The Role of Ingroup Contact in Intergroup Contact Theory



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CONTENTS

Acknowledgements i

Contents ii

List of Figures v

List of Tables vi

Abstract viii

Chapter 1: Introduction 1

1.1 Intergroup Contact Theory 4

1.1.1 Variation in Outgroup Contact Effects 6

1.1.2 Empirical Tests of Intergroup Contact Theory 14

1.1.3 The Importance of Ingroup Attitudes 21

1.2 Ingroup Contact 24

1.2.1 The Relationship Between Ingroup and Outgroup Contact 25

1.2.2 The Effects of Ingroup Contact on Attitudes 32

1.2.3 Attitude Socialisation 39

1.2.4 Summary 47

1.3 The Utility of Social Network Analysis 48

1.4 Overview of Thesis 52

Chapter 2: The Relationship Between Ingroup and Outgroup Contact 60

2.1 The Cross-Sectional Relationship Between Ingroup and Outgroup Contact 64

2.1.1 Analysis Strategy 65

2.1.2 Study 1a 67

2.1.3 Study 1b 72

2.1.4 Study 1c 75

2.1.5 Study 1d 79

2.1.6 Study 1e 83

2.1.7 Study 1f 92

2.1.8 Synthesis of Results 99

2.2 The Longitudinal Relationship Between Ingroup and Outgroup Contact 106

2.2.1 Analysis Strategy 107

2.2.2 Study 2a 111

2.2.3 Study 2b 117
2.2.4 Study 2c 122
2.2.5 Synthesis of Results 130
2.3 General Discussion 133
Chapter 3: The Effects of Ingroup and Outgroup Contact on Ingroup and Outgroup Attitudes 139
3.1 Disentangling the Effects of Ingroup and Outgroup Contact on Ingroup Bias 143
3.1.1 Study 2a 145
3.2 Advanced Analyses of the Effects of Ingroup and Outgroup Contact on Ingroup and Outgroup Attitudes 154
3.2.1 Analysis Strategy 156
3.2.2 Study 2a 161
3.2.3 Study 2b 173
3.2.4 Study 2c 181
3.2.5 Study 2d 190
3.2.6 Synthesis of Results 198
3.3 General Discussion 204
Chapter 4: The Socialisation of Ingroup and Outgroup Attitudes 211
4.1 Study 2c 217
4.1.1 Method 217
4.1.2 Analysis Strategy 219
4.1.3 Results 233
4.1.4 Discussion 241
Chapter 5: Summary and Conclusion 250
5.1 Key Findings 251
5.1.1 The Relationship Between Ingroup and Outgroup Contact 251
5.1.2 The Effects of Ingroup and Outgroup Contact on Ingroup and Outgroup Attitudes 257
5.1.3 The Socialisation of Ingroup and Outgroup Attitudes 262
5.1.4 Summary 268
5.2 Wider Implications 271
5.2.1 Theoretical Implications 271
5.2.2 Methodological Implications 273

5.2.3 Practical Implications 275
5.3 Caveats and Qualifications 277
5.4 Conclusion 281
Appendices 283
Appendix A: Studies 283
Appendix B: Correlation Matrices 284
Appendix C: Multivariate Latent Growth Models 289
Appendix D: Random-Intercept Cross Lagged Panel Models 294
Appendix E: Robustness Checks 305
Appendix F: Surveys 316
References 336

LIST OF FIGURES

Figure 1.1. Proposed model of how ingroup and outgroup contact shape ingroup and outgroup attitudes 53

Figure 2.1. The relationship between ingroup and outgroup contact 62

Figure 2.2. Study 1e friendship networks 87

Figure 2.3. Study 1f friendship network 95

Figure 2.4. Forest plot depicting effect sizes for the association between ingroup and outgroup friends 101

Figure 2.5. Forest plot depicting effect sizes for the association between generic ingroup and outgroup contact 104

Figure 2.6. Multivariate latent growth model 109

Figure 2.7. Study 2c friendship networks 126

Figure 2.8. Forest plot depicting effect sizes for the association between changes in ingroup friends and changes in outgroup friends over time 132

Figure 3.1. The effects of ingroup and outgroup contact on ingroup and outgroup attitudes 141

Figure 3.2. Random-intercept cross lagged panel model 160

Figure 3.3. Within-person coefficients for Study 2a 168

Figure 3.4. Within-person coefficients for Study 2b 178

Figure 3.5. Within-person coefficients for Study 2c 187

Figure 3.6. Within-person coefficients for Study 2d 196

Figure 3.7. Within-person coefficients across all studies 200

Figure 4.1. The socialisation of ingroup and outgroup attitudes 212

Figure 4.2. An illustration of ingroup contact, outgroup contact, ingroup socialisation and outgroup socialisation effects 215

Figure 4.3. Network adjacency and constant dyadic covariate matrices 223

Figure 4.4. Goodness of fit of indegree distribution 231

Figure 4.5. Goodness of fit of outdegree distribution 231

Figure 4.6. Goodness of fit of triad census 232

Figure 4.7. Goodness of fit of attitudes towards White British people 232

Figure 4.8. Goodness of fit of attitudes towards Asian British people 233

Figure 5.1. Proposed model of how ingroup and outgroup contact shape ingroup and outgroup attitudes 269

LIST OF TABLES

Table 1.1. Overview of Studies 59

Table 2.1. Means and Standard Deviations of Friends by Group (Study 1a) 71

Table 2.2. Correlations Between Ingroup and Outgroup Friends by Group (Study 1a) 71

Table 2.3. Correlations Between Ingroup and Outgroup Friends by Group (Study 1b) 74

Table 2.4. Means and Standard Deviations of Generic Contact by Group (Study 1c) 77

Table 2.5. Correlations Between Generic Ingroup and Outgroup Contact by Group (Study 1c) 78

Table 2.6. Means and Standard Deviations of Generic Contact by Group (Study 1d) 81

Table 2.7. Correlations Between Generic Ingroup and Outgroup Contact by Group (Study 1d) 82

Table 2.8. Means and Standard Deviations of Best Friends, Friends and Generic Contact by Group (Study 1e) 88

Table 2.9. Correlations Between Ingroup and Outgroup Best Friends, Friends and Generic Contact by Group (Study 1e) 90

Table 2.10. Means and Standard Deviations of Friends and Generic Contact by Group (Study 1f) 96

Table 2.11. Correlations Between Ingroup and Outgroup Friends and Generic Contact by Group (Study 1f) 98

Table 2.12. Means and Standard Deviations of Friends by Group and Wave (Study 2a) 115

Table 2.13. Correlations Between the Slopes of Ingroup Friends and Outgroup Friends by Group (Study 2a) 116

Table 2.14. Means and Standard Deviations of Friends by Group and Wave (Study 2b) 119

Table 2.15. Correlations Between the Slopes of Ingroup Friends and Outgroup Friends by Group (Study 2b) 121

Table 2.16. Means and Standard Deviations of Friends by Group and Wave (Study 2c) 127

Table 2.17. Correlations Between the Slopes of Ingroup Friends and Outgroup Friends by Group (Study 2c) 129

Table 3.1. Means and Standard Deviations of Friends, Attitudes and Ingroup Bias by Group (Study 2a) 150

Table 3.2. Multiple Linear Regression Analyses Predicting Ingroup Bias, Outgroup Attitudes, and Ingroup Attitudes (Study 2a) 151

Table 3.3. Means and Standard Deviations of Friends and Attitudes by Group and Wave (Study 2a) 164

Table 3.4. Means and Standard Deviations of Friends and Attitudes by Group and Wave (Study 2b) 176

Table 3.5. Means and Standard Deviations of Generic Contact, Friends and Attitudes by Group and Wave (Study 2c) 184

Table 3.6. Means and Standard Deviations of Generic Contact and Attitudes by Group and Wave (Study 2d) 193

Table 4.1. Explanation of RSiena Effects 225

Table 4.2. Means and Standard Deviations of Friends and Attitudes by Group and Wave (Study 2c) 234

Table 4.3. Multi-Group RSiena Co-Evolution Model: Behavioural Dynamics 237

Table 4.4. Multi-Group RSiena Co-Evolution Model: Network Dynamics 240

ABSTRACT

A wealth of research examining intergroup contact theory (Allport, 1954; Brown & Hewstone, 2005) has shown that outgroup contact improves outgroup attitudes. Few studies have examined the corresponding role of ingroup contact, despite its prevalence and evidence suggesting it may detrimentally affect intergroup relations (e.g., Levin et al., 2003; Wilder & Thompson, 1980), or the corresponding effects on ingroup attitudes. This thesis addresses these lacunae by investigating the ways in which ingroup contact, in addition to outgroup contact, shapes both ingroup and outgroup attitudes. In so doing, this thesis aims to achieve a more comprehensive understanding of how contact influences intergroup relations through the incorporation of ingroup contact in intergroup contact theory. Chapter 1 details the theoretical and empirical rationale that underpins this thesis, introduces the 10 studies (total N = 34,944) comprising this thesis, and outlines the analysis techniques used to test the proposed hypotheses (i.e., latent growth modelling, meta-analysis, random-intercept cross lagged panel modelling, and longitudinal social network analysis). Chapter 2 examines the relationship between ingroup and outgroup contact and finds that, at least for friendships, more ingroup contact is associated with less outgroup contact, and vice versa. Chapter 3 investigates the effects of contact on attitudes and identifies positive between-person associations for ingroup contact and ingroup attitudes, and for outgroup contact and outgroup attitudes, yet obtains little evidence for the corresponding within-person effects. Chapter 4 explores the socialisation of ingroup and outgroup attitudes and reports that individuals' attitudes are influenced by the attitudes held by their ingroup, but not their outgroup, friends. Finally, Chapter 5 discusses the research presented in this thesis and outlines its theoretical, methodological and practical implications. Overall, this thesis shows that ingroup contact has an important role in shaping both ingroup and outgroup attitudes, which highlights the imperative need for further research in this nascent area of study.

CHAPTER 1: INTRODUCTION

The societies that individuals inhabit are becoming increasingly diverse (e.g., Fong & Shibuya, 2005; Koser & Laczko, 2010; United Nations, 2019; Vertovec, 2007). For example, by the middle of the twenty-first century, ethnic minorities are predicted to comprise one third of the population in the United Kingdom (Coleman, 2010) and half of the population in the United States (Passel & Cohn, 2008). Individuals divide their diverse social worlds into groups across numerous dimensions, such as gender, ethnicity and religion (Tajfel, 1981; Turner et al., 1987). Individuals make a key distinction between the groups which they identify as belonging to, termed *ingroups*, and the groups with which they do not identify, termed *outgroups*.

With increasing levels of societal diversity, individuals have, in principle, greater opportunities to engage with outgroups. This can have positive effects on the overarching relationships between groups. Intergroup contact theory (Allport, 1954; Brown & Hewstone, 2005) states that direct face-to-face contact with outgroup members can improve individuals' attitudes towards outgroups (i.e., reduce prejudice). A wealth of empirical research provides compelling evidence in support of this theory. Most notably, Pettigrew and Tropp (2006) conducted a meta-analysis of 515 studies testing intergroup contact theory and identified a significant and consistent negative relationship of moderate size between outgroup contact and prejudice.

Consequently, it may be predicted that heightened levels of outgroup contact, attainable through increased societal diversity, would lead to a decrease in the overall levels of prejudice, discrimination, and intergroup conflict. However, negative relations between groups remain a persistent issue in contemporary societies. Individuals tend to evaluate ingroups more favourably than outgroups, a phenomenon termed *ingroup bias*

(Hewstone et al., 2002). Negative attitudes towards outgroups persist; for example, anti-Muslim attitudes have continued to rise in Europe and elsewhere (e.g., Savelkoul et al., 2012; Strabac & Listhaug, 2008). Furthermore, discrimination against outgroups remains common in present-day societies (Greenwald & Pettigrew, 2014).

One potential explanation for continued negative intergroup relations, despite increasing societal diversity, is that individuals often choose not to engage in contact with outgroup members. In support of this explanation, research has shown that high levels of segregation persist in diverse societies, and that individuals predominantly engage in contact with members of the same group (e.g., McPherson et al., 2001; Smith et al., 2016; Wölfer & Hewstone, 2018). Accordingly, ingroup contact is much more prevalent than outgroup contact.

Despite the relative prevalence of ingroup contact, the role of ingroup contact in shaping intergroup relations has largely been ignored in intergroup contact research to date. This is a potentially significant omission, because there exists evidence suggesting that ingroup contact may have important implications for intergroup relations, such as in accentuating ingroup bias (e.g., Levin et al., 2003; Wilder & Thompson, 1980). This thesis addresses this lacuna by investigating the role of ingroup contact, in addition to outgroup contact, in shaping attitudes towards different groups.

Specifically, in this thesis, I propose three distinct ways in which ingroup contact may influence attitudes towards different groups. Firstly, engagement in ingroup contact may necessarily limit engagement in outgroup contact, and consequently constrain the positive effects of outgroup contact on outgroup attitudes. Secondly, ingroup contact may in and of itself influence attitudes towards both the outgroup and

ingroup. Thirdly, ingroup contact may shape individuals' attitudes towards the outgroup and ingroup through the process of attitude socialisation (Kandel, 1978).

In the following sections of this chapter, I detail the prior research and the theoretical and empirical rationale that underpins this thesis. In the first section (1.1), I review research to date on intergroup contact theory, which has prioritised the study of the effects of outgroup contact. In three subsections, I respectively focus on relevant variation in the effects of outgroup contact (1.1.1), the nature and quality of research to date (1.1.2), and the importance of investigating the effects of outgroup contact on attitudes towards both the outgroup and ingroup (1.1.3). In the second section (1.2), I consider the potential effects of *ingroup* contact on outgroup and ingroup attitudes. I outline the rationale for the three ways in which I propose that ingroup contact may influence attitudes. Specifically, in three subsections, I discuss the relationship between ingroup and outgroup contact (1.2.1), the effects of ingroup contact on outgroup and ingroup attitudes (1.2.2), and the socialisation of outgroup and ingroup attitudes (1.2.3). In the third section (1.3), I provide an overview of the benefits of social network analysis for research examining intergroup relations, particularly for testing the research questions addressed in this thesis. In the final section (1.4), I conclude by introducing a new theoretical model depicting the ways in which both ingroup and outgroup contact may shape attitudes. In relation to this model, I outline the specific research questions and hypotheses addressed in this thesis and detail the empirical approach and the 10 studies through which I test my hypotheses.

1.1 Intergroup Contact Theory

The contact hypothesis (Allport, 1954) is one of the most influential hypotheses within the field of social psychology. The hypothesis was first introduced in Chapter 16 of Allport's book *The Nature of Prejudice*. In its simplest form, the hypothesis states that direct face-to-face contact between members of different groups has the potential to effectively reduce prejudice. Allport's fully-formulated contact hypothesis built upon the work of earlier theories that emerged during the American civil rights movement between the 1920s and 1950s. During this time, academics from various disciplines began to consider intergroup contact as a potential way to reduce racial tensions in the United States (e.g., Baker, 1934; Bogardus, 1928; Watson, 1947). For example, Williams (1947) proposed that interpersonal collaboration with goal interdependence could reduce intergroup hostility.

Allport's comprehensive formulation of the contact hypothesis stated that mere exposure to outgroup members would not necessarily guarantee the reduction of prejudice. He argued that for contact to be effective it must occur under a set of four optimal conditions, which consisted of equal status between groups, common goals, intergroup cooperation, and the support of authorities, law or customs. Allport provided evidence from early empirical studies that supported the claims of the contact hypothesis. For example, a quasi-experimental study conducted by Deutsch and Collins (1951) compared the attitudes held by White American homemakers living in segregated neighbourhoods verses desegregated neighbourhoods in New York. Those living in desegregated neighbourhoods reported comparatively more support for interracial housing initiatives and perceived less difference between themselves and their outgroup neighbours.

During the six decades following the publication of *The Nature of Prejudice*, an extensive body of empirical research has accumulated providing compelling evidence in support of the contact hypothesis (Brown & Hewstone, 2005). The most comprehensive examination of the contact hypothesis to date comprises a meta-analysis conducted by Pettigrew and Tropp (2006). The researchers examined 515 studies conducted between 1940 and 2000, which provided a combined sample size of just over 250,000 people. In support of the contact hypothesis, the meta-analysis identified a significant and reliable negative relationship between outgroup contact and prejudice (mean r = -.21, p < .001). The meta-analysis further provided some support for the four optimal conditions that Allport had proposed. Pettigrew and Tropp identified a significantly larger effect size amongst studies in which the optimal conditions were present (mean r = -.29) compared to studies in which these conditions were not present (mean r = -.20), although the effect was significant across both sets of studies. Therefore, the optimal conditions may facilitate the effects of outgroup contact on prejudice, but they are not necessary in order for contact to have an effect (Pettigrew, 1998).

In addition to determining the presence of a main effect of outgroup contact on prejudice, intergroup contact research has investigated *how* contact reduces prejudice. Numerous potential mediators of the relationship between outgroup contact and prejudice have been proposed, including knowledge about the outgroup (Allport, 1954), intergroup threat (Stephan et al., 2000), self-disclosure (Turner et al., 2007), intergroup anxiety (Stephan & Stephan, 1985), empathy (Hewstone et al., 2006), and intergroup emotions such as anger or disgust (Mackie et al., 2000). Research has predominantly focused on three key mediators: intergroup anxiety, empathy/perspective taking, and knowledge about the outgroup. The latter was a central component of Allport's formulation of the contact hypothesis. Early intergroup contact theorists proposed that

outgroup contact facilitated learning about the outgroup, and that in turn this acquired knowledge led to the reduction in prejudice. Many years later, Stephan and Stephan (1985) drew research attention to the mediational role of intergroup anxiety. A large number of subsequent studies have shown that intergroup contact reduces intergroup anxiety, which in turn reduces prejudice (e.g., Blascovich et al., 2001; Page-Gould et al., 2008; Paolini et al., 2004). Numerous studies have also shown that empathy and perspective taking mediate the association between intergroup contact and prejudice (e.g., Aberson & Haag, 2007; Hewstone et al., 2006). These studies suggest that outgroup contact enables individuals to take the perspective of outgroup members and empathize with their concerns, which in turn reduces prejudice.

In order to determine the relative mediational effects of the three key mediators, intergroup anxiety, empathy/perspective taking, and knowledge about the outgroup, Pettigrew and Tropp (2008) conducted another meta-analysis. While all three variables were found to mediate the relationship between contact and prejudice, the mediational effects were strongest for intergroup anxiety and empathy/perspective taking, and weaker for outgroup knowledge. This suggests that affective factors are more important than cognitive factors in shaping prejudice towards outgroups.

1.1.1 Variation in Outgroup Contact Effects

The contact hypothesis has been shown to have high generalisability across numerous groups, situations and societies (Pettigrew & Tropp, 2006). However, important differences in the strength of the effects of outgroup contact across studies have been identified. These differences depend on numerous factors, ranging from specific aspects of the contact experience itself, such as the degree of category salience during contact (Brown & Hewstone, 2005), to stable personality traits influencing individuals'

reactions to contact, such as social dominance orientation and right wing authoritarianism (Dhont & Van Hiel, 2009). Each factor is considered to moderate the effects of outgroup contact (Baron & Kenny, 1986), meaning that the strength of the contact-prejudice relationship differs depending on the level (high or low) of the respective factor. The following sections discuss differences in the effectiveness of outgroup contact dependent on factors relevant to the research reported in this thesis. These include contextual factors (e.g., the target group), individual characteristics (e.g., age), and the type of contact under consideration (e.g., friendship).

Variation Regarding the Intergroup Context

One aspect of the intergroup context that influences the effectiveness of outgroup contact is the target group examined. The contact hypothesis was originally formulated to address relations among different ethnic groups. Over time the focus of intergroup contact research has extended to examine the effects of contact with target groups based on various dimensions, such as sexual orientation (Reimer et al., 2017), age (Drury et al., 2016), religion (Paolini et al., 2004), and physical disability (Yuker & Hurley, 1987). The extent of variation in the target groups examined is highlighted by Pettigrew and Tropp's meta-analysis (2006), in which approximately half of the samples examined contact between different ethnic groups, and half examined contact between groups based on other characteristics (sexual orientation, age, physical disability, mental disability, and mental health).

To determine whether the relationship between contact and prejudice was consistent across target groups, Pettigrew and Tropp (2006) compared the effect sizes for each target group. Overall, they found no difference when comparing ethnic (mean r = -.22) and non-ethnic (mean r = -.22) target groups. However, Pettigrew and Tropp

conducted a further more fine-grained analysis, which compared the magnitude of the effect size for each individual target group, and here the researchers did identify significant differences in the strength of the effects. The strongest effects were identified for groups based on sexual orientation and physical disability, average effects were identified for groups based on ethnicity and mental disability, and the weakest effects were identified for groups based on age and mental health. Therefore, the impact of outgroup contact on outgroup attitudes differed depending on the outgroup under consideration. Nonetheless, despite the differences in effect sizes, the relationship between contact and prejudice was consistently significant across all target groups. This finding demonstrates the robustness of the effect and high generalisability across groups.

Another aspect of the intergroup context that may influence the effectiveness of outgroup contact is the geographical area. The contact hypothesis was formulated in the context of the American civil rights movement, and contact was viewed as a potential way to improve intergroup relations in the United States. While the majority of intergroup contact research has been conducted in the United States, studies have demonstrated the effectiveness of outgroup contact in numerous other countries (e.g., Schmid et al., 2017), and in both Western (e.g., Wölfer et al., 2016) and non-Western (e.g., Islam & Hewstone, 1993) cultures.

The generalisability of the contact hypothesis across geographical areas was also tested meta-analytically by Pettigrew and Tropp (2006). The meta-analysis included studies conducted in 38 different countries, although 71% of included studies were conducted in the United States. The results revealed the strongest effects in Australia, New Zealand and Canada, average effects in the United States and Europe, and the weakest effects in Africa, Asia, Latin America and Israel. However, the differences in

the effect sizes between countries were not significant. Therefore, both the presence and size of the effect of outgroup contact is highly robust across geographical areas.

Variation Regarding Individual Characteristics

Intergroup contact effects also differ depending on characteristics of the individuals experiencing contact (i.e., participant characteristics). One key characteristic that intergroup contact research has focused on is group status (Tropp & Pettigrew, 2005). Groups are predominantly categorised into historically disadvantaged minority status and comparatively advantaged majority status. This distinction is based on social status, as well as differences in resources and power, and often, but not always, aligns with differences in numerical status. Early intergroup contact research predominantly examined outgroup contact from majority, not minority, perspectives (i.e., examining majority group members' contact with and attitudes towards minority groups), because the prejudice of the majority was the social problem that contact was being used to overcome. Over the last two decades, research has increasingly considered minority perspectives (i.e., examining minority group members' contact with and attitudes towards majority groups). Notably, majority-minority differences can be considered as both an individual characteristic and intergroup context level factor that influences the effectiveness of intergroup contact. This is because majority-minority differences concern both the group status of the individual experiencing the contact (majority or minority) and in most cases also the target group (minority or majority), although there have been studies of inter-minority contact (e.g., Visintin et al., 2017).

Research examining majority-minority differences has provided evidence that the effects of outgroup contact may be significantly weaker for members of minority as compared to majority groups. Tropp and Pettigrew (2005) conducted a further meta-

analysis to establish whether contact effects differed depending on group status. They found significantly stronger contact-prejudice relationships for majority (mean r = -.23) as compared to minority (mean r = -.18) groups.

Studies have attempted to ascertain *why* outgroup contact may have a weaker effect for minority group members. One factor that has been widely investigated is perceived discrimination, which refers to the ongoing recognition of unfair treatment and devaluation of one's group. As minorities endure greater discrimination than majorities, perceived discrimination is more integral to how minorities view intergroup relations, and this negative perception may hinder the effectiveness of outgroup contact for minority groups (Tropp, 2003). In support of this claim, perceived discrimination has been shown to moderate the contact-prejudice relationship for minority, but not majority, group members, such that outgroup contact does not reduce prejudice for minority members who perceive high levels of discrimination (Tropp, 2007). Other explanations for majority-minority differences in the contact-prejudice relationship that have received empirical support include the *Wallpaper Effect*[1] (Barlow et al., 2013, but see Schmid et al., 2017) and varying group category salience during contact experiences (Binder et al., 2009).

However, majority-minority differences in the effectiveness of outgroup contact may not be as definitive as is commonly assumed. The meta-analytic test of majority-

[1] Barlow et al. (2013) proposed that contact may be less effective for minorities because the "wallpaper" of minority group members' lives is majority-dense, making contact with majorities commonplace and consequently less remarkable and transformative. The researchers found that neighbourhood composition moderated the relationship between contact and attitudes for minority but not majority groups. While contact consistently improved outgroup attitudes for the majority, contact only improved outgroup attitudes for minority group members who lived in minority-dense, not majority-dense, neighbourhoods. However, Schmid et al. (2017) failed to replicate this finding across five studies, therefore, the wallpaper effect has received mixed support.

minority differences (Tropp & Pettigrew, 2005) only considered research published prior to 2001. At that time, relatively few studies had considered minority samples: only 28% of the samples included in the 2005 meta-analysis examined contact effects for minority groups. The subsequent two decades, however, saw a substantial increase in the number of studies examining contact effects in minority samples. More recent investigations have not consistently replicated this majority-minority difference, as recent studies examining the effects of outgroup contact on prejudice have often found equal effects for minority and majority groups (e.g., Henry & Hardin, 2006; Schmid et al., 2017; Wölfer et al., 2016). Thus, it appears uncertain whether Tropp and Pettigrew's conclusion holds.

Another individual characteristic which has been suggested to influence the effectiveness of outgroup contact is the age of the individual experiencing contact. In their comprehensive meta-analysis, Pettigrew and Tropp (2006) compared the strength of the contact-prejudice relationship between adults, college students, adolescents and children. Significant contact effects were found across all age groups. However, the researchers identified significantly stronger effect sizes for the younger age groups (mean r = -.21 to mean r = -.24) as compared to adults (mean r = -.19).

Outgroup contact effects may differ depending on age because outgroup attitudes are still developing, and are more amenable to change, in youth as compared to later life. Sears (1986) proposed that attitudes are more malleable at younger ages and change to a lesser extent thereafter as attitudes crystallise with age. Regarding outgroup attitudes, research has shown that childhood and adolescence mark key periods in the development of prejudice and discrimination towards outgroups (Aboud, 2005; Wölfer et al., 2016). Individuals develop their ethnic identity and attitudes towards different groups during this time (Jugert et al., 2020; Krosnick & Alwin, 1989), and outgroup

attitudes are particularly susceptible to influence through ingroup norms at this age (Abrams & Rutland, 2008; Nesdale, 2004). Therefore, the increased malleability of outgroup attitudes during developmental periods may explain why outgroup contact has a greater effect on attitudes in younger as compared to older age groups.

