TITLE: Adolescent Development of Interethnic Attitudes Following a Social Intervention to Increase Intergroup Contact: The Moderating Role of Affective Forecasting

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Affective Forecasting and Accuracy of Perceived Contact Willingness

Abstract

This longitudinal, quasi-experimental field study investigated affective forecasting as a moderator of positive intergroup contact effects among adolescents. We also examined a novel mediating mechanism which underlies this effect, namely accuracy of perceived outgroup willingness for intergroup contact. Three annual waves of survey data were used from 1,169 adolescents ($M_{age} = 13.88$ at Wave 1; 50% girls; 66% White British, 44% Asian British) whose schools were merged, in a unique intervention that resulted in one school where ethnic groups were evenly mixed (i.e., *balanced school*) and two White British majority schools (i.e., *majority skewed schools*). Results showed that positive intergroup contact and attitudes improved more in the balanced school than in the majority skewed schools. In all schools, change in adolescents' positive intergroup contact predicted change in positive intergroup attitudes indirectly via (1) increased accuracy of perceived outgroup willingness for contact and (2) reduced intergroup anxiety. Indirect effects via accuracy of perceived contact willingness were stronger for adolescents who made more negative affective forecasts than for other adolescents. These moderated mediation effects were stronger in the balanced school than in the majority skewed schools. Thus, more balanced ethnic mixing in schools seemed to directly enhance positive intergroup relations and attitudes for all adolescents, but to particularly benefit adolescents who made more negative affective forecasts about positive contact before the school merger.

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Adolescent Development of Intergroup Contact and Attitudes Following School Mergers: The

Moderating Role of Affective Forecasting

Children's and adolescents' mental representations about intergroup interactions, such as their

expectancies of how positive future encounters with members from other groups (so-called

outgroups) will go, hold important developmental significance for intergroup attitude

development (e.g., Andrews et al., 2016; Hitti & Killen, 2015; Yip et al., 2010). Adolescents with

negative expectations may avoid interethnic contact, even in more ethnically diverse contexts

(Birtel et al., 2019; McGlothlin & Killen, 2006). Yet, when contact is actually taken up in these

contexts, does increased positive intergroup contact predict positive intergroup attitudes

differentially for those who made negative affective forecasts, or expected intergroup contact to

be negative, than for others? In the current study, we went beyond prior work, which had

provided initial evidence for short-term effects of affective forecasting in controlled laboratory

settings among adults (e.g., Deegan et al., 2015; Mallett & Wilson, 2010; Mallett et al., 2008), to

provide evidence of how affective forecasting moderates adolescent interethnic attitudes

following an ambitious intervention to increase school diversity.

We used a longitudinal quasi-experimental design to examine the effects of a social

intervention in which previously ethnically segregated schools were merged into more evenly

ethnically mixed (i.e., more integrated) schools. In these schools, we studied positive contact

between White British majority and Asian British minority adolescents, in a town in the north-

west of England, UK, Oldham, that had witnessed considerable ethnic segregation and tensions.

We focused on positively valenced contact, which has been shown to reliably improve intergroup

attitudes, especially for majority compared with minority members (e.g., Birtel et al., 2019; Christ

et al., 2014; Pettigrew & Tropp, 2006). For adolescents, schools are important contexts of

intergroup relations, as adolescents have daily opportunities to interact with ingroup and

outgroup peers (e.g., Al Ramiah et al., 2015) in a setting that approximates Allport's (1954)

'optimal' conditions for contact (equal status, cooperation, common goals, and institutional support). In these schools, we assessed affective forecasting before the mergers and followed up these adolescents periodically for two years after the mergers, thereby enabling us to examine how, over time, affective forecasting moderated the effects of post-merger positive contact on positive interethnic attitudes. Furthermore, we make a novel theoretical contribution by proposing and testing a new mediating mechanism that helps explain *how* affective forecasting moderates contact effects on attitudes. We suggest that increased positive contact leads to more accurate perceptions of how willing outgroup members are to engage in intergroup contact (e.g., see also Al Ramiah et al., 2015; Shelton & Richeson, 2005).

Negative Affective Forecasting in Contact Effects on Attitudes

Adolescence is an important period for the development of intergroup relationships. During the transition to high school, opportunities for adolescents to interact with more peers expand dramatically, and in mixed high schools these interactions could be with peers who belong to other social and ethnic groups (e.g., Killen et al., 2013). Since Allport (1954) proposed his 'Contact Hypothesis', many studies have shown that contact with outgroup members facilitates positive intergroup attitudes (here called "intergroup contact effects"; for meta-analytic evidence, see Davies et al., 2011; Pettigrew & Tropp, 2006). Prior meta-analytic studies revealed that adolescent samples were relatively scarce compared with, but yielded effect sizes about twice as high as, adult samples (for a detailed discussion of these two points, see Tropp & Prenovost, 2008). Wölfer and colleagues (2016) attributed the particularly strong potential for contact to change attitudes during adolescence, compared to adulthood, in part, to significantly higher individual differences in the rates of developmental change of attitudes in adolescence.

Despite evidence for the pronounced effect of contact on attitudes among adolescents, a challenge remains: how to establish *positive contact* in everyday settings. Simply creating opportunities for contact does not necessarily create positive, high quality contact experiences with outgroup members (McKeown & Dixon, 2017). Even in ethnically diverse schools,

adolescents tend to interact primarily with members of their own ethnic group (Birtel et al., 2019; McGlothlin & Killen, 2006). One reason is that people – especially those who have limited contact opportunities – may have negative expectations about contact with outgroup members, which inhibit them from taking up contact opportunities in diverse environments. In other words, people have a tendency to engage in negative affective forecasting, to the extent that they expect any potential future intergroup contact to be negative. Among children and adolescents, research has suggested that negative expectations have important developmental significance for intergroup attitude development because they predict subsequent intergroup behavior (e.g., Hitti & Killen, 2015).

Negative intergroup expectations can either improve or attenuate effects of contact on attitudes. Initial studies using adult samples focused on initial interactions between members of different groups, studied under controlled laboratory settings. Mallett and colleagues (Mallett et al., 2011; Mallett & Wilson, 2010; Mallett et al., 2008) suggest that when negative affective forecasting is followed by subsequent intergroup contact, these experiences typically involve a pleasant surprise: the actual experience of contact is often more positive than was expected before the interactions took place. As Wilson and Gilbert (2003) showed in a series of studies, the main reason for this is that people are typically *in*accurate in predicting intergroup encounters, underestimating the positivity of future interactions. Moreover, increased positive contact may reduce inaccurate expectations about subsequent encounters, and thereby enhance people's willingness to engage in future positive contact (e.g., Mallett et al., 2008). Other scholars (Deegan et al., 2015; Gaertner et al., 1994) have, however, suggested that negative expectations may weaken the effects of positive contact on subsequent positive attitudes. One cross-sectional study found that when people had negative expectations about mixing, subsequent intergroup contact was correlated more weakly with intergroup attitudes than when people had positive expectations (Deegan et al., 2015). This may be because people's low motivation to accurately assess their

expectations creates a superficial, careless comparison of negative expectations to actual intergroup experiences (Snyder et al., 1977).

To our knowledge, there exist few prior studies on adolescents' affective forecasting in intergroup relations. Previous research shows that children's and adolescents' negative expectations about future contact predict lower contact, yet none of these studies examined the degree to which expectations moderated intergroup contact effects on subsequent intergroup attitudes. In the case of gender, young children's expectations about cross-gender interactions seem to influence the likelihood of future cross-gender interactions. For instance, the more negative four- to six-year-olds expected playing with a child of another gender would be, the less they subsequently played with cross-gender playmates. To our knowledge, there is only one study examining adolescents' expectations about interethnic relations. This study showed that 12- to 16-year old non-Arab adolescents expected Arab outgroup adolescents to value ethnic identity more than shared interests in activities, and therefore expected Arab adolescents to be less likely to invite non-Arab adolescents to their friendship group than non-Arab adolescents would be to invite Arab adolescents to their friendship group. Finally, these negative expectations about outgroup inclusivity increased with age. Thus, there is some evidence that adolescent interethnic expectations tend to be negative, and become increasingly so with age. There is, however, no research on whether adolescents' negative forecasts increase or attenuate the impact of positive contact.

In this paper, we focus on the effect of general experiences of positively valenced intergroup contact on subsequent positive attitudes, in the context of contact between White and Asian British adolescents in high schools in the United Kingdom (see also [blinded for peer review]). We expected that change in positive intergroup contact would positively predict change in positive intergroup attitudes (*Hypothesis 1*). Moreover, we tested the prediction (e.g., Deegan et al., 2015; Mallett et al., 2008) that expectations about future contact would moderate how well subsequent contact predicts attitudes (*Hypothesis 2*). We test the two contradictory findings

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reported in prior research, namely whether (a) more negative expectations (i.e., negative forecasting) enhance contact effects on attitudes (Mallett et al., 2011; Mallett & Wilson, 2010; Mallett et al., 2008), or (b) more negative expectations diminish contact effects on attitudes (e.g., Deegan et al., 2015).

Why Affective Forecasting Moderates Positive Intergroup Contact Effects: The Mediating Role of Intergroup Anxiety and Accuracy of Perceived Contact Willingness

Notwithstanding prior work on affective forecasting, little is known about *why* positive intergroup contact may change intergroup attitudes more when expectations are negative. We suggest that two mediating mechanisms may work in parallel to explain why such contact changes attitudes, and why affective forecasting may moderate these contact effects (see Figure 1).

Figure 1.

Theoretical Model
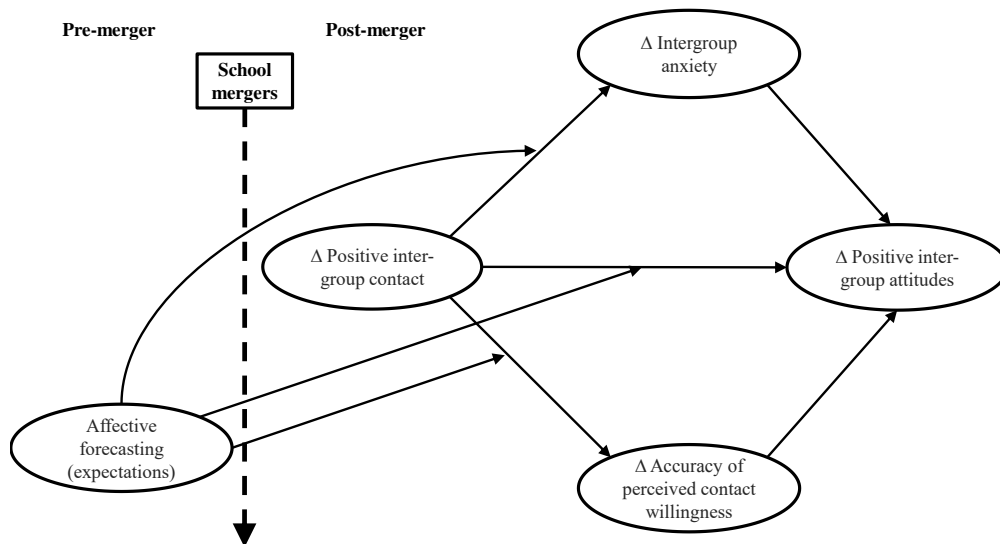
Prior research has found that 'intergroup anxiety' (relatively greater anxiety about interacting with unknown outgroup (vs. ingroup) members; Stephan and Stephan, 1985) reliably mediates intergroup contact effects on attitudes, including among adolescents (e.g., Pettigrew & Tropp, 2008). Stephan and Stephan (1985) suggested that it is particularly the *expectation* of negative consequences resulting from intergroup contact that increases intergroup anxiety, which results

in less positive contact and more hostility toward outgroup members. One possibility is that, when *actual* contact improves over time, adolescents who make negative affective forecasts are particularly likely to show a decrease in intergroup anxiety (e.g., Mallett et al., 2008), which leads to increased positive attitudes. In contrast, other scholars (Deegan et al., 2015) suggest that negative expectations hinder the beneficial effects of positive contact, perhaps because the negative expectation itself results in elevated intergroup anxiety and thereby reduces the beneficial effects of intergroup contact. To our knowledge, no research has examined whether this mediating effect of anxiety is particularly strong for those engaging in negative affective forecasting about intergroup contact (i.e., a moderated mediation). We expected that change in intergroup anxiety would mediate effects of change in positive contact on change in positive attitudes (*Hypothesis 3a*). We also expected that affective forecasting would moderate to what degree change in intergroup anxiety mediates effects of change in positive contact on change in positive attitudes (*Hypothesis 4a*).

