han, 2009).

Social exclusion and inclusion may manifest in a variety of ways. As some Indigenous Australian scholars have argued (e.g., Walter, 2016), few studies on social exclusion/inclusion go beyond simply describing the over-representation of Australia's First Peoples on social exclusion indicators, for instance, lower rates of educational attainment and higher incarceration. Further, research and public discourse about Australian Indigenous issues tend to focus on the Indigenous peoples' remoteness-related disadvantages, and politicians and social scientists alike have largely ignored the growing urban presence of the Indigenous peoples of Australia (and Canada), despite the fact that four in five Australian Indigenous people (and about half of all Canadian Aboriginal peoples) live in urban areas (Walter and Andersen, 2013). In other words, the extent to which Indigenous peoples of Australia, and other ethnic minorities, are integrated in the fabric of the Australian society needs to be better clarified.

### **Discrimination and Wellbeing**

Research on the effects of discrimination on the health and wellbeing of the victims has yielded mixed findings (Parker, Bodkin-Andrews, Parker & Biddle, 2018). A recent meta-analysis yielded weak to moderate associations between discrimination and greater

depressive and internalizing symptoms, psychological distress and poorer self-esteem (Benner, Wang, Shen, Boyle, Polk, & Cheng, 2018). Although a high proportion of studies in the literature (~80%) have found positive associations between racial discrimination and mental ill-health related outcomes (e.g., depression and anxiety), about half of the studies in the literature also report positive links between racial discrimination and indicators of positive mental health, such as, self-esteem, resilience and wellbeing of young people (Priest et al., 2013). These mixed results suggest the need to identify moderators of the link between discrimination and wellbeing related outcomes.

A number of individual-level moderators have been identified, including age, gender, cognitive development, ethnic identity, coping styles, and personality variables (Priest et al., 2013; Pascoe & Richman, 2009). Less attention has been given to potential moderators beyond the individual, despite the fact that an individual's experience is heavily influenced by the microsystems of their social context (Bronfenbrenner, 1986). In an adolescent context, the microsystem is comprised predominantly of family and friends. Looking first at family, there is evidence to suggest that support from family members can safeguard adolescents from some of the negative consequences of discrimination, namely, substance abuse, delinquency, externalizing problems, loneliness and anxiety (Ahmed, Mohammed & Williams, 2007; Ciarrochi et al., 2017; Gibbons, Etcheverry, Stock, Gerrard, Weng, Kiviniemi, et al., 2010; Juang & Alvarez, 2010; Simons, Simons, Burt, Drummund, Stewart, et al., 2006). In addition, there is evidence that the negative link between racial discrimination and wellbeing can be buffered by positive relations with peers (Arjouch, Reisine, Lim, Sohn & Ismail, 2010; Brody, Chen, Murry, Ge, Simons, et al., 2006; Grossman & Liang, 2008).

### **Discrimination as a Frames-of-Reference Effect**

We propose that young people's immediate social environment in school—their friendship network—may also be an important microsystem (Bronfenbrenner, 1986; Bronfenbrenner & Ceci, 1994), a key frame of reference (Frank, 2012) for determining whether feelings of discrimination have a negative or positive impact on wellbeing. In particular, young people's relative standing in their friendship group, rather than their absolute levels of felt discrimination, might matter for their wellbeing. Theoretical arguments about the importance of relative standing date back to at least Festinger (1954), who suggested that people continually appraise their standing and beliefs with reference to those nearest to them, which includes various friendship communities for high school students. These theoretical perspectives would suggest that feelings of being discriminated against due to one's cultural background may or may not negatively affect young people's wellbeing, depending on the contextual effects of their microsystems, for instance, the degree of discrimination their friends feel.

Individuals consciously or unconsciously compare themselves to their friends, which suggests that *relative* discrimination might impact one's wellbeing in a positive or negative manner depending on whether one feels less or more marginalized than one's friends. It is not just the absolute levels of felt discrimination that would matter for wellbeing but also rank-order position on discrimination within one's friendship group. This hypothesis is consistent with the frame-of-reference effects that are well-studied in education psychology, with one of the most famous examples being the "big fish, little pond" effect, in which school average achievement has a negative effect on academic self-concept for children with the same objective level of ability (see Marsh, 2006, for a review). Conceivably, friendship community level discrimination might moderate the link between individual level discrimination and wellbeing. As far as we know, no prior research has examined discrimination in frame-of-reference terms in overlapping friendship communities of ethnically diverse youth. Crocker

and Major (1989) have theorized that marginalized groups may form some aspects of their wellbeing by restricting their attention to their standing only within their own group. It remains to be seen how frame-of-reference effects manifest in relation to discrimination and wellbeing in friendship groups of mixed ethnicities.

### **Current Study**

There is no study, to the best of our knowledge, that empirically examines discrimination related frame-of-reference effects in overlapping friendship groups of ethnically diverse youth. Our study aims to fill this gap in the literature. An important limitation of prior research on contextual effects of friendship communities on individual level wellbeing is the use of community detection algorithms that constrain the communities to be non-overlapping (e.g., Parker et al., 2015). In contrast, overlapping communities in which individuals are members of multiple friendship groups are arguably more ecologically valid (Anh et al., 2010). We sought to answer the following research questions: To what extent is the frame of reference of overlapping friendship communities important for young people's feelings of discrimination and subjective wellbeing? That is, do youth feel better or worse to the extent that they feel less or more discrimination than their friends?

In a sample consisting of data from Year 7 to 12 students of three schools in New South Wales, Australia, we measured felt discrimination, mental ill-health, subjective wellbeing, felt social support, and number of close friends within one's year group. We deliberately selected the three schools in our sample due to their relatively high enrollments of Indigenous and/or other ethnic minority groups, compared to most schools in Australia, because of our key interest in frame-of-reference effects of discrimination in friendship groups of mixed ethnicities. Consistent with the literature on racism in Australia discussed above (Dunn et al., 2009; Mellor, 2003; Walter, 2016; Walter and Anderson, 2013), we expected members of ethnic minorities, including Indigenous Australians, to report higher



levels of felt discrimination against their group. Based on the literature review discussed above showing a weak link between discrimination and mental health (Parker et al., 2018; Priest et al., 2013), we expected White participants and ethnic minorities to show comparable levels of mental health, subjective wellbeing and felt social support. Finally, based on the theoretical perspectives discussed above regarding the youth's friendship networks as frames of references (Bronfenbrenner & Ceci, 1994; Festinger, 1959; Frank, 2012; Marsh, 2006), we expected the group-level discrimination of overlapping friendship communities to moderate the link between individual level discrimination and wellbeing. Specifically, we expected individual-level discrimination to be negatively associated with wellbeing amongst friendship communities with high group-level discrimination.