Variation Regarding the Type of Contact

The final factor I will discuss which has been shown to influence the effectiveness of outgroup contact is the type of contact under consideration. Outgroup contact can differ with regard to valence, and research has shown that, unsurprisingly, positive contact experiences reduce prejudice while negative contact experiences exacerbate prejudice (Barlow et al., 2012). This thesis empirically considers only positive contact, and the term *contact* is used to denote positive, not negative, contact (for a detailed discussion of negative contact, see Árnadóttir et al., 2018; Barlow et al., 2012; ten Berge et al., 2017). Positive outgroup contact is commonly conceptualised and operationalised as the quantity of positive interactions with outgroup members that an individual has had in the past (MacInnis & Page-Gould, 2015). Accordingly, what is considered to be outgroup contact spans a broad range of experiences with outgroup members, which can differ along dimensions such as the intimacy and duration of the contact.

One specific type of contact that has been widely investigated is outgroup friendship. Meta-analytic evidence has shown that outgroup friendship is an especially powerful form of contact, with stronger positive effects on outgroup attitudes than contact in general. In their extensive meta-analysis, Pettigrew and Tropp (2006) identified a significantly stronger effect size for outgroup friendship (mean r = -.25) than all other forms of contact (mean r = -.21). Davies et al. (2011) conducted a meta-analysis exclusively examining the effects of outgroup friendship on outgroup attitudes,

and identified a similarly large effect (mean $r = .26$, $p < .001$). The later meta-analytic sample (Davies et al., 2011) was over three times larger (208 verses 61 samples) than the former meta-analytic sample (Pettigrew & Tropp, 2006), as the later meta-analysis included studies conducted prior to August 2009 (in comparison to December 2000). It also contained considerably more longitudinal studies, which are better placed to indicate the directionality from contact to attitudes than are cross-sectional correlational studies (see below).

Together, these meta-analyses demonstrate important differences in the strength of outgroup contact effects depending on the type of contact considered, with outgroup friendship having a stronger effect on outgroup attitudes than more casual forms of contact. Outgroup friendship may have a greater effect on outgroup attitudes because friendship occurs over an extended period of time and entails greater active engagement, self-disclosure, intimacy, empathy and trust (Swart et al., 2011). Furthermore, friendship typically entails the optimal conditions (Allport, 1954) that facilitate the effects of outgroup contact, particularly cooperation, common goals, and equal status (Pettigrew, 1997), although it does not necessarily command institutional support.

Summary

In summary, the effect of outgroup contact on outgroup attitudes has been shown to be highly robust across numerous different dimensions. There is, however, variability in the strength of the contact-prejudice relationship dependent on intergroup context factors, participant characteristics, and the type of contact under consideration. In this thesis, I examine differences in outgroup contact effects across several of these dimensions, in order to assess the robustness of my findings. To this end, I examine

outgroup contact with a range of target groups (across both ethnic and religious group dimensions). I further conduct all my analyses separately for each group, in order to identify any differences dependent on the group membership of the individuals experiencing the contact (e.g., majority or minority group members). I also assess outgroup contact effects in four different countries (the United Kingdom, United States, South Africa and New Zealand) and across a range of age groups. Finally, I examine the effects of outgroup friendship in addition to more casual forms of outgroup contact.

1.1.2 Empirical Tests of Intergroup Contact Theory

The preceding sections detail the most influential and relevant findings from an extensive body of research providing evidence in support of intergroup contact theory. However, the nature and quality of this research has not yet been thoroughly considered.

The majority of research examining intergroup contact theory comprises cross-sectional survey studies. Of the studies included in Pettigrew and Tropp's (2006) meta-analysis, most used a cross-sectional correlational design, and very few used a longitudinal design. Cross-sectional studies have a critical disadvantage in that they cannot indicate either directionality or causality. Therefore, the negative relationship between contact and prejudice identified in such studies may result from contact reducing prejudice, or from less (more) prejudiced individuals choosing to engage in more (less) contact, or both. Accordingly, cross-sectional studies cannot convincingly indicate a causal effect of outgroup contact on outgroup attitudes. This well-established issue is termed *selection bias* (Pettigrew, 1998).

The issues of selection bias and directionality can be overcome to a degree in longitudinal studies. Since the publication of Pettigrew and Tropp's (2006) meta-analysis, the number of longitudinal studies examining intergroup contact theory has

increased. To determine the likely direction of effects, longitudinal studies have examined both the path from contact to prejudice, and the path from prejudice to contact. Longitudinal studies have suggested that the relationship between contact and prejudice is bidirectional: contact reduces prejudice, and prejudice reduces contact (e.g., Binder et al., 2009; Dhont et al., 2012; Swart et al., 2011). Therefore, the findings from longitudinal studies appear to provide a better indication for a potential effect of outgroup contact on outgroup attitudes, as compared to the findings from cross-sectional studies.

To examine the paths between contact and prejudice, longitudinal studies have used cross-lagged panel modelling (CLPM) and other similar modelling techniques. These analysis techniques were considered to be the best methods to assess directionality in longitudinal survey data (Cohen et al., 2003; Finkel, 1995; Pettigrew, 1996). CLPM and similar techniques remain the standard longitudinal analysis methods currently used in the field of intergroup contact research (e.g., Wölfer et al., 2019).

However, these analysis techniques have recently received severe criticism for conflating between-person stability and within-person change (Hamaker et al., 2015; Zyphur et al., 2020). CLPM and similar analysis techniques cannot disentangle the extent to which an observed association between outgroup contact and outgroup attitudes results from between-person stability (i.e., individuals with high contact *simultaneously* hold more positive attitudes) or within-person change (i.e., individuals with high contact *subsequently* hold more positive attitudes). Only within-person change, not between-person stability, provides an indication of an effect of outgroup contact on outgroup attitudes. In contrast, between-person stability indicates that unobserved variables result in positive correlations between individual differences in contact and attitudes across the population. These unobserved variables could include,

for example, personality traits, intergroup ideologies, intergroup contact opportunity structures, or demographic characteristics. As CLPM and similar techniques cannot separate between-person stability and within-person change, these models cannot convincingly indicate directionality. Therefore, recent analytic advances suggest that the findings from the aforementioned longitudinal studies of intergroup contact do not provide convincing evidence indicating an effect of outgroup contact on outgroup attitudes.

To address the problems with CLPM and similar analysis techniques, Hamaker et al. (2015) developed an alternative model. This new modelling technique, termed random-intercept cross lagged panel modelling (RI-CLPM), separates between-person stability and within-person change through the inclusion of random intercepts. Accordingly, RI-CLPM allows researchers to better assess directionality.

To date, only one study has used RI-CLPM to examine intergroup contact theory. Bohrer et al. (2019) examined the effects of contact with migrants on native Germans' attitudes towards migrants in Germany. Four waves of data were collected over 18 months in a sample of 673 German respondents. The results of RI-CLPM revealed non-significant within-person effects: individuals who reported more outgroup contact than expected at a given time did not subsequently report more positive outgroup attitudes than expected at a later time. Therefore, this study did not provide evidence in support of a potential effect of outgroup contact on outgroup attitudes.

There are numerous possible explanations for the non-significant effect (in addition to the explanation that outgroup contact may not influence outgroup attitudes). Perhaps most plausibly, a timespan of 18 months may not be an adequately long period in which to detect changes in attitudes. This explanation is supported by the high

stability in attitudes over the 18-month period reported by Bohrer et al. (2019). Alternatively, or additionally, the lack of contact effects may result from specific aspects of the sample. The sample included only adults, and research has shown that attitudes are less amenable to change through intergroup contact in adult as compared to younger samples (Wölfer et al., 2016). Furthermore, the sample included only one participant group (native Germans) and one target group (migrants) in one country (Germany). More research is required in order for the findings to be generalised beyond this very specific single intergroup context, nonetheless, this study demonstrates an impressive methodological advance.

Overall, this paucity of research highlights the need for more longitudinal intergroup contact research that can separate between-person and within-person effects. Accordingly, in this thesis I examine the effects of outgroup contact on outgroup attitudes using RI-CLPM. To overcome the potential limitations of Bohrer et al. (2019), I examine these effects across multiple timespans (ranging from one to five years), in both adult and younger samples, and in numerous intergroup contexts (differing in terms of the participant group, target group, and country).

The survey studies discussed thus far provide little evidence in support of a potential causal effect of outgroup contact on outgroup attitudes. However, while the intergroup contact literature relies heavily on survey studies (MacInnis & Page-Gould, 2015), there have also been many experimental studies examining intergroup contact theory. These studies have provided evidence indicating a potential causal effect of outgroup contact on outgroup attitudes.

Experimental studies of intergroup contact theory have shown a significant effect of experimentally manipulated outgroup contact on outgroup attitudes across

numerous different group dimensions, including ethnicity (e.g., Ioannou et al., 2018; Van Oudenhoven et al., 1996), nationality (e.g., Brown et al., 1999), and even more controlled artificial minimal groups (e.g., Bettencourt et al., 1992). Experimental tests of intergroup contact typically involve participants engaging in contact with an outgroup member (often a confederate) in a laboratory setting. The contact experience consists of either co-operative tasks (e.g., Van Oudenhoven et al., 1996; Wilder, 1984) or structured conversation (e.g., Ioannou et al., 2018). Participants report their attitudes towards the outgroup before (pre-test) and after (post-test) the contact experience. Support for a causal effect of outgroup contact on outgroup attitudes is indicated by a significant improvement in attitudes from pre-test to post-test, and a non-significant corresponding effect in the control condition when included in the experimental design (e.g., Ioannou et al., 2018; Wilder & Thompson, 1980).

Experimental studies examining intergroup contact theory were included in Pettigrew and Tropp's (2006) meta-analysis. The researchers compared the effects sizes between experimental and non-experimental studies, and found a significantly stronger effect in the experimental studies (mean r = -.34) as compared to the non-experimental studies (mean r = -.20). Therefore, experimental studies have provided evidence in support of a causal effect of outgroup contact on outgroup attitudes.

Research has also sought to experimentally test the effects of outgroup friendship on outgroup attitudes. In a substantial meta-analysis examining outgroup friendship, Davies et al. (2011) compared the effect sizes for the relationship between outgroup friendship and outgroup attitudes between experimental and non-experimental studies. The researchers identified a smaller effect size for experimental studies (mean r = .16) than non-experimental studies (mean r = .26). Nonetheless, the effect size was

significant, albeit smaller, in the experimental studies, which suggests a causal effect of outgroup friendship on outgroup attitudes.

Experimental studies of outgroup friendship typically use the *fast friends procedure* (Aron et al., 1997). For example, Page-Gould et al. (2008) used an adapted form of the fast friends procedure to examine the effects of outgroup friendship on intergroup anxiety. The fast friends procedure aims to generate feelings of closeness between two strangers through mutual self-disclosure in conversation and relationship-building tasks conducted during 45-minute sessions in laboratory settings. In the procedure, participants are provided with an instruction sheet and three tasks to guide their meeting (Aron et al., 1997). The instruction sheet includes information such as, "your task, which we think will be quite enjoyable, is simply to get close to your partner" (p. 374). Participants complete three tasks, which involve discussing personal questions. Every 15 minutes, the experimenters instruct participants to stop each task and proceed to the following task.

The degree to which the fast friends procedure successfully simulates naturally occurring friendship outside of laboratory settings is, however, uncertain. Friendships in the real world develop gradually over time (e.g., Hays, 1984, 1985). The short time period in which strangers become 'friends' in the fast friends procedure is not able to examine friendship beyond its early stages of development, and it is unlikely that meaningful relationships can be built during this time. This limitation is particularly problematic for studies in which change in outgroup attitudes is the intended result of the fast friends procedure. The limited time period may not provide ample opportunity especially for participants with more negative attitudes to overcome their initial reservations and become closer to their outgroup interaction partner. The fast friends procedure may consequently only improve the attitudes of those with initially positive

attitudes, yet those with initially negative attitudes are the primary intended targets for attitude improvement.

Furthermore, the environment of the fast friends procedure is highly artificial, with participants given instruction sheets and set tasks to guide their meeting. This does not resemble the varied and unstructured manner in which friendships form in the real world, therefore, the setting has low ecological validity. Finally, the aim of the fast friends procedure (to generate feelings of closeness between interaction partners) is not hidden from participants, which may lead to demand characteristics. For example, participants may interact positively with one another despite not liking their interaction partner, simply because they feel the setting requires positive interactions. In contrast, mutual liking is a prerequisite for friendship in the real world.

Together, these limitations of experimentally inducing friendship may account for the small effect size identified in the experimental studies in the meta-analysis (Davies et al., 2011). These limitations may also account for the lack of studies which have attempted to experimentally manipulate outgroup friendship: only four of the 208 samples included in the meta-analysis experimentally manipulated friendship.

In summary, an extensive body of research, including both survey and experimental studies, provides strong evidence in support of intergroup contact theory. The varying research designs each have strengths and limitations; for example, survey studies provide high ecological validity, while experimental studies provide more convincing evidence of a potentially causal effect. The fact that a positive relationship between outgroup contact and outgroup attitudes has been demonstrated consistently across a range of research designs shows that the effect is robust.

1.1.3 The Importance of Ingroup Attitudes

Thus far I have discussed the effects of outgroup contact on outgroup attitudes. The overarching relationships between groups, however, are not only guided by individuals' attitudes towards the outgroup, but also by their attitudes towards the ingroup (Brewer, 1999; Greenwald & Pettigrew, 2014). The following sections detail the importance of ingroup attitudes for intergroup relations, and the role that outgroup contact may have in shaping ingroup attitudes, in addition to outgroup attitudes.

Ingroup Love or Outgroup Hate?

Brewer (1999) highlighted that when studying aspects of intergroup relations such as ingroup bias, discrimination and conflict, an important distinction must be made between attitudes towards the ingroup and attitudes towards outgroups. Brewer states that positive ingroup attitudes, termed *ingroup love*, and negative outgroup attitudes, termed *outgroup hate*, are distinct constructs, such that ingroup love does not necessarily coincide with outgroup hate. Brewer further argued that many forms of intergroup discrimination and bias may result not from negative attitudes towards outgroups, but from comparatively more positive attitudes towards one's ingroup. Numerous instances of discrimination may result from the preferential treatment of ingroup members over outgroup members, without the presence of negativity towards the outgroup. For example, the manager of a company may be more likely to hire an ingroup member as compared to an outgroup member because the manager explicitly or implicitly feels greater trust and admiration towards ingroup members (Bendick et al., 2010; Riordan, 2000).

Greenwald and Pettigrew (2014) further proposed that in certain present-day societies, the *primary* determinant of discrimination is positive ingroup attitudes, not

negative outgroup attitudes. The researchers contend that in countries such as the United States, subtle forms of discrimination are most prevalent, and such discrimination results more often from individuals aiming to help ingroup members, rather than harm outgroup members. This may be in part due to the prevalence of comparatively more positive attitudes towards the ingroup than outgroups, but crucially still moderately positive, not negative, attitudes towards outgroups (Dovidio & Gaertner, 1993). In many Western societies, including the United Kingdom, the overt expression of prejudice and discrimination has decreased, and ingroup bias is more commonly expressed in a relatively subtle and indirect manner (e.g., Gaertner & Dovidio, 1986; Hodson et al., 2005).

Intergroup relations involve, however, not only more subtle forms of intergroup discrimination and bias, but also intergroup hostility, aggression, violence and outgroup derogation. More severe aspects of negative intergroup relations remain present, if not prevalent, across all societies, and in some areas even ethnic cleansing and genocide persist (United Nations, 2018). More severe forms of discrimination and bias cannot result solely from positive ingroup attitudes (Hewstone et al., 2002). For example, while the racial profiling perpetrated by police in the United States could be considered an outcome of ingroup favouritism (see Greenwald & Pettigrew, 2014), the same argument cannot be made for higher rates of police brutality and violence towards minority groups. These severe forms of discrimination may result from a range of alternative causes, including negative outgroup attitudes, but also factors such as intergroup threat, fear and the broader intergroup context (Hewstone et al., 2002).

Overall, both ingroup love and outgroup hate have important implications for wider aspects of intergroup relations. Intergroup contact research has focused predominantly on outgroup, not ingroup, attitudes (Greenwald & Pettigrew, 2014). To

provide a more comprehensive examination of intergroup relations, and to address the fact that research may have overlooked potentially consequential effects of outgroup contact on ingroup attitudes, this thesis considers the effects of contact on attitudes towards both the ingroup and outgroup.

The Deprovincialisation Hypothesis

One approach which emphasises the importance of ingroup attitudes is the deprovincialisation hypothesis (Pettigrew, 1997). This hypothesis proposes that outgroup contact influences attitudes towards the ingroup, in addition to the outgroup. Pettigrew (1997) contended that outgroup contact leads individuals to develop a less provincial view of the world, that is, to see that the traditions, norms, and values of the ingroup are not the only way to view the world. Outgroup contact may lead to a recognition of the value of other cultures, and put the ingroup's cultural standards into perspective. Deprovincialisation entails a reappraisal of, and distancing away from, the ingroup, which involves a reduction in both ingroup identification and feelings of positivity towards the ingroup. Accordingly, a negative effect of outgroup contact on ingroup attitudes forms a key part of the deprovincialisation hypothesis.

In comparison to the wealth of research examining the effects of outgroup contact on outgroup attitudes, comparatively few studies have examined the effects of outgroup contact on ingroup attitudes. The few studies that have considered ingroup attitudes as an outcome variable have yielded mixed results.

Verkuyten et al. (2010) examined the effects of contact with ethnic minority outgroup members on Dutch adolescents' ingroup distancing. Ingroup distancing was operationalised as ingroup identification and ingroup attitudes. Across three cross-sectional studies, the researchers identified a consistently significant negative effect of

outgroup contact on both ingroup identification and ingroup attitudes. These findings support the deprovincialisation hypothesis. Other studies (e.g., Pettigrew, 1998, 2009) have found that outgroup contact leads to a reduction in ingroup identification, but did not examine ingroup attitudes. Therefore, while such studies provide evidence for other aspects of the deprovincialisation hypothesis, they do not demonstrate a negative effect of outgroup contact on ingroup attitudes.

Tausch et al. (2010) examined the effects of outgroup contact on ingroup attitudes in a series of four studies investigating relations between different ethnic and ethno-religious groups in Cyprus, Northern Ireland and the United States. In Study 1, Tausch and colleagues identified a significant negative effect of outgroup contact on ingroup attitudes, in support of the deprovincialisation hypothesis. However, in Studies 2, 3 and 4, Tausch and colleagues consistently found no significant effects of outgroup contact on ingroup attitudes. Importantly, while Studies 1, 2 and 3 were cross-sectional, Study 4 was longitudinal. Therefore, Study 4 provides the only longitudinal test of outgroup contact on ingroup attitudes, and failed to identify an effect.

In summary, the scarcity of studies and the disparity in the findings leads to uncertainty regarding whether outgroup contact has a negative effect on ingroup attitudes. More broadly, the research to date therefore provides mixed evidence for the deprovincialisation hypothesis. Further research is required in order to determine whether outgroup contact affects ingroup attitudes, in addition to outgroup attitudes.

1.2 Ingroup Contact

The extensive body of research discussed thus far considers the role of outgroup contact in shaping attitudes. The corresponding role of ingroup contact has been largely ignored in research to date. This is surprising for two reasons. Firstly, although research

examining ingroup contact is sparse, there is evidence suggesting that ingroup contact may influence attitudes towards different groups (e.g., Levin et al., 2003; Wilder & Thompson, 1980). Secondly, ingroup contact is much more prevalent than outgroup contact: despite increasing levels of societal diversity (e.g., Fong & Shibuya, 2005; Koser & Laczko, 2010; United Nations, 2019; Vertovec, 2007), opportunities for contact do not always transform into actual contact, as individuals predominantly engage in contact with members of the same group (e.g., McPherson et al., 2001; Smith et al., 2016). Therefore, if ingroup contact does indeed influence attitudes towards different groups, the relative prevalence of ingroup contact as compared to outgroup contact may result in ingroup contact having a comparatively larger impact on attitudes. However, the scarcity of research to date renders the effects of ingroup contact on outgroup attitudes almost entirely unknown.

I propose three distinct ways in which ingroup contact may influence attitudes towards different groups. Firstly, engagement in ingroup contact may limit engagement in outgroup contact, and consequently constrain the positive effects of outgroup contact on outgroup attitudes. Secondly, ingroup contact may in and of itself influence attitudes towards both the outgroup and ingroup. Finally, ingroup contact may shape individuals' attitudes towards the outgroup and ingroup through the process of attitude socialisation. These proposals are detailed in the following three sections.

1.2.1 The Relationship Between Ingroup and Outgroup Contact

Research suggests that individuals can only engage in a limited amount of contact with others (e.g., Dunbar, 1998; Saramäki et al., 2014; Tooby & Cosmides, 1996). Accordingly, engagement in ingroup contact may limit engagement in outgroup contact, and vice versa. This inverse relationship between ingroup and outgroup contact could

have important implications for individuals' attitudes towards outgroups. If individuals engage in ingroup contact at the expense of outgroup contact, the potential positive effects of outgroup contact on outgroup attitudes will be constrained.

The social brain hypothesis (Dunbar, 1998) proposes that the number of relationships individuals can maintain is limited by cognitive constraints. The hypothesis was first developed with regard to variability in the size of social groups between different groups of primates. Constraints on group size were proposed to result from the limited information-processing capacity of the primate brain, particularly the neocortex. Dunbar suggested various cognitive mechanisms that may be involved, such as limitations regarding memory for retaining social information (e.g., who is connected to whom), the ability to manipulate social information, and the capacity to process emotional information. These explanations are not mutually exclusive, and it is likely that multiple mechanisms may be involved.

Dunbar extrapolated the relationship between neocortex size and social group size identified in other species to humans, which produced an estimated human social group size of approximately 150. This prominent and influential approximation of the number of social relationships humans can maintain is widely referred to as *Dunbar's number*. Studies have provided a wealth of evidence supporting the approximate limit of 150 social relationships. For example, Roberts et al. (2009) found that individuals list 136 to 150 others when instructed to indicate whom they share some sort of personal relationship with. Similarly, Hill and Dunbar (2003) found that on average individuals address Christmas cards to around 154 others. Furthermore, research has identified that the group size of 150 is common in numerous contemporary and historical societies, for example, in business organisations, farming communities, and the military (Dunbar,

1993). Overall, these studies provide convincing evidence that individuals can only maintain approximately 150 social relationships.

Furthermore, research suggests that the social relationships individuals have are organised into a hierarchical series of inclusive layers (Zhou et al., 2005). These layers consist of the support clique of approximately 5 individuals, the sympathy group of 15 individuals, the affinity group of 50 individuals, and the active network of 150 individuals (Sutcliffe et al., 2012). The quality of the social relationships in each layer differs: intimacy and frequency of interaction increase from the active network to the support clique. Research has provided support for the size of, and differentiation between, these four layers, based on factors including contact frequency and the provision of social support (e.g., Dunbar & Spoors, 1995; Wellman et al., 1988). While the number of social relationships in each layer is limited to approximately 5, 15, 50, and 150, there is variation across individuals in the exact number of relationships, dependent on individual differences such as personality traits (e.g., Centellegher et al., 2017; Pollet et al., 2011).

The number of relationships individuals can maintain is limited not only by cognitive constraints, but also by the amount of time that individuals can devote to social interactions. This notion was eloquently summarised by Tooby and Cosmides (1996), who stated, “Human hunter-gatherers, along with all other prisoners of space and time, have finite time and energy budgets, and cannot be in more than one place at a time. The decision to spend time with some individuals is, therefore, the decision not to spend time with others.” (p. 136). Dunbar et al. (2009) further contended that the limits on social interactions imposed by time constraints may ultimately confine the size of the social group that can be maintained. Individuals have a limited amount of time to invest in their relationships, and increasing the number of relationships reduces the time

devoted to the maintenance of pre-existing relationships. Accordingly, pre-existing relationships will be lost through a lack of maintenance if new relationships are introduced. Therefore, both cognitive and time constraints result in a limited and stable number of relationships over time.

Research has shown that the number of social relationships individuals maintain is highly stable over time. For example, Saramäki et al. (2014) identified high stability in their examination of students' phone call data over an 18-month period. The researchers found that the number of individuals each student called, and the frequency and duration of their calls, remained stable over time. This stability was present despite considerable changes in the identity of the specific individuals that students called. That is, as new relationships were established (i.e., students called new contacts), pre-existing relationships were lost (i.e., students reduced or stopped calls to old contacts). Overall, this led to stability in both the number of relationships and frequency of contact over time, despite changes in the identity of those contacted. The researchers proposed that the high stability is likely to have resulted from cognitive and time constraints limiting the number of relationships that can be successfully maintained through frequent communication.

The proposed limit on the number of social relationships individuals can maintain raises an interesting question when considered through an intergroup perspective. One type of social relationship that has been examined extensively in intergroup relations research is friendship (Davies et al., 2011). If individuals can only maintain a limited number of friends, individuals with more ingroup friends should have fewer outgroup friends, and vice versa. This implies a negative relationship between individuals' numbers of ingroup and outgroup friends, which would be present at any given time. Based on the stability in the number of social relationships maintained over

time (e.g., Saramäki et al., 2014), a negative relationship between individuals' numbers of ingroup and outgroup friends should also be present when examined longitudinally. That is, as an individual's number of outgroup friends increases over time, their number of ingroup friends should concurrently decrease, and vice versa.

A similar argument can be made for individuals' engagement in more casual forms of contact with ingroup and outgroup members. The number of friendships an individual can maintain is limited by both cognitive and time constraints. In contrast, the amount of contact an individual can have is likely to be limited only by time constraints (Tooby & Cosmides, 1996). This is because friendship requires greater cognitive resources, such as retaining and manipulating social information regarding the friend, whereas such extensive social information is not required for more casual forms of contact. For example, a friendship may be maintained through frequent conversation requiring information about the friend's life, while a positive interaction with a stranger in one's neighbourhood requires no personal information. Nonetheless, the number of positive interactions an individual can have is limited by time. Therefore, as individuals have a finite amount of time in which they can engage in contact with others, individuals who engage in more ingroup contact should engage in less outgroup contact, and vice versa. Due to the greater capacity limits on friendship than more casual forms of contact, the negative relationship between ingroup and outgroup friendship is likely to be stronger than the negative relationship between more casual types of ingroup and outgroup contact.

Importantly, a negative relationship between ingroup and outgroup contact could have significant implications for individuals' attitudes towards outgroups. Research has shown that outgroup contact improves outgroup attitudes (Pettigrew & Tropp, 2006). If individuals engage in ingroup contact at the expense of outgroup contact, the potential

positive effects of outgroup contact will be constrained. Therefore, assuming a limit to the amount of contact individuals can have, and a positive effect of outgroup contact on outgroup attitudes, engagement in ingroup contact would hinder the improvement of outgroup attitudes, as the benefits of outgroup contact would not be obtained.