A second mediating explanation for positive contact effects on positive attitudes is increased intergroup knowledge ((Davies et al., 2011; Pettigrew & Tropp, 2008; Tropp & Prenovost, 2008), and we propose a new conception of knowledge, which has previously often been conceived as knowledge about outgroup customs, norms, or values. Allport (1954) originally suggested that unfavorable attitudes towards an outgroup are due to a lack of information about that group, and that contact could increase positive attitudes by providing opportunities to learn about the outgroup. Increased knowledge can reveal similarities and thus lead to liking (Pettigrew, 1998), and reduces uncertainty about how to interact with others (Stephan & Stephan, 1985). Although there is meta-analytic support that knowledge mediates contact effects on attitudes (Pettigrew & Tropp, 2008; Tropp & Prenovost, 2008), the variance in attitudes explained by gains in knowledge is modest. Prior research has pointed out, however, that *perceptions* of willingness to have contact (i.e., an implicit form of knowledge about the outgroup) may have important effects on positive attitudes (e.g., Al Ramiah et al., 2015; Shelton

& Richeson, 2005). In the current research, we go a step further than these two studies, to assess perceived, as well as actual, willingness to engage in contact. We refer to the correspondence, or "fit", between (a) ingroup members' perceptions of outgroup members' willingness to have contact with ingroup members, and (b) the outgroup's actual willingness to have contact with ingroup members as: accuracy in the perceived willingness of the outgroup to engage in intergroup contact (i.e., *accuracy of perceived contact willingness*). Consistent with suggestions from other scholars (Deegan et al., 2015; Shelton & Richeson, 2005; Tropp & Prenovost, 2008), we agree that adolescents tend to underestimate how willing outgroup members are to engage in contact with them. More specifically, we hypothesized that positive contact would lead adolescents who initially made more negative forecasts to subsequently discover that outgroup members were more willing to have contact than they had initially perceived them to be, and this would change their intergroup attitudes more than for adolescents who made more positive forecasts.

We propose that one powerful way to change inaccurate perceptions of perceived outgroup contact willingness is through positive contact experiences (Mallett et al., 2008), because *increased* positive contact allows adolescents to gain more accurate knowledge about how willing intergroup members are to have contact. One additional possibility is that increased accuracy of perceptions of how willing the outgroup is to have intergroup contact will mediate contact effects on attitudes *particularly* for adolescents who made negative intergroup forecasts of positive contact. This possibility was suggested by Mallett et al. (2011), who proposed that inaccurate perceptions of contact willingness underlie affective forecasting, or there is an 'intergroup forecasting error': people tend to inaccurately estimate that future contact will go badly (i.e., an 'error'); however, after positive contact experiences, they tend to change their perceptions of how willing the outgroup is to engage in contact, and to become more accurate in their estimation. These ideas are also consistent with prior work on expectation violations and change in accuracy (e.g., Jonas et al., 2014): unexpected experiences enhance selective attention

and social learning more than expected experiences, thereby leading to more accurate assessments of future situations (Jonas et al., 2014). Nevertheless, an alternative possibility is that negative expectations hamper the effect of positive contact on changing accuracy perceptions, because negative expectations lead to more superficial intergroup interactions (e.g., Deegan et al., 2015; Snyder et al., 1977). Thus, we expected that change in accuracy of the perceived willingness of the outgroup for contact will mediate effects of positive contact on change in positive attitudes (*Hypothesis 3b*). We also expected that stronger effects of contact on attitudes would be found for adolescents who make negative intergroup forecasts, compared to others (*Hypothesis 4b*).

The Current Study

The current study investigated the mediating mechanisms which underlie the effects of positive contact on attitudes, especially for adolescents who make negative intergroup forecasts. Over and above confirming the long-established mediating effects of intergroup anxiety, we examined a novel mediator, that of accuracy of perceived contact willingness. We investigated these mediators in the context of a series of planned mergers of ethnically segregated schools in a town in the United Kingdom. The town, Oldham, has a large ethnic minority population originally from South-West Asia – primarily of Pakistani and Bangladeshi heritage – with an Asian population of 22.5% (approximately three times the national average; of which 10% are Pakistani, 7% Bangladeshi, 5.5%, other Asian-British; 2011 census) and has experienced ethnic unrest. For further details about the study design, see [blinded for peer review]; for this study's social, cultural, and historical context, and the background to the school mergers, see OSM; 5; pp. 16-21; And for more information on ethnic school mergers, more generally, see Miah (2015).

The three new 'merger' schools in the town were established, in part, to promote better social cohesion in this town. One of the three merger schools involved the merging of a school with a predominantly White British student population and a school including a predominantly Asian British student population. This merger was thus designed to achieve a proportion of

ethnic minority adolescents roughly double that in the town as a whole, with approximately equal proportions of each group. Overall, the mergers-intervention constitutes a unique real-world quasi-experiment.

Studying positive contact in mixed schools is important since prior research indicates that school can provide propitious contact conditions, yet ethnic composition at both the school level and the individual level of positive contact has unique and distinct effects on intergroup attitudes (Eller et al., 2017; Schmid et al., 2017). Creating schools in which there is a more equal ethnic mix represents 'institutionally sanctioned' change (Eller et al., 2017; Tropp & Prenovost, 2008). But for real change in ethnic relations to occur, adolescents must grasp the opportunity and engage in contact, and positive contact in these schools will result in a stronger increase in positive attitudes than occurs in schools in which the respective proportions of majority and minority groups are less equal. A school where ethnic groups are equally mixed may also create a context of positive intergroup norms and standards, thereby making contact more positive and effective than before (e.g., Al Ramiah et al., 2015; Christ et al., 2014).

Prior studies have examined the effects of ethnic mixing within schools (i.e., increased opportunities, at the school level, to mix) among adolescents (notably studies of school desegregation in the United States, e.g., Schofield & Eurich-Fulcer, 2004). Many of these studies report that higher ethnic mixing resulted in increased effects of positive contact on positive attitudes (Birtel et al., 2019; Eller et al., 2017; McGlothlin & Killen, 2006) and some specifically for the context we studied, namely relations between White and Asian British adolescents (Birtel et al., 2019). None of this prior research, however, examined the effects of a planned ethnic merger of schools, which yields a longitudinal, quasi-experimental field study. We assessed pre-merger affective forecasting about future positive contact, and then examined how forecasting moderated effects of post-merger positive contact on attitudes. We refer to the longitudinal change of gaining contact opportunities with outgroup members as *ethnic mixing* [reference blinded for peer review] in mergers: a structural social change from segregation to integration

(e.g., the change from one underrepresented ethnic groups in a school to ethnic groups becoming equal in size within schools; Eller et al., 2017).

All hypotheses (discussed above in the text) can also be found under https://osf.io/fwgnc/?view_only=3887eefc57cb44d396b7e8c29f809dfc (referred to as "OSF-Page" throughout). Because prior research has not examined ethnic mixing in mergers, we explore differences between types of mergers. We focus on one merged school that increased in ethnic mixing, and compared adolescent development in this school to adolescent development in other schools with less ethnic mixing. Finally, in additional analyses (shown in the Online Supplementary Material (OSM)), we explored age, grade, pre-merger school, ethnicity (i.e., group status), and age differences in all hypothesized effects.

Method

Anonymized data, Mplus-scripts, and output files based on the data used in the current study can be found on the OSF-page. None of the variables used in this manuscript have been considered in prior publications. We have, however, referred to the quasi-experiment provided by this unique school situation in another paper [blinded for review], in which we did not report any actual data or results.

Sample and sampling procedure. Participants were 1,169 adolescents ($M_{age} = 13.88$, $SD_{age} = .87$; 50% girls) in high schools in Oldham. Adolescent participants were the year groups 7, 8 and 9 (i.e., this corresponds to grades 6 to 8 in the United States). The majority of our sample were White British (66%; see Table 1). These adolescents came from six schools, pairs of which were subsequently merged in September 2012, resulting in three merged schools (labeled schools A, B and C for ethical reasons; see Table 1). In the current study, we use three waves of data: Pre-merger data collected in June 2012 (Wave 1), and two post-merger data collection points in June 2013 and June 2014 (Waves 3 and 4). We also collected an additional wave of data in December 2012 (Wave 2); however, this wave contained a high amount of missingness on key variables so we do not include this data (discussed in detail in the section Missing Data; we did, however,

replicate findings including Wave 2 data with additional analyses, see the OSF-page and the OSM (4.6; p. 9). At each wave students completed questionnaires (paper and pencil), which were administered by teachers during regular school hours (the researchers were not present during data collection). Ethical approval to carry out the research, as well as sampling procedures and materials, were granted by the University Ethics Committee of [blinded for review]; for further details, see OSM, 6. Ethical procedure of the study and recruitment of participants, pp. 22.

All three school mergers were implemented gradually, such that the schools were first officially merged in name only (i.e., the pairs of schools were already given their new school names and school uniforms, but adolescents remained for a year at their original school sites/buildings) and then were merged 'physically' (i.e., the point at which adolescents from the paired schools moved to the new, single sites and shared classes in single school buildings). Here, when we refer to the school 'merger' or 'merged schools' we are referring to the point at which the schools physically merged, as this is the point at which adolescents actually came into regular contact with each other. This physical merger occurred in September 2012, between Wave 1 (June 2012) and Wave 3 (June 2013). As shown in Table 1, in post-merger School A, students went to a school where ethnic groups were evenly mixed (i.e., 48% White British, 52% Asian British; we called this the *balanced school*) after the merger. In post-merger schools B and C, students went to a school where the White British constituted the majority (*majority skewed schools*) after the merger (see for the same terminology Kanter, 1977).