## Method

### Participants and Procedure

Participants ( $N=898$ ) were high school students of three public schools in New South Wales, Australia (School 1  $n = 334$ ; School 2  $n = 305$ ; School 3  $n = 259$ ). Their mean age was 14.13 years ( $SD=3.37$ ). Of the participants, 46.2% self-identified as females, 52% males, 1.7% of other gender, and the remaining did not specify their gender. The distribution of participants in year groups was as follows: 23.8% were in Year 7, 19% in Year 8, 23% in Year 9, 21.9% in Year 10, 6.8% in Year 11, 5.4% in Year 12, and the remaining 0.1% did not report their year group.

Regarding cultural/ethnic background, 46.2% reported being White, 2% East and Southeast Asian, 1.7% South Asian, 2.1% Middle Eastern, 1.5% African, 1.4% Latin/Central/South American, 0.2% Caribbean, 16.8% Pacific Islander, 20.1% Indigenous Australian (Aboriginal and Torres Strait Islander), 6.1% other, and the remaining 1.9% did not specify their cultural/ethnic background. Since the original goal of the study was to

examine individual and friendship-group level effects of felt discrimination on wellbeing of members of different ethnic groups, we created three categories for inter-ethnic comparisons: White Australians ( $n = 420$ ), Indigenous Australians<sup>1</sup> ( $n = 174$ ), and Other Australians ( $n = 277$ ). Regarding socioeconomic status (SES), we asked participants about their parents' education and employment status, but these variables had large (~70%) missing data. We also asked participants whether or not they had access to the following 14 items at home: desk to study at, room of their own, computer for school work, educational software, access to internet, own calculator, classic literature, books of poetry, works of art, books to help with school work, a dictionary, a dishwasher, place to study and more than 100 books (Organization for Economic Co-operation and Development, 2005). On average, participants had about half of these items at home ( $M=7.59$ ,  $SD=3.41$ ). These statistics suggest participants' low SES and are in line with their school-level SES: The average Index of Community Socio-Educational Advantage (ICSEA) for the three schools in our sample was 870. The ICSEA scores of individual schools were as follows: School 1: 870, with 78% of the students in bottom quartile; School 2: 932, with 56% in bottom quartile; and School 3: 807, with 78% in bottom quartile. The ICSEA of each school in our sample was well below the Australian national median score of 1000, and fell in the bottom 10% of the distribution of ICSEA in the state of New South Wales (My School, 2015).

Ethics clearance was obtained from the Human Research Ethics Committee (Protocol number: 2015-224H1) of the university of the lead author. Active informed consent was

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<sup>1</sup> There is considerable debate regarding the most appropriate English language label to respectfully represent the immense diversity of Aboriginal and Torres Strait Islander peoples, communities, clans, and nations found within Australia (Dudgeon & Walker, 2015). For this paper, we are employing the label of 'Indigenous Australian' to remain consistent with most of the academic research but request that the readers recognize that this label is a poor reflection of 250+ language groups of the Aboriginal peoples found across Australia.

obtained from all participants, and passive informed consent was obtained from all parents. Participants were informed that they were free to withdraw from the study at any time. Those who consented to participate were asked to complete a brief online survey, using either iPads or their school computers, during school hours, administered with the help of their teachers. The survey consisted of measures of the following constructs:

### Measures

**Felt Discrimination.** To measure perceived discrimination against one's cultural background, we adapted a measure from King et al. (2007). The measure consisted of the following four items: "I have been discriminated against in education because of my cultural background," "Sometimes I feel that I am being talked down to because of my cultural background," "I have been discriminated against by the police because of my cultural background," "I would have had better chances in life if I had come from a different cultural background." Participants rated their agreement with these four items using a five-point scale (1 = *Strongly Disagree* to 5 = *Strongly Agree*). The four items showed high internal consistency ( $\alpha = .88$ ).

**Mental Ill-Health.** Mental ill-health was measured using the General Health Questionnaire, which is a reliable and valid measure of mental health (Goldberg & Hillier, 1979) that has been successfully used with adolescents (Ciarrochi, et al., 2016). Participants were provided with the sentence stem, "Have you recently..." and then with 12 response-items including, "been feeling unhappy or depressed," "felt you couldn't overcome your difficulties," and "been able to face up to your problems." Ratings were made on a four-point scale, with labels such as "*not at all*" to "*much more than usual*." Higher scores are indicative of greater psychological distress. The 12 items were internally consistent ( $\alpha = .96$ ).

**Subjective Wellbeing.** We used a 12-item self-report questionnaire that assesses positive mental health (Keyes, 2006). Participants utilized a 6-point Likert scale (1 = *never* to 6 = *every day*) to rate their emotional wellbeing ( $\alpha = .88$ ; 3 items, e.g., “During the past month, have you felt happy”), psychological wellbeing ( $\alpha = .78$ ; 4 items, e.g., “During the past month, how often did you feel good at managing the responsibilities of your daily life”), and social wellbeing ( $\alpha = .86$ ; 5 items, e.g., “During the past month, how often did you feel that you belonged to a community like a social group, your school, or your neighborhood”). The internal consistency of all 12 items was high ( $\alpha = .92$ ), so we used a single index of subjective wellbeing in the analyses reported below.

**Perceived Social Support.** We employed the Student Social Support Scale, which has been previously validated in a sample of students in grades 7 to 12 (Malecki & Elliott, 1999), similar to our sample. Participants utilized a six-point scale (1 = *never* to 6 = *always*) to rate social support from parents ( $\alpha = .94$ ; 7 items, e.g., “Praise me when I do a good job”), teachers ( $\alpha = .95$ ; 7 items, e.g., “Cares about me”), classmates ( $\alpha = .95$ ; 7 items, e.g., “Treats me nicely”), and close friends ( $\alpha = .94$ ; 7 items, e.g., “Understands my feelings”).