Thus far I have outlined theoretical reasoning for a negative relationship between ingroup and outgroup contact, which results from time and cognitive constraints. Only one study to date has empirically tested this hypothesis. Pfister et al. (2020) examined the effects of the total number of friends individuals have at a given time on the numbers of ingroup and outgroup friends individuals have at a later time. The sample consisted of 6,600 ethnic majority and minority adolescents in schools across Germany, Sweden, and the Netherlands. The researchers found that the number of friends individuals initially had negatively predicted the numbers of ingroup and outgroup friends individuals had one year later. This was proposed to result from individuals with more friends being unable and unmotivated to form new friendships over time, because such individuals have already reached the upper limit on the number of friendships they can maintain.

Pfister et al. (2020) contended that their findings indicate an overall capacity limit on the number of friendships individuals can maintain. However, the findings may alternatively be the result of the measures employed in the study. The study used a network measure of friendship, in which students nominated up to five classmates as friends. As students were unable to nominate more than five friends, a limit on the number of friendships individuals could have was artificially imposed by the study's methodology. The study's findings could be a result of this methodological artefact. Individuals who initially nominated a greater number of friends (e.g., five friends) were unable to subsequently report more friends, even if they formed new friendships over

time, because the study limited friendship to five nominations. For example, if Student A initially had three friends, and Student B initially had five friends, and over time both students formed two new friendships, both students would only be able to later nominate five friends, despite Student A having five friends and Student B having seven friends. This could result in the number of friends individuals initially report negatively predicting the number of friends individuals later report. That being said, Pfister et al. found that individuals reported, on average, three friends (M = 2.62, SD = 1.37), which indicates that the majority of students did not reach the artificial capacity limit imposed by the study's methodology. Consequently, it remains uncertain whether the study's findings result from a capacity limit on friendship or methodology. Therefore, further research is required to determine whether capacity limits on friendship influence the number of ingroup and outgroup friends individuals have.

In this thesis, I examine whether there is a negative relationship between ingroup and outgroup contact, regarding both friendship and more casual forms of contact. To extend the findings of Pfister et al. (2020), I use multiple measures of friendship and contact, including both network and self-report measures. I vary the number of possible nominations in the network measures of friendship, and include a crucial measure in which individuals can nominate an unlimited number of friends. Based on research investigating cognitive and time constraints on social relationships, I hypothesise that there will be a negative relationship between ingroup and outgroup contact, and that the relationship is likely to be stronger for friendship than more casual types of contact. I test these hypotheses in Chapter 2, across six cross-sectional studies and four longitudinal studies.

Notably, by investigating the relationship between ingroup and outgroup contact, I simultaneously examine individuals' levels of engagement in ingroup and

outgroup contact. As a wealth of research has demonstrated the relative prevalence of ingroup contact as compared to outgroup contact (e.g., McPherson et al., 2001; Windzio & Bicer, 2013), I expect individuals to engage in significantly more ingroup than outgroup contact. However, there is likely to be variation in the levels of ingroup and outgroup contact for different majority and minority groups, which results from underlying differences in contact opportunity structures. Members of numerical minority groups have fewer opportunities for ingroup contact, and more opportunities for outgroup contact, in comparison to members of numerical majority groups (Barlow et al., 2013; Smith et al., 2016). As there are likely to be significant majority-minority differences in engagement in ingroup and outgroup contact, I examine the relationship between ingroup and outgroup contact separately for different groups.

1.2.2 The Effects of Ingroup Contact on Attitudes

While many studies have investigated the effects of outgroup contact on outgroup attitudes, few studies have investigated the corresponding effects of ingroup contact. Moreover, the sparse existing evidence regarding the role of ingroup contact seems to be inconclusive, with several studies identifying significant effects (e.g., Levin et al., 2003), and other studies identifying no significant effects (e.g., Munniksma et al., 2015). The inconsistent findings are likely the result of great variation in the methods employed across the few studies which have examined ingroup contact. Overall, the scarcity of research, inconsistent methodology, and mixed findings lead to uncertainty concerning the effects of ingroup contact on attitudes, and further research is required.

Wilder and Thompson (1980) proposed that ingroup contact may increase attraction to, identification with, and the salience of norms favouring the ingroup, and thus have negative effects on intergroup relations. To investigate their proposal, Wilder

and Thompson conducted the first empirical test of the effects of ingroup contact on intergroup relations. The researchers experimentally manipulated the amount of contact college students had with members of their own college (the ingroup) or a rival college (the outgroup) during cooperative problem-solving tasks. Following the contact manipulation, students completed a range of outcome measures, which assessed different forms of ingroup bias. Ingroup bias refers to the tendency to evaluate ingroups more favourably than outgroups, and is most commonly operationalised as the difference score between self-reported ingroup attitudes and outgroup attitudes. The study assessed ingroup bias in terms of attitudes towards both members of the ingroup and outgroup involved in the experimental cooperative tasks and the wider targets of ingroup and outgroup students in each college. Overall, the results indicated that outgroup contact reduced ingroup bias, while ingroup contact accentuated ingroup bias. Having identified an effect of ingroup contact on ingroup bias, Wilder and Thompson concluded that the "limitation of in-group contact may be an effective strategy for reducing intergroup bias" (p. 600).

However, contact only affected ingroup bias regarding representatives of the ingroup and outgroup involved in the experiment, and did not influence ingroup bias regarding the wider ingroup and outgroup college populations. This is an important caveat, because the generalisation of attitude change from the individuals involved in the contact experience to the wider group is crucial in order for contact to have meaningful effects on intergroup relations (Brown & Hewstone, 2005). Wilder and Thompson proposed that the lack of generalisation to the wider groups may have resulted from participants regarding the experimental environment as atypical of intercollege contact experiences. This explanation was voiced by participants in

additional follow-up interviews conducted by the researchers. This highlights a significant limitation of experimental research: it is difficult to induce realistic contact.

Using an alternative research method, Levin et al. (2003) also examined the effects of ingroup and outgroup contact on ingroup bias. The researchers conducted a longitudinal survey study at the University of California, Los Angeles (UCLA), with a sample of over 2,000 ethnic majority and minority students. For five years students completed annual surveys, which contained self-report measures of their numbers of ingroup and outgroup friends, and ingroup bias (operationalised as the difference between students' attitudes towards the wider ingroup and outgroup). The researchers found that over time having more ingroup friends increased ingroup bias, while having more outgroup friends decreased ingroup bias. Through the demonstration of generalisation to the wider ingroup and outgroup, in addition to the large sample size and longitudinal design, this study provides more convincing evidence that ingroup contact increases ingroup bias.

Other studies have found that ingroup contact influences alternative measures relating to intergroup relations. For example, ingroup contact has been shown to increase identification with the ingroup (Maliepaard & Phalet, 2012; Phinney et al., 2001). Furthermore, research has shown that ingroup contact influences minority group members' political attitudes regarding ethnic inequality, such that ingroup contact increases support for reparative policies benefitting the ingroup (Sengupta & Sibley, 2013; Sengupta et al., 2015). Although these studies do not consider attitudinal outcomes, the studies indicate that ingroup contact has important implications for other aspects of intergroup relations, especially for members of minority groups.

Significant effects of ingroup contact on intergroup relations have also been demonstrated in studies which have examined approximations of ingroup contact. Sidanius et al. (2004), using the same UCLA data set as used by Levin et al. (2003), found that membership in university ethnic organisations and fraternities and sororities increased students' sense of ethnic victimisation, prejudice and perceived group conflict. Membership was assumed to entail increased opportunities for ingroup contact, as ethnic organisations predominantly accommodated ethnic minority groups, while fraternities and sororities predominantly accommodated the ethnic majority group. Relatedly, Smith et al. (2008) found that subliminal exposure to ethnic ingroup faces led to more negative outgroup attitudes in a series of experiments. Both of these studies suggest that greater exposure to ingroup members negatively affects various measures of intergroup relations. However, greater exposure to ingroup members and increased opportunities for ingroup contact are both substantially different from actually engaging in contact (Hewstone & Schmid, 2014); therefore, these studies provide limited insights into the effects of actual ingroup contact.

The research discussed thus far suggests that ingroup contact significantly influences various measures of intergroup relations. Other studies, however, have found no effects of ingroup contact on intergroup relations. Munniksma et al. (2015) examined the longitudinal effects of ingroup contact and outgroup contact on outgroup attitudes. The sample consisted of 224 ethnic minority adolescents in the Netherlands. At three timepoints over one academic year, minority adolescents completed measures of attitudes towards the ethnic outgroup and friendships with ethnic minority and majority group peers in school. While outgroup friends were found to be associated with more positive outgroup attitudes, the researchers found no association between ingroup friends and outgroup attitudes.

Van Laar et al. (2005), again using the UCLA data set, also identified no significant effects of ingroup contact on intergroup relations. The researchers examined the longitudinal effects of living with ethnic ingroup and outgroup roommates in university accommodation on ingroup attitudes, outgroup attitudes, and symbolic racism. Having ingroup roommates was not significantly associated with the outcome measures. Of course, this study only examined an approximation of ingroup contact, as being roommates does not necessarily entail positive contact experiences.

Overall, studies examining the effects of ingroup contact on intergroup relations have produced mixed findings. This is likely to result at least in part from the great variation in the measures employed in this research. Only three of the studies (Levin et al., 2003; Munniksma et al., 2015; Wilder & Thompson, 1980) examined actual (not approximate) measures of ingroup contact and attitudinal outcome measures. These studies are most relevant to this thesis, which considers the effects of ingroup and outgroup contact on ingroup and outgroup attitudes. However, even when considering only these three studies, the results remain mixed.

One key potential explanation for the inconsistent findings across the three most relevant studies regards the attitudinal outcome measures. Both Wilder and Thompson (1980) and Levin et al. (2003) employed a measure of ingroup bias, and found that ingroup contact increased ingroup bias. The two studies operationalised ingroup bias as the difference score between ingroup attitudes and outgroup attitudes. Accordingly, it is uncertain whether ingroup contact increases ingroup bias by improving attitudes towards the ingroup, worsening attitudes towards the outgroup, or both. Phrased differently, a positive effect of ingroup contact on ingroup attitudes, or a negative effect of ingroup contact on outgroup attitudes, would each result in ingroup contact increasing ingroup bias. Therefore, to establish the role of ingroup contact, ingroup

attitudes and outgroup attitudes must both be studied as separate outcome variables. Munniksma et al. (2015) employed a measure of outgroup attitudes (but did not measure ingroup attitudes), and found that ingroup contact did not affect outgroup attitudes. When considering the findings of the three studies together, they suggest that ingroup contact increases ingroup bias by improving ingroup attitudes (not worsening outgroup attitudes). However, none of these studies actually examined ingroup attitudes as an outcome variable. Moreover, the small and specific sample examined by Munniksma et al. (i.e., 224 ethnic minority adolescents in the Netherlands) limits the generalisability of this conclusion. Therefore, further research is required in order to establish the effects of ingroup contact on both outgroup and ingroup attitudes.

The investigation of ingroup and outgroup attitudes as independent outcome variables is important for reasons beyond disentangling the effects of contact on ingroup bias. As discussed earlier, ingroup attitudes and outgroup attitudes are distinct constructs, and both have important implications for the overarching relationships between groups (Brewer, 1999). For example, both may lead to intergroup discrimination. Greenwald and Pettigrew (2014) contended that positive ingroup attitudes account for the majority of subtle forms of discrimination, which are most prevalent in many societies, while negative outgroup attitudes are more likely the cause of more extreme forms of discrimination. As both ingroup and outgroup attitudes have significant real-world implications, both warrant research attention.

A further potential issue regarding research examining ingroup contact to date is its inability to determine the likely direction of effects. The issue of selection bias may hinder not only research examining outgroup contact (Pettigrew, 1998), but also ingroup contact. For example, it is equally plausible that ingroup contact may improve ingroup attitudes, or that individuals with more positive ingroup attitudes choose to engage in

more ingroup contact. With the exception of Wilder and Thompson (1980), research examining ingroup contact consists of survey studies. These studies have used longitudinal analysis techniques that conflate between-person stability and within-person change (Hamaker et al., 2015). As previously discussed, RI-CLPM (Hamaker et al., 2015) can separate between-person stability and within-person change and accordingly provide better evidence indicating the directionality of the observed relations. However, no study to date has used RI-CLPM to investigate ingroup contact.

In order to extend the findings of prior research, in this thesis I examine the effects of ingroup contact on both outgroup attitudes and ingroup attitudes. Based on the sparse but nonetheless informative prior research, I propose the tentative hypothesis that ingroup contact will have a positive effect on ingroup attitudes, but will not reliably affect outgroup attitudes. I test my hypothesis using four longitudinal survey studies and analyse the data using RI-CLPM. This research question in addressed in Chapter 3.

I further investigate whether there are differences in the effects of ingroup contact on ingroup and outgroup attitudes dependent on pertinent intergroup context factors and individual differences. Research suggests that there may be significant variation across different groups in the effects of ingroup contact. For example, Phinney et al. (2001) found significant differences in the effects of ingroup contact on ingroup identification between Armenian, Vietnamese and Mexican immigrant groups in the United States. Additionally, there are likely to be differences between majority and minority groups, because members of numerical minority groups have fewer opportunities for ingroup contact than do members of numerical majority groups (Barlow et al., 2013; Smith et al., 2016). Furthermore, the effects of ingroup contact are likely to differ with regard to age. Attitudes are more malleable at younger ages, when attitudes are still developing, and change to a lesser degree with increasing age

(Krosnick & Alwin, 1989; Sears, 1986; Wölfer et al., 2016). To the extent that attitudes are more amenable to change in youth, ingroup contact may have a greater effect on attitudes in younger as compared to older age groups. Moreover, individuals are particularly susceptible to influence through ingroup norms in youth (Abrams & Rutland, 2008; Nesdale, 2004), which further suggests that ingroup contact may be more influential for younger people. Notably, there may also be differences depending on the type of ingroup contact, akin to the differences identified between friendship and more casual interactions in research examining outgroup contact (Davies et al., 2011). However, the scarcity of research examining ingroup contact results in limited variation in the type of contact considered; therefore, it remains unclear whether the type of ingroup contact influences its impact. Overall, there is likely to be variability across multiple dimensions in the effects of ingroup contact. Accordingly, I investigate this variation in Chapter 3, to identify any important differences in ingroup contact effects and assess the robustness of my findings.

1.2.3 Attitude Socialisation

Thus far, I have discussed the effects of having more or less contact on ingroup and outgroup attitudes. There are, however, additional ways in which contact, particularly friendships, may shape attitudes. Research has shown that individuals' attitudes are shaped not only by having friends, but also by the attitudes held by their friends (e.g., Van Zalk et al., 2013). This leads to the attitudes held by individuals and their friends becoming more similar over time. Research further suggests that individuals' attitudes may be influenced to a greater extent by their ingroup friends' attitudes than their outgroup friends' attitudes (e.g., Abrams et al., 1990; Stangor et al., 2001; Thijs & Verkuyten, 2011), however, no study to date has compared these effects. More broadly, the influence of friends' attitudes has largely been neglected in intergroup contact

research. The distinction between the effects of having friends and those friends' attributes, such as attitudes, on individuals is well established in developmental psychology (Bukowski et al., 1998; Hartup, 1996), but less so in social psychology. Accordingly, this distinction has been hitherto rarely considered when examining the effects of friendships on attitudes.

Individuals' attitudes may be influenced by the attitudes held by their friends through the process of socialisation (Kandel, 1978), which involves learning social norms in a given social context via influence, modelling and reinforcement from relevant others (Eder & Nenga, 2003). Friends are an important source of influence, and socialisation includes the process by which mutual friends' attitudes and behaviours become more similar over time (Veenstra et al., 2018).

Prior research has revealed considerable levels of attitudinal similarity between friends. For example, Stangor and Leary (2006) conducted a study in which 94 participants, consisting of 47 pairs of friends, independently completed surveys containing a battery of measures. They found that the measures of attitudes towards various ethnic and religious outgroups correlated highly between friends. Moreover, Kiesner et al. (2003) identified a significant positive correlation between friends' outgroup attitudes, and also between friends' ingroup attitudes. Significant similarity between friends has been identified regarding a wide range of measures relating to intergroup relations, for example, the tendency to vote for right-wing extremist parties also correlates between friends (Kuhn, 2004). Together, these studies show that friends share similar attitudes, including both outgroup and ingroup attitudes.

However, these cross-sectional studies cannot indicate the likely cause of attitudinal similarity among friends. Individuals tend to select those who are similar as

friends, regarding characteristics including attitudes (McPherson et al., 2001). Accordingly, attitudinal similarity among friends may result from either friends influencing each other's attitudes over time (a *socialisation* effect) or from individuals choosing to befriend others with more similar attitudes (a *selection* effect). Longitudinal studies are therefore required in order to determine whether attitudinal similarity among friends results from socialisation effects, selection effects, or both.

Subsequent research using longitudinal social network analysis has provided consistent evidence that socialisation can shape attitudes towards various groups. Van Zalk et al. (2013) examined the socialisation of xenophobic and tolerant attitudes towards immigrants in school friendship networks. The findings provided evidence of both selection and socialisation effects. Individuals befriended those with more similar attitudes. Moreover, friends significantly influenced each other's attitudes over the two-year study, so that friends' attitudes became increasingly similar over time. Other longitudinal studies of friendship networks have provided evidence for the socialisation of anti-immigrant sentiment (Hjerm et al., 2018; Miklikowska, 2017), homophobic attitudes (Poteat, 2007) and attitudes toward ethnic minorities (Zingora et al., 2020). Through the use of longitudinal social network analysis, these studies convincingly demonstrate that individuals' attitudes are influenced by the attitudes held by their friends.

These longitudinal studies did not, however, account for group membership in two important ways. Firstly, the studies examined attitudes towards specific ethnic and sexual minority groups, but the samples included participants belonging to these minority groups. Accordingly, for *majority* group participants *outgroup* attitudes were examined, while for *minority* group participants *ingroup* attitudes were examined. Therefore, these studies provide evidence for the general socialisation of attitudes

towards groups, but not necessarily attitudes towards outgroups or ingroups in particular. This is problematic for two reasons. First, it is also important to examine *majority* group participants' *ingroup* attitudes, and *minority* group participants' *outgroup* attitudes; yet no study to date has considered both these attitudes. Second, as there are substantial differences between ingroup and outgroup attitudes (for example, ingroup attitudes are comparatively more positive), the assumption that socialisation operates identically for ingroup and outgroup attitudes is dubious. Therefore, further research is required to examine the socialisation of ingroup attitudes and outgroup attitudes separately, for both majority and minority groups.

The second key way in which studies to date have not accounted for group membership concerns the group membership of friends. Studies thus far have not separated and compared socialisation through ingroup and outgroup friends. Instead, friends were considered to be equal sources of influence, regardless of whether they were ingroup or outgroup members. It is plausible that individuals may be influenced by ingroup friends and outgroup friends to differing extents (e.g., Abrams et al., 1990; Stangor et al., 2001; Thijs & Verkuyten, 2011). However, as yet studies have not separated the effects of ingroup friends' attitudes, and outgroup friends' attitudes, on individuals' attitudes. Accordingly, any potential differences in these effects remain undetected.

I contend that attitude socialisation is likely to occur primarily through ingroup, not outgroup, friends. Group norm theory (Sherif, 1936; Sherif & Sherif, 1953) showed, in classic research, that attitudes develop through compliance with ingroup norms. Later theoretical and empirical work by Festinger (1957) revealed that influence through ingroup norms was stronger than influence via outgroup norms. Social comparison theory (Festinger, 1954) argues that individuals evaluate their attitudes through

comparison with similar others and adjust their attitudes to achieve uniformity within a social group. Similarly, self-categorisation theory (Turner et al., 1987), specifically its concept of referent informational influence, proposes that individuals conform to the norms of the groups with which they identify, and that only ingroup members provide influential descriptive and prescriptive information. Together, these three theories argue that ingroup norms are more important than outgroup norms for shaping attitudes and behaviours.

In support of these theories, research has shown that social influence is stronger when exerted through ingroup than outgroup sources (Abrams et al., 1990). Regarding prejudicial norms, Stangor et al. (2001) compared the influence of experimental variations of ingroup norms and outgroup norms on individuals' racial stereotypes. The researchers exposed participants to consensus information regarding the racial stereotypes endorsed by either ingroup members or outgroup members. Participants subsequently adjusted their own racial stereotypes more in accordance with ingroup norms than outgroup norms. Studies have also demonstrated the effect of ingroup norms on attitudes in child and adolescent samples (e.g., Abrams & Rutland, 2008; McGuire et al., 2015). For example, Thijs and Verkuyten (2011) found that ingroup peer norms, but not outgroup peer norms, influenced adolescents' ingroup bias. Overall, this research shows that individuals adjust their attitudes to better align with the ingroup, rather than the outgroup. In turn, this suggests that individuals may adjust their attitudes in accordance with their ingroup friends' attitudes, not their outgroup friends' attitudes.

While research on ingroup norms is insightful, ingroup norms differ from socialisation through ingroup friends in important ways. Firstly, friendship is more personal, involving direct interactions and friend-to-friend influence, in contrast to knowledge regarding the collective beliefs of the ingroup. Secondly, the attitudes of the

ingroup as a whole may differ from the attitudes held by an individual's friends; each group member is subject to similar ingroup norms, whereas their friends vary idiosyncratically. Finally, in the absence of direct experimental manipulations of ingroup norms, these studies of norms assessed the influence of perceived group-level attitudes, which may be distorted through projection of the individual's own attitude (Thijs & Verkuyten, 2016; Thijs & Zee, 2019). In contrast, socialisation, as defined in this research, concerns the influence of an individual's friends' actual attitudes. These distinctions suggest that ingroup friends could potentially be even more influential than ingroup norms. Attitudes may be more amenable to change through long-term intimate interactions with friends than knowledge regarding group-level beliefs, and individuals may wish to align their attitudes more with familiar than unfamiliar ingroup members. Nonetheless, ingroup norms and ingroup friendship are interrelated. For example, individuals may view their ingroup friends as prototypical ingroup members, and ingroup friends may function as effective carriers of ingroup norms through frequent interactions.

Relatedly, socialisation is more likely to occur through friendship than more casual forms of contact. Experimental studies have indicated that the attitudes expressed by unfamiliar others in short interactions can influence individuals' attitudes. For example, Blanchard (1991) found that university students reported more racist opinions following exposure to a stranger (confederate) expressing racist opinions, and more antiracist opinions following exposure to a stranger expressing antiracist opinions, as compared to a no-exposure control condition. This suggests that attitude socialisation can occur through more casual interactions with strangers, although the same pattern of results could have arisen solely through demand characteristics. Either way, socialisation is more likely to occur through long-term intimate interactions within

friendships than short-term exposure to the opinions of unfamiliar others. An individual may be motivated to adjust their attitudes in accordance with another person's attitudes to the extent that the individual likes the other person, wishes to be liked by the other person, and intends to establish or maintain a social relationship with the other person (Sinclair et al., 2005). Each of these factors is more likely to be present in a friendship as compared to a casual interaction with an unfamiliar person. Moreover, the degree of exposure to others' attitudes is also greater in friendships than more casual forms of contact. It is highly likely that an individual will come to know their friends' attitudes over time. In contrast, an individual is unlikely to come to know the attitudes of an unfamiliar person during a short interaction. The likelihood of attitude socialisation increases to the extent that the attitudes of others are known.

Research has provided support for the notion that attitude socialisation occurs to a greater extent through friendship as compared to more casual forms of contact. Paluck (2011) conducted a field experimental intervention to determine the spread of intergroup attitudes and behaviours to others in a wider social network. The intervention consisted of training a subset of students termed *Peer Trainers* in five schools to engage in anti-prejudice attitudes and behaviours over a five-month period. The control group consisted of *Control Trainers* in five schools who were on a training waitlist. Interviews conducted with students at the end of the intervention indicated an improvement in Peer Trainers (but not Control Trainers) intergroup attitudes and behaviours. The improvement in Peer Trainers' behaviours spread to their friends and to a lesser extent to other students in the school. The improvement in Peer Trainers' attitudes spread somewhat to their friends, but not more widely to other students in the school. These findings show that individuals influence their friends' attitudes, but not the attitudes of others in the wider social environment. Other studies provide additional evidence for

particular facets of friendship increasing the likelihood of attitude socialisation. For example, Sinclair et al. (2005) found that participants' levels of implicit prejudice were influenced by the racial attitudes expressed by a confederate to the extent that the participants liked the confederate. If socialisation occurs to the extent that the other person is liked, socialisation is much more likely in friendships (which necessitate mutual liking) than more casual interactions.

Further studies of attitudinal similarity in friendships have suggested that the processes involved may not operate identically for members of majority and minority status groups. Garcia et al. (2017) examined the associations between friendship quality and similarity in racial attitudes in friendship dyads, and compared the associations for ethnic majority and minority groups in the United States. The results revealed that attitude divergence in friendship dyads was associated with poorer friendship quality for minority members, but not for majority members. The researchers proposed that attitude divergence was particularly damaging for minority group members' friendships because shared racial attitudes may be a crucial source of social support for minority group members, who are often subject to prejudice and discrimination. To support this claim, the researchers conducted a further study which found that minority group members reported personally caring more about racial issues than did majority group members. These findings suggest that attitude socialisation may be greater for majority than minority groups, because of the comparatively greater importance of shared attitudes regarding intergroup relations for minority groups.

In conclusion, prior research has provided evidence for attitude socialisation through friends, and research on norms suggests that ingroup friends may have a stronger influence than outgroup friends. This thesis examines, for the first time, the extent to which attitude socialisation occurs though ingroup friends, outgroup friends, or

both. I examine the socialisation of both outgroup attitudes and ingroup attitudes, and expect to find similar results for each. Specifically, I hypothesise that ingroup friends' attitudes will influence individuals' attitudes so that their attitudes become more similar over time. Based on prior literature investigating norms, I do not predict that outgroup friends' attitudes will influence individuals' attitudes. I also investigate differences in attitude socialisation between majority and minority groups, as research suggests that attitude socialisation may be stronger in minority groups. These research questions are addressed in Chapter 4 in a unique longitudinal social network study.

1.2.4 Summary

I have provided the theoretical and empirical rationale for three ways in which ingroup contact may influence ingroup and outgroup attitudes. To summarise, engagement in ingroup contact may limit engagement in outgroup contact, and consequently hinder the improvement of outgroup attitudes through outgroup contact. Furthermore, ingroup contact may in and of itself influence both outgroup attitudes and ingroup attitudes. Finally, ingroup contact may shape ingroup and outgroup attitudes through the process of attitude socialisation. However, the extent to which ingroup contact has these three effects remains unknown, due to the scarcity of research investigating the role of ingroup contact in shaping attitudes. This thesis addresses this lacuna, by empirically investigating the ways in which ingroup contact may influence both ingroup and outgroup attitudes.