Table 1

Pre-Merger and Post-Merger School Sample Sizes and Ethnic Mixing at School- and Sample-Level

Pre-merger schools (Wave 1)			Post-merger schools (Wave 3 and Wave 4)			
School	*n*	Percentage White British	School	*N*	Percentage White British	Label post-merger
1	276	93% [91%] (*n* = 252)	A	563	39% [48%] (*n* = 271)	Balanced school
2	287	14% [7%] (*n* = 19)				
3	164	85% [84%] (*n* = 138)	B	374	85% [89%] (*n* =334)	Majority skewed schools
4	210	90% [93%] (*n* = 196)				
5	161	96% [88%] (*n* = 141)	C	232	61% [73%] (*n* = 171)	
6	71	40% [42%] (*n* = 30)				
Total	1169	66% (*n* = 776)		1169	66% (*n* = 776)	

Note. Percentages (and subsample sizes, in parentheses) at pre-merger and post-merger are shown for the White British adolescents at the school- and sample-level (shown in square brackets); the remaining percentage are Asian British (34.0% of the entire sample; 28.6% "Asian or Asian British- Pakistani", 4.2% "Asian or Asian British- Bangladeshi", 1.1% "any other Asian / Asian British background", and 0.1% "Asian Indian"). As ethnicities other than White British and Asian British (e.g., "Black or Black British- Caribbean") comprised a very small percentage per school (< .4%), these were not included in Table 1 or in the analyses. We also report distribution per year group in the OSM (see Table S1; p. 23).

We used a cross-sequential design (Little, 2013), meaning that at each subsequent wave, the same participants who were initially targeted at Wave 1 (*N* = 1,357) participated. We selected participants from the initial sample of 1,357 participants for our final analytical sample based on

three inclusion criteria: they were (1) 7th to 9th graders at Wave 1, (2) of Asian British or White British ethnicity, and (3) they completed the questionnaire item indicating the pre-merger school they attended. A total of 188 participants were thereby excluded. In the OSM, we included a detailed account of the sample selection (1; pp. 2-3), how we handled missing data (2; p. 5), and power analyses (3; p. 6).

Measures. All measures were assessed with questionnaires (each on a 5-point scale), and all items were answered at all waves, except affective forecasting which was only assessed at Wave 1 before the mergers took place. All measures were derived from prior studies, as explained, with references, in the OSM (pp. 3-4). We included the questionnaires with specific instructions in the OSF-page (in the folder "Materials").

Affective forecasting. At Wave 1 only, pupils (as school students are called in the UK) were asked to answer the following two items (*1 = Not at all, 5 = Very much*): "Do you look forward to mixing with pupils from the other campus?" and "When all pupils move to the new site, how well do you think they will get on with each other?". We used these two items to specify a latent affective forecasting factor (described below under the Strategy of analysis). The items correlated highly ($r = .79, p < .001$).[1]

Positive contact. To measure positive intergroup contact, we asked: "How positive do you feel about spending time with [outgroup] pupils at school?" and "How much do you enjoy spending time with [outgroup] pupils?" (*1 = Not at all* to *5 = Very Much*). As these items correlated highly within waves ($rs > .78, ps < .001$); we created a measure of *positive contact* by taking the mean of these two items for each group.

Positive attitudes. To measure positive intergroup attitudes, we asked: "How much do you <u>like</u> [outgroup] pupils?" and "How much do you <u>trust</u> [outgroup] pupils?" (underlining as in

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[1] On closer analysis, it might be argued that the second item is a better operationalization of 'affective forecasting' than the first item. However, given the high correlations between the items, we preferred to use the more reliable two-item scale. We also ran analyses using each item individually; the findings, which were unchanged, are reported in the OSM.

questionnaire; *1 = Not at all, 5 = Very*). As these items correlated highly within waves (*rs* > .87, *ps* < .001), we computed the mean of these two items for each group.

Intergroup anxiety. We measured intergroup anxiety with the following two items: "When you meet [outgroup] pupils, do you feel … nervous?" and "… uncomfortable?" (*1 = Not at all, 5 = Very*). As the two items correlated highly within waves (*rs* > .84, *ps* < .001), we calculated the mean of these two items for each group.

Accuracy of perceived contact willingness. We calculated accuracy of perceived contact willingness by subtracting actual mean outgroup contact willingness from perceived outgroup contact willingness. Participants were asked to answer (*a*) *perceived outgroup contact willingness*: "Do you think White British/Asian British pupils would like to have more Asian British/White British friends?" (*1 = None at all, 5 = Very much*). We also calculated (*b*) the *average actual outgroup contact willingness*, or the average rating across all the members of a specific ethnic group of their *own* group's willingness to have intergroup friends, for each ethnic group separately, and for each of the six premerger schools separately. We then created an index that captured the accuracy of *outgroup* contact willingness for each participant by subtracting (b) the average actual willingness for the outgroup from (a) individuals' perceived willingness scores for the outgroup. This means that a zero on this measure would indicate perfect accuracy of perceived contact willingness, or that a person's perceived intergroup willingness exactly matched the outgroup's actual willingness for contact. Positive scores reflect an *over*estimation of contact willingness (i.e., perceiving that outgroup members are *more* willing to have contact with the ingroup than actually reported by the outgroup, on average), and negative scores an *under*estimation of contact willingness (i.e., perceiving that outgroup members are *less* willing to have contact with the ingroup than actually reported by the outgroup, on average). In all analyses (discussed in detail below and in the Results section), we controlled for the individual's own willingness to have contact.

Analysis Strategy. We used Latent Growth Models with multiple groups (i.e., multigroup LGM) using Mplus 8.3 (Muthén & Muthén, 2017) to examine to what extent adolescents in the balanced school (school A) differed from adolescents in the majority skewed schools (schools B and C) in terms of change in positive contact and positive attitudes. On the OSF page, we included all data and Mplus syntaxes (OSF link, see Folder "Results"). The data can be found in the subfolder "Data"; Mplus inputs and outputs were organized according to each hypothesis. We used multiple group Multivariate Longitudinal Growth Models (MLGM) with three waves of measurement (pre-merger Wave 1, and post-merger Waves 3 and 4) to: (1) estimate intercepts (starting values) and slopes (changes) as latent variables, thus estimating effects between variables more reliably because measurement error was attenuated; and (2) examine how *change* in a person's positive contact predicted, for that same person, *change* in positive attitudes, while controlling for that same person's initial (pre-merger) levels of intergroup contact and attitudes. We used multiple group analyses to examine merger differences in intercepts and slopes. In all analyses, we reported two-tailed, exact *p*-values. We estimated all models with the robust maximum likelihood estimator, unless stated otherwise, and therefore adjusted model fit indices through the Satorra-Bentler correction on robust chi-square testing (Satorra & Bentler, 2001). For more details on the modelling approach and specifications, see the "Results" section below.

Results

Descriptives. Given the large number of means and standard deviations for, and correlations between, all variables within and across waves, this information is shown in the OSM (Tables S2 and S3; pp. 24-27). Correlations show that positive contact, positive attitudes, contact willingness, and accuracy of perceived contact willingness were positively correlated within and across waves. These same variables were negatively correlated with items measuring intergroup anxiety. Correlations between items of the same constructs (e.g., the two items of positive contact) were moderate to high, $r > .59$.

Multigroup Univariate Latent Growth Models

Multigroup approach comparing two merger types. To investigate merger differences in *average* starting levels and change in the predictor, outcome, and two mediator variables, we estimated a series of univariate LGMs with latent intercepts and latent slopes for each of the four variables that were assessed longitudinally (i.e., Models A to D for positive contact, positive attitudes, intergroup anxiety, and accuracy of perceived outgroup willingness, respectively; see the OSF page under "Univariate LGMs"). In these univariate LGMs, the slope loadings were fixed to 0, 1, and 2 for Waves 1, 3, and 4, respectively, to reflect linear change. All model fit comparisons are shown in Table S4 in the OSM (pp. 29-32). The OSM (4.7; pp. 9-10) also shows our univariate LGM analyses on quadratic growth; model fit comparisons showed linear growth consistently had better model fit, and the intercepts of quadratic growth factors were not significantly different from 0.

We created a grouping variable (see Table 1) to compare post-merger school A (n = 563; *balanced school*) with post-merger schools B and C (n = 606, *majority skewed schools*). These latter schools were conceived as 'control' schools, because they controlled for the merger process itself, but achieved much lower levels of mixing (with White British students still in a large majority, 89% and 73% respectively, compared with 48% in merger school A). We then collapsed the samples of schools B and C into one joint control group since the samples of these (n = 390 for School B; n = 239 for School C) were too small for the estimation of our most complex models. Additional analyses showed no significant (ps>.678) differences between schools B and C in any of the hypothesized effects. Also, when comparing the original model results (where the data from Schools B and C were collapsed) with model follow-up results (where data from schools B and C were used separately), parameter estimates differed only slightly (Δbs<.01), as did the p-values (Δps<.001).

We examined group differences in two steps for all models (Little, 2013). First, to avoid increased Type I error through multiple testing, we computed an omnibus test where we

compared significant changes in model fit (i.e., $\Delta\chi^2$ with $p <. 05$; and $\Delta CFI > .01$) for two types

of models: a *free model* (i.e., all parameters unconstrained between the two merger school types)

with a *constrained model* (i.e., specific parameters were constrained to be equal between mergers,

meaning there were no modelled differences between mergers for these parameters). Second, we

used the Model Constraint command in Mplus to test whether the difference between two

specific parameters was significantly different from 0 by estimating exact *p*-values for this

difference (see also Preacher, 2015). We presented model fit indices and comparisons in the

OSM (pp. 1-4): The univariate LGMs where the merger differences in starting levels and changes

were constrained to be equal (Models A_2, B_2, C_2, and D_2) had a worse model fit than the

models where the starting level and changes were left unconstrained (Models A_1, B_1, C_1, and

D_1). This showed that, overall, the balanced school differed from the majority skewed schools

in terms of starting levels and/or slopes.

Change in positive contact, positive attitudes, and intergroup anxiety. Multigroup

Univariate Latent Growth Models.