**Friendship Networks.** Similar to the friendships nominations questions used by Parker et al. (2015), we asked students to nominate five of their closest male and five of their closest female friends in the same year group at their school. These data allowed us to build directed social networks for each grade. A unidirectional link from student A to student B, for instance, indicated that student A nominated student B as a close friend, but student B did not nominate student A as a close friend. The total number of nominations given by any given participants corresponds to out-degree in network science parlance, and the total number of nominations received is equivalent to in-degree. Sample sizes varied across friendship network data ( $N=1094$ ) and the psychological measures data ( $N=898$ ) because not all participants who completed the psychological measures completed the friendship

nomination measures and vice versa. The analyses reported below were conducted using all available data.

### **Detecting Overlapping Friendship Communities**

To examine frame-of-reference effects, we first extracted friendship communities in each school's network data using an algorithm for clustering the links between students, which allows the students to belong to multiple communities, thus representing the overlapping communities structure of the network (Ahn et al., 2010). Analyses were conducted in R version 3.5.0 (R Core Team, 2018). We used Kalinka & Tomancak's (2011) implementation of the algorithm in the R package, *linkcomm*, which extends the original algorithm outlined by Ahn et al. (2010) to include directed networks. The algorithm employs the Jaccard coefficient for assigning similarity between two links that share a node. Based on such pairwise similarities between all links in the network, the links are hierarchically clustered to produce a dendrogram, which is divided at a point that maximizes the density of links within the clusters normalized against the maximum and minimum numbers of links possible in each cluster, known as the partition density (Ahn et al., 2010; Kalinka, 2014). Figure 1 shows the link communities dendrogram cut based on the partition density for the friendship network data of one of the schools (see Figure S1 in Online Supplementary materials for the link communities figures of all three schools).

### **Multiple Membership Multilevel Modelling**

To account for the overlapping friendship communities structure and school-level variation while examining the frame-of-reference effects with respect to discrimination, we used a 3-level multiple membership multilevel modelling framework in which individuals (Level 1) belonged to multiple friendship communities (Level 2), which were nested within schools (Level 3). The overlap between communities occurred within schools and never

across school, so multiple membership classification was specified at Level 2. Separate multilevel models were run for mental ill-health and subjective wellbeing as outcomes. Individual-level discrimination, friendship community-level discrimination, and their interaction were used as predictors. Ethnicity was used as a covariate because preliminary models (details reported in the Results section below) showed that there was a slight tendency for Indigenous Australians to show higher subjective wellbeing than Whites. The multiple membership multilevel model can be written as:

$$\begin{aligned} \mathbf{Wellbeing}_i = & \beta_0 + \beta_1 \text{ Ethnicity:Indigenous} + \beta_2 \text{ Ethnicity:Other} + \\ & \beta_3 \text{ Individual\_Discrimination} + \beta_4 \text{ Community\_Discrimination} + \\ & \beta_5 \text{ Individual\_Discrimination\_x\_Community\_Discrimination} + e_i \end{aligned}$$

$$\text{Community\_Discrimination} = \sum_{j \in \text{Community}(i)} w_{i,j}^{(2)} \text{Discrimination}_j$$

$$\beta_0 = \beta_0 + \mu^{(3)}_{0, \text{School}(i)} + \sum_{j \in \text{Community}(i)} w_{i,j}^{(2)} \mu^{(2)}_{0j}$$

$$\mu^{(3)}_{0, \text{School}(i)} \sim N(0, \Omega^{(3)}_{\mu 0,0})$$

$$\mu^{(2)}_{0, \text{Community}(i)} \sim N(0, \Omega^{(2)}_{\mu 0,0})$$

$$e_i \sim N(0, \Omega_{e0,0})$$

where  $\mathbf{Wellbeing}_i$  is the observed wellbeing score for individual  $i$ ,

$\sum_{j \in \text{Community}(i)} w_{i,j}^{(2)} \text{Discrimination}_j$  is the average of discrimination across the multiple

communities that the individual  $i$  belongs to weighted by the size of each community,  $\beta_0$  is

the overall mean score of wellbeing,  $\mu^{(3)}_{0, \text{School}(i)}$  is the school level effect,  $\sum_{j \in \text{Community}(i)} w_{i,j}^{(2)}$

$\mu^{(2)}_{0j}$  is a weighted sum of overlapping community effects where the multiple membership

weight  $w_{i,j}^{(2)}$  represents the weight of the community  $j$  for the person  $i$  with associated effect

$\mu^{(2)}_{0j}$ ,  $\beta_1$  and  $\beta_2$  are the coefficients for Indigenous and other minorities respectively

compared to the reference category of Whites,  $\beta_3$  represents the main effect of individual level discrimination,  $\beta_4$  represent the main effect of community level discrimination,  $\beta_5$  is the coefficient for the interaction between the individual and community level discrimination, and  $e_i$  is the individual level residual error term.

We fit the multiple membership multilevel models in MLwiN Version 2.36 (Rasbash et al., 2016) using a Bayesian method of Markov chain Monte Carlo (MCMC) estimation (Browne, 2012) to deal with the complexity of estimating many parameters due to overlapping communities at Level 2 and school-level variation at Level 3 in the parameters of interest, including an interaction testing the moderation of the link between individual-level (Level 1) discrimination and the outcome by the community-level (Level 2) discrimination. Bayesian statistics treats parameters as random quantities with two probability distributions: a ‘prior’ representing known information prior to data collection and a ‘posterior’, which combines the prior information with the sample data (Kaplan, 2014). We assumed ‘diffuse’ or ‘non-informative’ priors because we had no prior information about likely parameter values, especially for the interaction term of the frame-of-reference effect, which has never been tested before in the context of felt discrimination in overlapping friendship communities.

In MCMC method, a chain of values for each parameter is obtained by taking draws from the joint posterior distribution of the model parameters (Kaplan, 2014). The initial draws of MCMC may not be from the desired posterior distribution, depending on the starting values. The chains can take some time to reach equilibrium. This initial period, known as the ‘burn-in’, is discarded. The summary statistics from the remaining ‘monitoring chain’ are used to calculate the parameter estimates and standard errors. To ensure a stable solution, we used the burn-in length of 500 draws and monitoring chain length of 5000

draws, and manually examined the trajectories of the monitoring chains of the model parameters to check that the chains were sufficiently long.