Notably, as there appear to be sufficient grounds for speculating that ingroup contact may influence attitudes, it is surprising that research examining intergroup contact theory to date has almost exclusively ignored ingroup contact. Moreover, if ingroup contact does indeed shape attitudes, this could have significant implications for

intergroup contact theory. Most importantly, if ingroup contact is negatively related to both outgroup contact and outgroup attitudes, the well-established positive effects of increased outgroup contact on outgroup attitudes may, in fact, result from the negative effects of concurrently decreased ingroup contact on outgroup attitudes. Therefore, the benefits of outgroup contact, demonstrated over the past sixty years, could result, at least in part, not from increased outgroup contact, but from concurrently reduced ingroup contact. The role of ingroup contact could accordingly have significant theoretical implications, in addition to the real-life implications of influencing intergroup relations.

1.3 The Utility of Social Network Analysis

In outlining the relevant literature to date, I have occasionally highlighted the use of social network measures and social network analysis. Specifically, the studies highlighted have examined sociocentric networks, in which data are collected from all individuals within a given network, such as a school (e.g., Munniksma et al., 2013). This methodology has substantial benefits for research examining intergroup relations.

First, social network measures provide more robust estimates of friendship, especially outgroup friendship. Research examining the effects of outgroup friendship on outgroup attitudes typically compares individuals with more outgroup friends to individuals with fewer outgroup friends. Prior studies have relied predominantly on self-report measures of friendship, such as individuals' estimates of their number of outgroup friends (e.g., Swart et al., 2011). More recent investigations have begun to use network measures, in which individuals nominate specific individuals as friends (e.g., Wölfer et al., 2016). Individuals' numbers of ingroup and outgroup friends are then identified based on the correspondence between individuals' self-reported group

membership and their friends' self-reported group memberships. Network measures provide more robust estimates of friendship than self-report measures (Wölfer et al., 2015; Wölfer & Hewstone, 2017). This is because self-report measures refer to friends' group memberships, and social desirability bias can lead individuals to exaggerate the number of outgroup friends they report to appear more tolerant (Smith, 2002). Network measures reduce social desirability bias, as participants nominate specific individuals as friends without reference to group membership (the group membership of nominated friends is only afterwards assessed, by the researchers). Therefore, in comparison to self-report measures, network measures provide more objective and less biased estimates of friendship. Accordingly, recent studies using network measures provide more robust evidence for the positive effect of having more outgroup friends on outgroup attitudes (e.g., Munniksma et al., 2013; Wölfer et al., 2016).

Second, social network measures provide more accurate estimates of the attitudes held by individuals' friends. Individuals are unlikely to be able to accurately report their friends' attitudes: individuals may be unaware of their friends' attitudes, or their perceptions of their friends' attitudes may be distorted through projection of their own attitudes (Thijs & Verkuyten, 2016; Thijs & Zee, 2019). In contrast, social network measures determine friends' attitudes by first identifying the friends each individual nominates in the network, and then directly assessing the friends' self-reported attitudes. Therefore, social network measures provide a more objective and accurate estimate of the attitudes held by each individual's friends. An accurate measure of the attitudes held by individuals' friends is required in order to successfully examine attitude socialisation.

Furthermore, attitude socialisation is best examined through the use of social network *analysis*, in addition to social network *measures*. Attitude socialisation can be

conceptualised as a moderation of the relationship between friends and attitudes. That is, the relationship between the number of (ingroup/outgroup) friends and (ingroup/outgroup) attitudes may be moderated by the friends' attitudes. If individuals' attitudes are influenced by the attitudes held by their friends, then friendships with those holding negative attitudes may worsen individuals' own attitudes, while friendships with those holding positive attitudes may improve individuals' own attitudes. Accordingly, attitude socialisation could be examined using moderation analysis. However, social network analysis provides a more accurate examination of attitude socialisation. In comparison to moderation analysis, social network analysis provides better evidence indicating directionality, by determining the extent to which attitude similarity results from socialisation or selection effects. In social network analysis, selection effects are determined by modelling the likelihood of an individual selecting specific others in the network as friends on the basis of their attitudes. This is not possible in alternative analysis techniques. Accordingly, studies examining attitude socialisation have used social network analysis (e.g., Van Zalk et al., 2013; Zingora et al., 2020). Specifically, these studies have used RSiena co-evolution modelling (Ripley et al., 2019).

These studies did not, however, disentangle the effects of attitude socialisation through ingroup and outgroup friends, because of the hitherto insuperable problem of statistically separating these effects. Building on recent methodological advances, I have developed a novel analysis technique using RSiena co-evolution modelling, which enables me to disentangle attitude socialisation effects through ingroup and outgroup friends. Accordingly, my innovative adaptation of longitudinal social network analysis uniquely enables the examination of my hypotheses concerning the effects of ingroup and outgroup friends' attitudes on individuals' attitudes.

Social network analysis also has more widely applicable advantages, which benefit all studies examining intergroup relations, in addition to studies of attitude socialisation. Most notably, social network analysis enables researchers to examine friendships within the social context and consequently control for important contextual influences on friendships (Snijders et al., 2010). These controls consist primarily of structural effects of the network, which capture how the network itself influences friendship choices. Structural effects have substantial impacts on friendships and, therefore, represent important confounding effects (Snijders et al., 2007). For example, whether an individual chooses to befriend an ingroup or outgroup member is influenced by triadic closure, which is the tendency for individuals to befriend their friends' friends. The exclusion of structural effects like triadic closure can lead to biases in the estimates for other effects, including the key hypothesised effects. Accordingly, analysis techniques other than social network analysis are suboptimal methods with which to analyse network data, as many established effects influencing network structure are ignored (Snijders et al., 2010). In contrast, studies which examine intergroup relations using social network analysis can control for important aspects of the social context, making their findings more valid (e.g., Stark, 2015, 2020).

Finally, it is important to note that social network measures and social network analysis also have limitations. The most relevant limitation for studies of intergroup relations is that the relationships examined are restricted to a specific network boundary (Clifton & Webster, 2017). For example, only relationships within a classroom or school are examined (e.g., Munniksma et al., 2013). The network boundary can significantly influence the findings of studies, such as the degree of ethnic segregation identified (Leszczensky & Pink, 2015). Furthermore, individuals form relationships in multiple contexts, and by examining relationships within only one context studies may

miss the potentially important effects that relationships outside of this context may have on attitudes. For example, if examining friendship networks in schools, studies may miss the potential influence of family members on children's outgroup attitude development (Miklikowska, 2017).

Additionally, while social network measures of relationships such as friendships may be more robust than self-report measures, social network measures cannot accurately assess more casual forms of contact. Individuals are unlikely to be able to name, and subsequently nominate as a network connection, all people they have positive interactions with. For example, names are rarely learnt during short interactions between strangers. Accordingly, social network measures cannot capture the wide range of interactions that comprise more casual forms of contact. Therefore, researchers should tailor their choice of methodology to the specific research question under examination, as social network studies may better examine certain research questions but not others.

1.4 Overview of Thesis

In this chapter, I have reviewed the extant literature concerning the ways in which ingroup and outgroup contact shape ingroup and outgroup attitudes. Furthermore, I have identified several significant lacunae in this literature. An extensive body of empirical research examining intergroup contact theory has shown that outgroup contact improves outgroup attitudes. However, few studies have investigated the effects of outgroup contact on *ingroup* attitudes. Moreover, research has largely ignored the corresponding role of ingroup contact in shaping attitudes towards both the ingroup and outgroup. This is a potentially significant omission, because ingroup contact may limit engagement in

outgroup contact, directly affect attitudes, and shape attitudes through the process of socialisation.

This thesis aims to address these lacunae, and in so doing contribute substantially to our understanding of the ways in which both ingroup and outgroup contact shape ingroup and outgroup attitudes. To this end, I propose a new theoretical model, shown in Figure 1.1, which depicts the ways in which contact may shape attitudes. I test each component of this model across the three empirical chapters in this thesis. The following sections detail the model components, and the corresponding research questions and hypotheses, addressed in each empirical chapter.

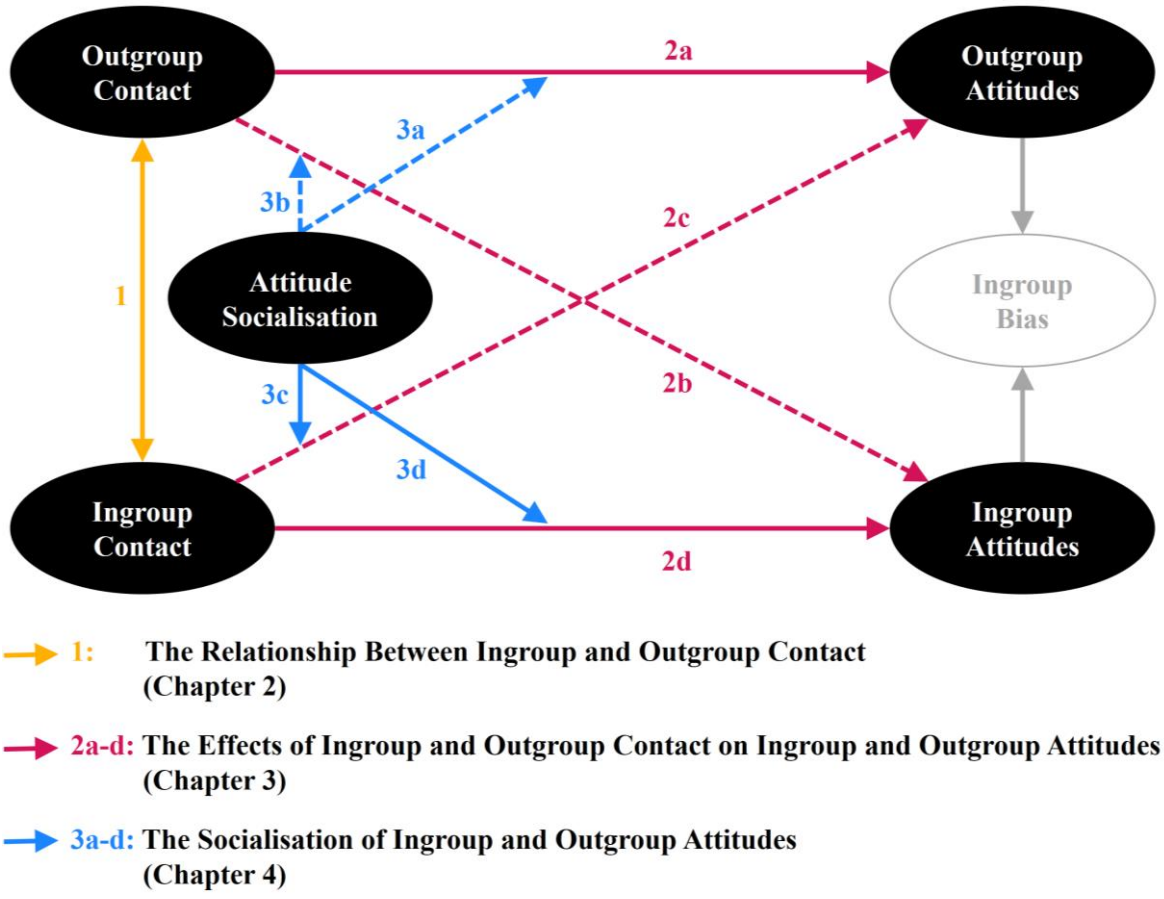


Figure 1.1. Proposed model of how ingroup and outgroup contact shape ingroup and outgroup attitudes. In Chapter 2, I examined Path 1 (depicted in yellow), in Chapter 3, I examined Paths 2a-d (depicted in red), and in Chapter 4, I examined Paths 3a-d (depicted in blue). I hypothesised significant effects for Paths 1, 2a, 2d, 3c and 3d (depicted as bold lines), but not Paths 2b, 2c, 3a and 3b (depicted as dashed lines).

In Chapter 2, I investigate the relationship between ingroup and outgroup contact. This corresponds to Path 1 (shown in yellow) in Figure 1.1. Based on research investigating cognitive and time constraints on the number of social relationships individuals can maintain, I hypothesise that there will be a negative relationship between ingroup and outgroup contact. Furthermore, I hypothesise that the negative relationship will be stronger for friendship than more casual types of contact, due to the greater capacity limits on friendship than casual contact. These hypotheses concern concurrent levels of ingroup and outgroup contact and do not imply directionality or causality. Therefore, the relationship between ingroup and outgroup contact can be assessed with both cross-sectional and longitudinal data. Consequently, I test these hypotheses across six cross-sectional studies and four longitudinal studies. By investigating these hypotheses in multiple studies, I can assess the robustness of my findings across different groups, and assess the reliability of my findings across multiple measures of friendship and contact.

In Chapter 3, I investigate the effects of ingroup and outgroup contact on ingroup and outgroup attitudes. This corresponds to Paths 2a-d (shown in red) in Figure 1.1. Based on the findings of prior research investigating outgroup contact, I hypothesise that outgroup contact will have a positive effect on outgroup attitudes, but will not reliably affect ingroup attitudes. In contrast, based on the limited research investigating ingroup contact, I hypothesise that ingroup contact will have a positive effect on ingroup attitudes, but will not reliably affect outgroup attitudes. Therefore, with regard to the model shown in Figure 1.1, I expect to find evidence in support of Paths 2a and 2d, but not Paths 2b and 2c. To disentangle between-person stability and within-person change, I analyse the data using RI-CLPM (Hamaker et al., 2015). Notably, as this research question concerns directional effects, it requires longitudinal

data. Accordingly, I test these hypotheses across four longitudinal studies. By investigating these hypotheses in multiple studies, I can assess the robustness of my findings across different ethnic groups, age groups and types of contact, and identify any important differences across these dimensions.

In Chapter 4, I examine the socialisation of ingroup and outgroup attitudes. This corresponds to Paths 3a-d (shown in blue) in Figure 1.1. I investigate the extent to which attitude socialisation occurs though ingroup friends, outgroup friends, or both. I examine the socialisation of both outgroup attitudes and ingroup attitudes, and expect to find similar results for each. Specifically, I hypothesise that ingroup friends' attitudes will influence individuals' attitudes so that their attitudes become more similar over time. In contrast, I do not predict that outgroup friends' attitudes will influence individuals' attitudes. Therefore, with regard to the model depicted in Figure 1.1, I expect to find evidence in support of Paths 3c and 3d, but not Paths 3a and 3b. I further investigate differences in attitude socialisation between majority and minority groups, because research suggests that attitude socialisation may be comparatively stronger for minority group members. Importantly, longitudinal social network analysis is required in order to examine attitude socialisation. Accordingly, I test these hypotheses in one unique longitudinal social network study.

To summarise, this thesis tests multiple hypotheses. In Chapter 2, I test the hypotheses that there will be a negative relationship between ingroup and outgroup contact, and that the relationship will be stronger for friendship than more casual types of contact. In Chapter 3, I test the hypotheses that outgroup contact will have a positive effect on outgroup attitudes (but will not reliably affect ingroup attitudes), and that ingroup contact will have a positive effect on ingroup attitudes (but will not reliably affect outgroup attitudes). Finally, in Chapter 4, I test the hypotheses that ingroup

friends' attitudes will influence individuals' attitudes, while outgroup friends' attitudes will not influence individuals' attitudes. Each hypothesis is tested using different state-of-the-art analysis techniques, tailored to best assess the specific hypothesis under examination. I use a range of sophisticated techniques, including longitudinal social network analysis (RSiena co-evolution modelling), random-intercept cross lagged panel modelling (RI-CLPM), latent growth modelling, and meta-analysis.

The hypotheses are tested in a diverse set of studies. Intergroup contact theory has been examined using a wide range of research designs. The literature consists predominantly of survey studies, but also includes experimental studies, social network studies, and many others. The differing approaches each have strengths and limitations; for example, survey studies provide higher external validity, while experimental studies provide higher internal validity and can yield strong evidence of causality. No particular research design is best; instead, there are better and worse designs with which to test particular research questions, and the optimal solution may be to try to triangulate findings across a range of different methodological approaches. Therefore, the choice of research design should be made in light of the specific research questions and hypotheses under investigation.

Consequently, this thesis consists of a combination of survey and social network studies, for several key reasons. First, I investigate limits on the amount of contact individuals can have with ingroup and outgroup members. This precludes the use of experimental designs, because if contact were experimentally manipulated, the extent to which it naturally occurs could not be assessed. Second, I investigate outgroup friendship as an optimal form of contact, and the extent to which friendship can be successfully simulated in experimental settings is uncertain, as previously discussed regarding the fast friends procedure. Third, by using RI-CLPM a key disadvantage of

survey studies, that is, the inability to infer directionality, can be ameliorated by disentangling within-person and between-person effects (Hamaker et al., 2015). Fourth, intergroup relations are important real-world phenomenon, and both survey and social network studies provide higher external and ecological validity, by examining contact as it occurs in the real world. Furthermore, by combining survey studies and social network studies, I can exploit the strengths and mitigate the limitations of each. For example, I can obtain more robust estimates of friendship through social network measures, and capture the wide range of interactions that comprise more casual forms of contact through self-report measures.

This thesis comprises 10 studies across the three empirical chapters. I provide the key details of the studies in Table 1.1, and the studies are described in greater detail in the empirical chapters. Together, the studies draw on a total sample of 34,944 participants across four countries (the United Kingdom, United States, South Africa, and New Zealand). Four studies consist of primary data, while six studies consist of secondary data. In Appendix A, I present acknowledgements of the researchers involved in each study. Four studies are longitudinal (one social network study and three survey studies), while six studies are cross-sectional (two social network studies and four survey studies). The studies vary with regard to the country, social context, age groups, and ethnic and religious groups examined. Consequently, I am able to identify any important differences across these dimensions, and assess the robustness and generalisability of my findings.

Different parts of the data from the various studies are included in different chapters. Chapter 2 includes all 10 studies, as the hypotheses in this chapter can be tested in the six cross-sectional studies, in addition to the four longitudinal studies. Chapter 3 includes the four longitudinal studies (Studies 2a, 2b, 2c, and 2d), as

longitudinal data is required in order to test the hypotheses in this chapter. Finally, Chapter 4 includes the one longitudinal social network study (Study 2c), because the hypotheses tested in this chapter require longitudinal social network data.

Together, these studies dramatically increase the quantity of research examining ingroup contact (in addition to outgroup contact). Only one study to date has examined the relationship between ingroup and outgroup contact (Pfister et al., 2020). Furthermore, only three studies to date have examined the effects of ingroup contact on attitudes (Levin et al., 2003; Munniksma et al., 2015; Wilder & Thompson, 1980). Finally, no study to date has examined attitude socialisation through ingroup and outgroup friends. Accordingly, the 10 studies reported in this thesis significantly increase the volume of empirical data on ingroup contact. Moreover, through these studies, this thesis aims to contribute substantially to our understanding of the ways in which ingroup contact, in addition to outgroup contact, shapes attitudes.

Table 1.1. Overview of Studies

Study	Study Type	Empirical Chapters	Primary or Secondary Data	Number of Waves	Sample Size	Sample Age (Years)	Location	Groups
1a	Survey	1	Secondary	1	3,435	18-65	South Africa	White/Coloured/Indian/Black South African
1b	Survey	1	Secondary	1	984	18-96	Northern Ireland	Protestant/Catholic
1c	Survey	1	Secondary	1	4,083	13-80	Great Britain	White/Asian/Black British
1d	Survey	1	Primary	1	851	18-87	USA	White/Black African American
1e	Social Network	1	Primary	1	180	11-12	England	White/Asian British
1f	Social Network	1	Primary	1	178	13-14	England	White/Asian British
2a	Survey	1, 2	Secondary	6	2,132	17-25	USA	White/Asian/Latino/Black African American
2b	Survey	1, 2	Secondary	5	1,203	11-14	England	White/Asian British
2c	Social Network	1, 2, 3	Primary	5	1,170	11-14	England	White/Asian British
2d	Survey	1, 2	Secondary	5	20,728	16-105	New Zealand	New Zealand European/Māori

CHAPTER 2: THE RELATIONSHIP BETWEEN INGROUP AND OUTGROUP CONTACT

In Chapter 1, I reviewed research suggesting that individuals can only maintain a limited number of friendships and engage in a limited amount of contact. To summarise this literature, individuals can only maintain a maximum of approximately 150 social relationships (Dunbar, 1998). This is widely referred to as *Dunbar's number*. The limit on the number of social relationships individuals can maintain results from both cognitive and time constraints (e.g., Dunbar, 1998; Dunbar et al., 2009). Furthermore, there is a limit on the quantity of more casual social interactions individuals can have, as individuals have a finite amount of time in which they can engage in contact with others (e.g., Saramäki et al., 2014; Tooby & Cosmides, 1996).

Overall, this literature claims that there exists a limit on both the number of friends individuals can maintain, and the amount of more casual contact individuals can engage in. Accordingly, I contended that individuals with more ingroup friends should have fewer outgroup friends, and vice versa, and that individuals who engage in more casual ingroup contact should engage in less casual outgroup contact, and vice versa. In Chapter 1, I discussed the one empirical study to date which has investigated capacity limits on individuals' numbers of ingroup and outgroup friends (Pfister et al., 2020). I detailed how the findings could potentially have been influenced by the study's methodology, which imposed an artificial capacity limit on friendship, and I consequently proposed that further research is required, which employs different methods.

In this chapter, I examine whether there is a negative relationship between ingroup and outgroup contact, regarding both friendship and more casual forms of contact. Figure 2.1 situates the research question this chapter addresses within the

broader model used in this thesis, as proposed in Chapter 1. Specifically, in this chapter, I test the hypotheses that there will be a negative relationship between ingroup and outgroup contact, and that this relationship will be stronger for friendship than for more casual types of contact. This prediction is based on the assumption that friendships require more time, and both more cognitive and social-emotional resources than do casual interactions. The number of friendships an individual can maintain is limited by both cognitive and time constraints (e.g., Dunbar, 1998; Dunbar et al., 2009), while the amount of contact an individual can have is only limited by time constraints (e.g., Saramäki et al., 2014; Tooby & Cosmides, 1996). Furthermore, as compared to more casual types of contact, the time devoted to one set of friendships is more likely to deny time to other friendships. In order to distinguish between friendship and more casual forms of contact, I hereafter use the term *generic contact* to refer to more casual forms of positive contact, in accordance with the terminology used in prior research (e.g., Voci et al., 2015).

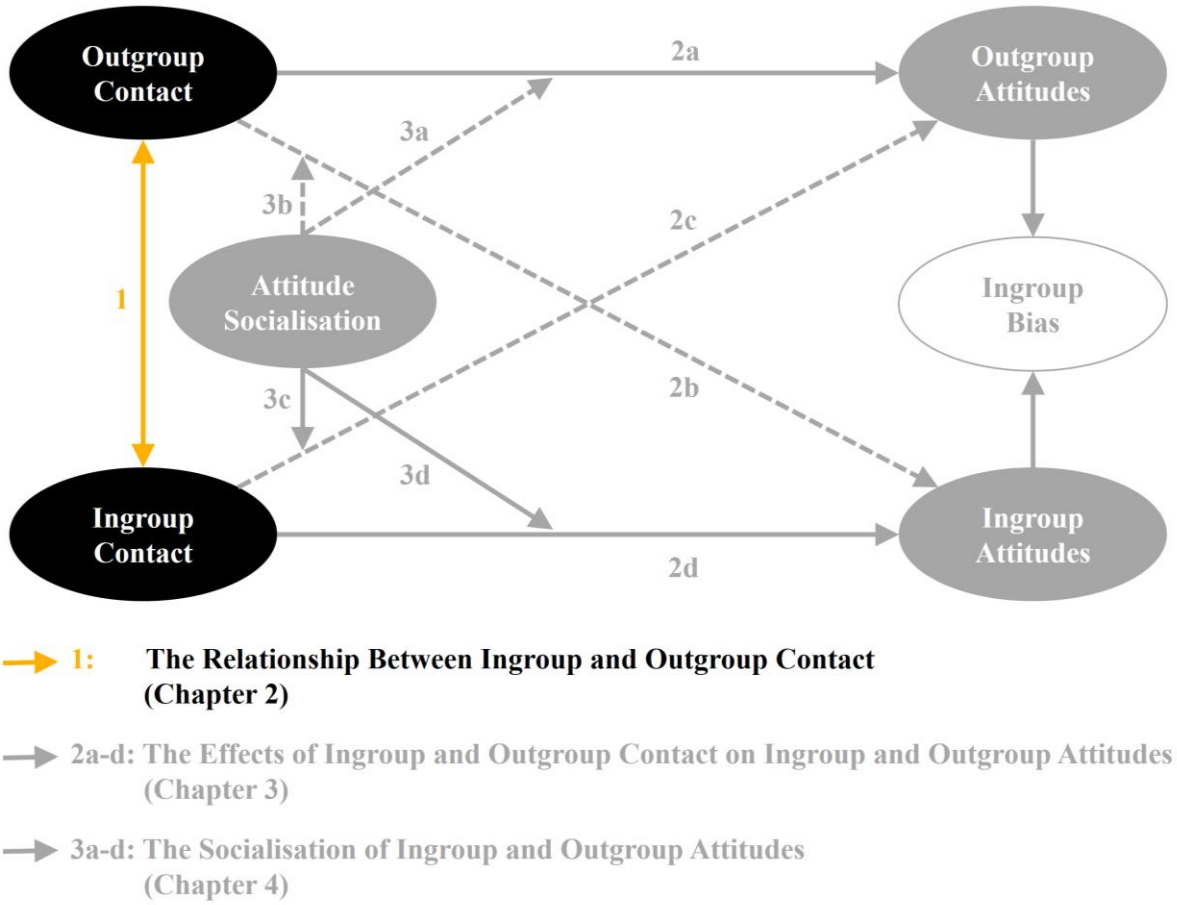


Figure 2.1. The relationship between ingroup and outgroup contact. In this chapter, I examined Path 1 (depicted in yellow). I hypothesised a significant effect for Path 1 (denoted by the bold line, in contrast the dashed lines denoting non-significant effects).

Importantly, a negative relationship between ingroup and outgroup contact could have significant implications for individuals' attitudes towards outgroups. If individuals engage in ingroup contact at the expense of outgroup contact, the potential positive effects of outgroup contact on outgroup attitudes will be constrained.

In this chapter, I investigate both the cross-sectional and longitudinal relationships between ingroup and outgroup contact. Capacity limits on contact would theoretically result in a negative relationship both cross-sectionally and longitudinally. At any given time, there should be a negative relationship between ingroup and outgroup contact, as individuals who engage in more ingroup contact should engage in less outgroup contact, and vice versa. Furthermore, research has demonstrated that

individuals' numbers of social relationships, and frequency of contact within social relationships, remain highly stable over time, despite considerable changes in the identity of the social relations (Saramäki et al., 2014). Therefore, there should also be a negative relationship between ingroup and outgroup contact when examined longitudinally. That is, as engagement in ingroup contact increases over time, engagement in outgroup contact should concurrently decrease, and vice versa. To test both of these predictions, this chapter examines the cross-sectional and longitudinal relationships between ingroup and outgroup contact.