Findings for the final models are shown in Table 2. When the last column is empty,

model fit comparisons indicated no significant differences between the balanced school and the

majority skewed schools. Importantly, slope variances of all outcome variables and mediators

were significant ($p < .05$) which is necessary when predicting these slopes (Little, 2013). There

was a significant increase in positive contact in the balanced school (see Figure 2). For the

majority skewed schools, however, positive contact did not change significantly over time. The

slopes between the schools were significantly different ($\Delta S_i = .197, p = .007$). For positive

attitudes, there was a significant increase in the balanced school, but attitudes became

significantly less positive in the majority skewed schools (see Figure 3). The difference between

these slopes ($\Delta S_i = .290, p < .001$) was significant. There was a significant decrease in

intergroup anxiety (see Table 2) in all schools; the difference between the slopes ($\Delta S_i = .109, p = .119$) was not significant, meaning that anxiety decreased similarly in all schools.
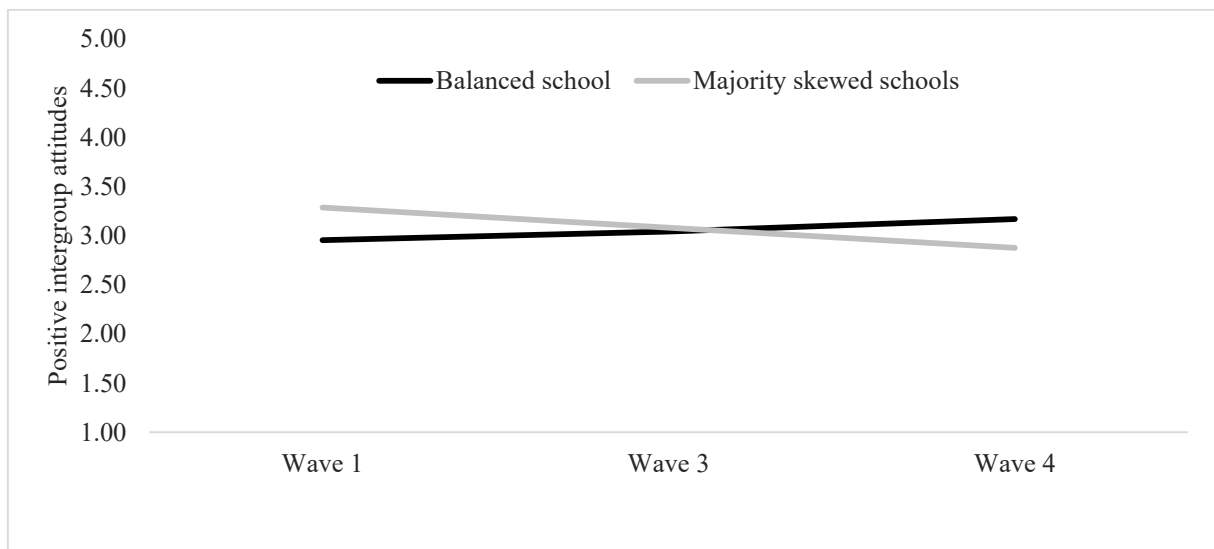
18

Figure 2.

Positive Intergroup Contact Development (Model A_1)
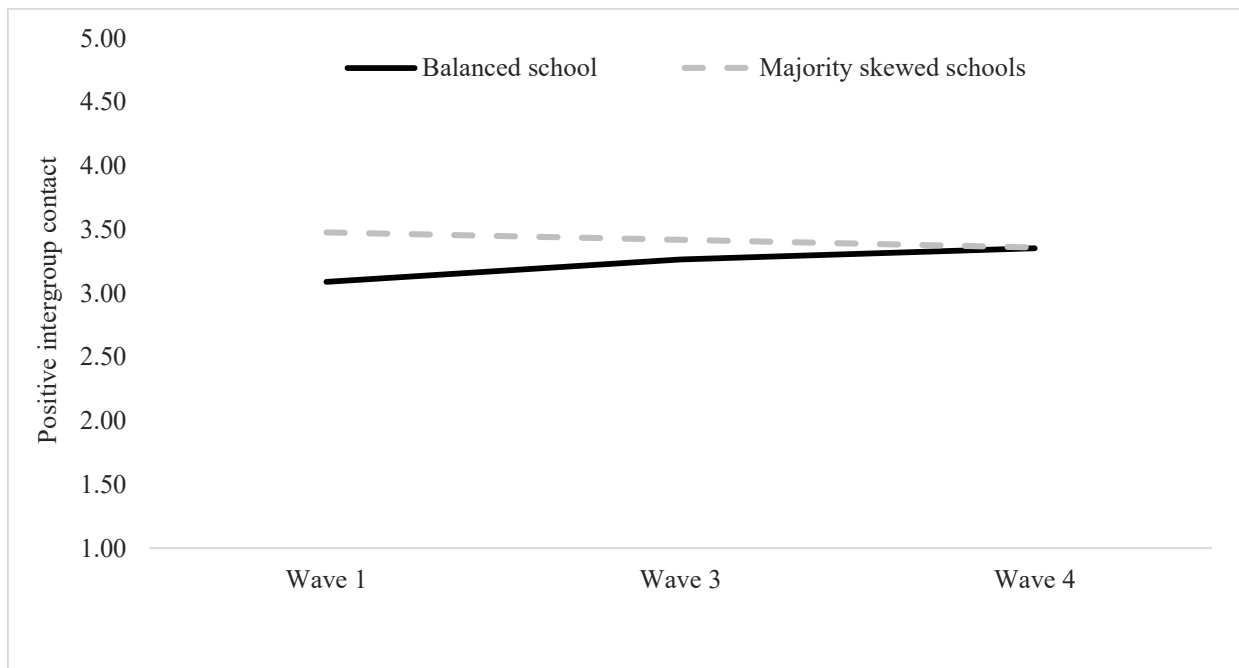
Note. Solid lines denote that the slope was significantly (*p* < .05) different from 0, broken lines

denote a non-significant slope.

Figure 3.

Positive Intergroup Attitude Development (Model A_1)

Note. Solid lines denote that the slope was significantly (*p* < .05) different from 0.

Table 2

Parameter Estimates for Univariate Longitudinal Growth Models

Model	Balanced school		Majority skewed schools	
	b	*p*	*b*	*p*
A_1. Positive intergroup contact				
Means				
Intercept positive intergroup contact	3.086[a]	<.001	3.478[b]	<.001
Slope positive intergroup contact	0.138[a]	.009	-0.059[b]	.235
Variances				
Intercept positive intergroup contact	0.194[a]	.622	0.174[b]	<.001
Slope positive intergroup contact	0.109[a]	.669	0.332[b]	.107
B_1. Positive intergroup attitudes				
Means				
Intercept positive intergroup attitudes	2.956[a]	<.001	3.286[b]	<.001
Slope positive intergroup attitudes	0.086[a]	<.001	-0.205[b]	<.001
Variances				
Intercept positive intergroup attitudes	0.647[a]	.040	0.957[b]	<.001
Slope positive intergroup attitudes	0.236[a]	.021	0.242[a]	.035
C_1. Intergroup anxiety				
Means				
Intercept intergroup anxiety	2.262[a]	<.001	2.353[b]	<.001
Slope intergroup anxiety	-0.238[a]	<.001	-0.129[a]	.010
Variances				
Intercept intergroup anxiety	1.041[a]	.003	0.982[b]	.002
Slope intergroup anxiety	0.409[a]	.043	0.326[a]	.023

Table 2 continues

Table 2 continued

	Balanced school		Majority skewed schools	
	b	*p*	*b*	*p*
D_1. Accuracy of perceived contact willingness				
Means				
Intercept accuracy of perceived contact willingness	-0.405[a]	<.001	-0.008[b]	.875
Slope accuracy of perceived contact willingness	0.163[a]	<.001	<0.001[b]	.992
Variances				
Intercept accuracy of perceived contact willingness	0.626[a]	<.001	1.044[b]	.007
Slope accuracy of perceived contact willingness	0.038[a]	0.030	0.046[a]	.040

Note. Within rows, differing superscripts [ab] indicate significant differences ($p < .05$). Parameter estimates *b* and their *p* values are shown for unconstrained estimates between mergers only, as these models fit the data significantly ($p < .05$) better than models with constrained parameters. For constrained parameters, see the OSF page, in the subfolder "Results".

Finally, we considered the accuracy of perceptions about the outgroup's contact willingness (see Figure 4). In the balanced school, students initially (i.e., at Wave 1) *under*estimated the outgroup's willingness to have intergroup friends: The intercept of accuracy of outgroup contact willingness was negative and significantly different from zero ($p < .001$; see Table 2). The slope was positive and significant, indicating that students in this school, on average, became more accurate, in their perceptions of the outgroup's willingness for contact, after the mergers (accuracy of perceived contact willingness scores moved closer to zero over time), controlling for initial accuracy and also individuals' own willingness to have intergroup contact.

Figure 4.

Accuracy of Perceived Contact Willingness Development (Model D_1)
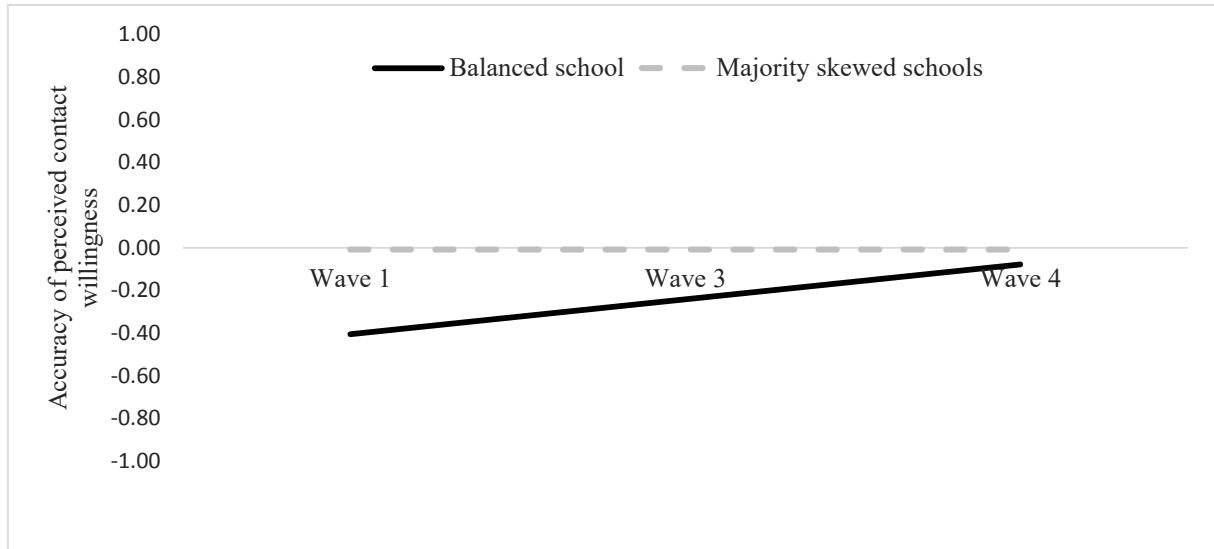
Note. Solid line denotes significant (*p* < .05) slope, broken line denotes non-significant slope.

In contrast, the majority skewed schools did not show significant change in accuracy of perceived contact willingness as indicated by the non-significant slope. Accuracy of perceived contact willingness in these schools stayed around zero (i.e., at all waves, it was not significantly different from zero), which indicates that students in these schools were, on average, accurate in estimating the outgroup's willingness to have ingroup friends. The difference between the slopes ($\Delta S_i =$ .163, $p =< .001$) was significant, meaning that the increase in accuracy of outgroup contact willingness in the balanced school was significantly different from the (non-)change in accuracy of outgroup contact willingness in the majority skewed schools. We also performed additional analyses to examine individual trajectories of actual outgroup willingness (instead of taking the group averages), and found the same difference between the schools (see OSM; 4.8; pp. 10-12).