## Results

### Preliminary Analyses

Table 1 reports the correlations of the study variables. Subjective wellbeing and social support variables were positively associated with each other. Mental ill-health was negatively linked with subjective wellbeing, but the coefficient was small ( $-.15$ ), suggesting that mental ill-health and subjective wellbeing, although related, share only a small amount of variance. Most pertinent to our study, felt discrimination was unrelated to mental ill-health and subjective wellbeing, but negatively associated with felt support from parents and teachers. Again, the effect sizes were small ( $\sim -.10$ ), but they nevertheless indicate that the more the young people felt supported by the adults in their lives, the less they felt marginalized by society at large.

The Spearman's correlations between the psychological variables and in-degree (nominations received) and out-degree (nominations sent) from the friendship network data are also reported in Table 1. The Spearman's method was more appropriate than the Pearson's method for this set of correlations because Spearman's correlations are computed based on rank ordering of scores, which makes sense for the count data of in-degree and out-degree. In-degree was unrelated to all variables, except it was positively associated with social support from friends and classmates. The pattern of correlations of in-degree with social support variables can be seen as a validation evidence for the self-reported social support variables. The more the youth received friendship nominations, the more they felt supported from friends and classmates. Providing evidence of divergent validity, felt support from parents and teachers was orthogonal to number of friendship nominations. Table 1 also



shows that out-degree was negatively linked with discrimination and mental ill-health, and positively linked with subjective wellbeing and social support from all sources. The more marginalized the youth felt, the less they befriended others. The more mentally distressed they were, the less they befriended others. But if they felt high subjective wellbeing or well supported by people in their lives, they were more likely to befriend others.

We ran multilevel models to examine ethnic differences in terms of the psychological variables. All models allowed varying intercepts to account for mean differences in schools. Table 2 contains the fixed effect estimates (standardized coefficients), standard errors and 95% confidence intervals from these multilevel models. Relative to Whites, Indigenous and other minority Australians reported greater discrimination against their group, but the three ethnic groups were comparable in terms of mental ill-health and subjective wellbeing, though there was a tendency for Indigenous and other ethnic minorities youth to report greater wellbeing than their White counterparts. There were no ethnic differences in terms of social support from parents, teachers, friends and classmates. For the sake of complete reporting, we have included the raw counts of friendship nominations as a function of ethnic group and gender in the Online Supplementary materials (see Tables S1 and S2). Friendship nominations were converted into directed edge-lists (nominator -> nominee) for the analyses reported below.

### **Frame-of-Reference Effects**

To examine the friendship communities related frame-of-reference effects of discrimination on individual level wellbeing, we first extracted friendship communities within each school's network using the link communities algorithm discussed above (Anh et al., 2010; Kalinka & Tomancak, 2011). We ran the algorithm in R separately on each school's edge-list. Figure S1 in Online Supplementary materials visually depicts the summary of the link communities in each of the three schools, including their respective

dendrograms, partition density plots, the largest cluster size, and the number of nodes, edges and clusters. There were 215 overlapping communities in total (School 1: 91 communities; School 2: 85; School 3: 39). Of the 736 participants who were classified in friendship communities, 45.7% belonged to more than one friendship community, suggesting that there was a substantial overlap between communities. We combined the communities' data from the three schools to examine the frame-of-reference effects with respect to discrimination in the entire sample.

Table 3 contains the expected a posteriori (EAP) of the fixed effects estimates, posterior standard deviations and posterior probability intervals (PPI) from the multiple membership multilevel models for mental ill-health and subjective wellbeing as outcomes. The model for mental ill-health showed that there were no effects of individual or community level discrimination, or that of the interaction, on mental ill-health of participants. For the model predicting subjective wellbeing, the PPI of the interaction term did not include zero, suggesting that the link between individual level discrimination and wellbeing was moderated by the community level discrimination. The interaction was significant with or without using ethnicity as a covariate. We report results from models including ethnicity as a covariate as these demonstrate the frame-of-reference effects for discrimination despite the initially observed differences in the wellbeing levels of Whites and Indigenous Australians (as reported in Table 2 in the preliminary analyses above).

Figure 2 depicts the simple slopes for the links between individual level discrimination and subjective wellbeing for low (-1 SD), medium (at mean level) and high (+1 SD) community level discrimination. As shown by the two dotted lines in the figure, there was no association between individual level discrimination and wellbeing when the community level discrimination was average (EAP = -0.07 [95% PPI: -0.14 0.00]) or below average (EAP = 0.005 [95% PPI: -0.09 -0.10]). However, as shown by the solid line in Figure

2, there was a negative association between individual level discrimination and wellbeing when the community level discrimination was higher than average:  $EAP = -0.14$  [95% PPI: -0.23 -0.05]. When the community level discrimination was low, individual level discrimination conferred no wellbeing related benefits or costs on the individuals in those communities. When the community level discrimination was high, individuals in those communities who themselves did not experience discrimination had better wellbeing than individuals who did experience discrimination.

### **Discussion**

We examined the dynamics of felt discrimination and wellbeing in the context of overlapping friendship communities of Australian youth of diverse ethnic backgrounds. Our study is the first, as far as we know, to provide evidence for a frame-of-reference effect involving discrimination. We employed a novel method combining a state-of-the-art community detection algorithm for identifying overlapping friendship communities (Ahn et al., 2010) and multiple membership multilevel modeling framework powered by Bayesian statistics (Browne, 2012). Our method takes into account several complexities simultaneously: individuals' multiple memberships in different but overlapping friendship communities, the relative group sizes of the multiple communities, and school-level variations in the various parameter of interest, including the moderation effect of friendship community level discrimination on the link between individual level discrimination and wellbeing. Consistent with our frame-of-reference hypothesis, the results show that individuals' relative standing in their group in terms of the levels of felt discrimination reliably predicted their wellbeing levels among those groups of friends who felt high levels of discrimination. Our results extend the literature emphasizing the importance of relative standing in one's group (Festinger, 1954; Frank, 2012; Marsh, 2006) by identifying

overlapping friendship communities as an important microsystem (Bronfenbrenner & Ceci, 1994) or a key frame of reference relevant for discrimination and wellbeing of young people.