I investigated the relationship between ingroup and outgroup contact across ten studies, of which six were cross-sectional and four were longitudinal. The studies used different measures of ingroup and outgroup contact, including both self-report and social network measures. This enabled me to assess the reliability of my findings across multiple measures of friendship and more casual forms of contact. Moreover, the studies examined different social groups in different intergroup contexts, which enabled me to determine the robustness and generalisability of my findings. There may be important differences between social groups in the levels of ingroup and outgroup contact, resulting from the size of the group influencing contact opportunity structures. Members of numerical minority groups have fewer opportunities for ingroup contact, and more opportunities for outgroup contact, in comparison to members of numerical majority groups (Barlow et al., 2013; Smith et al., 2016). Accordingly, I examined the relationship between ingroup and outgroup contact separately for each social group, to determine whether the negative relationship held across different contact opportunity structures.

Of the ten studies, I conducted four studies specifically to examine the research questions addressed in this thesis (Studies 1d, 1e, 1f and 2c), while six studies

comprised a secondary analysis of pre-existing data (Studies 1a, 1b, 1c, 2a, 2b and 2d). Some studies contained adequate but imperfect data with which to test my hypotheses (as discussed in the following sections for each individual study). Nonetheless, drawing on data from so many studies yielded an excellent database from which to draw conclusions and assess the robustness and generalisability of the findings.

This chapter is divided into two main sections, in which I respectively examine the cross-sectional relationship between ingroup and outgroup contact (2.1), and the longitudinal relationship between ingroup and outgroup contact (2.2). Within each section, I first detail the methods and results of each individual study, and then provide an overall summary of the findings across the studies. To summarise the findings in each section, I synthesise the results of the studies using fixed-effect meta-analyses (Goh et al., 2016). The chapter concludes with a general discussion (2.3), in which I consider the findings from both the cross-sectional and longitudinal studies in relation to prior research, and discuss the strengths and limitations of the present research.

2.1 The Cross-Sectional Relationship Between Ingroup and Outgroup Contact

Across six cross-sectional studies, I tested the hypothesis that there will be a negative relationship between ingroup and outgroup contact. Furthermore, I investigated differences in this relationship depending on the type of contact under examination. I conducted separate analyses for measures of friendship and generic contact, to test the hypothesis that the negative relationship would be stronger for friendship than more casual forms of contact.

Study 1a investigated friendship among Black (African) South African, Coloured South African, White South African, Indian South African, and foreign Black African adults in South Africa. Study 1b examined friendship among Protestants and

Catholics in Northern Ireland. Study 1c investigated generic contact among Black British, White British and Asian British people in Great Britain. Study 1d examined generic contact among Black/African American and White American adults in the United States. Finally, Studies 1e and 1f examined friendship and generic contact among White British and Asian British adolescents in England. All studies used self-report measures, with the exception of Studies 1e and 1f, which used both self-report and social network measures. Together, the six studies provided a total sample of 9,711 respondents, who differed with regard to their ethnic group, religious group and age.

To enable both comparisons across studies and the meta-analytic synthesis of the results, I employed identical analysis methods across all six studies. Accordingly, below, I first describe the analysis strategy used for all studies, after which I detail the unique methods and corresponding results for each individual study. To conclude, I present the results of the meta-analyses in which I synthesised the results across studies and discuss the overall findings.

2.1.1 Analysis Strategy

For each study, I first examined the descriptive statistics for the measures of ingroup and outgroup contact. I expected to identify significantly higher levels of ingroup contact than outgroup contact, based on prior research showing the relative prevalence of ingroup as compared to outgroup contact (e.g., McPherson et al., 2001; Windzio & Bicer, 2013). I also expected to identify significantly higher levels of ingroup contact, and lower levels of outgroup contact, in numerical majority groups, as compared to numerical minority groups, due to differences between groups in contact opportunity structures (e.g., Barlow et al., 2013; Smith et al., 2016). In order to identify differences in the levels of ingroup and outgroup contact between social groups of different size, I

conducted a two-way mixed model analysis of variance (ANOVA), with one between subjects factor (social group) and one within subjects factor (contact target: ingroup or outgroup). Comparisons between the levels of ingroup and outgroup contact across different groups are not the main focus of this chapter, but nonetheless reveal interesting insights relevant to the study of ingroup and outgroup contact.

To test the main hypotheses, I used correlational analyses. I used Pearson's product-moment correlation coefficient, *r*, to determine the associations between measures of ingroup and outgroup friends, and between measures of generic ingroup and outgroup contact. For one study (Study 1e) there were multiple measures of friends (i.e., best friends and friends), and I analysed each measure separately. In order to identify any patterns of variation dependent on specific social groups, I ran separate analyses for each group.

I then synthesised the results across the six studies using fixed-effect meta-analyses, following the procedure outlined in Goh et al. (2016). I conducted two separate meta-analyses. The first examined the association between ingroup and outgroup friends, while the second examined the association between generic ingroup and outgroup contact. I used fixed effects in which the mean effect size (i.e., mean correlation) was weighted by sample size for each of the groups and studies included in the meta-analyses. Each correlation was Fisher's *z* transformed prior to the analyses and then converted back to Pearson correlations for ease of interpretation. I used Stouffer's *Z* Test to assess whether the overall association identified in each meta-analysis reached statistical significance. I then created figures (forest plots) to visualise the results of each meta-analysis.

Regarding statistical power, simulation studies have shown that a sample size of approximately $N = 250$ is required in order to identify stable estimates for correlations (Schönbrodt & Perugini, 2013). Of the 15 group-specific sub-samples across the six cross-sectional studies, ten exceeded the required sample size of $N = 250$. Five groups (i.e., Black British respondents in Study 1c, and White British and Asian British respondents in Studies 1e and 1f) did not meet the ideal sample size requirement. This was because sample size was predetermined in the pre-existing Study 1c, and limited by school data collection constraints in the primary Studies 1e and 1f. I resolved the potential issues surrounding power by combining the samples across studies in two meta-analyses with sufficient power ($N = 4{,}777$ and $N = 5{,}292$).

2.1.2 Study 1a

Study 1a provided an initial examination of the relationship between ingroup and outgroup friends. This study only examined friendship, not generic contact, because Study 1a comprised a secondary analysis of pre-existing data (Crankshaw, 2011), collected with the purpose of examining different research questions, which did not require measures of generic contact (see Study 1e in Christ et al., 2014).

Study 1a was conducted in two cities in South Africa, Cape Town and Johannesburg. South Africa is a multicultural nation, with an intricate and troubled history regarding intergroup relations, whose nadir was the system of institutionalised racial segregation termed apartheid (Gibson, 2004), which only ended in 1994 with the formation of the South African Government of National Unity and Nelson Mandela as president. South Africa today is still marked by segregation, inequality, prejudice and discrimination. Schools and residential areas remain largely ethnically homogeneous, and positive contact between different ethnic groups is uncommon (Chisholm &

Nkomo, 2005; Gibson, 2004; Schrieff et al., 2010). Furthermore, despite the shift in political power from White South Africans to Black (African) South Africans since 1994, White South Africans continue to have socioeconomic advantage over Black (African) and Coloured South Africans. For example, there are stark discrepancies in the rates of unemployment for different ethnic groups: 29% of Black (African) South Africans and 24% of Coloured South Africans are unemployed, while only 6% of White South Africans are unemployed (Statistics South Africa, 2012).

The population of South Africa comprises 76% Black (African) South African, 9% White South African, 9% Coloured South African (of mixed heritage), and 3% Asian South African (of predominantly Indian heritage) people (Statistics South Africa, 2011). The variation in the size of the different ethnic groups results in differing opportunity structures for ingroup and outgroup contact. Furthermore, the relative economic success of South Africa, compared with its neighbours, has attracted foreign-born Black African migrants to South Africa, to whom attitudes are predominantly negative, commonly aligned with xenophobic attitudes regarding immigration policy (Crush, 2008). For example, only 18% of White South African, 20% of Black (African) South African, 13% of Coloured South African, and 23.5% of Indian South Africans report having favourable attitudes towards African immigrants (Crush, 2008). This study examined relations between five distinct groups: Black (African) South African, Coloured South African, White South African, Indian South African, and foreign Black African people in South Africa.

Method

Respondents and Procedure

Data were collected by the professional survey organisation Progressus (Crankshaw, 2011) in 2011 in two cities in South Africa. In Cape Town, 1,752 people participated in the study, while in Johannesburg, 1,683 people participated in the study. The sample consisted of respondents from the five largest groups in South Africa: Black (African) South African, Coloured South African, White South African, Indian South African, and foreign Black African people. Data were collected in respondents' own homes by interviewers conducting face-to-face interviews.

The total sample consisted of 3,435 respondents (54% female, 46% male; M_{age} = 37.14, *SD* = 12.57), of whom 778 were Black (African) South African, 819 were Coloured South African, 733 were White South African, 339 were Indian South African, and 766 were foreign Black African.

Measures

The surveys contained a variety of measures. Here, I only report measures relevant to the hypotheses. These consist of self-report measures of demographics (ethnicity, age and gender) and friends.

Demographic Information. Respondents reported their own ethnicity, age and gender. The sample included only respondents who reported their ethnicity as Black (African) South African, Coloured South African, White South African, Indian South African, or foreign Black African.

Friends. Five identical items measured friendships: "What proportion of your close friends are [Black South African/Coloured South African/White South African/Indian

South African/African immigrant] people?" (1 = *None*, 5 = *All*). Separate measures of ingroup friends and outgroup friends were computed based on respondents' self-reported ethnicity. The measure of ingroup friends comprised the single item for friends of each respondent's own ethnic group. The measure of outgroup friends comprised the average of the four items for friends of the other four groups.[2]

Results and Discussion

Descriptive Statistics

Table 2.1 shows the means and standard deviations for the measures of ingroup and outgroup friends for each group.

[2] In this study, I averaged respondents' levels of contact with the four ethnic outgroups. This method was preferable to the alternatives. One alternative would be to sum contact across the four outgroups, but this would artificially inflate the level of outgroup contact. For example, if a respondent reported no friendships with members of each of the four outgroups (1 = *None*), the respondent would have a summed score of four (4 = *A lot*) for outgroup friendship, which would artificially appear higher than the mean score of 3.67 identified for ingroup friendship. Another alternative would be to examine the association between ingroup and outgroup contact separately for each outgroup. This would lead to 20 correlations, because this study examined contact with four outgroups for five respondent groups. I only report the full results for the averaged levels of outgroup contact; however, I also conducted the correlations separately for each outgroup as a robustness check. I found that 19 of the 20 correlations identified a significant negative association between ingroup and outgroup friends. Therefore, the findings concerning the main hypothesis addressed in this chapter were robust across the two operationalisations of outgroup contact. In this study, I did not analyse differences in the levels of ingroup and outgroup contact using a two-way mixed model ANOVA, as the average outgroup contact measure was not equivalent to the single ingroup contact measure.

Table 2.1. Means and Standard Deviations of Friends by Group (Study 1a)

	Black (African) South African	Coloured South African	White South African	Indian South African	Foreign Black African
Ingroup friends	4.05 (0.86)	3.76 (0.90)	3.85 (0.86)	3.44 (1.06)	3.33 (1.06)
Outgroup friends	1.34 (0.40)	1.68 (0.53)	1.65 (0.50)	1.69 (0.50)	1.68 (0.48)

Note. Standard deviations are shown in parentheses.

Correlational Analyses

Table 2.2 shows the correlations between ingroup and outgroup friends for each group.

Table 2.2. Correlations Between Ingroup and Outgroup Friends by Group (Study 1a)

				95% CI	
	r	*SE*	*p*	*low*	*high*
Black (African) South African	-0.39*	0.03	<.001	-0.44	-0.32
Coloured South African	-0.35*	0.03	<.001	-0.41	-0.28
White South African	-0.39*	0.03	<.001	-0.45	-0.33
Indian South African	-0.25*	0.05	<.001	-0.35	-0.15
Foreign Black African	-0.27*	0.03	<.001	-0.34	-0.20

Note. SE = Standard Error; *CI* = Confidence Interval. * Denotes significant correlations ($p < .05$).

I identified significant negative associations between ingroup and outgroup friends for all five groups. These findings provide consistent support for the hypothesis that there will be a negative association between ingroup and outgroup contact. However, this study only examined friendship, not generic contact, thus the findings cannot be generalised to other forms of contact beyond friendship. Moreover, while these findings yielded initial insights into the relationship between ingroup and

outgroup contact, this study only examined the research questions in one intergroup context (i.e., among different ethnic groups in South Africa). To assess the generalisability of the findings, the following studies investigated the research questions in different intergroup contexts.

2.1.3 Study 1b

Study 1b examined friendships among different ethno-religious groups in Northern Ireland, in a secondary analysis of data collected by Schmid et al. (2008). Specifically, this study investigated relations between Protestants and Catholics in Belfast. Northern Ireland has a longstanding history of ethno-religious conflict between Protestants and Catholics (McLernon et al., 2003). Intergroup conflict was particularly pronounced during The Troubles, a period spanning from the 1960s to 1998, scarred by an estimated 3,600 deaths, 14,000 bombings, and 16,000 injuries (Fay et al., 1999). The conflict subsided following the Good Friday Agreement in 1998. However, there remains tension and distrust between the Protestant and Catholic communities in Northern Ireland (Kenworthy et al., 2016). Furthermore, Northern Ireland remains highly segregated, and meaningful contact between the two groups is uncommon (Dixon et al., 2020). The two communities share similar contact opportunity structures: Protestants comprise 42% of the population and Catholics comprise 41% of the population in Northern Ireland (Office for National Statistics, 2011). These figures differ slightly in Belfast, the city in which this study was conducted, which comprises a population of 42% Protestant and 49% Catholic residents.

Method

Respondents and Procedure

Data were collected by a professional survey organisation from March to July 2006. The sample consisted of individuals selected at random from four neighbourhoods in Belfast. Data were collected in respondents' own homes by trained interviewers conducting face-to-face interviews. The final sample consisted of 984 respondents (61% female, 39% male; M_{age} = 51.73, *SD* = 17.37), of whom 547 were Protestant and 437 were Catholic.

Measures

Respondents completed surveys containing a variety of measures. Here, I only report measures relevant to the hypotheses. These consist of self-report measures of demographics (age, gender, and group membership - Protestant or Catholic) and friends.

The friendship measure available in this secondary dataset was adequate for my analysis but sub-optimal. Specifically, the measure of friends was only available for each respondent as a standardised score (*z*-score), rather than a raw score. This does not affect the main analysis, as correlations are computed using *z*-scores. However, I could not examine the descriptive statistics for the measure of friends because the transformation to *z*-scores removes descriptive information (i.e., the *z*-score calculation transforms the sample mean to zero and standard deviation to one). Therefore, I do not report descriptive statistics for this study.

Demographic Information. Respondents reported their own age, gender and ethno-religious group membership. To determine group memberships, respondents were asked, "In which community were you brought up in?", and responded by selecting

either the Protestant community, Catholic community, or neither community. The interview was terminated at this point for those who responded with neither community.

Friends. Friendships with Protestants and Catholics were measured using two identical items: "How many of your close friends are [Protestant/Catholic]?" (1 = *None*, 6 = *All*). Measures of ingroup friends and outgroup friends were identified based on the correspondence between each item and individuals' self-reported group membership.

Results and Discussion

Correlational Analyses

Table 2.3 shows the correlations between ingroup and outgroup friends, which were conducted separately for Protestant and Catholic respondents.

Table 2.3. Correlations Between Ingroup and Outgroup Friends by Group (Study 1b)

				95% CI	
	r	*SE*	*p*	*low*	*high*
Protestant	-0.66*	0.02	<.001	-0.71	-0.61
Catholic	-0.62*	0.03	<.001	-0.67	-0.55

Note. SE = Standard Error; *CI* = Confidence Interval. * Denotes significant correlations ($p < .05$).

I identified significant negative associations between ingroup and outgroup friends for both Protestant and Catholic respondents. The present findings therefore provide consistent support for the hypothesis that there will be a negative association between ingroup and outgroup contact. Moreover, together the findings from Studies 1a and 1b show that the negative association between ingroup and outgroup contact is robust across different intergroup contexts. However, the studies presented thus far only

examined friendship, and not more casual forms of contact. Therefore, the findings cannot be generalised to other types of contact beyond friendship. To address this issue, the following study assessed generic contact, in contrast to friendship.

2.1.4 Study 1c

Study 1c examined the association between generic ingroup and outgroup contact among White British, Asian British and Black British people in Great Britain. In Great Britain, 87% of the population are White British, 7% are Asian British, and 3% are Black British (Office for National Statistics, 2011). The variation in the size of the different ethnic groups results in differing opportunity structures for ingroup and outgroup contact. The Black British and Asian British communities in Great Britain today formed primarily through immigration in the mid-20th Century, and relations between different ethnic groups in Great Britain have been heavily influenced by immigration and the response to it. Intergroup relations remain marked by prejudice and discrimination. For example, in a survey of 2,000 adults, one third of respondents reported making comments that could be construed as racist (Reilly, 2012). Furthermore, government statistics regarding the employment of working age people (aged 16 to 64) reveal large discrepancies between different ethnic groups: 77% of White British people, as compared to 66% of Asian British people and 67% of Black British people, are employed (Office for National Statistics, 2018).

The present study comprised a secondary analysis of data collected in the Social Integration Survey (Social Integration Commission, 2015), which was conducted by The Challenge, a social integration charity that implements programmes to bring individuals from different backgrounds together, such as the National Citizen Service and HeadStart (The Challenge, 2020). The present secondary analysis could only

examine generic contact, because the survey was conducted in order to examine alternative research questions, which did not require measures of friendship.

Method

Respondents and Procedure

In 2015, The Challenge commissioned the professional survey organisation Ipsos MORI to survey a representative sample of 4,265 people across Great Britain. The sample was recruited through online panels, and data were then collected in respondents' own homes by trained interviewers conducting face-to-face interviews.

The survey included measures of contact with three ethnic groups: White British, Asian British and Black British people. Of the total sample of 4,265 people, I excluded 182 respondents because they reported an ethnicity other than White British, Asian British or Black British (the survey contained no ingroup contact measures for the excluded respondents). The final sample consisted of 4,083 respondents (51% female, 49% male; M_{age} = 43.10, SD = 17.57), of whom 3,536 were White British, 391 were Asian British, and 156 were Black British.

Measures

The respondents completed surveys containing a variety of measures. Here, I only report measures relevant to the hypotheses, which consist of self-report measures of demographics (ethnicity, age and gender) and generic contact.

Demographic Information. Respondents reported their own ethnicity, age and gender. To assess ethnicity, individuals were asked, "Which of these best describes your ethnic group?", and responded by selecting one of eighteen options. The sample included only respondents who selected either White British, Asian British or Black British.

Generic Contact. Generic contact with White British, Asian British and Black British people was measured using three identical items: "In the last year, how often, if at all, did you have positive/good interactions with [White/Asian/Black] people?" (1 = *Never*, 5 = *Very often*). Measures of generic ingroup contact and outgroup contact were identified based on the correspondence between each item and individuals' self-reported ethnicity. The measure of generic ingroup contact comprised the single item for contact with members of each respondent's own ethnic group. The measure of generic outgroup contact comprised the average of the two items for contact with members of the other two ethnic groups.[3]

Results and Discussion

Descriptive Statistics

Table 2.4 shows the means and standard deviations for the measures of generic ingroup and outgroup contact.

Table 2.4. Means and Standard Deviations of Generic Contact by Group (Study 1c)

	White British	Asian British	Black British
Generic ingroup contact	4.19 (0.99)	3.99 (0.98)	4.24 (0.83)
Generic outgroup contact	2.86 (1.07)	3.56 (0.86)	3.81 (0.89)

Note. Standard deviations are shown in parentheses.

[3] In this study, I assessed the average level of outgroup contact, in an identical manner to that reported in detail in Study 1a. I report the full results for the averaged levels of outgroup contact. I also conducted the correlations separately for each specific outgroup as a robustness check. The results were the same for both operationalisations of outgroup contact (i.e., I identified consistently significant positive associations between generic ingroup and outgroup contact).

Correlational Analyses

Table 2.5 shows the correlations between generic ingroup and outgroup contact, which were conducted separately for White British, Asian British and Black British respondents.

Table 2.5. Correlations Between Generic Ingroup and Outgroup Contact by Group (Study 1c)

				95% CI	
	r	*SE*	*p*	*low*	*high*
White British	0.28*	0.02	<.001	0.24	0.31
Asian British	0.48*	0.04	<.001	0.40	0.56
Black British	0.46*	0.06	<.001	0.32	0.57

Note. *SE* = Standard Error; *CI* = Confidence Interval. * Denotes significant correlations ($p < .05$).

I identified significant positive associations between generic ingroup and outgroup contact for all three ethnic groups. These findings do not support the hypothesis that there will be a negative association between ingroup and outgroup contact. Together, the results of the three studies reported thus far indicate that the association between ingroup and outgroup contact differs depending on the type of contact under consideration. As predicted, the studies revealed negative associations for friendship, yet, in contrast to expectations, the studies revealed positive associations for generic contact. These findings could be seen to support the second hypothesis (i.e., that the negative association would be stronger for friendship than more casual types of contact), however, I predicted significant negative associations for both friendship and generic contact, with only the strength of the association varying with the type of contact. I have only examined generic contact in one study thus far; therefore, in the

following study I examined generic contact in another intergroup context, in order to determine the robustness of the findings before drawing strong conclusions.

2.1.5 Study 1d

Study 1d examined the association between generic ingroup and outgroup contact among Black/African American and White American people in the United States. In the United States, White Americans are the racial majority group, comprising 77% of the population (60% when not including Latino Americans), while Black/African Americans are the largest racial minority group, comprising 13% of the population (United States Census Bureau, 2010). Intergroup relations between Black/African Americans and White Americans have a long and painful history, tied to slavery, and segregation, inequality and discrimination persist in present-day American society (Greenwald & Pettigrew, 2014). For example, there remains discrimination against Black/African American people with regards to employment (e.g., Bendick et al., 2010), housing (e.g., Turner et al., 2002), and policing (e.g., The Leadership Conference on Civil and Human Rights, 2011).

In order to examine my research questions in this intergroup context, I conducted an online survey study. This study received ethical approval from the Medical Sciences Inter-divisional Research Ethics Committee (R52970/RE001).

Method

Respondents and Procedure

I collected data in July 2018. I recruited respondents online through the Project Implicit research pool website (www.implicit.harvard.edu). Respondents were randomised into the study from a list of studies they qualified for based on the demographic information they self-reported when creating their account. Only those who reported being residents

(but not necessarily citizens) of the United States, and who reported being either Black/African or White, were eligible to be randomised into the study. Randomly selected respondents then completed the survey online through the Project Implicit website. Respondents provided informed consent prior to initiating the study, and completed all the measures included in the study in an order randomised for each respondent.

The total sample consisted of 851 respondents (74% female, 26% male; M_{age} = 39.49, *SD* = 14.62), of whom 427 were White American and 424 were Black/African American.

Measures

The online survey contained a variety of measures. Here, I only report measures relevant to the hypotheses. These consist of self-report measures of demographics (ethnicity, age and gender) and generic contact.[4]

Demographic Information. Respondents reported their own ethnicity, age and gender.

[4] I set out to examine both generic contact *and* friendship in this study. However, the measure of friendship employed in this study resulted in a ceiling effect for ingroup friends. Specifically, I measured friendship using two identical items: "How many [White/Black] friends do you have?", and respondents reported their number of friends on an 11-point scale from "zero" to "more than ten" (0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, >10). I identified a ceiling effect for the ingroup friendship measure (*M* = 9.35, *SD* = 2.99), with 72% of the sample reporting the maximum number of ingroup friends ("more than ten"). Each alternative response category was selected by less than 6% of the sample. Therefore, this measure could not detect the likely variation in the number of ingroup friends beyond ten. This imposes an artificial limit on the number of ingroup friends that could be reported, which would constrain the likelihood of detecting an association between ingroup and outgroup friendship. Accordingly, I only analysed the data regarding generic contact.

Generic Contact. Generic contact with White American and Black/African American people was measured using two identical items: "On average, how often do you have pleasant interactions with [White/Black] people?" (1 = *Never*, 5 = *Everyday*). Measures of generic ingroup and outgroup contact were identified based on the correspondence between each item and individuals' self-reported ethnicity.

Results and Discussion

Descriptive Statistics

Table 2.6 shows the means and standard deviations for all study variables.

Table 2.6. Means and Standard Deviations of Generic Contact by Group (Study 1d)

	White American	Black/African American
Generic ingroup contact	4.51 (0.75)	4.35 (0.88)
Generic outgroup contact	3.93 (1.08)	4.00 (1.01)

Note. Standard deviations are shown in parentheses.

I examined differences in the levels of generic ingroup and outgroup contact between groups. The results of a two-way mixed model ANOVA showed that there was a significant main effect of contact target, $F(1, 838) = 154.94$, $p < .001$, $\eta_p^2 = .16$, with respondents reporting significantly more ingroup contact ($M = 4.43$) than outgroup contact ($M = 3.97$). In contrast, there was no significant main effect of ethnicity, $F(1, 838) = 0.73$, $p = .395$, $\eta_p^2 = .00$. There was, however, a significant interaction between contact target and ethnicity, $F(1, 838) = 9.88$, $p = .002$, $\eta_p^2 = .01$. Descriptive statistics showed that White American respondents reported more ingroup contact ($M = 4.51$) than Black/African American respondents ($M = 4.35$), while Black/African American respondents reported more outgroup contact ($M = 4.00$) than White American

respondents (*M* = 3.93). This pattern likely reflects variation in contact opportunity structures between the two groups: the numerical majority group (White American respondents) reported more ingroup contact, and less outgroup contact, than the numerical minority group (Black/African American respondents). Despite this difference between the two groups, ingroup contact was found to be more prevalent than outgroup contact for both groups. These findings are in accordance with expectations and prior research (e.g., Barlow et al., 2013; McPherson et al., 2001; Smith et al., 2016; Windzio & Bicer, 2013).

Correlational Analyses

Table 2.7 shows the correlations between generic ingroup and outgroup contact, which were conducted separately for White American and Black/African American respondents.

Table 2.7. Correlations Between Generic Ingroup and Outgroup Contact by Group (Study 1d)

				95% CI	
	r	*SE*	*p*	*low*	*high*
White American	0.37*	0.04	<.001	0.28	0.45
Black/African American	0.36*	0.04	<.001	0.28	0.44

Note. *SE* = Standard Error; *CI* = Confidence Interval. * Denotes significant correlations ($p < .05$).

I identified significant positive associations between generic ingroup and outgroup contact for both White American and Black/African American respondents. Therefore, the findings from both Studies 1c and 1d, which assessed generic contact, did not support the hypothesis that there will be a negative association between ingroup

and outgroup contact. Together, the results thus far indicate that the association between ingroup and outgroup contact differs depending on the type of contact assessed.