Multigroup Multivariate Latent Growth Models

The prior univariate models were combined to create Parallel Process Models of Mediation (von Soest & Hagtvet, 2011; see Models 1-4) to examine how change in the predictor

(i.e., slope of positive contact) predicted change in the outcome (i.e., slope of positive attitudes) indirectly via change in the mediator (e.g., slope of intergroup anxiety) (for details, see below, under Hypotheses 3a-4b). In all multivariate models, we controlled for regression to the mean effects by estimating the effects of intercepts on slopes (e.g., the slope of attitudes was regressed on the intercept of attitudes) when examining how one slope predicted another slope (i.e., the slope of attitudes was regressed on the slope of contact). Finally, we explored the moderating context of the balanced school versus the majority mixed schools on the hypothesized effects by using multiple group analyses and the same criteria as before, and reported the model that showed best model fit. Results (discussed in the OSM; 4.1 – 4.3; pp. 7-8) showed that none of the hypothesized effects discussed below changed when including pre-merger school, ethnicity, and age differences. In Table 3, we only show effects relevant to the hypotheses; for all estimated effects and covariances, see the OSM, Table S5, pp. 33-39.

Hypothesis 1: Change in positive contact predicts change in positive attitudes. We first examined to what extent change in positive contact positively predicts change in positive attitudes. We examined differences between the two types of post-merger schools (i.e., the balanced school vs majority skewed schools) by comparing the constrained (i.e., the slope of contact on change in attitudes was constrained to be equal across groups) versus the unconstrained (i.e., the slope on slope effect was freely estimated across groups) model. Table 3 shows that the slope of contact effects on the slope of attitudes was not significantly different between schools. This effect, therefore, remained constrained and we report the constrained effect in Table 3, under Model 1_2. Findings showed that, as expected, change in positive contact significantly and positively predicted change in attitudes in all schools.

Hypothesis 2: Affective forecasting moderates change in positive contact effects on change in positive attitudes. To examine to what extent affective forecasting moderated the slope of positive contact effects on the slope of positive attitudes, we examined the latent interaction effect between affective forecasting and the slope of contact to predict the slope of

attitudes, controlling for all main effects on the slope of attitudes. We examined the latent factor 'affective forecasting' using the effects coding method (for details, see Little, 2013), where the mean and variance of the latent factor are freely estimated. The latent mean ($\lambda = 3.02$) of affective forecasting was almost exactly at the middle of the metric (i.e., the metric ranged from 1 = *negative* to 5 = *positive*). To facilitate interpretation of interaction effects, we plotted the effects of change in contact on attitudes at one standard deviation below the latent mean ($\lambda_{-1SD} = 1.43$), which reflected those students who made more negative affective forecasts, and one standard deviation above the latent mean ($\lambda_{+1SD} = 4.42$), reflecting those students who made more positive affective forecasts. Factor loadings were freely estimated and were high and significant ($\beta > .893$, p < .001) in all models.

We examined merger differences by comparing the constrained (i.e., the interaction effect between affective forecasting and the slope of positive contact on change in positive attitudes was constrained to be equal across merger groups) versus the unconstrained (i.e., the interaction effect was freely estimated across merger groups) model. In latent interaction models, only AIC and BIC values can be compared; models with lower AIC or BIC values fit the data better (Wasserman, 2000). Additionally, we used the Maximum Likelihood parameter estimator with standard errors approximated by first-order derivatives (MLF; Muthén & Muthén, 2017). All parameters from Model 1_2 were also included. Table 3 shows that interactions between affective forecasting and the slope of contact effects on the slope of attitudes were not significantly different between schools. This effect, therefore, remained constrained and we report the constrained effect in Table 3, under Model 2_2.

Table 3

Parameter Estimates of Multivariate Longitudinal Growth Models

	Balanced school		Majority skewed schools	
	b	*p*	*b*	*p*
Hypothesis 1: Change in positive contact predicts change in positive attitudes (Model 1_2: Constrained)				
Direct effects				
Slope positive contact ➔ Slope positive attitudes	0.969	<.001		
Intercept positive attitudes ➔ Slope positive attitudes	-0.480	<.001		
Hypothesis 2: Affective forecasting moderates change in positive contact effects on change in positive attitudes (Model 2_2, constrained)				
Interaction effects				
Affective forecasting * Slope positive contact ➔ Slope positive attitudes	-0.234	<.001		
Direct effects				
Affective forecasting ➔ Slope positive attitudes	-0.039	.413		
Intercept positive attitudes ➔ Slope positive attitudes	-0.058	.318		
Slope positive contact ➔ Slope positive attitudes	0.980	<.001		
Hypothesis 3a: Change in intergroup anxiety mediates effects of change in positive contact on change in positive attitudes (Model 3_2. Constrained)				
Indirect effects				
Slope positive contact ➔ Slope intergroup anxiety ➔ Slope positive attitudes	1.168	.039		
Direct effects				
Intercept positive attitudes ➔ Slope positive attitudes	-0.923	.088		
Intercept positive contact ➔ Slope intergroup anxiety	-0.467	<.001		
Slope intergroup anxiety ➔ Slope positive attitudes	-1.930	.016		
Slope positive contact ➔ Slope intergroup anxiety	-1.048	.005		
Slope positive contact ➔ Slope positive attitudes	-1.839	.168		

Table 3 continues

	Balanced school		Majority skewed schools	
	b	*p*	*b*	*p*
Hypothesis 3b: Change in accuracy of perceived contact willingness mediates effects of positive contact on change in positive attitudes (Model 3_3. Unconstrained)				
Indirect effects				
Slope positive contact ➔ Slope intergroup anxiety ➔ Slope positive attitudes	2.326	.033	2.297	.128
Direct effects				
Intercept accuracy of perceived contact willingness ➔ Slope positive attitudes	-0.030	.844	-0.350	.414
Intercept positive attitudes ➔ Slope positive attitudes	-0.315	.158	-0.315	.158
Slope accuracy of perceived contact willingness ➔ Slope positive attitudes	3.046	.133	5.300	.279
Slope positive contact ➔ Slope accuracy of perceived contact willingness	0.433	.152	1.842	.347
Slope positive contact ➔ Slope positive attitudes	-1.448	.321		
Hypothesis 4a: Affective forecasting moderates to what degree change in intergroup anxiety mediates effects of positive contact on change in positive attitudes (Model 4_2. Constrained)				
Moderated mediation effect				
Affective forecasting * Slope positive contact ➔ Slope intergroup anxiety ➔ Slope positive attitudes	0.049	†		
Interaction effects				
Affective forecasting * Slope positive contact ➔ Slope intergroup anxiety	-0.189	.063		
Interaction effects				
Affective forecasting * Slope positive contact ➔ Slope positive attitudes	-0.216	.034		

Table 3 continues

	Balanced school		Majority skewed schools	
	b	*p*	*b*	*p*
Direct effects				
Affective forecasting ➔ Slope intergroup anxiety	0.036	.319		
Intercept intergroup anxiety ➔ Slope positive attitudes	0.049	.341		
Slope intergroup anxiety ➔ Slope positive attitudes	-0.102	.797		
Slope positive contact ➔ Slope intergroup anxiety	-0.477	<.001		
Slope positive contact ➔ Slope positive attitudes	0.824	.003		

Hypothesis 4b: Affective forecasting moderates the degree to which change in accuracy of perceived contact willingness mediates effects of positive contact on change in positive attitudes (Model 4_3. Unconstrained)

Moderated mediation effect				
Affective forecasting * Slope positive contact ➔ Slope accuracy of perceived contact willingness ➔ Slope positive attitudes	0.570	†	0.278	†
Interaction effects				
Affective forecasting * Slope positive contact ➔ Slope accuracy of perceived contact willingness	-0.281	<.001	-0.195	.097
Affective forecasting * Slope positive contact ➔ Slope positive attitudes	-0.028	.835	-0.248	.036
Direct effects				
Affective forecasting ➔ Slope accuracy of perceived contact willingness	-0.060	.075		
Affective forecasting ➔ Slope positive attitudes	0.009	.858		
Intercept accuracy of perceived contact willingness ➔ Slope positive attitudes	-0.194	.008		

Table 3 continues

Table 3 continued

	Balanced school		Majority skewed schools	
	b	*p*	*b*	*p*
Slope accuracy of perceived contact willingness ➔ Slope positive attitudes	0.946	.007	0.880	.010
Slope positive contact ➔ Slope accuracy of perceived contact willingness	0.603	<.001	0.316	<.001
Slope positive contact ➔ Slope positive attitudes	0.144	.555	0.286	.052

Note. In the table, we used "positive contact" instead of "positive intergroup contact" and "positive attitudes" instead of "positive intergroup attitudes" for reasons of space. When the last column is empty, parameters were constrained to be equal. Unstandardized (direct, indirect, and interaction) effects (➔) are shown for the best fitting models only. To view all model estimates, see the OSF-page, in the folder "Results", and in the subfolder corresponding to each hypothesis. Unstandardized parameters are shown because latent interaction models estimated with MLF do not allow standardization.

† The exact *p*-values for indirect effects are not available when using multiple group comparisons combined with latent interactions (Maslowsky et al., 2015). The average is taken from the LOOP function in Mplus 8.4 (see the OSF page, in the folder "Results" and "Hypothesis 4" for the exact procedure).

Figure 5.