Our sample was not representative of the general population of Australian youth, as evident from the lower socio-economic status of the schools in this sample than the national average. Still, our results of ethnic differences in felt discrimination—Indigenous and other minority feeling more discrimination than Whites—were consistent with prior research showing that members of ethnic minority groups in Australia tend to feel marginalized by society at large (Mellor, 2003). However, on average, all ethnic groups reported comparable levels of mental ill-health and felt social support from parents, teachers, classmates and friends. If anything, there was a slight tendency for Indigenous Australians and other minorities, relative to Whites, to show higher levels of subjective wellbeing. Most importantly, in the frame-of-reference models, friendship community level discrimination reliably moderated the link between individual level discrimination and wellbeing even when we controlled for ethnicity.

Further, felt discrimination was negatively related to felt social support from parents and teachers, suggesting that supportive adults in young people's lives may have a positive impact on their perceptions of discrimination from society at large. There was no simple association between felt discrimination and mental health and nominations received, suggesting that felt discrimination, in itself, did not necessarily mean worse mental health. However, felt discrimination was negatively related to nominations sent in friendship networks. Youth who felt high discrimination tended to befriend others less, suggesting that discrimination may have an isolating effect on young people.

Despite the social cost of felt discrimination, it stands to reason that members of disadvantaged groups are justified in feeling marginalized and their feelings are morally appropriate responses to historical and/or ongoing social injustices against their ethnic group.

Even members of privileged group can perceive discrimination against their group despite the objective data that shows that they are advantaged relative to other groups (e.g., White Americans feeling that they are discriminated against due to their race; Gonyea, 2017). A key insight from our study is that one's relative standing in one's close friendship network—whether one is more or less marginalized than one's friends who feel high discrimination—matters more than absolute levels of discrimination for individuals' subjective wellbeing. The pernicious link between discrimination and wellbeing was not apparent at the individual-level analysis but was evident in an interaction between individual-level and friendship group-level discrimination. In the context of overlapping friendship communities with high group-level discrimination, individual-level discrimination predicted negative subjective wellbeing, regardless of ethnicity. In friendship communities with high group-level discrimination, individuals who felt less marginalized relative to the average discrimination of their friendship network tended to have higher wellbeing than did those who felt high discrimination themselves.

Past research suggests that ethnic identity may protect against some of the negative effects of ethnic-racial discrimination on youth's adjustment (Umaña-Taylor, 2016). Youth with strong ethnic identity tend to cope with discrimination by utilizing proactive strategies, such as, sitting down with the person to negotiate a resolution to his/her objectionable behavior (Umaña-Taylor, Vargas-Chanes, Garcia, & Gonzales-Backen, 2008). Future research is needed to examine how our frame-of-reference effects are moderated by the strength of ethnic identity. It remains to be seen, for instance, if people who have a strong ethnic identity tend to engage in more or less social comparison with others. Our study suggests that any variable that might exacerbate social comparison in mixed-ethnicity friendship groups can be particularly harmful to wellbeing of those who feel more discrimination than others in the group.

Our research has clear implications for interventions. Consistent with recent arguments highlighting the importance of context in wellbeing interventions (Ciarrochi, Atkins, Hayes, Sahdra & Parker, 2016), our findings suggest that interventionists need to pay attention to the context in which the youth are situated. If the goal of an intervention is to improve adolescent wellbeing, then felt discrimination may not always be the most effective intervention target depending on the youth's friendship context. Specifically, our results suggest that if youth are nested in a friendship group that experiences little discrimination on average, then changes to individual level discrimination are unlikely to bring about changes to wellbeing. We speculate that in groups with low group-level discrimination, the issue of discrimination is not salient enough for social comparison. In contrast, in groups that experience substantial discrimination, interventions that seek to reduce felt discrimination may be especially effective in improving the wellbeing of youth who feel more discriminated against than their friends.

We hasten to add that reducing *felt* discrimination in the larger societal context in which *real* social injustice of discriminatory practices persists may be objectionable on moral grounds, regardless of whether or not reducing felt discrimination makes the youth feel better. However, the fact that felt discrimination seems to be irrelevant for wellbeing when the friendship community level discrimination is low has another implication for interventions: reduction of contextual-level discrimination—promotion of a societal context in which everyone feels low levels of discrimination—remains a worthwhile target for intervention on both moral and empirical grounds. Our data suggest that in such a context of low group level discrimination, youth seem to have similar levels of wellbeing, but importantly, higher levels of wellbeing than do youth who are nested in friendship contexts with high group level discrimination *and* who themselves feel higher levels of discrimination than their friends. Perhaps somewhat ironically, our frame-of-reference finding calls for

interventions for reducing societal level discriminatory practices so that the frame of reference with respect to discrimination is rendered irrelevant to individuals' wellbeing.

We acknowledge that social comparison within friendship groups is assumed and not directly measured in our study. That is, our measure of discrimination focused on how marginalized participants felt, and not how marginalized they thought they felt in comparison to their friends. While subjective reports of social comparison of discrimination might provide additional valuable information, focusing on relative effects in statistical terms, as we did, has the benefit of avoiding any potential bias in subjective reporting of relative levels of discrimination. Another weakness of the study is the use of cross-sectional data, which can be remedied in future studies with longitudinal assessments of friendship networks, discrimination and wellbeing. We also acknowledge that the measurement of social networks can be improved in future work. We asked participants to nominate up to five same- and opposite-sex friends. It remains to be seen if our results will hold up in a future study in which no upper limit on friendship nominations is imposed on participants. Finally, we note that we focused only on the quantity of friendship and did not measure quality of friendship, which has been shown to be critical for understanding race relations in cross-ethnic friendships (Shelton & Richeson, 2006). Future research is needed to test whether quality of friendship might moderate the discrimination frame-of-reference effects we observed.

Nevertheless, our results highlight the importance of examining overlapping friendship communities while understanding the dynamics of discrimination and wellbeing of youth of diverse ethnic backgrounds. At the individual level, feeling marginalized seems to be costly for youth of all ethnic backgrounds in terms of reduced tendency to befriend others. At the friendship network level, feeling marginalized is costly for some people in the network, and perhaps counterintuitively, beneficial for others: when the friendship group-

level discrimination is high, those who experience low levels of discrimination themselves have better wellbeing than those who experience high levels of discrimination.