Alternatively, as Studies 1a, 1b, 1c and 1d each examined a different intergroup context, it could be concluded that the differences in the findings result from differences in the intergroup contexts, rather than differences in the type of contact under consideration. That is, there could be a negative association between ingroup and outgroup contact among ethnic groups in South Africa and ethno-religious groups in Northern Ireland, while there could be a positive association between ingroup and outgroup contact among ethnic groups in Great Britain and the United States. In order to determine the most likely cause of variation in the results thus far, I isolated differences dependent on the intergroup context and type of contact in the following study, by examining both friendship and generic contact in a single intergroup context. Hence, any differences found in the associations identified for friendship and generic contact in the following study cannot be attributed to the intergroup context.

2.1.6 Study 1e

Study 1e examined the associations between ingroup and outgroup friends, and between generic ingroup and outgroup contact. I investigated the research questions among adolescents (aged 11-12) attending an ethnically heterogeneous school in Oldham, a town in North West England. Oldham has a population of 78% White British and 17% Asian British residents (Oldham Council, 2019). The town's Asian British population is predominantly South Asian of Pakistani and Bangladeshi heritage. The proportion of Asian British residents in Oldham is significantly greater than the national average (87% White British, 7% Asian British). During the 1950s and 1960s many people immigrated to Great Britain, particularly from South Asian countries, to fill a shortfall

of workers and revitalise industries (Vertovec, 2007). At that time, Oldham was a thriving industrial centre with many employment opportunities, which attracted migrant workers, and led to the town's diversity. However, Oldham's industries fell into decline during the subsequent decades, which severely impacted the local economy. The negative consequences of this decline are still present today; for example, the employment rate in Oldham of 67% is significantly lower than the national average of 77% (Oldham Council, 2019).

Furthermore, Oldham has a history of conflictual intergroup relations between the White British and Asian British populations (Cantle, 2005). Most notably, in 2001 Oldham experienced the most extreme ethnically-motivated riots in Great Britain since the 1980s. While the conflict between groups has subsided over time, intergroup tension, in addition to continued residential and educational self-segregation, remains present in Oldham (Al Ramiah et al., 2015). More broadly, segregation, prejudice and discrimination persist in Great Britain, including in school environments, which provide the context for the present study. For example, between 2007 and 2011, 88,000 racist incidents occurred in British schools (Talwar, 2012).

The town's diversity is reflected in the school in which this study was conducted. The school's student body contains, and aims to integrate, sizeable numbers of students from the White British and Asian British communities (43% White British, 50% Asian British). Although White British and Asian British people respectively represent the numerical majority and minority in the town and wider country, the two groups are of approximately equal size in this school. Therefore, White British and Asian British students share similar opportunity structures for ingroup and outgroup contact in this specific school environment.

Study 1e received ethical approval from the Medical Sciences Inter-divisional Research Ethics Committee (R45534/RE001).

Method

Respondents and Procedure

I collected data in person in the school in June 2016. I invited all students in Year 7 to participate in the study. Of the 228 students in Year 7, 195 students (86%) participated in the study. I excluded 15 students because they reported an ethnicity other than White British or Asian British. Therefore, the final sample consisted of 180 students aged 11-12 (78 boys, 102 girls), of whom 97 were Asian British and 83 were White British.

The students completed paper-and-pencil questionnaires in classrooms during their 30-minute morning registration period. I visited each classroom to explain the study and answer any questions. The questionnaire booklet included an informed consent form and information sheet explaining that the students' participation was voluntary and that the confidentiality of their data would be maintained. Students filled in the informed consent forms. In addition, parents of all students received information sheets and opt-out consent forms two weeks before the study.

Measures

Students completed surveys containing a variety of measures. Here, I only report measures relevant to the hypotheses. These consist of self-report measures of demographics (ethnicity and gender) and generic contact, and social network measures of best friends and friends. In contrast to the self-report measures of friendship used in the previous studies, Study 1e used network measures of friendship, which have the advantage of being less susceptible to social desirability bias as compared to self-report measures (as discussed in Chapter 1).

Demographic Information. Students reported their own ethnicity and gender. To assess ethnicity, students were asked, "Which of the following ethnic groups do you belong to?", and responded by selecting one of eight options. The sample included only students who selected either White/White British or Asian/Asian British.

Generic Contact. Generic contact with White and Asian British people was measured using two identical items: "On average, how frequently do you have positive/good contact with [White/Asian] British people?" (1 = *Never*, 5 = *Very frequently*). Measures of generic ingroup and outgroup contact were identified based on the correspondence between each item and individuals' self-reported ethnicity.

Best Friends. Friendship networks were elicited using peer-nomination procedures. Students nominated up to five best friends in response to the question, "Who are your best friends in class?". On average, students nominated four best friends (M = 3.65, SD = 1.38). Ingroup best friends and outgroup best friends were identified based on the correspondence between individuals' self-reported ethnicity and their best friends' self-reported ethnicity. The best friend network is shown in the upper panel of Figure 2.2.

Friends. I used similar procedures to obtain measures of best friends and friends. Students nominated up to 15 friends in response to the question, "Who else are you friends with in class?". On average, students nominated eight friends (M = 7.94, SD = 4.47), in addition to the four best friends. Ingroup friends and outgroup friends were identified based on the correspondence between individuals' self-reported ethnicity and their friends' self-reported ethnicity. The friend network is shown in the lower panel of Figure 2.2.

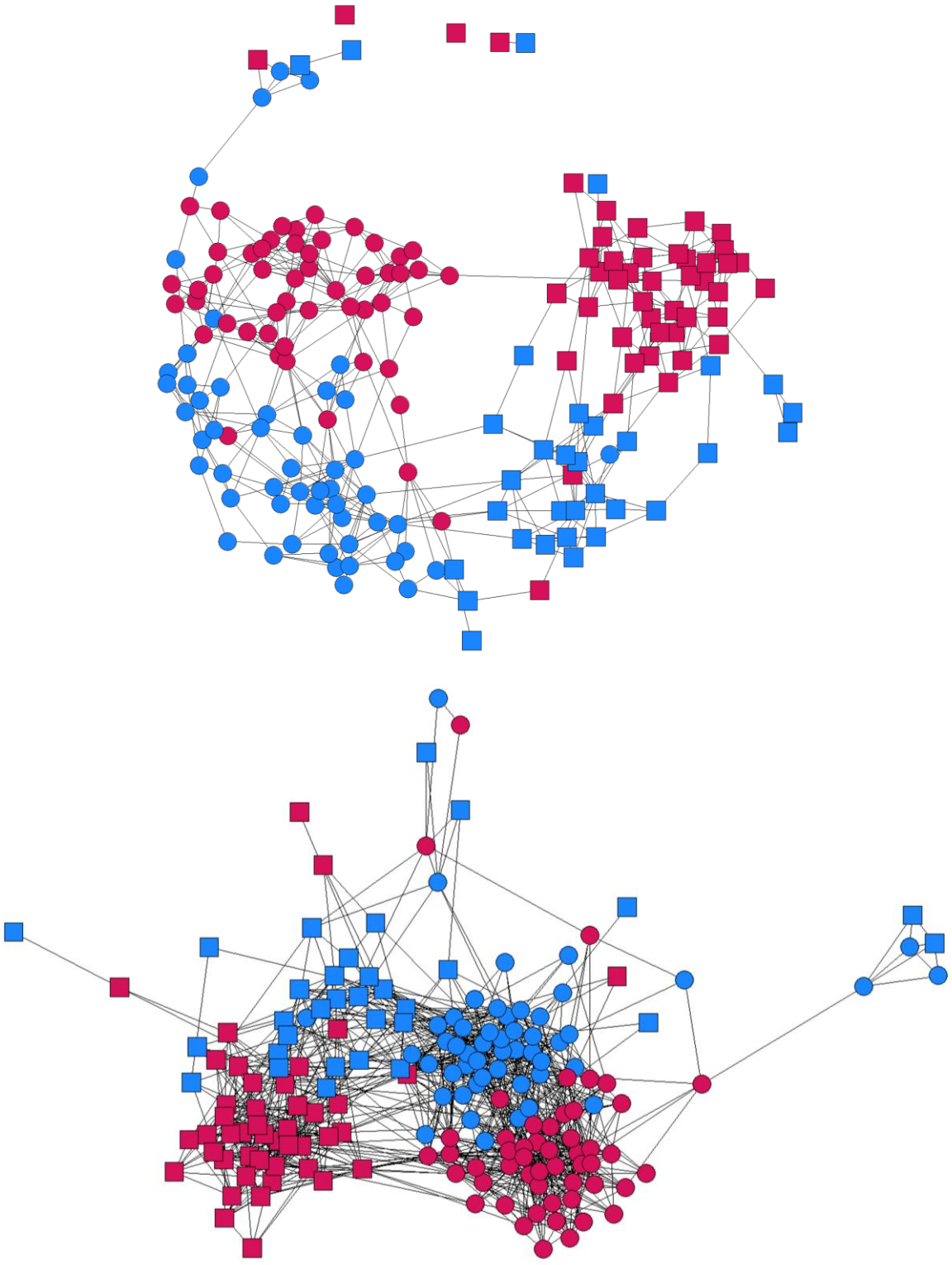


Figure 2.2. Study 1e friendship networks. The best friend network is shown in the upper panel and the friend network is shown in the lower panel. Each node (square or circle) represents a student and each tie (link between nodes) represents a friendship. Red = Asian British student; Blue = White British student; Square = boy; Circle = girl. The networks show high levels of segregation by both ethnicity and gender.

Results and Discussion

Descriptive Statistics

Table 2.8 shows the means and standard deviations for all study variables.

Table 2.8. Means and Standard Deviations of Best Friends, Friends and Generic Contact by Group (Study 1e)

	White British	Asian British
Ingroup best friends	2.98 (1.46)	3.48 (1.53)
Outgroup best friends	0.37 (0.64)	0.42 (0.93)
Ingroup friends	5.57 (4.34)	6.88 (3.45)
Outgroup friends	1.20 (1.73)	2.07 (2.25)
Generic ingroup contact	4.63 (0.85)	4.56 (0.69)
Generic outgroup contact	3.66 (1.17)	3.55 (1.06)

Note. Standard deviations are shown in parentheses.

I examined differences in the levels of ingroup and outgroup contact between the two ethnic groups. I conducted a separate two-way mixed model ANOVA for each type of contact (i.e., best friends, friends, and generic contact).

Regarding *best friends*, the results of the two-way mixed model ANOVA showed that there was a significant main effect of contact target, $F(1, 178) = 364.13$, $p < .001$, $\eta_p^2 = .67$, with respondents reporting significantly more ingroup best friends ($M = 3.23$) than outgroup best friends ($M = 0.40$). In addition, there was a significant main effect of ethnicity, $F(1, 178) = 7.53$, $p = .007$, $\eta_p^2 = .04$, with Asian British respondents reporting significantly more best friends ($M = 1.95$) than White British respondents ($M = 1.68$). The interaction between contact target and ethnicity was not significant, $F(1, 178) = 2.39$, $p = .123$, $\eta_p^2 = .01$.

Regarding *friends*, the results of the two-way mixed model ANOVA showed that there was a significant main effect of contact target, $F(1, 178) = 192.17$, $p < .001$, $\eta_p^2 = .52$, with respondents reporting significantly more ingroup friends ($M = 6.22$) than outgroup friends ($M = 1.64$). In addition, there was a significant main effect of ethnicity, $F(1, 178) = 11.22$, $p = .001$, $\eta_p^2 = .06$, with Asian British respondents reporting significantly more friends ($M = 4.47$) than White British respondents ($M = 3.39$). The interaction between contact target and ethnicity was not significant, $F(1, 178) = 0.45$, $p = .504$, $\eta_p^2 = .00$.

Finally, regarding *generic contact*, the results of the two-way mixed model ANOVA showed that there was a significant main effect of contact target, $F(1, 171) = 92.34$, $p < .001$, $\eta_p^2 = .35$, with respondents reporting significantly more generic ingroup contact ($M = 4.59$) than generic outgroup contact ($M = 3.61$). There was no significant main effect of ethnicity, $F(1, 171) = 0.79$, $p = .377$, $\eta_p^2 = .01$, and the interaction between contact target and ethnicity was not significant, $F(1, 171) = 0.02$, $p = .902$, $\eta_p^2 = .00$.

Overall, the findings showed that ingroup contact was more prevalent than outgroup contact. The substantial differences between the number of ingroup best friends and friends, as compared to outgroup best friends and friends, reported by students reflects a high level of ethnic segregation in the networks. This high level of ethnic segregation is visualised in Figure 2.2. The non-significant interactions between contact target and ethnicity suggest that there were not substantial differences in ingroup and outgroup contact between ethnic groups. This may result from the two ethnic groups being of approximately equal size in the school, and therefore sharing similar contact opportunity structures. I identified one unexpected effect: Asian British students

reported more best friends and friends (regardless of whether they were ingroup or outgroup members) than White British students.

Correlational Analyses

Table 2.9 shows the correlations between each pair of ingroup and outgroup contact measures, which were conducted separately for White British and Asian British students.

Table 2.9. Correlations Between Ingroup and Outgroup Best Friends, Friends and Generic Contact by Group (Study 1e)

				95% CI	
	r	*SE*	*p*	*low*	*high*
White British					
Ingroup and outgroup best friends	-0.36*	0.10	.001	-0.54	-0.15
Ingroup and outgroup friends	-0.05	0.12	.662	-0.28	0.18
Generic ingroup and outgroup contact	-0.03	0.11	.830	-0.24	0.20
Asian British					
Ingroup and outgroup best friends	-0.63*	0.06	<.001	-0.74	-0.49
Ingroup and outgroup friends	-0.25*	0.10	.016	-0.43	-0.05
Generic ingroup and outgroup contact	0.06	0.10	.557	-0.14	0.26

Note. SE = Standard Error; *CI* = Confidence Interval. * Denotes significant correlations ($p < .05$).

I found evidence for negative associations between the ingroup and outgroup friendship measures. For Asian British students, I identified significant negative associations between ingroup and outgroup best friends, and between ingroup and outgroup friends. For White British students, I identified a significant negative

association between ingroup and outgroup best friends, while the association between ingroup and outgroup friends was negative, albeit very small and non-significant. In contrast, the results did not reveal negative associations between generic ingroup and outgroup contact: the association between generic ingroup and outgroup contact was positive and non-significant for Asian British students, and negative and non-significant for White British students.

The present study's findings extend the findings of the previous studies by examining both friendship and generic contact in one intergroup context, and revealing that the differences in the findings thus far are more likely to result from differences in the type of contact under consideration, rather than differences in the intergroup context examined.

Nonetheless, the present study's findings regarding generic contact differed from the previous studies' findings, as I identified non-significant associations between generic ingroup and outgroup contact in this study, in contrast to the significant positive associations identified between generic ingroup and outgroup contact in Studies 2c and 2d. Accordingly, the results across the studies thus far have provided consistent evidence for a negative relationship between ingroup and outgroup friends, while the results regarding generic contact appear more mixed.

While the present findings yielded further insights into the association between ingroup and outgroup contact, Study 1e had a potential weakness, which limits the validity of the findings. The network measures employed in this study restricted the number of friendship nominations that could be made to five best friends and 15 friends. This means that a limit on the number of friendships individuals could have was artificially imposed by the study's methodology. Therefore, it remains unknown

whether the negative association identified between ingroup and outgroup friends resulted from a capacity limit on friendship, or methodology (as the study imposed an artificial capacity limit on friendship). The descriptive statistics of this first study suggest, however, that this limitation may not have constrained the results. As reported above, students reported a mean number four best friends (M = 3.65, SD = 1.38) and eight friends (M = 7.94, SD = 4.47), which both fall short of the upper limits imposed, of five best friends and 15 friends. Nonetheless, I addressed this potential methodological issue in Study 1f, by using a network measure of friendship in which individuals could nominate an unlimited number of friends.

2.1.7 Study 1f

This study built upon Study 1e by using an alternative network measure of friendship, which enabled individuals to nominate an unlimited number of friends. Hence, any negative association between measures of ingroup and outgroup friends detected in Study 1f cannot be due to imposing an artificial ceiling of five or 15 friends.

Study 1f was conducted in the same town (Oldham) as Study 1e. However, this study was conducted in a different school in Oldham. Asian British students comprised the largest ethnic group in this school, while White British students comprised the second largest ethnic group: the student body consisted of 83% Asian British and 12% White British students. Accordingly, while White British and Asian British people represent, respectively, the numerical majority and minority in the town, this demography was reversed in the school. Asian British students were the numerical majority, while White British students were the numerical minority, and the two groups therefore differed in terms of their opportunity structures for ingroup and outgroup contact.

Study 1f received ethical approval from the Medical Sciences Inter-divisional Research Ethics Committee (R60598/RE001).

Method

Respondents and Procedure

I collected data in December 2018. I invited all students in Year 9 to participate in the study. Of the 213 students in Year 9, 186 students (87%) participated in the study. I excluded eight students because they reported an ethnicity other than White British or Asian British. Therefore, the final sample consisted of 178 students aged 13-14 (77 boys, 101 girls), of whom 155 were Asian British and 23 were White British.

Data collection was performed identically to Study 1e. Students completed paper-and-pencil questionnaires in classrooms during a 30-minute morning registration period. A research assistant visited each classroom to explain the study and answer any questions. The questionnaire booklet included an informed consent form and information sheet explaining that the students' participation was voluntary and that the confidentiality of their data would be maintained. Students filled in the informed consent forms. In addition, parents of all students received information sheets and opt-out consent forms two weeks before the study.

Measures

The students completed surveys, which contained a variety of measures. In this section, I only report measures relevant to the hypotheses under examination. These consist of self-report measures of demographics (ethnicity and gender) and generic contact, and a network measure of friends.

Demographic Information. Students reported their own ethnicity and gender. To assess ethnicity, students were asked, "Which of the following ethnic groups do you think best describes you?", and responded by selecting one of ten options. The sample included only students who selected either White/White British or Asian/Asian British.

Generic Contact. Generic contact with White British people and Asian British people was measured using two identical items: "How often do you have positive contact with [White/Asian] British people?" (1 = *Never*, 5 = *Every day*). Measures of generic ingroup and outgroup contact were identified based on the correspondence between each item and individuals' self-reported ethnicity.

Friends. The friendship network was elicited using a peer-nomination procedure. Students nominated an unlimited number of friends in response to the question, "Who are your friends (in your year group)?". On average, students nominated 10 friends (M = 10.16, SD = 5.11). The maximum number of friends students nominated was 32, and 11% of the sample nominated more friends than the limit of 15 imposed in Study 1e. This suggests that restricting the number of friendship nominations may artificially impose a capacity limit and result in missing friendship information, as some students nominated more friends than would be possible if using the restricted nomination method employed in Study 1e. However, as the majority of students (89%) nominated fewer than 15 friends, restricting the number of friendship nominations appears not to have a large impact on the number of friends listed. Ingroup friends and outgroup friends were identified based on the correspondence between individuals' self-reported ethnicity and their friends' self-reported ethnicity. The friendship network is shown in Figure 2.3.

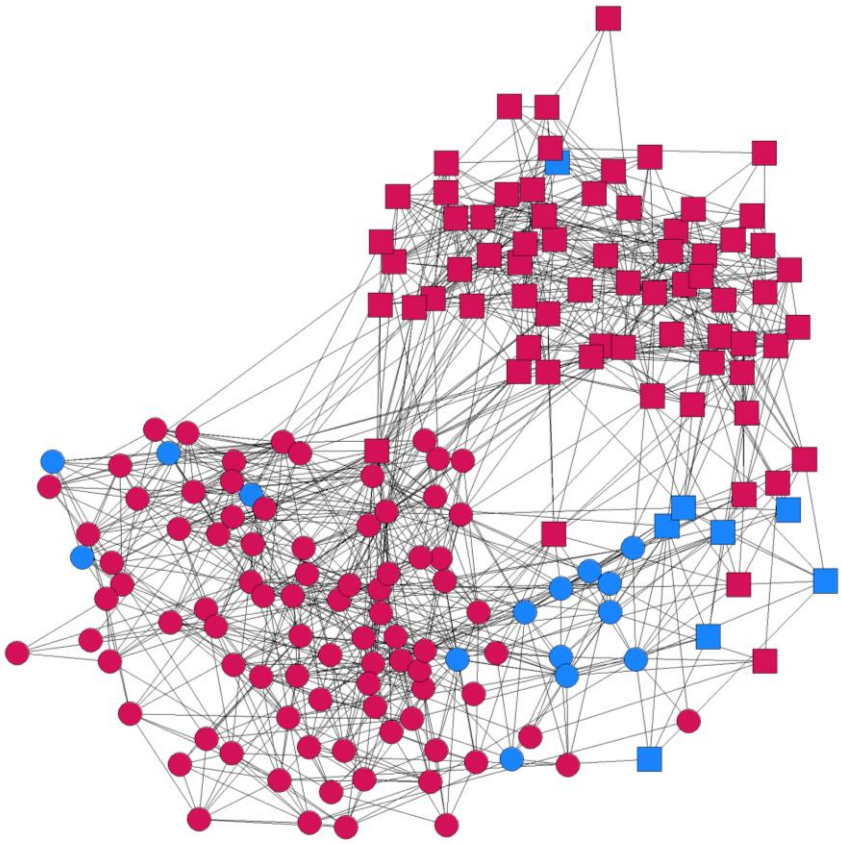


Figure 2.3. Study 1f friendship network. Each node (square or circle) represents a student and each tie (link between nodes) represents a friendship. Red = Asian British student; Blue = White British student; Square = boy; Circle = girl. The network shows high levels of segregation by both ethnicity and gender.

Results and Discussion

Descriptive Statistics

Table 2.10 shows the means and standard deviations for all study variables.

Table 2.10. Means and Standard Deviations of Friends and Generic Contact by Group (Study 1f)

	White British	Asian British
Ingroup friends	3.87 (2.42)	8.35 (4.48)
Outgroup friends	3.65 (2.35)	0.72 (1.12)
Generic ingroup contact	4.78 (0.52)	4.83 (0.44)
Generic outgroup contact	4.43 (0.79)	4.14 (0.83)

Note. Standard deviations are shown in parentheses.

I examined differences in the levels of ingroup and outgroup contact between the two ethnic groups. I conducted a separate two-way mixed model ANOVA for each type of contact (i.e., friends and generic contact).

Regarding *friends*, the results of the two-way mixed model ANOVA showed that there was a significant main effect of contact target, $F(1, 176) = 60.91$, $p < .001$, $\eta_p^2 = .26$, with respondents reporting significantly more ingroup friends ($M = 6.11$) than outgroup friends ($M = 2.18$). In contrast, there was no significant main effect of ethnicity, $F(1, 176) = 2.42$, $p = .122$, $\eta_p^2 = .01$. There was, however, a significant interaction between contact target and ethnicity, $F(1, 176) = 54.36$, $p < .001$, $\eta_p^2 = .24$. Descriptive statistics showed that Asian British respondents reported more ingroup friends ($M = 8.35$) than White British respondents ($M = 3.87$), while White British

respondents reported more outgroup friends (M = 3.65) than Asian British respondents (M = 0.72).

Regarding *generic contact*, the results of the two-way mixed model ANOVA showed that there was a significant main effect of contact target, $F(1, 175) = 26.43$, $p < .001$, $\eta_p^2 = .13$, with respondents reporting significantly more ingroup contact (M = 4.80) than outgroup contact (M = 4.29). There was no significant main effect of ethnicity, $F(1, 175) = 1.39$, $p = .240$, $\eta_p^2 = .01$, and the interaction between contact target and ethnicity was not significant, $F(1, 175) = 2.85$, $p = .093$, $\eta_p^2 = .02$.

Therefore, in accordance with expectations, both ingroup friendship and generic ingroup contact were found to be more prevalent than outgroup friendship and generic outgroup contact. Furthermore, White British students reported comparatively fewer ingroup friends, and more outgroup friends, than Asian British students. This pattern is likely to have resulted from the ethnic composition of the school (12% White British, 83% Asian British) limiting the opportunities for ingroup friendship for White British students. Notably, while White British students reported a similar number of ingroup as compared to outgroup friends, the friendship network (shown in Figure 2.3) still exhibited a high level of ethnic segregation, due to the prevalence of ingroup friendship among Asian British students.

Correlational Analyses

Table 2.11 shows the correlations between each pair of ingroup and outgroup contact measures, which were conducted separately for White British and Asian British students.

Table 2.11. Correlations Between Ingroup and Outgroup Friends and Generic Contact by Group (Study 1f)

				95% CI	
	r	*SE*	*p*	*low*	*high*
White British					
Ingroup and outgroup friends	-0.15	0.21	.487	-0.53	0.28
Generic ingroup and outgroup contact	0.02	0.21	.930	-0.40	0.43
Asian British					
Ingroup and outgroup friends	-0.21*	0.07	.004	-0.35	-0.07
Generic ingroup and outgroup contact	0.01	0.08	.885	-0.14	0.16

Note. SE = Standard Error; *CI* = Confidence Interval. * Denotes significant correlations ($p < .05$).

For both White British and Asian British students, the associations between generic ingroup and outgroup contact were small, positive, and non-significant. In contrast, I identified a significant negative association between ingroup and outgroup friends for Asian British students, and a negative but non-significant association between ingroup and outgroup friends for White British students. The negative but non-significant association identified for White British students may have resulted from a lack of power to detect the small effect, as the sample consisted of only 22 White British students.

Similarly to Study 1e, these findings provided mixed support for the hypotheses that there will be a negative association between ingroup and outgroup contact, and that the association will be stronger for friendship than more casual types of contact. Negative associations were identified between ingroup and outgroup friends, but the association was only significant for Asian British (not White British) students.

Furthermore, the associations between generic ingroup and outgroup contact were non-significant in Studies 1e and 1f, and positive in Studies 1c and 1d.

As the results differed across the six studies, it is not clear how systematic the cross-sectional associations between ingroup and outgroup friends, and generic ingroup and outgroup contact, are. To synthesise the results across the six cross-sectional studies, I present the results of fixed-effect meta-analyses in the following section.

2.1.8 Synthesis of Results

I synthesised the results across the six cross-sectional studies using fixed-effect meta-analyses, following the procedure outlined in Goh et al. (2016). I conducted two separate meta-analyses. The first examined the association between ingroup and outgroup friends, while the second examined the association between generic ingroup and outgroup contact. As the studies differed with regard to the types of contact examined (i.e., friendship, generic contact, or both), different subsets of studies were included in each meta-analysis. Studies 1e and 1f were included in both meta-analyses, as these studies examined both friendship and generic contact. In contrast, Studies 1a and 1b were only included in the meta-analysis for friendship, while Studies 1c and 1d were only included in the meta-analysis for generic contact.

In each meta-analysis, I expected to identify a negative meta-analytic effect, as I hypothesised that there would be a negative relationship between ingroup and outgroup friends, and between generic ingroup and outgroup contact. Furthermore, in line with my hypotheses, I predicted that there would be a stronger meta-analytic effect for friendship than generic contact.