Interaction Effects between Affective Forecasting and Slope of Positive contact Predicting Slope of Positive Intergroup Attitudes in the Balanced School (Model 2_2)
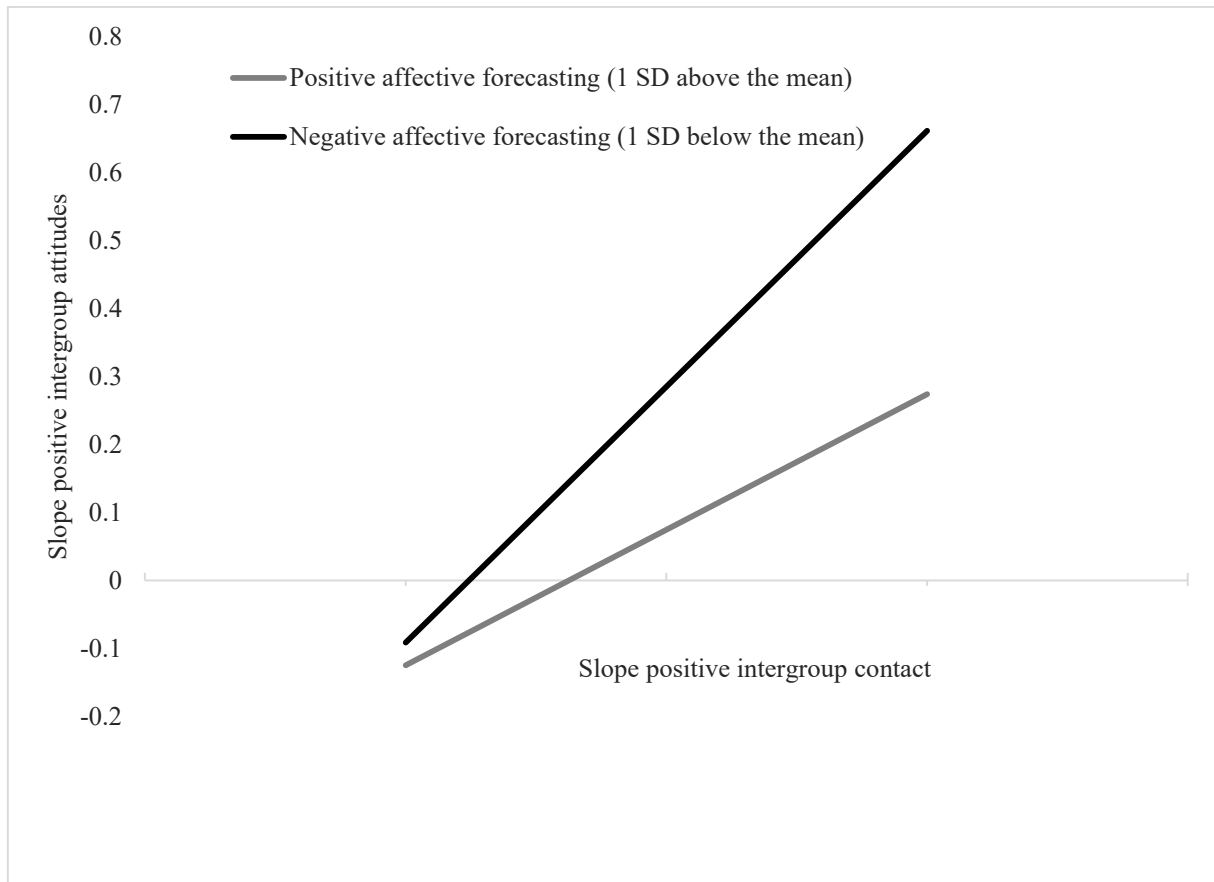

Table 3 shows support for Hypothesis 2: affective forecasting interacted negatively and significantly with the slope of positive contact to predict the slope of positive attitudes. As shown in Figure 5 increases in positive contact predicted increases in positive attitudes more strongly for students who engaged in more negative affective forecasting than for other students. We found this interaction effect to be equivalent when comparing between the balanced school and the majority skewed schools.

Hypothesis 3a: Change in intergroup anxiety mediates effects of change in positive contact on change in positive attitudes. As Table 2 shows, there were no significant

differences between the schools for this effect. We therefore reported the constrained effect in Table 3, under Model 3_2. Table 3 shows that the indirect effect was positive and significant in all post-merger schools. Specifically, change in contact predicted change in attitudes indirectly via change (a reduction) in anxiety. Thus, Hypothesis 3a was supported. Additional analyses revealed no evidence for between-school differences in indirect effects.

Hypothesis 3b: Change in accuracy of perceived contact willingness mediates effects of positive contact on change in positive attitudes. We tested this hypothesis by using accuracy in perceived outgroup contact willingness as the mediator and included main effects of the slope of positive contact and the slope of accuracy of outgroup contact willingness on the slope of attitude in the same model. Table 2 shows a better model fit for the model where the mediation effect was estimated differently between schools than when it was constrained to be the same. Thus, we reported the unconstrained effects (i.e., differences between mergers) in Table 3, under Model 3_3.

Table 3 shows that the indirect effect was positive and significant in all post-merger schools. Follow-up analyses showed that, although the model with school differences fit the data better than the model without merger differences, the indirect effect was not significantly different between post-merger schools ($p = .532$). Thus, Hypothesis 3b was supported: change in positive contact predicted change in positive attitudes indirectly via change (an increase) in accuracy of perceived outgroup willingness.

Hypothesis 4a: Affective forecasting moderates to what degree change in intergroup anxiety mediates effects of positive contact on change in positive attitudes. We tested this hypothesis using the same model as under Hypothesis 3a, but now additionally included the interaction between affective forecasting and the slope of contact in order to test to what extent the interaction between affective forecasting and the slope of contact predicted the slope of positive attitudes via the slope of anxiety. Moreover, all effects in Models 2_2 and 3_2 were retained, which means we controlled for all main effects. Importantly, we controlled for the

interactions between affective forecasting and the slope of positive contact on both (a) the slope of positive attitudes and (b) the slope of intergroup anxiety as we were interested in the moderated mediation effects when holding the moderation effects constant. Thus, our aim was to examine whether affective forecasting moderated the *indirect* effects of contact changes on attitude changes via anxiety changes, over and above the moderating effect of affective forecasting on the *direct* effects of contact changes on attitude changes.

Table 2 shows that the model without post-merger school differences in the moderated mediation effect fit the data better than the model with merger differences. The moderated mediation effects therefore remained constrained and we report results in Table 3, under Model 4_2. As indirect effects are not available when using multiple group comparisons combined with latent interactions (Maslowsky et al., 2015), we estimated indirect effects and interactions between affective forecasting and indirect effects using the LOOP-function in Mplus (Muthén & Muthén, 2017). Results showed that the average moderated mediation effect was .016; 95% CI [-.349, .381], which was not significantly different from zero. For details, see the "Anxiety moderated mediation.xlsx" file, in the folder "Results" on the OSF-page. Thus, no support was found for Hypothesis 4a.

Hypothesis 4b: Affective forecasting moderates the degree to which change in accuracy of perceived contact willingness mediates effects of positive contact on change in positive attitudes. We tested this hypothesis using the same procedure as for Hypothesis 4a, but now with accuracy of perceived contact willingness as the mediator. Table 2 shows that the model with post-merger school differences in the moderated mediation effect fit the data better than the model without differences, as indicated by lower AIC and BIC values. These effects, therefore, remained unconstrained and are reported in Table 3, under Model 4_3. We then examined the moderated mediation effects, that is, to what extent the interactions between affective forecasting and the slope of contact predicted the slope of positive attitudes via the slope of accuracy of perceived outgroup willingness.

To examine the differences between post-merger schools in this moderated mediation effect, we examined the difference between (a) the moderated indirect effect in the balanced school and (b) the moderated indirect effect in the majority skewed schools. We used the Mplus Model CONSTRAINT command (Muthén & Muthén, 2017) to examine whether this difference was significantly different from zero. Results showed that the difference was significant ($p =$ .048). We therefore plotted the findings for the comparison between post-merger schools in Figure 6. Results showed that for the balanced school, the mean moderated mediation effect was .570, 95% CI [.313, .827]. For the majority skewed schools, the mean moderated mediation effect was .278, 95% CI [.025, .531]. Thus, while affective forecasting moderated the indirect effect of positive contact on positive attitudes, via accuracy of perceived outgroup willingness, in all mergers, it did so especially in the balanced school.

Figure 6.

Affective Forecasting Moderated Indirect Effects of Slope of Positive Contact on Slope of

Intergroup Attitudes via Slope of Accuracy of Perceived Contact Willingness
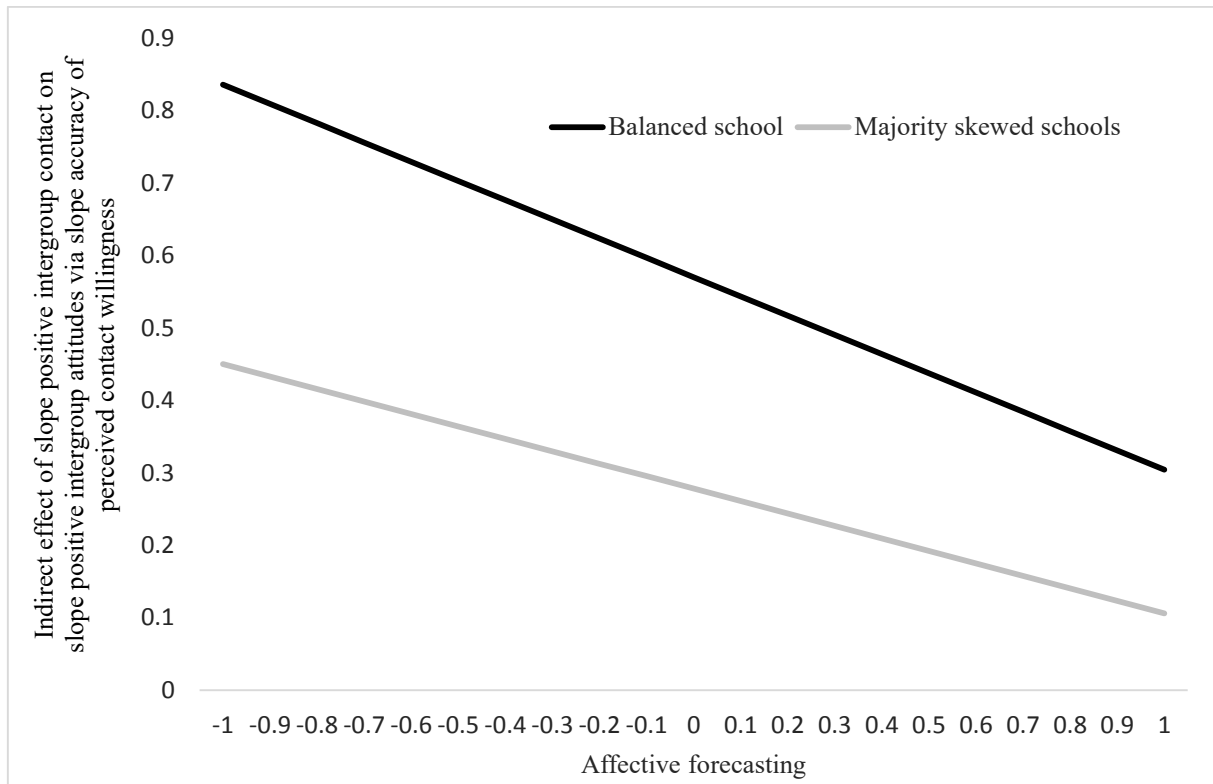
Discussion

In this paper we investigated how adolescents attending high schools respond to a quasi-

experimental intervention in the form of an educational merger that achieved either a dramatic

(in one post-merger school, almost equal numbers of majority and minority students) or more

modest (in the other two post-merger schools, the majority group still represented over 73% of

the student body) increase in ethnic mixing. Our longitudinal analyses revealed five main

findings. First, the 'balanced school' resulted in more positive contact, more positive attitudes,

and less intergroup anxiety. In contrast, the attitudes of adolescents in the majority skewed

schools became less positive over time. In all schools, second, increases in positive contact

predicted increases in positive attitudes, and, third, we found that these contact effects were

mediated by two processes: decreases in intergroup anxiety and increases in knowledge. We

proposed a new conception of knowledge about the outgroup, namely how accurately

adolescents perceived the outgroup's willingness for intergroup contact. Fourth, also in both types of school mergers, improvements in positive contact and attitudes were more pronounced for adolescents who made negative affective forecasts (i.e., who expected future contact to go more poorly than other adolescents). Fifth, the novel mediating mechanism for the effect of intergroup contact on intergroup attitudes, perceived outgroup willingness, partially explained *how* positive contact increased positive attitudes more strongly for adolescents who made negative affective forecasts. Adolescents who increased their contact with the outgroup after the mergers tended also to show an increase in how accurately they perceived the outgroup's willingness for contact. Accuracy of perceived outgroup willingness for contact explained the effect of contact on attitudes to a lesser degree for other adolescents who made more positive affective forecasts, especially in the balanced school. We now discuss in more detail the evidence adduced for each of the hypotheses tested, and discuss the findings in terms of the theoretical importance of affective forecasting as a moderator of positive intergroup contact effects, and accuracy of perceived contact willingness as a novel mediator of contact effects on attitudes (along with the more well-established mediator, intergroup anxiety). Finally, we acknowledge some inevitable limitations in a field study of this type and highlight directions for future research.