Finally, we acknowledge that the frame-of-reference effects observed in our samples may not generalize to the wider Australian population or that of the world. Future research is needed to assess the discrimination related frame-of-reference effect we report here in other cultures. The key strength of our sample—high ethnic diversity—necessarily made the conclusions of our study less general to the wider Australian population in which the distribution of ethnic minority groups remains sparse. Even so, our results are as relevant to the Australian context as they are to any other multicultural nation in which ethnic minorities may feel marginalized by society at large.



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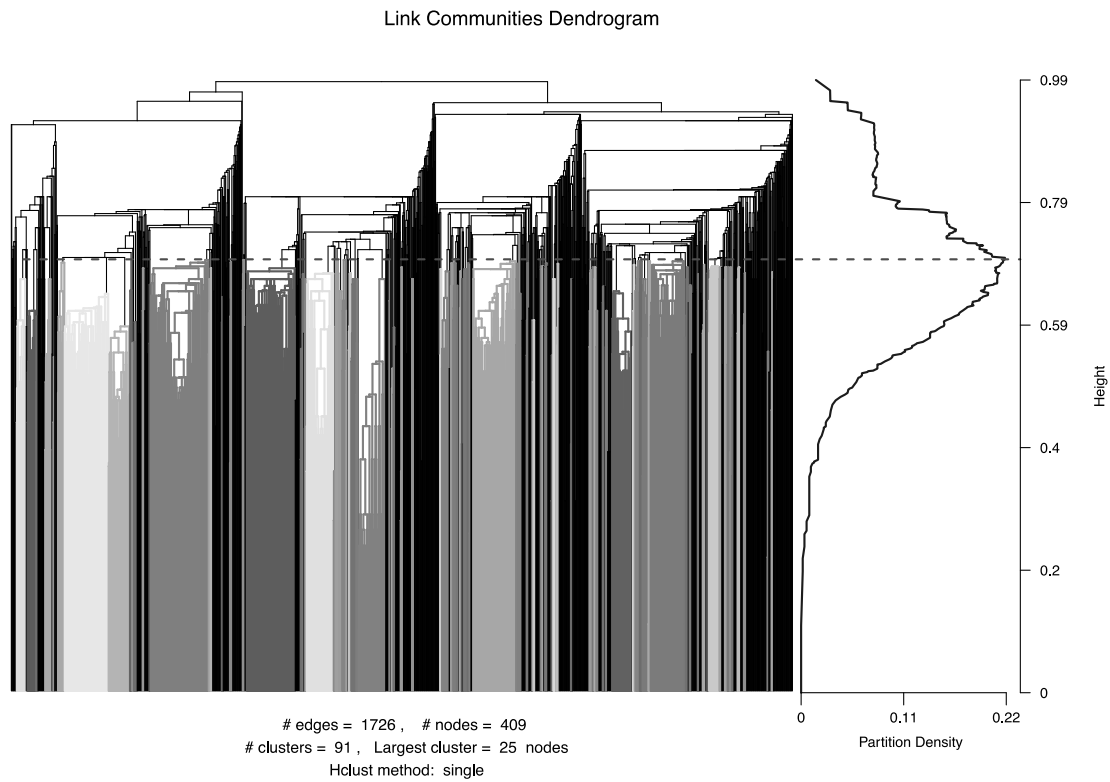
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*Figure 1.* Link communities dendrogram and partition density for the friendship networks data of School 1 (see Figure S1 in Online Supplementary materials for colored plots for all three schools)



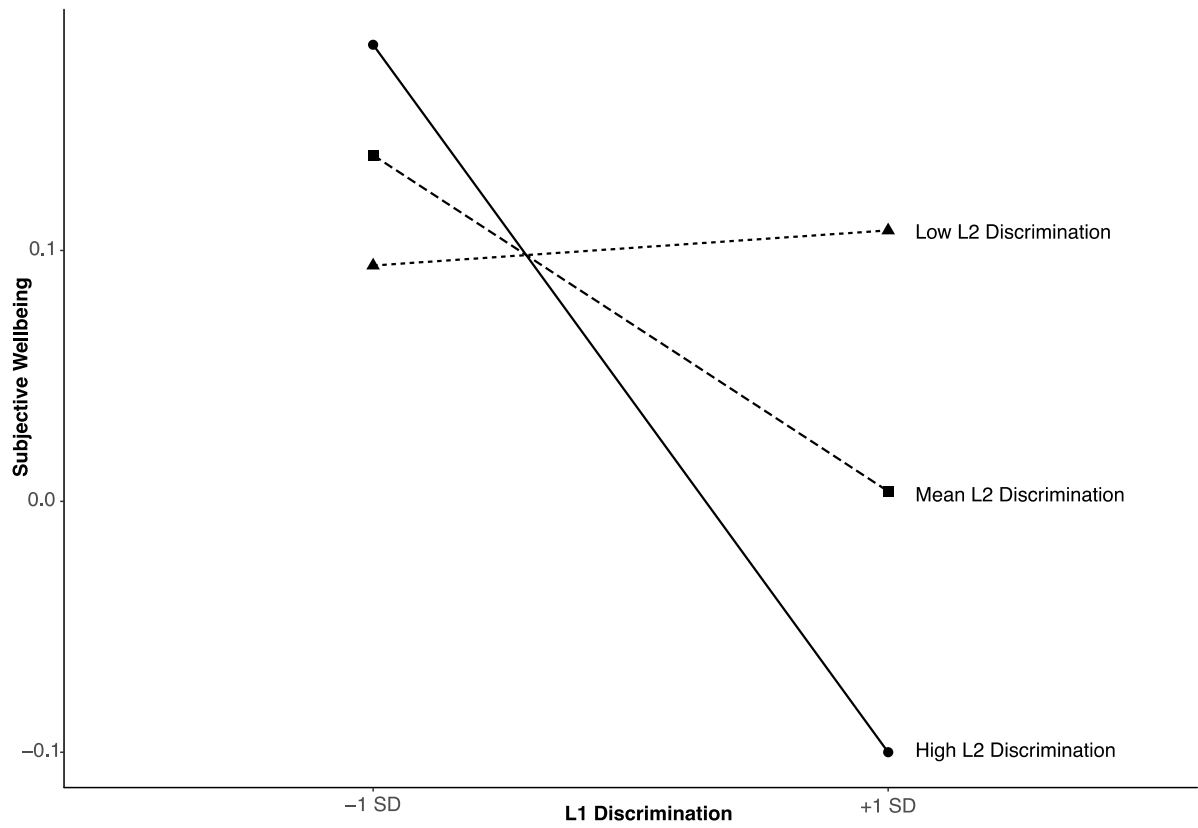


Figure 2. Friendship community level discrimination moderating the link between individual level discrimination and subjective wellbeing. L1 Discrimination: Individual Level Discrimination; L2 Discrimination: Friendship Community Level Discrimination