The results of the fixed-effect meta-analysis for friendship revealed an overall significant negative effect, $M\ r = -.41$, $Z = -29.95$, $p < .001$, *95% CI* [-.43, -.38]. This

provides strong evidence of a negative relationship between ingroup and outgroup friends. Figure 2.4 shows these results as a forest plot (Schild & Voracek, 2015). As depicted in the figure, the effects for all subgroups across all studies were consistently negative. Notably, for two subgroups (White British respondents in Studies 1e and 1f), the 95% confidence intervals for the negative effects crossed zero and were wider than the confidence intervals for other subgroups. These instances occurred uniquely when the subgroup sample size fell substantially below 100 respondents; therefore, the non-significant effects identified for these subgroups are likely to have resulted from a lack of power.

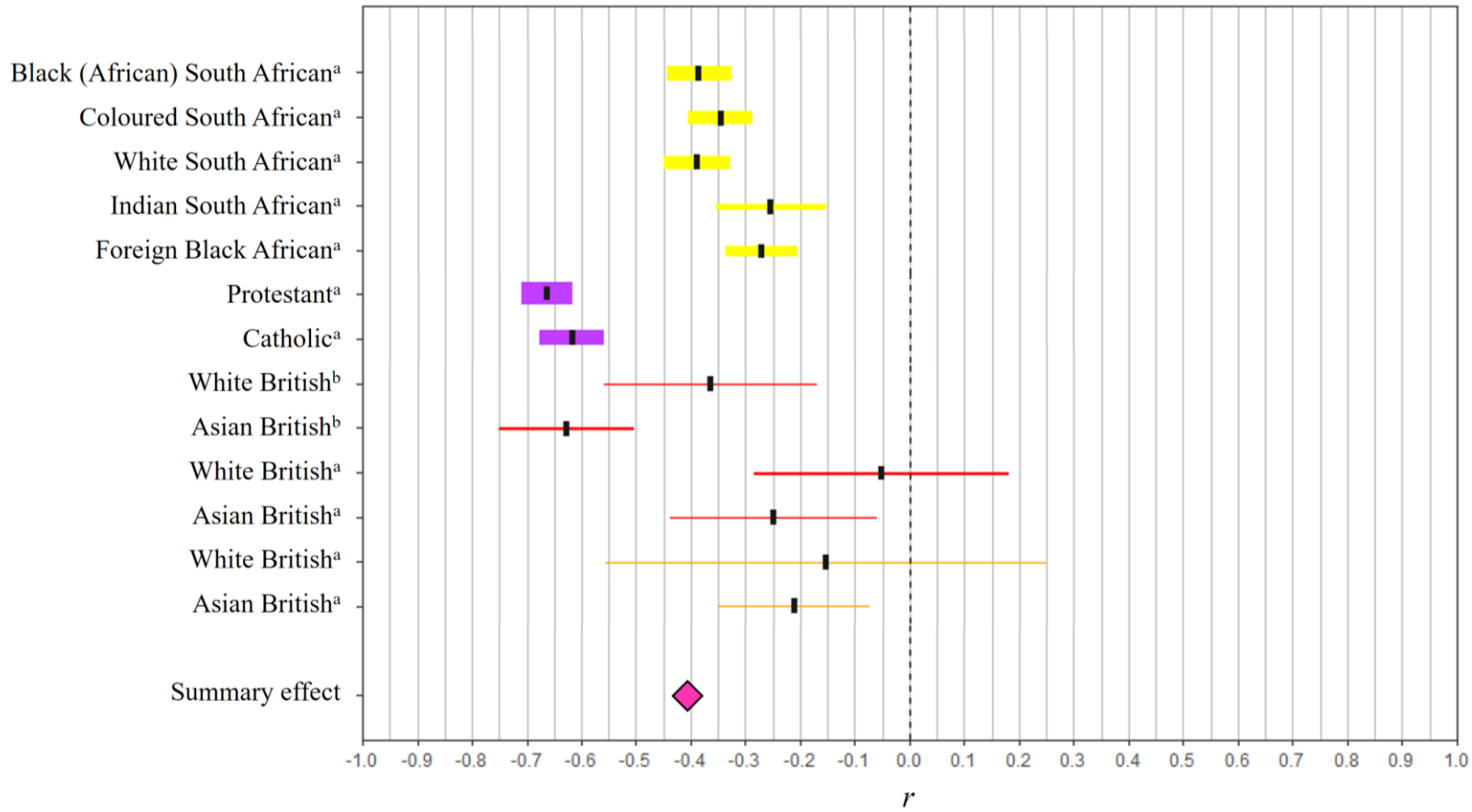


Figure 2.4. Forest plot depicting effect sizes for the association between ingroup and outgroup friends. The x-axis shows effect sizes (Pearson's *r*). Effect sizes are depicted for each subgroup in each study, as labelled on the y-axis. The studies are colour-coded as: Yellow = Study 1a; Purple = Study 1b; Red = Study 1e; Orange = Study 1f. [a] Friendship measure; [b] Best friendship measure. The black vertical bars represent the estimated effect size for each subgroup in each study, and the corresponding colour-coded horizontal bars represent 95% confidence intervals for each effect size. The figure depicts a thick variant of the forest plot, developed by Schild and Voracek (2015), which enhances the classic forest plot by visualising meta-analytic weight. The horizontal bars are weighted (in terms of height) by their relative meta-analytic weight. This accurately emphasises larger subgroups (with more weight in the meta-analysis) over smaller subgroups (with less weight in the meta-analysis). The summary effect size across studies is represented by the pink diamond.

The results of the fixed-effect meta-analysis for generic contact revealed an overall significant positive effect, $M\ r = .29$, $Z = 22.04$, $p < .001$, *95% CI* [.27, .32]. In contrast to expectations, this result indicates that there is a positive association between generic ingroup and outgroup contact. The results are visualised in a forest plot in Figure 2.5. On closer examination of the effects across studies visualised in the figure, it is possible that the overall meta-analytic effect identified may be misleading. As shown in the figure, two studies identified positive effects (Studies 1c and 1d) and two studies identified non-significant effects (Studies 1e and 1f). The non-significant effects identified in Studies 1e and 1f do not appear to be the result of low statistical power, because the estimated effects are close to zero; therefore, the lack of significance is not solely the result of wide confidence intervals, as depicted in Figure 2.5. The results are therefore rather mixed across studies.

The significant positive meta-analytic effect may be the result of Study 1c. The sample size for the White British subgroup in Study 1c (N = 3,536) was substantially larger than the combined sample size for all other subgroups across all other studies (total N = 1,756). This is visualised in Figure 2.5 via the weighted horizontal bars: the bar for the White British subgroup in Study 1c is considerably thicker than all other horizontal bars. The horizontal bars are weighted by their relative meta-analytic weight; these demonstrate the larger weight given to this subgroup, as compared to all other subgroups, in the meta-analysis. Accordingly, it is possible that the significant positive meta-analytic effect identified for generic contact resulted from one subsample (White British respondents in Study 1c) pulling the meta-analytic effect towards the effect identified for this large subgroup. This could account for the significant positive meta-analytic effect despite the mixed findings across studies.

Overall, the relationship between generic ingroup and outgroup contact may be interpreted as being positive, owing to the significant positive meta-analytic effect, or uncertain, owing to the mixed results across studies. Either way, the findings reveal no support for the hypothesis that there is a *negative* relationship between generic ingroup and outgroup contact.

It should be noted that the issue regarding the relative meta-analytic weight of the White British subgroup in Study 1c does not impact the meta-analysis for friendship, because Study 1c is not included in the friendship meta-analysis (this study only measured generic contact). Instead, in the meta-analysis for friendship, the sample size for each subgroup were more evenly distributed across studies, as shown by the weighted horizontal bars in Figure 2.4.

I hypothesised that the negative association between ingroup and outgroup contact would be stronger for friendship as compared to generic contact. This hypothesis is partially supported by the comparison of the confidence intervals for meta-analytic effects identified for friendship, *95% CI* [-.43, -.38], and generic contact, *95% CI* [.27, .32]. The confidence intervals do not overlap, which indicates a significantly stronger meta-analytic effect for friendship as compared to generic contact. However, as I hypothesised significant negative associations for both friendship and generic contact, with only the strength of the relationship varying with contact type, this finding does not fully support the hypothesis.

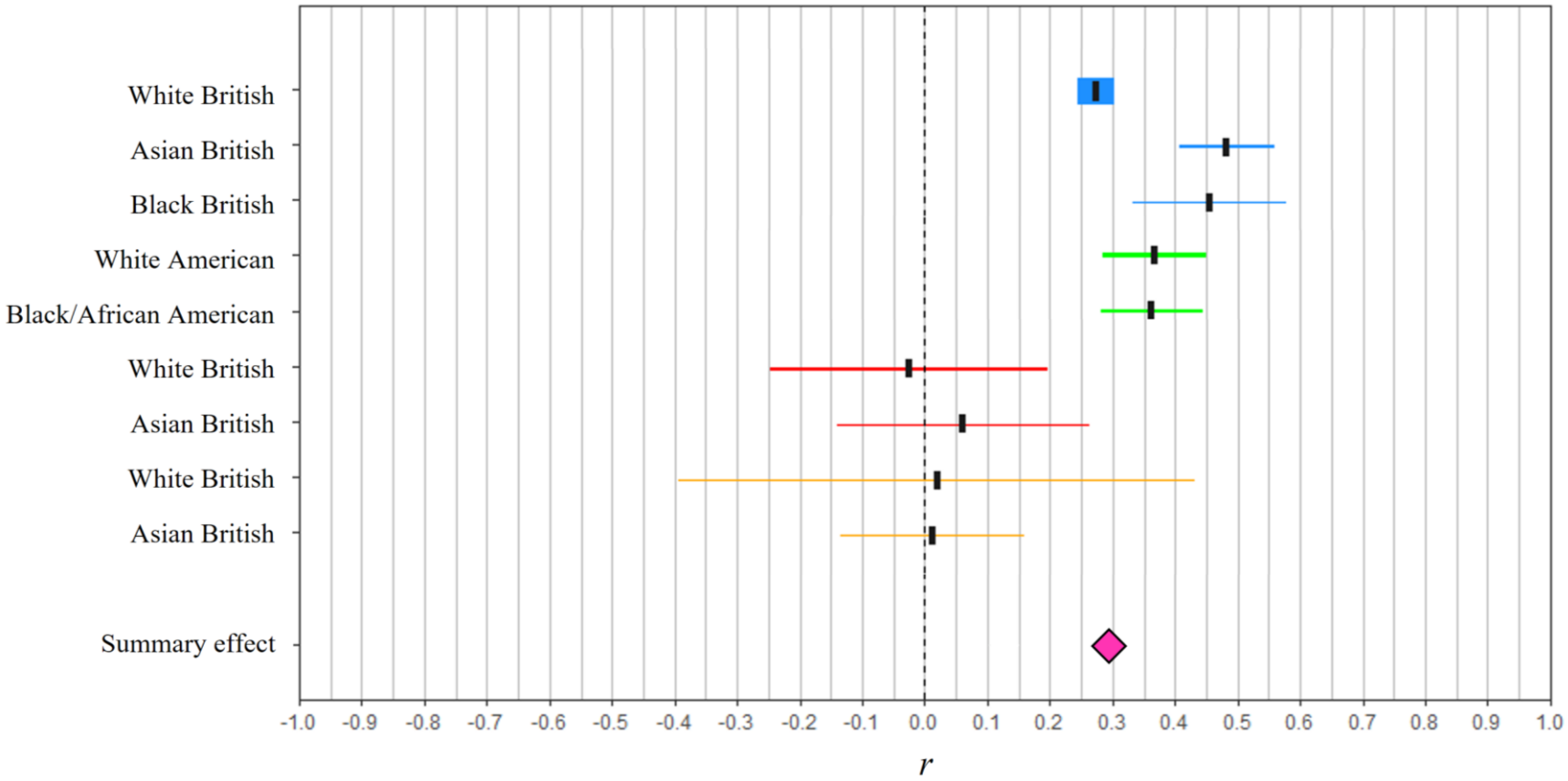


Figure 2.5. Forest plot depicting effect sizes for the association between generic ingroup and outgroup contact. The x-axis shows effect sizes (Pearson's *r*). Effect sizes are depicted for each subgroup in each study, as labelled on the y-axis. The studies are colour-coded as: Blue = Study 1c; Green = Study 1d; Red = Study 1e; Orange = Study 1f. The black vertical bars represent the estimated effect size for each subgroup in each study, and the corresponding colour-coded horizontal bars represent 95% confidence intervals for each effect size. The figure depicts a thick variant of the forest plot, developed by Schild and Voracek (2015), which enhances the classic forest plot by visualising meta-analytic weight. The horizontal bars are weighted (in terms of height) by their relative meta-analytic weight. This accurately emphasises larger subgroups (with more weight in the meta-analysis) over smaller subgroups (with less weight in the meta-analysis). The summary effect size across studies is represented by the pink diamond.

Overall, the findings from the two meta-analyses of cross-sectional studies provide important insights into the relationship between ingroup and outgroup contact. I hypothesised that that there would be a negative relationship between ingroup and outgroup contact, and that the relationship would be stronger for friendship than more casual types of contact. The findings provided mixed support for these hypotheses. I identified a significant negative association between ingroup and outgroup friendship; I did not, however, identify a negative association between generic ingroup and outgroup contact. Therefore, beyond the prediction that the negative relationship would be stronger for friendship than generic contact, my findings indicate that the negative relationship is only present for friendship, and not for more casual forms of contact. Instead, the meta-analysis revealed a *positive* association between generic ingroup and outgroup contact, although the results were mixed, and further research is required, which should examine generic contact in larger samples, before firm conclusions are drawn. The different results found for friendship and generic contact may result from variation in the limits imposed on different types of contact: friendship is limited by both cognitive and time constraints, while generic contact is limited only by time constraints.

I discuss potential explanations for the findings in detail in the general discussion, which considers the findings of both the cross-sectional and longitudinal studies. Next, to provide further insight into the relationship between ingroup and outgroup contact, I examine the relationship longitudinally.

2.2 The Longitudinal Relationship Between Ingroup and Outgroup Contact

In this section, I investigate the longitudinal relationship between ingroup and outgroup contact. Based on prior research concerning capacity limits on relationships (e.g., Dunbar, 1998; Dunbar et al., 2009) and the stability of contact frequency over time (Saramäki et al., 2014), I proposed that there would be a negative *longitudinal* relationship between ingroup and outgroup contact. That is, as engagement in ingroup contact increases over time, engagement in outgroup contact should concurrently decrease, and vice versa. I formulated identical hypotheses for the cross-sectional and longitudinal relationships: there will be a negative relationship between ingroup and outgroup contact, and the relationship will be stronger for friendship than more casual types of contact. The key difference between the cross-sectional and longitudinal approaches concerns the analysis methods used. In contrast to the correlational analyses conducted in the previous section, in this section I used multivariate latent growth modelling to examine the co-development of ingroup and outgroup contact over time.

I set out to test the hypotheses across four longitudinal studies. Study 2a examined friendship among White American, Asian American, Latino American and Black/African American college students in the United States, using self-report measures. Study 2b investigated friendship among White British and Asian British adolescents in England, using self-report measures. Study 2c investigated friendship and generic contact among White British and Asian British adolescents in England, using social network measures in addition to self-report measures. Finally, Study 2d examined generic contact among Māori and people of European descent in New Zealand, using self-report measures.

I employed identical analysis methods across the studies in order to facilitate the meta-analytic synthesis of the results. In the following section, I outline the analysis strategy. I then sequentially present the unique methods and corresponding results for each individual study. Finally, I describe the results of the meta-analysis in which I synthesised the results across the studies, and I discuss the overall findings.

2.2.1 Analysis Strategy

First, I examined the descriptive statistics for all ingroup and outgroup contact measures. I expected to identify higher levels of ingroup contact than outgroup contact, on the basis of prior research regarding the relative prevalence of ingroup contact as compared to outgroup contact (e.g., McPherson et al., 2001; Windzio & Bicer, 2013). I also expected to identify higher levels of ingroup contact, and lower levels of outgroup contact, for numerical majority groups, as compared to numerical minority groups, resulting from differences in contact opportunity structures (e.g., Barlow et al., 2013; Smith et al., 2016). In order to identify differences in the levels of ingroup and outgroup contact between groups of different size, I conducted a two-way mixed model analysis of variance (ANOVA), with one between subjects factor (group) and one within subjects factor (contact target: ingroup or outgroup).

I then tested the hypothesis that there would be a negative longitudinal relationship between ingroup and outgroup contact. To test this hypothesis, I analysed the data using multivariate latent growth modelling (MLGM). This analytic approach uses a set of observed repeated measures to estimate the underlying trajectory of change over time in each observed variable. MLGM further enables the examination of the relationships between the trajectories of each observed variable.

I analysed the data following the procedure detailed in Little (2013). Figure 2.6 shows the multivariate latent growth model I estimated for an illustrative five-wave model. I modelled each of the two observed variables (i.e., ingroup contact and outgroup contact) as a function of two latent variables. The first latent variable was the intercept, which represents the initial level of each observed variable. The second latent variable was the slope, which represents the linear growth rate (i.e., change from initial level) of each observed variable over time.

I then estimated the covariances between the latent intercepts and latent slopes of all observed variables. I transformed the covariances into correlations both for ease of interpretation and to enable the estimates identified in each study to be combined in the meta-analysis. The correlation between the intercepts represents the association between the initial level of each observed variable; thus, this correlation indicates whether there is a negative association between ingroup and outgroup contact at Wave 1 (this is equivalent to testing the relationship between observed variables cross-sectionally). The correlation between the slopes represents the degree to which, and in which direction, change over time in one observed variable is associated with change over time in another observed variable. Hence, this allowed me to test whether increases in ingroup contact over time were associated with decreases in outgroup contact over time, and vice versa. Missing data were treated using full information maximum likelihood (FIML). I estimated separate models for each ethnic group to identify any differences between groups.

MLGM is well-suited to examine the relationship between changes over time in ingroup and outgroup contact. This approach does not assume a causal direction, unlike many other longitudinal analysis methods (e.g., random-intercept cross-lagged panel modelling). That is, MLGM examines concurrent change over time in each observed

variable, rather than examining whether change in one observed variable predicts subsequent change in another observed variable. Furthermore, MLGM offers several key advantages over alternative longitudinal analysis methods that examine concurrent change over time (Little, 2013). MLGM has more statistical power than approaches based on either difference scores or repeated-measures analysis, which reduces Type II error. Additionally, MLGM uses all waves (in contrast to difference scores), which results in reduced measurement error and more reliable estimates.

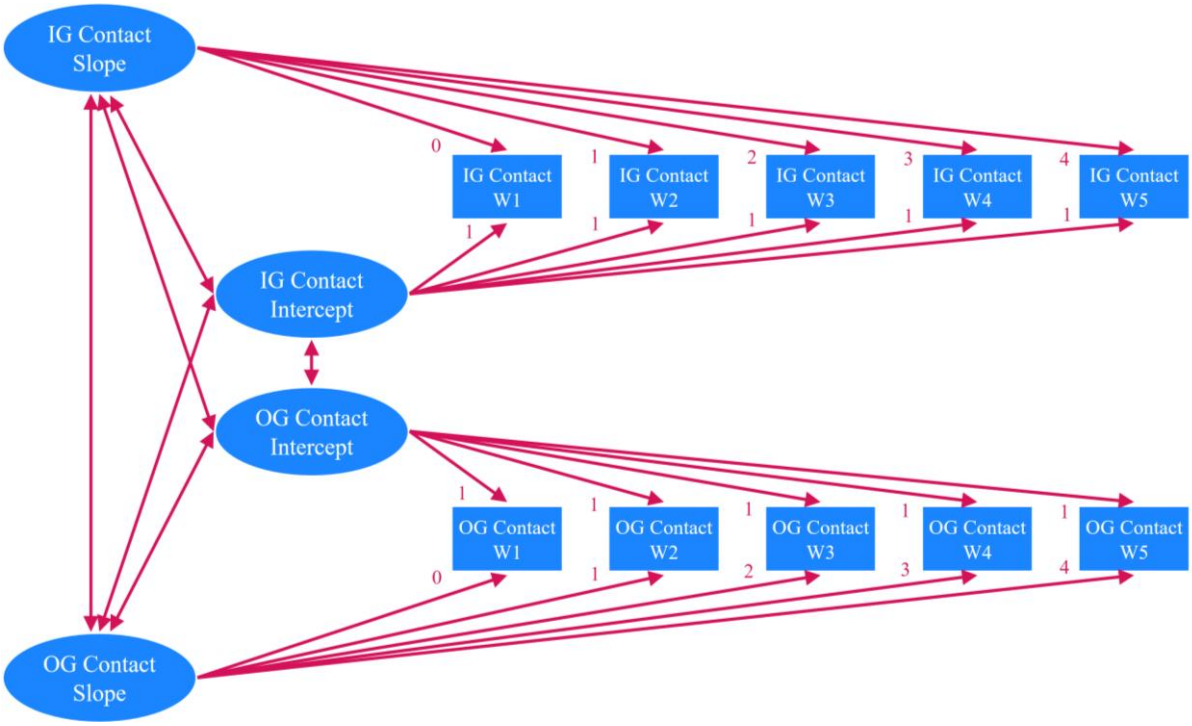


Figure 2.6. Multivariate latent growth model. IG = Ingroup; OG = Outgroup; W1 = Wave 1; W2 = Wave 2; W3 = Wave 3; W4 = Wave 4; W5 = Wave 5. Rectangles represent observed variables (i.e., ingroup contact and outgroup contact measured at each wave). Ellipses represent latent variables (i.e., the intercept of ingroup contact, slope of ingroup contact, intercept of outgroup contact, and slope of outgroup contact).

To conclude my analyses of the longitudinal studies, I synthesised the results across studies in a fixed-effect meta-analysis, following the procedure outlined in Goh et al. (2016). I used fixed effects in which the mean effect size (i.e., mean correlation) was weighted by sample size for each of the groups and studies included in the meta-

analysis. The meta-analysis focused only on the correlations between the slopes, not intercepts, because I was interested in the relationship between changes in ingroup and outgroup contact over time. Each correlation was Fisher's *z* transformed prior to the analysis and then converted back to Pearson correlations for ease of interpretation. I used Stouffer's *Z* Test to assess whether the overall association identified in the meta-analysis reached statistical significance. I then created a figure (forest plot) to visualise the results of the meta-analysis.

Regarding statistical power, simulation studies have shown that, for studies with five waves, MLGM requires a minimum sample size of approximately $N = 200$, and an ideal sample size of approximately $N = 400$ (Diallo et al., 2014; Diallo & Morin, 2015). Of the ten ethnic groups across the four longitudinal studies, all but one group ($N = 144$ Black/African American respondents in Study 2a) met the minimum sample size requirement of $N = 200$. A further two groups did not meet the ideal sample size requirement of $N = 400$ ($N = 397$ Asian British respondents in Study 2b, and $N = 341$ White British respondents in Study 2c). This was because sample size was predetermined in the pre-existing Studies 2a and 2b, and limited by school data collection constraints in the primary Study 2c. I resolved the potential issues surrounding power by combining the samples across studies in a meta-analysis with sufficient power ($N = 4{,}505$).

Model Convergence

I intended to test my hypotheses using measures of friendship in Studies 2a and 2b, measures of both friendship and generic contact in Study 2c, and a measure of generic contact in Study 2d. For all measures of friendship, the models converged, and, moreover, fitted the data well. However, for all measures of generic contact, the models

did not converge. Specifically, the models of generic contact did not converge because the covariance matrix of the latent variables was not positive definite. There are multiple potential explanations for this form of non-convergence. Most relevantly, the model misspecification for generic contact may be the result of there being no significant covariances between the latent variables for ingroup contact and outgroup contact. I formed this potential explanation on the basis of the consistent convergence for friendship models, and consistent non-convergence for generic contact models, coupled with the findings of the cross-sectional analyses: ingroup and outgroup friendship were consistently correlated, but generic ingroup and outgroup contact were not consistently correlated. In this section, I present the findings for only the models that converged, that is, the models of friendship in Studies 2a, 2b, and 2c.

2.2.2 Study 2a

Study 2a provided an initial examination of the longitudinal relationship between ingroup and outgroup friends. This study consisted of a secondary analysis of data collected among students attending the University of California, Los Angeles (for previous analyses of this dataset, see Levin et al., 2003; Sidanius et al., 2004; Van Laar et al., 2005; Van Laar et al., 2008).

Study 2a investigated the research questions in the context of the United States, akin to Study 1d. The sample included four different ethnic groups: Black/African American, Asian American, Latino American and White American people. The population of the United States comprises 60% White Americans, 13% Black/African Americans, 18% Latino Americans, and 6% Asian Americans (United States Census Bureau, 2010). The variation in the size of the different groups results in different opportunity structures for ingroup and outgroup contact.

Method

Respondents and Procedure

Data were collected among college students who commenced their studies at the University of California, Los Angeles (UCLA) in 1996. This cohort consisted of 3,877 students, of whom 32% were White American, 36% were Asian American, 18% were Latino American, 6% were Black/African American, and 8% either reported an alternative ethnicity or did not disclose their ethnicity.

Six waves of data were collected between 1996 and 2001. The first wave of data was collected in the summer prior to college entry (1996), and the following five waves were collected in the spring of each subsequent college year (1997-2001). For Wave 1, data were collected through a survey conducted during the summer orientation program. For Waves 2-6, data were collected through telephone surveys, which consisted of interviews lasting approximately 20 minutes. The telephone surveys were conducted by the Institute for Social Science Research at UCLA, using the Computer-Assisted Telephone Interview (CATI) system.

Of the cohort of 3,877 students, 2,617 students (68%) participated in at least one wave of data collection. Of these, I excluded 485 students who did not report their ethnicity or who reported an ethnicity other than White, Asian, Latino or Black/African American. This left a final sample of 2,132 students (56% female, 44% male; M_{age} = 17.92, SD = 0.45) of whom 764 were White American, 758 were Asian American, 466 were Latino American, and 144 were Black/African American.

Of the final sample, 78% participated in Wave 1, 82% in Wave 2, 82% in Wave 3, 66% in Wave 4, 59% in Wave 5, and 30% in Wave 6. I examined whether drop-out

correlated with participant attributes measured at each wave. Participant attributes were, at most, weakly correlated (mean absolute $|r| = .064$) with participation in each wave.

In this analysis, I only used data from Waves 2-6. I excluded Wave 1 data because this wave employed a different friendship measure from that used in Waves 2-6. Wave 1 used a retrospective measure of friendships in high school, whereas Waves 2-6 used a measure of current friendships in college.

Measures

Students completed surveys containing a variety of measures. Here, I only report measures relevant to the hypotheses. These consist of self-report measures of demographics (ethnicity, age and gender) and friends. Respondents' demographic information was recorded in Waves 1 or 2 (depending on whether the students participated in the pre-college survey at Wave 1, or commenced participation in the study once attending UCLA at Wave 2). Identical friendship measures were included in Waves 2-6.

Demographic Information. Students reported their own ethnicity, age and gender. To assess ethnicity, students were asked, "Which of the following groups do you most closely identify with?", and responded by selecting one of eight options. The sample included only students who selected either White, Asian, Latino or Black/African American.