Affective Forecasting Moderates Positive Contact Effects

Confirming prior studies (e.g., Davies et al., 2011; Pettigrew, 1998; Pettigrew & Tropp, 2006, 2008), we found support for Hypothesis 1: Change in positive contact, in this case following the mergers, predicted change in positive attitudes. In the present study we showed this in a longitudinal quasi-experimental field study, but went beyond these effects to examine the moderating role of affective forecasting, or individual adolescents' expectations of how future intergroup contact would go. We also provided the first evidence on the role of affective forecasting in positive contact among adolescents, thereby replicating results from adult laboratory studies (e.g., Mallett et al., 2008). Our study was designed to investigate whether, and if so how, adolescents' affective forecasts, measured before the school merger occurred, moderated

subsequent post-merger effects of positive contact on attitude change. We found support for Hypothesis 2: for adolescents who made more negative affective forecasts, post-merger change in positive contact predicted post-merger change in positive attitudes more strongly than for adolescents who made more positive forecasts. This finding is even more noteworthy when we consider the negative expectations that some students may have had about the proposed mergers (Miah, 2015). Our additional analyses show that there were no grade or age differences in these findings, indicating homogeneity in these developmental processes from early to middle adolescence. There also were no differences in ethnic group status (i.e., no differences between White British majority and Asian British minority adolescents) in any of the effects, suggesting that positive contact may improve positive attitudes equally for members of all groups, especially for those with more negative expectations.

Our results, therefore, contribute further to understanding adolescents' social cognitions, and in particular their intergroup expectations, for the development of intergroup attitudes. We hereby heed the prior call from some scholars for an increased focus on the importance of children's and adolescents' individual differences in social cognitions for intergroup relations and attitude development (Andrews et al., 2016; Hitti & Killen, 2015; Yip et al., 2010). Arguably, adolescence presents a particularly important developmental period for change in ethnic group identity, group relations and cognitions (e.g., Wölfer et al., 2016). Schools are also a particularly important context, as noted by the history of school (de)segregation in the United States, because even adolescents living in highly segregated areas can be exposed on a daily basis to contact in the structured and supervised setting provided by schools (Pettigrew & Tropp, 2006; Tropp & Prenovost, 2008). Specifically, in the mergers we studied, the ethnic groups involved were accorded equal status (mandated by law), worked collaboratively towards common goals (e.g., rewards for the best class), the contact was backed by institutional support (in the form of educational authorities, head teachers, and classroom teachers), and encouraged perceptions of common group interests and identity (e.g., the shared categorization of the new school's name,

and even new school uniforms). Our findings showed that, especially for those adolescents who are likely to miss out on contact with outgroup members, namely those with more negative affective forecasts about contact, taking up new opportunities for contact is likely to result in improved intergroup relations.

It is important to note, however, that in majority skewed schools, positive attitudes decreased on average. That is, although in all schools affective forecasting moderated the effects of positive contact on positive attitudes to the same extent, the average adolescent's view of outgroup members became worse over time in these schools. This may seem somewhat puzzling because, on the school-level, there were no significant changes in positive contact, and perceptions of outgroup contact willingness remained accurate. One possibility is that the experience of both residential and school segregation was unchecked in these schools; there seemed to be no average increase in positive contact to improve positive attitudes. Furthermore, although adolescents may have *accurate* perceptions of outgroup contact willingness, outgroup (and perhaps ingroup) members may have shown low willingness to engage in contact in these continued segregated settings.

How Contact Worked: Reducing Intergroup Anxiety and Accurately Perceiving the Outgroup's Willingness for Contact

Our research examined two possible mediators of the effects of positive contact on attitudes. We predicted that reduced intergroup anxiety (Hypothesis 3a) and increased accuracy of perceived contact willingness (i.e., more accurately perceiving how willing the outgroup is to have intergroup contact; Hypothesis 3b) would help to explain how positive contact predicted positive attitudes. Further, we examined to what extent affective forecasting moderated these mediation effects. We expected that both mediators would explain contact effects more strongly for adolescents who made negative affective forecasts (Hypotheses 4a and 4b, respectively). Below, we discuss the findings for each mediator in turn.

Consistent with Hypothesis 3a, adolescents who gained positive contact with outgroup members over time showed reductions in intergroup anxiety, which, in turn, resulted in increased positive attitudes toward these outgroup members. These findings are in line with previous data, including meta-analytic results, which suggest that intergroup anxiety is a strong mediator of contact effects (Pettigrew & Tropp, 2008). Contrary to Hypothesis 4a, however, we did not find that affective forecasting moderated these mediation effects of intergroup anxiety: that is, regardless of negative or positive affective forecasts, increased positive contact seemed to facilitate positive attitudes through reduced anxiety about interacting with outgroup members. The finding that this reliable mediation effect operated relatively independently of affective forecasts of future positive contact strengthens the view that intergroup anxiety is a robust mediator of positive contact effects.

We also provided first evidence concerning our novel mediator, perceived outgroup willingness for contact. Confirming Hypothesis 3b, by increasing their positive contact, adolescents perceived more accurately the outgroup's willingness to have intergroup contact. Additionally, our findings supported Hypothesis 4b: affective forecasting moderated the mediation effect of accuracy of perceived contact willingness. Thus, our findings show that one specific form of intergroup knowledge is important for those adolescents making *negative* intergroup forecasts about positive contact: the ability to accurately estimate how willing outgroup members are to engage in contact. One explanation for why this form of knowledge mediates the effect of contact on outgroup attitudes seems to be that negative affective forecasting tends to be inaccurate. When adolescents then discover that contact with peers from a different ethnic group unfolds more positively than they thought it would, they gain vital intergroup knowledge, adjust their inaccurate impressions, and develop more positive attitudes. Our findings are thus consistent with results of experimental studies showing that when contact is more positive than expected, this leads to a short-term (i.e., measured directly after contact is experienced) correction of inaccurate beliefs about future contact that are particularly present

among those who make negative affective forecasts (e.g., Mallett et al., 2008). In contrast, our findings do not support prior experimental results indicating that negative expectations diminish positive contact effects on intergroup attitudes (see, for example, Deegan et al., 2015). We explain this discrepancy by pointing to critical differences between the design of prior studies and our own. Most prominently, we examined more long-lasting positive contact (which, as found in this and prior studies (e.g., Pettigrew & Tropp, 2006), may have positive effects on intergroup attitudes). In contrast, prior studies concerning intergroup interaction effects during initial meetings were typically conducted under controlled laboratory settings (which may have negative effects on intergroup attitudes; see, for a review, MacInnis & Page-Gould, 2015). Finally, the two parallel mediation effects were found to operate in similar ways from early to middle adolescence, suggesting that these explanatory processes are comparable in this developmental period.

Limitations and Future Directions

Notwithstanding its theoretical innovation, application of robust methodological techniques, and unique context with high external validity, we acknowledge some limitations of the present study and propose directions for future research.

First, by using data from a (relatively rare) real-life, quasi-experimental intervention, the research concerns a specific intergroup context. We studied White British and Asian British 7th to 9th graders, who were mostly in heavily segregated schools, then, through the school-merging intervention, some were given the opportunity to develop their interethnic contact substantially. One important caveat of such studies is that the changes in the degree of ethnic mixing due to the school mergers were not the only changes that may have causally affected outcome changes (e.g., increased positive attitudes in the 'balanced school'). These findings should, therefore, only be generalized across contexts and target groups with due caution. Prior research strongly suggests, however, that teenagers who transition to high school and (relatively suddenly) experience increased opportunities to engage in positive contact are sensitive to positive contact effects (Schmid et al., 2017; Tropp & Prenovost, 2008; Wölfer et al., 2016). On the one hand, this

suggests that results likely generalize, but on the other hand it indicates that we optimized the possibility of finding significant effects of positive contact on attitudes by studying this context, and we expect that these effects may not be as strong in other contexts (e.g., in a work and organisational context; but see Terry et al., 2001). Nevertheless, we hope our findings stimulate future research to examine the robustness of contact effects on attitudes by studying other intergroup contexts.

Second, we acknowledge that the variation in rates of ethnic mixing across the schools was limited. All three school mergers in our study resulted in relatively *more* ethnic diversity for students from pre-merger schools (with one exception), and almost all schools increased in ethnic mixing (to different degrees). We could not, therefore, contrast increased segregation with increased ethnic diversity. Nor did we have available a school without notable change in ethnic composition to use as a true control condition. Additionally, the two "control" schools both ended up being White British majority skewed schools, which means that the changes (such as the decrease in positive contact) may have been specifically caused by the majority group's dominance. Other studies indicate, the corollary of our findings, that reduced ethnic diversity in high schools does reduce contact effects on intergroup attitudes (Birtel et al., 2019; Eller et al., 2017), as do studies on other contextual forms of variation in ethnic diversity, such as neighborhood diversity (Schmid et al., 2014; Schmid et al., 2017). Future studies should therefore try to widen the range of diversity considered, include both positive and negative change in diversity, and examine the moderating effects of affective forecasting under other levels of ethnic mixing, and in contexts other than schools, such as neighborhoods (e.g., Christ et al., 2014; Schmid et al., 2014; Schmid et al., 2017) in order to examine the robustness of our current findings.

Third, our analyses were primarily focused on self-reports, and shared observer bias may, in part, explain the longitudinal effects found in the current study. In a similar vein, only explicit measures of attitudes, contact, and all other variables were used, which may have been influenced

by respondents' social desirability concerns. This may be especially true for the school that became more equally mixed, where students may have felt obliged to provide positive views. This is an important limitation, which, unfortunately, applies to the vast majority of studies on contact effects (Pettigrew & Tropp, 2006; Tropp & Prenovost, 2008). To examine accuracy of perceived contact willingness, however, we did use two sources (i.e., we compared White [Asian] British adolescents' perceptions of outgroup willingness with Asian [White] British adolescents' self-reported contact willingness), which means that the effects we found for this variable cannot be completely explained by having ratings on all measures using the same source. In addition, prior studies using observer-reports on contact show considerable overlap between observer- and self-reports on contact (e.g., Hewstone et al., 2011). Nevertheless, we encourage researchers to combine multiple observers' reports in future research to examine the robustness of our findings.