Table 1

*Inter-correlations between study variables*

|                                  | <b>Discrimination</b> | <b>Mental ill-health</b> | <b>Subjective wellbeing</b> | <b>Social support parents</b> | <b>Social support teachers</b> | <b>Social support friends</b> | <b>Social support classmates</b> |
|----------------------------------|-----------------------|--------------------------|-----------------------------|-------------------------------|--------------------------------|-------------------------------|----------------------------------|
| <i>Pearson's correlations</i>    |                       |                          |                             |                               |                                |                               |                                  |
| <b>Mental ill-health</b>         | -0.04                 |                          |                             |                               |                                |                               |                                  |
| <b>Subjective wellbeing</b>      | -0.06                 | -0.15***                 |                             |                               |                                |                               |                                  |
| <b>Social support parents</b>    | -0.09**               | 0.05                     | 0.53***                     |                               |                                |                               |                                  |
| <b>Social support teachers</b>   | -0.17***              | 0.02                     | 0.41***                     | 0.44***                       |                                |                               |                                  |
| <b>Social support friends</b>    | -0.04                 | 0.04                     | 0.43***                     | 0.52***                       | 0.42***                        |                               |                                  |
| <b>Social support classmates</b> | -0.03                 | -0.02                    | 0.48***                     | 0.43***                       | 0.41***                        | 0.54***                       |                                  |
| <i>Spearman's correlations</i>   |                       |                          |                             |                               |                                |                               |                                  |
| <b>In-degree</b>                 | -0.01                 | -0.02                    | 0.03                        | -0.01                         | 0.03                           | 0.09*                         | 0.14***                          |
| <b>Out-degree</b>                | -0.10**               | -0.09*                   | 0.17***                     | 0.15***                       | 0.14***                        | 0.16***                       | 0.22***                          |

*Note.* The Spearman's correlation of in-degree and out-degree was 0.34\*\*\*

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$

Table 2

*Fixed effects, standard errors and 95% confidence intervals from multilevel models (with varying intercepts for schools) with ethnicity predicting the psychological variables.*

|                                | <b>Fixed effect</b> | <b>SE</b> | <b>95% CI</b> |       |   |
|--------------------------------|---------------------|-----------|---------------|-------|---|
| <b>Felt Discrimination</b>     |                     |           |               |       |   |
| Intercept (Whites)             | -0.15               | 0.10      | [-0.37        | 0.07] |   |
| Indigenous                     | 0.34                | 0.09      | [0.16         | 0.53] | ◇ |
| Other ethnicities              | 0.24                | 0.08      | [0.08         | 0.40] | ◇ |
| <b>Mental ill-health</b>       |                     |           |               |       |   |
| Intercept (Whites)             | 0.00                | 0.48      | [-1.09        | 1.09] |   |
| Indigenous                     | 0.03                | 0.07      | [-0.11        | 0.16] |   |
| Other ethnicities              | -0.04               | 0.06      | [-0.16        | 0.08] |   |
| <b>Subjective wellbeing</b>    |                     |           |               |       |   |
| Intercept (Whites)             | -0.06               | 0.15      | [-0.38        | 0.27] |   |
| Indigenous                     | 0.19                | 0.09      | [0.01         | 0.37] | ◇ |
| Other ethnicities              | 0.12                | 0.08      | [-0.03        | 0.29] |   |
| <b>Social support parents</b>  |                     |           |               |       |   |
| Intercept (Whites)             | 0.02                | 0.15      | [-0.30        | 0.35] |   |
| Indigenous                     | 0.00                | 0.09      | [-0.18        | 0.19] |   |
| Other ethnicities              | -0.02               | 0.08      | [-0.17        | 0.15] |   |
| <b>Social support teachers</b> |                     |           |               |       |   |
| Intercept (Whites)             | 0.02                | 0.16      | [-0.34        | 0.39] |   |
| Indigenous                     | -0.02               | 0.09      | [-0.20        | 0.16] |   |
| Other ethnicities              | 0.01                | 0.08      | [-0.14        | 0.18] |   |

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| <b>Social support friends</b> |       |      |        |       |
|-------------------------------|-------|------|--------|-------|
| Intercept (Whites)            | 0.06  | 0.15 | [-0.28 | 0.39] |
| Indigenous                    | 0.02  | 0.09 | [-0.15 | 0.20] |
| Other ethnicities             | -0.10 | 0.08 | [-0.26 | 0.06] |

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| <b>Social support classmates</b> |       |      |        |       |
|----------------------------------|-------|------|--------|-------|
| Intercept (Whites)               | -0.01 | 0.12 | [-0.28 | 0.26] |
| Indigenous                       | 0.04  | 0.09 | [-0.14 | 0.22] |
| Other ethnicities                | 0.08  | 0.08 | [-0.08 | 0.25] |

---

*Note.*  $\diamond$  indicates that the fixed effect for that ethnic group is different from the intercept, the reference category of Whites.

Table 3

*Parameter estimates from multiple membership multilevel models*

|                             | <b>Fixed effect</b> | <b>SD</b> | <b>95% PPI</b> |        |
|-----------------------------|---------------------|-----------|----------------|--------|
|                             | <b>EAP</b>          |           |                |        |
| <b>Mental Ill-health</b>    |                     |           |                |        |
| Intercept                   | 0.34                | 0.57      | [-0.84         | 1.20]  |
| Ethnicity: Indigenous       | 0.02                | 0.08      | [-0.12         | 0.17]  |
| Ethnicity: Other            | 0.01                | 0.07      | [-0.12         | 0.14]  |
| L1 Discrimination           | 0.02                | 0.03      | [-0.03         | 0.07]  |
| L2 Discrimination           | 0.01                | 0.04      | [-0.06         | 0.08]  |
| L1 x L2 Discrimination      | -0.02               | 0.03      | [-0.07         | 0.04]  |
| <b>Subjective Wellbeing</b> |                     |           |                |        |
| Intercept                   | -0.04               | 0.26      | [-0.48         | 0.66]  |
| Ethnicity: Indigenous       | 0.20                | 0.10      | [0.01          | 0.39]  |
| Ethnicity: Other            | 0.22                | 0.09      | [0.06          | 0.40]  |
| L1 Discrimination           | -0.07               | 0.04      | [-0.14         | 0.00]  |
| L2 Discrimination           | -0.03               | 0.04      | [-0.11         | 0.05]  |
| L1 x L2 Discrimination      | -0.07               | 0.03      | [-0.14         | -0.01] |