To conclude, our findings indicated that in ethnically segregated contexts, increased positive contact in school was particularly effective in improving positive attitudes when adolescents had negative expectations about future intergroup contact. Moreover, we proposed a novel explanation for this: surprisingly positive contact experiences, in contrast to less surprising ones, correct inaccurate perceptions of how willing the outgroup is to engage in contact (perceptions which, in fact, underestimate the outgroup's willingness for positive contact). Our results provide unique evidence for this novel mechanism, and jointly underline the importance of considering individual expectations and perceptions together with the wider contextual opportunities when intervening to improve intergroup relations. Creating a more diverse context in which majority and minority groups are more evenly represented clearly improves opportunities for positive contact, which, when taken up, have a direct positive impact on intergroup attitudes. This occurs irrespective of differences in individuals' expectations about contact, which shows the power of contextual effects on intergroup relations. Nevertheless, within such contexts, those group members who make more negative affective forecasts about

intergroup contact may, somewhat paradoxically, experience the strongest improvements in

positive attitudes when they take up carefully engineered opportunities for positive contact.

References

Al Ramiah, A., Schmid, K., Hewstone, M., & Floe, C. (2015). Why are all the White (Asian) kids sitting together in the cafeteria? Resegregation and the role of intergroup attributions and norms. *British Journal of Social Psychology*, *54*, 100-124. https://doi.org/10.1111/bjso.12064

Allport, G. W. (1954). *The nature of prejudice*. Addison-Wesley.

Andrews, N. C. Z., Martin, C. L., Field, R. D., Cook, R. E., & Lee, J. (2016). Development of expectancies about own- and other-gender group interactions and their school-related consequences. *Child Development*, *87*, 1423-1435. https://doi.org/10.1111/cdev.12596

Birtel, M. D., Reimer, N. K., Wölfer, R., & Hewstone, M. (2019). Change in school ethnic diversity and intergroup relations: The transition from segregated elementary to mixed secondary school for majority and minority students. *European Journal of Social Psychology*. https://doi.org/10.1002/ejsp.2609

Christ, O., Schmid, K., Lolliot, S., Swart, H., Stolle, D., Tausch, N., Al Ramiah, A., Wagner, U., Vertovec, S., & Hewstone, M. (2014). Contextual effect of positive intergroup contact on outgroup prejudice. *Proceedings of the National Academy of Sciences*, *111*, 3996-4000. https://doi.org/10.1073/pnas.1320901111

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*, 332-351. https://doi.org/10.1177/1088868311411103

Deegan, M. P., Hehman, E., Gaertner, S. L., & Dovidio, J. F. (2015). Positive expectations encourage generalization from a positive intergroup interaction to outgroup attitudes. *Personality and Social Psychology Bulletin*, *41*, 52-65. https://doi.org/10.1177/0146167214556240

Eller, A., Abrams, D., & Koschate, M. (2017). Can stateways change folkways? Longitudinal tests of the interactive effects of intergroup contact and categorization on prejudice. *Journal of Experimental Social Psychology*, *72*, 21-31. https://doi.org/10.1016/j.jesp.2017.04.005

Gaertner, S. L., Rust, M. C., Dovidio, J. F., Bachman, B. A., & Anastasio, P. A. (1994). The contact hypothesis: The role of a common ingroup identity on reducing intergroup bias. *Small Group Research*, *25*, 224-249. https://doi.org/10.1177/1046496494252005

Hewstone, M., Judd, C. M., & Sharp, M. (2011). Do observer ratings validate self-reports of intergroup contact?: A round-robin analysis. *Journal of Experimental Social Psychology*, *47*, 599-609. https://doi.org/10.1016/j.jesp.2010.12.014

Hitti, A., & Killen, M. (2015). Expectations about ethnic peer group inclusivity: The role of shared interests, group norms, and stereotypes. *Child Development*, *86*, 1522-1537. https://doi.org/10.1111/cdev.12393

Jonas, E., McGregor, I., Klackl, J., Agroskin, D., Fritsche, I., Holbrook, C., Nash, K., Proulx, T., & Quirin, M. (2014). Threat and defense: From anxiety to approach. In J. M. Olson & M. P. Zanna (Eds.), *Advances in experimental social psychology* (Vol. 49, pp. 219–286). Academic Press. https://doi.org/10.1016/B978-0-12-800052-6.00004-4

Kanter, R. M. (1977). *Men and women of the corporation*. Basic Books.

Killen, M., Mulvey, K. L., & Hitti, A. (2013). Social exclusion in childhood: A developmental intergroup perspective. *Child Development*, *84*, 772-790. https://doi.org/10.1111/cdev.12012

Little, T. D. (2013). *Longitudinal structural equation modeling*. Guilford Press.

MacInnis, C. C., & Page-Gould, E. (2015). How can intergroup interaction be bad if intergroup contact is good? Exploring and reconciling an apparent paradox in the science of intergroup relations. *Perspectives on Psychological Science*, *10*, 307-327. https://doi.org/10.1177/1745691614568482

Mallett, R. K., Wagner, D. E., & Harrison, P. R. (2011). Understanding the intergroup forecasting error. In L. R. Tropp & R. K. Mallett (Eds.), *Moving beyond prejudice reduction: Pathways to positive intergroup relations* (pp. 63-79). American Psychological Association. https://doi.org/10.1037/12319-003

Mallett, R. K., & Wilson, T. D. (2010). Increasing positive intergroup contact. *Journal of Experimental Social Psychology*, *46*, 382-387. https://doi.org/10.1016/j.jesp.2009.11.006

Mallett, R. K., Wilson, T. D., & Gilbert, D. T. (2008). Expect the unexpected: Failure to anticipate similarities leads to an intergroup forecasting error. *Journal of Personality and Social Psychology*, *94*, 265-277. https://doi.org/10.1037/0022-3514.94.2.94.2.265

Maslowsky, J., Jager, J., & Hemken, D. (2015). Estimating and interpreting latent variable interactions: A tutorial for applying the latent moderated structural equations method. *International Journal of Behavioral Development*, *39*, 87–96. https://doi.org/10.1177/0165025414552301

McGlothlin, H., & Killen, M. (2006). Intergroup attitudes of European American children attending ethnically homogeneous schools. *Child Development*, *77*, 1375-1386. https://doi.org/10.1111/j.1467-8624.2006.00941.x

McKeown, S., & Dixon, J. (2017). The "contact hypothesis": Critical reflections and future directions. *Social and Personality Psychology Compass*, *11*, Article e12295. https://doi.org/10.1111/spc3.12295

Miah, S. (2015). Mixed school imperative and the question of self-segregation. In *Muslims, schooling and the question of self-segregation* (pp. 67-88). Palgrave Macmillan. https://doi.org/10.1057/9781137347763_5

Muthén, L. K., & Muthén, B. O. (2017). *Mplus user's guide* (8th ed.).

Pettigrew, T. F. (1998). Intergroup contact theory. *Annual Review of Psychology*, *49*, 65-85. https://doi.org/10.1146/annurev.psych.49.1.65

Pettigrew, T. F., & Tropp, L. R. (2006). A meta-analytic test of intergroup contact theory. *Journal of Personality and Social Psychology*, *90*, 751-783. https://doi.org/10.1037/0022-3514.90.5.751

Pettigrew, T. F., & Tropp, L. R. (2008). How does intergroup contact reduce prejudice? Meta-analytic tests of three mediators. *European Journal of Social Psychology*, *38*, 922-934. https://doi.org/10.1002/ejsp.504

Preacher, K. J. (2015). Advances in mediation analysis: A survey and synthesis of new developments. *Annual Review of Psychology*, *66*, 825-852. https://doi.org/10.1146/annurev-psych-010814-015258

Satorra, A., & Bentler, P. M. (2001). A scaled difference chi-square test statistic for moment structure analysis. *Psychometrika*, *66*, 507-514. https://doi.org/10.1007/BF02296192

Schmid, K., Al Ramiah, A., & Hewstone, M. (2014). Neighborhood ethnic diversity and trust: The role of intergroup contact and perceived threat. *Psychological Science*, *25*, 665-674. https://doi.org/10.1177/0956797613508956

Schmid, K., Wölfer, R., Swart, H., Christ, O., Al Ramiah, A., Vertovec, S., & Hewstone, M. (2017). The "wallpaper effect" revisited: Divergent findings on the effects of intergroup contact on attitudes in diverse versus nondiverse contexts. *Personality and Social Psychology Bulletin*, *43*, 1268-1283. https://doi.org/10.1177/0146167217711929

Schofield, J. W., & Eurich-Fulcer, R. (2004). When and how school desegregation improves intergroup relations. In M. B. Brewer & M. Hewstone (Eds.), *Applied social psychology* (pp. 186-205). Blackwell Publishing.

Shelton, J. N., & Richeson, J. A. (2005). Intergroup contact and pluralistic ignorance. *Journal of Personality and Social Psychology*, *88*, 91-107. https://doi.org/10.1037/0022-3514.88.1.91

Snyder, M., Tanke, E. D., & Berscheid, E. (1977). Social perception and interpersonal behavior: On the self-fulfilling nature of social stereotypes. *Journal of Personality and Social Psychology*, *35*, 656-666. https://doi.org/10.1037/0022-3514.35.9.656

Stephan, W. G., & Stephan, C. W. (1985). Intergroup anxiety. *Journal of Social Issues*, *41*, 157-175. https://doi.org/10.1111/j.1540-4560.1985.tb01134.x

Terry, D. J., Carey, C. J., & Callan, V. J. (2001). Employee adjustment to an organizational merger: An intergroup perspective. *Personality and Social Psychology Bulletin*, *27*, 267-280. https://doi.org/10.1177/0146167201273001

Tropp, L. R., & Prenovost, M. A. (2008). The role of intergroup contact in predicting children's interethnic attitudes: Evidence from meta-analytic and field studies. In S. R. Levy & M. Killen (Eds.), *Intergroup attitudes and relations in childhood through adulthood* (pp. 236-248). Oxford University Press.

Von Soest, T., & Hagtvet, K. A. (2011). Mediation analysis in a latent growth curve modeling framework. *Structural Equation Modeling: A Multidisciplinary Journal*, *18*, 289-314. https://doi.org/10.1080/10705511.2011.557344

Wasserman, L. (2000). Bayesian model selection and model averaging. *Journal of Mathematical Psychology*, *44*, 92-107. https://doi.org/10.1006/jmps.1999.1278

Wilson, T. D., & Gilbert, D. T. (2003). Affective forecasting. In M. P. Zanna (Ed.), *Advances in experimental social psychology* (Vol. 35, pp. 345-411). Academic Press. https://doi.org/10.1016/S0065-2601(03)01006-2

Wölfer, R., Schmid, K., Hewstone, M., & van Zalk, M. H. W. (2016). Developmental dynamics of intergroup contact and intergroup attitudes: Long-term effects in adolescence and early adulthood. *Child Development*, *87*, 1466-1478. https://doi.org/10.1111/cdev.12598

Yip, T., Seaton, E. K., & Sellers, R. M. (2010). Interracial and intraracial contact, school-level diversity, and change in racial identity status among African American adolescents. *Child Development*, *81*, 1431-1444. https://doi.org/10.1111/j.1467-8624.2010.01483.x

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