*Note.* EAP: expected a posteriori; SD: posterior standard deviation; PPI: posterior probability interval; L1 Discrimination: Individual-Level Discrimination; L2 Discrimination: Friendship Community-Level Discrimination

Online Supplementary Materials

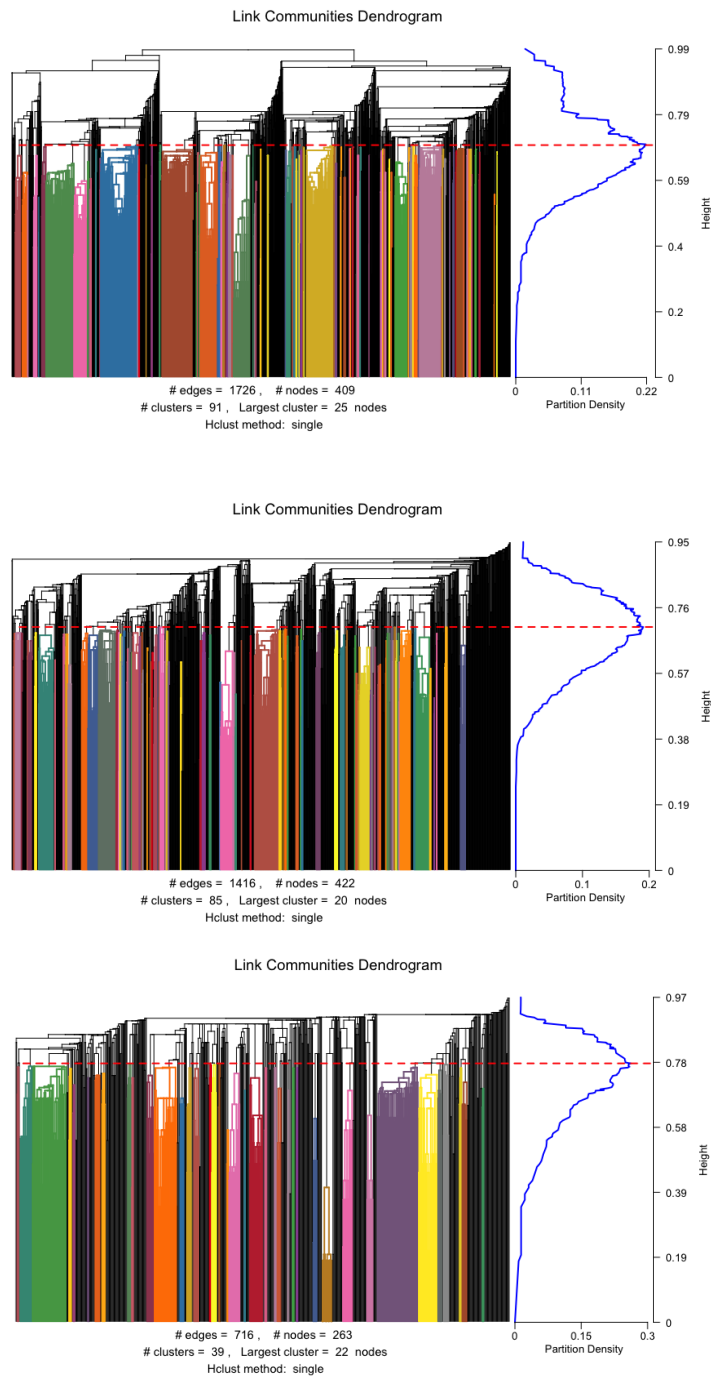


Figure S1. Link communities dendrograms cut based on their respective partition densities for each of the three schools

Table S1

*Mean, standard deviation and median of friendship nominations as a function of the ethnicity of the nominators and nominees.*

|                  | <i>M</i> | <i>SD</i> | <i>Median</i> |
|------------------|----------|-----------|---------------|
| <b>W -&gt; W</b> | 2.91     | 1.90      | 3             |
| <b>W -&gt; I</b> | 1.00     | 1.05      | 1             |
| <b>W -&gt; O</b> | 1.01     | 1.15      | 1             |
| <b>I -&gt; W</b> | 0.98     | 1.59      | 0             |
| <b>I -&gt; I</b> | 1.80     | 1.41      | 2             |
| <b>I -&gt; O</b> | 0.95     | 1.45      | 0             |
| <b>O -&gt; W</b> | 1.03     | 1.56      | 0             |
| <b>O -&gt; I</b> | 0.91     | 1.08      | 1             |
| <b>O -&gt; O</b> | 3.51     | 2.71      | 3             |

*Note.* W->W: Whites nominating Whites as close friends; W->I: Whites nominating Indigenous; W->O: Whites nominating other ethnic minorities; I->W: Indigenous nominating Whites; I->I: Indigenous nominating Indigenous; I->O: Indigenous nominating other ethnic minorities; O->W: Other ethnic minorities nominating Whites; O->I: Others nominating Indigenous; O->O: Other ethnic minorities nominating other ethnic minorities as close friends. The rows shaded in grey contain the data from friendship nominations when the ethnicity of the nominators and the nominees were the same.

Table S2

*Mean, standard deviation and median of friendship nominations as a function of the sex of the nominator and nominees.*

|                  | <i>M</i> | <i>SD</i> | <i>Median</i> |
|------------------|----------|-----------|---------------|
| <b>F -&gt; F</b> | 3.01     | 1.92      | 3             |
| <b>M -&gt; F</b> | 1.44     | 2.35      | 0             |
| <b>F -&gt; M</b> | 1.29     | 1.92      | 0             |
| <b>M -&gt; M</b> | 2.68     | 2.13      | 2             |

*Note.* F -> F: Females nominating females; M -> F: Males nominating females; F -> M: Females nominating males; M -> M: Males nominating males.