Friends. Four items measured friendships. The stem question read: "At UCLA, how many of your closest friends are…" and the individual items were "…Asian American?", "…African American?", "…Latino?", and "…Caucasian?" (1 = *None*, 5 = *All*). Separate measures of ingroup friends and outgroup friends were computed based on the respondents' self-reported ethnicity (White, Asian, Latino, or Black/African

American). For each wave, the measure of ingroup friends comprised the single item for friends of each respondent's own ethnic group, and the measure of outgroup friends comprised the average of the three items for friends of the other ethnic groups.[5]

Results and Discussion

Descriptive Statistics

Table 2.12 shows the means and standard deviations for the measures of ingroup and outgroup friends for each group at each wave.

[5] In this study, I assessed the average level of outgroup contact, in an identical manner to that reported in detail in Study 1a. I report the full results for the averaged levels of outgroup contact. I also estimated the MLGM separately for each specific outgroup as a robustness check. The results were similar for both operationalisations of outgroup contact. For White and Asian American respondents, the slope of ingroup friends was significantly negatively correlated with the slope of outgroup friends, consistently across the three ethnic outgroups. For Latino and Black/African American respondents, the correlations were non-significant, with one exception: the slope of ingroup friends was significantly negatively correlated with the slope of outgroup (Asian American) friends for Black/African American respondents. Therefore, the findings concerning the main hypothesis addressed in this chapter were robust across the two operationalisations of outgroup contact.

Table 2.12. Means and Standard Deviations of Friends by Group and Wave (Study 2a)

	Wave 2	Wave 3	Wave 4	Wave 5	Wave 6
White American					
Ingroup friends	3.38 (0.79)	3.39 (0.76)	3.41 (0.76)	3.35 (0.74)	3.34 (0.69)
Outgroup friends	1.93 (0.43)	2.01 (0.43)	2.01 (0.43)	2.04 (0.42)	2.08 (0.36)
Asian American					
Ingroup friends	3.28 (0.89)	3.38 (0.87)	3.37 (0.86)	3.36 (0.85)	3.36 (0.83)
Outgroup friends	1.80 (0.45)	1.85 (0.46)	1.83 (0.47)	1.84 (0.45)	1.91 (0.48)
Latino American					
Ingroup friends	3.03 (0.96)	3.16 (0.97)	3.09 (0.95)	3.20 (0.97)	3.16 (0.95)
Outgroup friends	2.10 (0.48)	2.13 (0.48)	2.10 (0.51)	2.07 (0.47)	2.05 (0.49)
Black/African American					
Ingroup friends	3.40 (1.09)	3.36 (1.00)	3.26 (1.09)	3.29 (1.07)	3.15 (1.17)
Outgroup friends	1.97 (0.53)	2.07 (0.52)	2.00 (0.56)	2.07 (0.48)	2.14 (0.73)

Note. Standard deviations are shown in parentheses.

Correlations between measures across waves are shown in Appendix B. Each individual measure was significantly correlated between waves (mean absolute $|r| = .52$, $p < .001$).

Multivariate Latent Growth Models

I estimated a separate MLGM for each of the four ethnic groups. The results showed that the MLGM fit the data well for White American respondents, $\chi^2_{(41)} = 40.33$; *CFI* = 1.00; *TLI* = 1.00; *RMSEA* = .00, *95% CI* [.00, .03]; *SRMR* = .06, Asian American respondents, $\chi^2_{(41)} = 66.90$; *CFI* = .98; *TLI* = .98; *RMSEA* = .03, *95% CI* [.02, .05];

SRMR = .05, Latino American respondents, $\chi^2_{(41)}$ = 55.53; *CFI* = .99; *TLI* = .99; *RMSEA* = .03, *95% CI* [.00, .05]; *SRMR* = .05, and Black/African American respondents, $\chi^2_{(41)}$ = 53.71; *CFI* = .97; *TLI* = .96; *RMSEA* = .05, *95% CI* [.00, .08]; *SRMR* = .08.

To test my hypothesis that there would be a negative longitudinal relationship between ingroup and outgroup contact, I examined the correlation between the slope of ingroup friends and the slope of outgroup friends. This correlation represents the relationship between changes in the numbers of ingroup friends and outgroup friends over time. The correlations between the slopes of ingroup and outgroup friends for each ethnic group are shown in Table 2.13. Appendix C shows the full results of each MLGM, including the means and variances for, and correlations between, all four latent variables (i.e., the intercept of ingroup friends, slope of ingroup friends, intercept of outgroup friends, and slope of outgroup friends).

Table 2.13. Correlations Between the Slopes of Ingroup Friends and Outgroup Friends by Group (Study 2a)

				95% CI	
	r	*SE*	*p*	*low*	*high*
White American	-0.45*	0.15	.002	-0.74	-0.17
Asian American	-0.90*	0.40	.026	-1.69	-0.11
Latino American	-0.23	0.22	.303	-0.66	0.21
Black/African American	-0.30	0.83	.716	-1.93	1.33

Note. SE = Standard Error; *CI* = Confidence Interval. * Denotes significant correlations ($p < .05$).

For White American and Asian American respondents, the slope of ingroup friends was significantly negatively correlated with the slope of outgroup friends. This indicates that increases in the number of ingroup friends over time were associated with

decreases in the number of outgroup friends over time, and vice versa. For Latino American and Black/African American respondents, the correlations were negative but non-significant. The differences in statistical significance may have resulted from a lack of power to detect the effect in the models estimated using smaller samples, as the sample sizes for Latino American and Black/African American respondents were substantially smaller than the sample sizes for White American and Asian American respondents.

These findings provide initial evidence supporting the hypothesis that there is a negative *longitudinal* relationship between ingroup and outgroup contact, although the negative relationships identified were not consistently significant. This study only examined the hypothesis in one specific context (i.e., among different ethnic groups in the United States), however. To assess the robustness and generalisability of the findings, I tested the hypothesis in an alternative intergroup context in the following study.

2.2.3 Study 2b

Study 2b investigated the longitudinal relationship between ingroup and outgroup friends among White British and Asian British adolescents in Oldham. This intergroup context is therefore the same as described in Studies 1e and 1f, however, unlike Studies 1e and 1f, Study 2b employed a longitudinal design. This study comprised a secondary analysis of data collected with the purpose of examining different research questions (reported in Study 3 of Hewstone et al., 2018).

Method

Respondents and Procedure

Data were collected at three schools in Oldham. The schools comprised sizeable numbers of students from the White British and Asian British communities in Oldham (School 1: 39% White British, 48% Asian British; School 2: 61% White British, 22% Asian British; School 3: 85% White British, 6% Asian British).

Five waves of data were collected, in June 2012, December 2012, September 2013, June 2014, and February 2015. The intervals between waves ranged from six to nine months. Information regarding participation rates per wave were unavailable in this secondary data. All students in Year 7 (aged 11-12), Year 8 (aged 12-13) and Year 9 (aged 13-14) were invited to participate in the study. The total sample consisted of 1,203 students (61% boys, 39% girls; M_{age} = 13.72, SD = 0.94) of whom 806 were White British and 397 were Asian British. For each wave, data were collected using paper-and-pencil questionnaires administered in classrooms during school hours.

Measures

Students completed surveys containing a variety of measures. Here, I only report measures relevant to the hypotheses. These consist of self-report measures of demographics (ethnicity, age and gender) and friends. All measures were included at each of the five waves.

Demographic Information. Students reported their own ethnicity, age and gender. To assess ethnicity, students were asked, “Which ethnic group do you belong to?”, and responded by selecting one of 17 options. The sample included only students who selected either White/White British or Asian/Asian British.

Friends. Friendships with White British and Asian British people were measured using two identical items: "How many of your friends are [White/Asian] British?" (1 = *None*, 5 = *All*). Ingroup and outgroup friendships were identified based on the correspondence between each item and individuals' self-reported ethnicity.

Results and Discussion

Descriptive Statistics

Table 2.14 shows the means and standard deviations for the measures of ingroup and outgroup friends for each ethnic group at each wave.

Table 2.14. Means and Standard Deviations of Friends by Group and Wave (Study 2b)

	Wave 1	Wave 2	Wave 3	Wave 4	Wave 5
White British					
Ingroup friends	4.75 (0.61)	4.74 (0.65)	4.70 (0.63)	4.81 (0.47)	4.68 (0.63)
Outgroup friends	2.29 (1.06)	2.44 (1.01)	2.39 (1.01)	2.30 (0.98)	2.47 (0.95)
Asian British					
Ingroup friends	4.57 (0.97)	4.71 (0.78)	4.65 (0.75)	4.65 (0.79)	4.64 (0.88)
Outgroup friends	3.10 (1.29)	3.25 (1.23)	3.16 (1.24)	2.96 (1.23)	2.86 (1.14)

Note. Standard deviations are shown in parentheses.

I examined differences in the levels of ingroup and outgroup contact between the two ethnic groups. The results of a two-way mixed model ANOVA showed that there was a significant main effect of contact target, $F(1, 1194) = 2726.31$, $p < .001$, $\eta_p^2 = .70$, with respondents reporting significantly more ingroup friends ($M = 4.68$) than outgroup friends ($M = 2.69$). In addition, there was a significant main effect of ethnicity, $F(1, 1194) = 100.59$, $p < .001$, $\eta_p^2 = .08$, with Asian British respondents reporting

significantly more friends (M = 3.84) than White British respondents (M = 3.53). There was also a significant interaction between contact target and ethnicity, $F(1, 1194)$ = 126.30, $p < .001$, $\eta_p^2 = .10$. Descriptive statistics showed that White British respondents reported more ingroup friends (M = 4.73) than Asian British respondents (M = 4.62), while Asian British respondents reported more outgroup friends (M = 3.06) than White British respondents (M = 2.32). This pattern likely reflects variation in contact opportunity structures between the two groups: the numerical majority group (N = 806 White British respondents) reported more ingroup friends, and fewer outgroup friends, than the numerical minority group (N = 397 Asian British respondents). Despite this difference between the two groups, ingroup friendship was more prevalent than outgroup friendship for both groups. These findings are in accordance with expectations and prior research (e.g., Barlow et al., 2013; McPherson et al., 2001; Smith et al., 2016; Windzio & Bicer, 2013).

Appendix B shows the correlations between measures across waves. Each individual measure was significantly correlated between waves (mean absolute $|r| = .42$, $p < .001$).

Multivariate Latent Growth Models

I estimated a separate MLGM for each ethnic group. The results showed that the MLGM fit the data well for Asian British respondents, $\chi^2_{(41)} = 78.67$; *CFI* = .93; *TLI* = .92; *RMSEA* = .05, *95% CI* [.03, .06]; *SRMR* = .08, and reasonably well for White British respondents, $\chi^2_{(41)} = 101.07$; *CFI* = .87; *TLI* = .85; *RMSEA* = .04, *95% CI* [.03, .05]; *SRMR* = .08.

To test the hypothesis that there would be a negative longitudinal relationship between ingroup and outgroup contact, I examined the correlation between the slope of

ingroup friends and the slope of outgroup friends. Table 2.15 shows the correlations between the slopes of ingroup and outgroup friends for each ethnic group. The full results of each MLGM, including the means and variances for, and correlations between, all four latent variables, are shown in Appendix C.

Table 2.15. Correlations Between the Slopes of Ingroup Friends and Outgroup Friends by Group (Study 2b)

				95% CI	
	r	*SE*	*p*	*low*	*high*
White British	-0.29*	0.13	.021	-0.54	-0.04
Asian British	-0.34	0.28	.220	-0.88	0.20

Note. SE = Standard Error; *CI* = Confidence Interval. * Denotes significant correlations ($p < .05$).

For White British respondents, the slope of ingroup friends was significantly negatively correlated with the slope of outgroup friends. This indicates that increases in the number of ingroup friends over time were associated with decreases in the number of outgroup friends over time, and vice versa. For Asian British respondents, the correlation was negative but non-significant. Similarly to Study 2a, the non-significant correlation identified for the smaller sample in this study may have resulted from a lack of power to detect the effect: the model estimated for the smaller sample (Asian British students) identified a non-significant negative effect, while the model estimated for the larger sample (White British students) identified a significant negative effect. Alternatively, as the findings from both longitudinal studies thus far show non-significant correlations for numerical minority groups, it is plausible that there is only a significant negative longitudinal relationship for numerical majority groups.

Overall, these findings provide further evidence supporting the hypothesis that there is a negative longitudinal relationship between ingroup and outgroup contact, although the findings across both Studies 2a and 2b were not consistently significant. Both longitudinal studies presented thus far have used self-report measures of friendship; the final longitudinal study, detailed in the following section, tests whether the findings generalise across friendship measures by using a network measure of friendship.

2.2.4 Study 2c

Studies 2a and 2b both used self-report measures of friendship. As previously discussed (see Chapter 1), self-report measures of friendship are susceptible to social desirability bias, which can lead individuals to exaggerate their number of outgroup friends (Smith, 2002). If individuals were to exaggerate their numbers of outgroup friends, this would distort the relationship between ingroup and outgroup friends. In order to avoid this potential issue, Study 2c employed a network measure of friendship.

In contrast to Studies 2a and 2b, which comprised secondary data, I conducted Study 2c specifically to investigate the research questions addressed in this thesis. In this study, I investigated my research questions among White British and Asian British adolescents in Oldham. The intergroup context is therefore the same as described in Studies 1e, 1f, and 2b. The study received ethical approval from the Medical Sciences Inter-divisional Research Ethics Committee (R52944/RE001).

Method

Respondents and Procedure

I collected five waves of data over the academic year 2017/2018 (in October, December, February, March and May). The intervals between waves ranged from six to eight weeks. I collected data at two schools, which each contained sizeable numbers of students from the White British and Asian British communities in Oldham (School 1: 16% White British, 82% Asian British; School 2: 39% White British, 55% Asian British).

I invited all students in Year 7 (aged 11-12), Year 8 (aged 12-13) and Year 9 (aged 13-14) to participate in the study. Of a total of 1,445 students across the three year groups, 1,328 (92%) participated in at least one wave of data collection. Of these, I excluded 158 students who reported an ethnicity other than Asian British or White British (n = 45) or who did not report their ethnicity (n = 113). This left a final sample of 1,170 students (M_{age} = 12.11, SD = 0.89) of whom 341 were White British (171 boys, 170 girls) and 829 were Asian British (387 boys, 442 girls).

Of the final sample, 84% participated in Wave 1, 81% in Wave 2, 80% in Wave 3, 79% in Wave 4, and 77% in Wave 5. For each wave, I examined whether drop-out correlated with participant attributes measured at the preceding wave. Participant attributes were, at most, weakly correlated (mean absolute $|r|$ = .061) with participation in the subsequent wave.

Two weeks before the study, parents of all students received information sheets and opt-out consent forms. Less than 1% of parents indicated that they did not want their child to participate. In addition, students filled in informed consent forms at each wave of data collection. Students completed paper-and-pencil questionnaires in

classrooms during school hours. Each data collection session lasted 30 to 50 minutes. A team of two to four researchers visited each classroom to explain the study and answer any questions. Each questionnaire contained the measures described below, as well as an information sheet explaining that the students' participation was voluntary and that the confidentiality of their data would be maintained.

Measures

Students completed surveys containing a variety of measures. Here, I only report measures relevant to the hypotheses. These consist of a network measure of friendship and a self-report measure of ethnicity. I ordered the measures included in the survey so as to avoid well-documented response biases (Smith, 2002). Specifically, I assessed the students' friendships (without reference to group memberships) before the other measures (which referred to group memberships). All measures were included at each of the five waves.

Friends. Friendship networks within each year group were elicited using peer-nomination procedures. Students nominated up to ten friends in response to the question, "Who are your friends (in your year group)?". I used year group rather than classroom network boundaries because students at these schools are allocated to different classes for each subject, and so mix with peers throughout their year group. Accordingly, I examined six friendship networks: year groups 7, 8 and 9 at each of the two schools. The six friendship networks are shown in Figure 2.7. The networks ranged in size from $n = 163$ to $n = 221$ students. On average, students nominated seven friends ($M = 7.04$, $SD = 1.99$). Ingroup friends and outgroup friends were identified based on the correspondence between individuals' self-reported ethnicity and their friends' self-reported ethnicity.

Demographic Information. The schools provided information about students' age and gender, while students reported their own ethnicity. Students were asked, "Which of the following ethnic groups do you think best describes you?", and responded by selecting one of ten options. The sample included only students who selected either White/White British or Asian/Asian British.

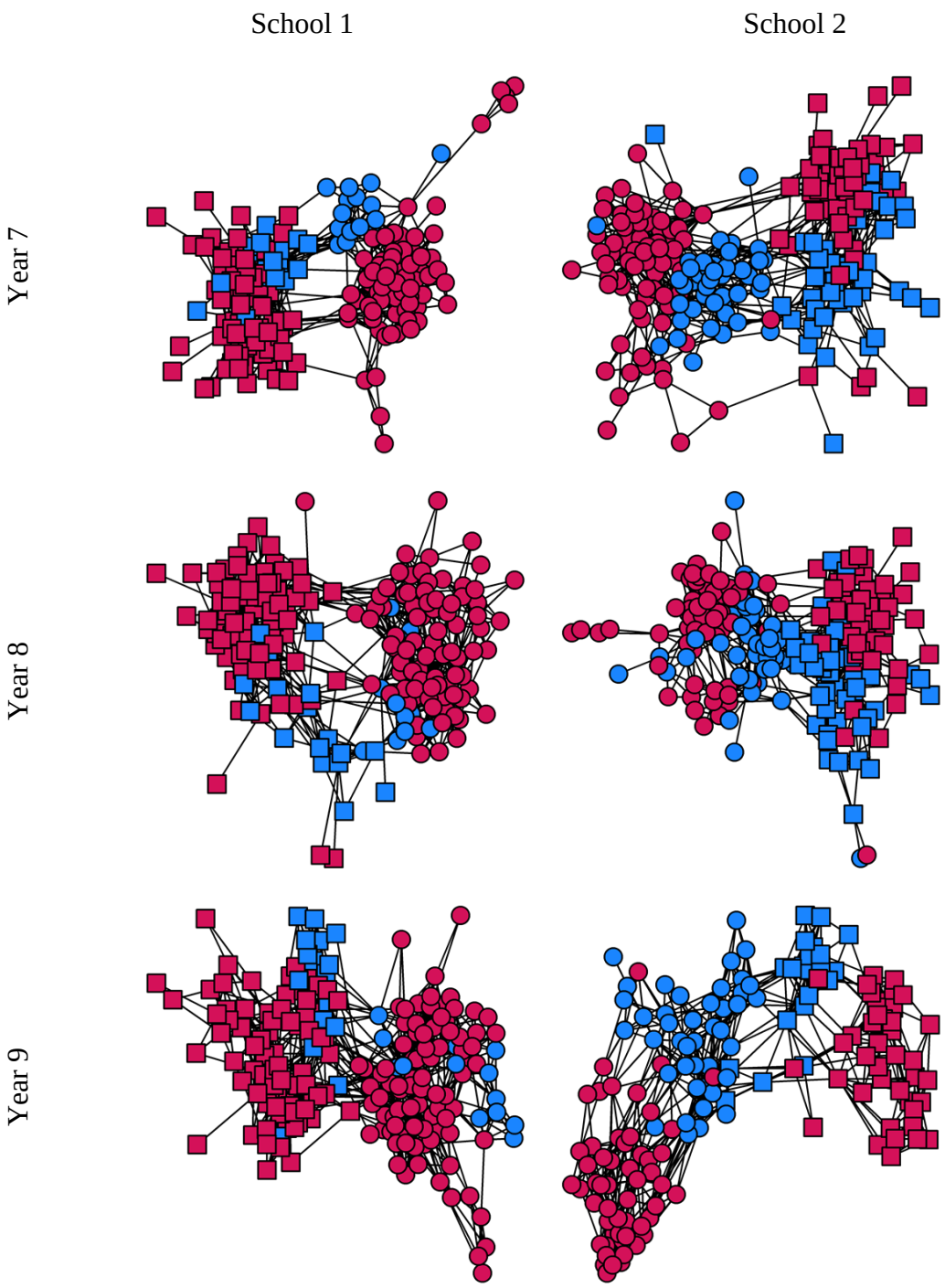


Figure 2.7. Study 2c friendship networks. Each node (square or circle) represents a student and each tie (link between nodes) represents a friendship. Red = Asian British student; Blue = White British student; Square = boy; Circle = girl. The figure shows each friendship network at Wave 1, with isolates removed. The networks show high levels of segregation by both ethnicity and gender.

Results and Discussion

Descriptive Statistics

Table 2.16 shows the means and standard deviations for the measures of ingroup and outgroup friends for each ethnic group at each wave.

Table 2.16. Means and Standard Deviations of Friends by Group and Wave (Study 2c)

	Wave 1	Wave 2	Wave 3	Wave 4	Wave 5
White British					
Ingroup friends	5.40 (2.40)	5.08 (2.44)	5.02 (2.55)	5.07 (2.42)	4.92 (2.24)
Outgroup friends	1.21 (1.67)	1.48 (1.82)	1.40 (1.77)	1.56 (2.00)	1.58 (1.86)
Asian British					
Ingroup friends	6.53 (2.50)	6.67 (2.41)	6.75 (2.44)	6.78 (2.41)	6.86 (2.37)
Outgroup friends	0.82 (1.30)	0.84 (1.26)	0.84 (1.33)	0.83 (1.29)	0.74 (1.22)

Note. Standard deviations are shown in parentheses.

I examined differences in the levels of ingroup and outgroup contact between the two ethnic groups. The results of a two-way mixed model ANOVA showed that there was a significant main effect of contact target, $F(1, 1157) = 2414.25$, $p < .001$, $\eta_p^2 = .68$, with respondents reporting significantly more ingroup friends ($M = 5.83$) than outgroup friends ($M = 1.08$). In addition, there was a significant main effect of ethnicity, $F(1, 1157) = 61.22$, $p < .001$, $\eta_p^2 = .05$, with Asian British respondents reporting significantly more friends ($M = 3.70$) than White British respondents ($M = 3.20$). There was also a significant interaction between contact target and ethnicity, $F(1, 1157) = 111.60$, $p < .001$, $\eta_p^2 = .09$. Descriptive statistics showed that Asian British respondents reported more ingroup friends ($M = 6.59$) than White British respondents ($M = 5.07$),

while White British respondents reported more outgroup friends (M = 1.34) than Asian British respondents (M = 0.82). In accordance with expectations, these findings indicate that the numerical majority group reported significantly more ingroup friends, and fewer outgroup friends, than the numerical minority group, as there were more Asian British than White British students in these schools. Despite this difference between the two groups, ingroup friendship was more prevalent than outgroup friendship for both groups. The large difference between the numbers of ingroup and outgroup friends reflects a high level of ethnic segregation in the networks. This high level of ethnic segregation was similar across all six networks, as shown in Figure 2.7.

The correlations between measures across waves are shown in Appendix B. Each individual measure was significantly correlated between waves (mean absolute $|r|$ = .59, $p < .001$).

Multivariate Latent Growth Models

I estimated a separate MLGM for each ethnic group. The results showed that the MLGM fit the data well for White British respondents, $\chi^2_{(41)}$ = 102.35; *CFI* = .96; *TLI* = .96; *RMSEA* = .07, *95% CI* [.05, .08]; *SRMR* = .05, and Asian British respondents, $\chi^2_{(41)}$ = 220.75; *CFI* = .96; *TLI* = .96; *RMSEA* = .07, *95% CI* [.06, .08]; *SRMR* = .05.

To test the hypothesis that there would be a negative longitudinal relationship between ingroup and outgroup contact, I examined the correlation between the slope of ingroup friends and the slope of outgroup friends. Table 2.17 shows the correlations between the slopes of ingroup and outgroup friends for each ethnic group. Appendix C shows the full results of each MLGM, including the means and variances for, and correlations between, all four latent variables.

Table 2.17. Correlations Between the Slopes of Ingroup Friends and Outgroup Friends by Group (Study 2c)

				95% CI	
	r	*SE*	*p*	*low*	*high*
White British	-0.94*	0.22	<.001	-1.36	-0.51
Asian British	-0.81*	0.12	<.001	-1.04	-0.58

Note. *SE* = Standard Error; *CI* = Confidence Interval. * Denotes significant correlations ($p < .05$).

For both White British and Asian British respondents, the slope of ingroup friends was significantly negatively correlated with the slope of outgroup friends. This indicates that increases in the number of ingroup friends over time were associated with decreases in the number of outgroup friends over time, and vice versa. In contrast to Studies 2a and 2b, the present study identified a significant negative relationship for both the numerical majority group and numerical minority group. Therefore, the findings from Study 2c provide further evidence supporting the hypothesis that there is a negative longitudinal relationship between ingroup and outgroup contact, and demonstrate that this relationship is not exclusive to numerical majority groups. Furthermore, by using a network measure of friendship, in contrast to the self-report measures used in Studies 2a and 2b, the present study demonstrates the generalisability of the findings across different friendship measures. In order to synthesise the results across the three longitudinal studies, I present the results of a fixed-effect meta-analysis in the following section.

2.2.5 Synthesis of Results

I synthesised the results across the three longitudinal studies using a fixed-effect meta-analysis, following the procedure outlined in Goh et al. (2016). The meta-analysis examined the association between the slope of ingroup friends (i.e., change in the number of ingroup friends over time) and the slope of outgroup friends (i.e., change in the number of outgroup friends over time). I predicted a negative meta-analytic effect, as I hypothesised that the slope of ingroup friends would be significantly negatively correlated with the slope of outgroup friends.

The results of the fixed-effect meta-analysis revealed an overall highly significant negative effect, $M\ r = -.65$, $Z = -49.43$, $p < .001$, *95% CI* [-.67, -.63]. This provides strong evidence of a negative *longitudinal* relationship between ingroup and outgroup friends. That is, across studies, increases in the number of ingroup friends over time were associated with decreases in the number of outgroup friends over time, and vice versa.

The results of the meta-analysis are visualised using a forest plot (Schild & Voracek, 2015) in Figure 2.8. As shown in the figure, the effects for all subgroups across all studies were negative. The figure also displays the 95% confidence intervals for each effect. The confidence intervals for the subgroups with small sample sizes were very wide, particularly for the smallest sample, which consisted of Black/African American respondents in Study 2a ($N = 144$). Nonetheless, the consistency of the negative effect across all subgroups and studies indicated that the finding was robust.

I was not able to test all my hypotheses in the longitudinal studies. I hypothesised that that there would be a negative relationship between ingroup and outgroup contact, and that the relationship would be stronger for friendship than more

casual types of contact. In partial support of this hypothesis, I identified a negative relationship between ingroup and outgroup friends in the longitudinal studies. I could not, however, test whether this result held for generic contact, nor whether the strength of the relationship differed depending on the type of contact. In the following section, I discuss the overall findings of all the studies presented thus far, assessing support for the hypotheses addressed based on both the cross-sectional *and* longitudinal studies.

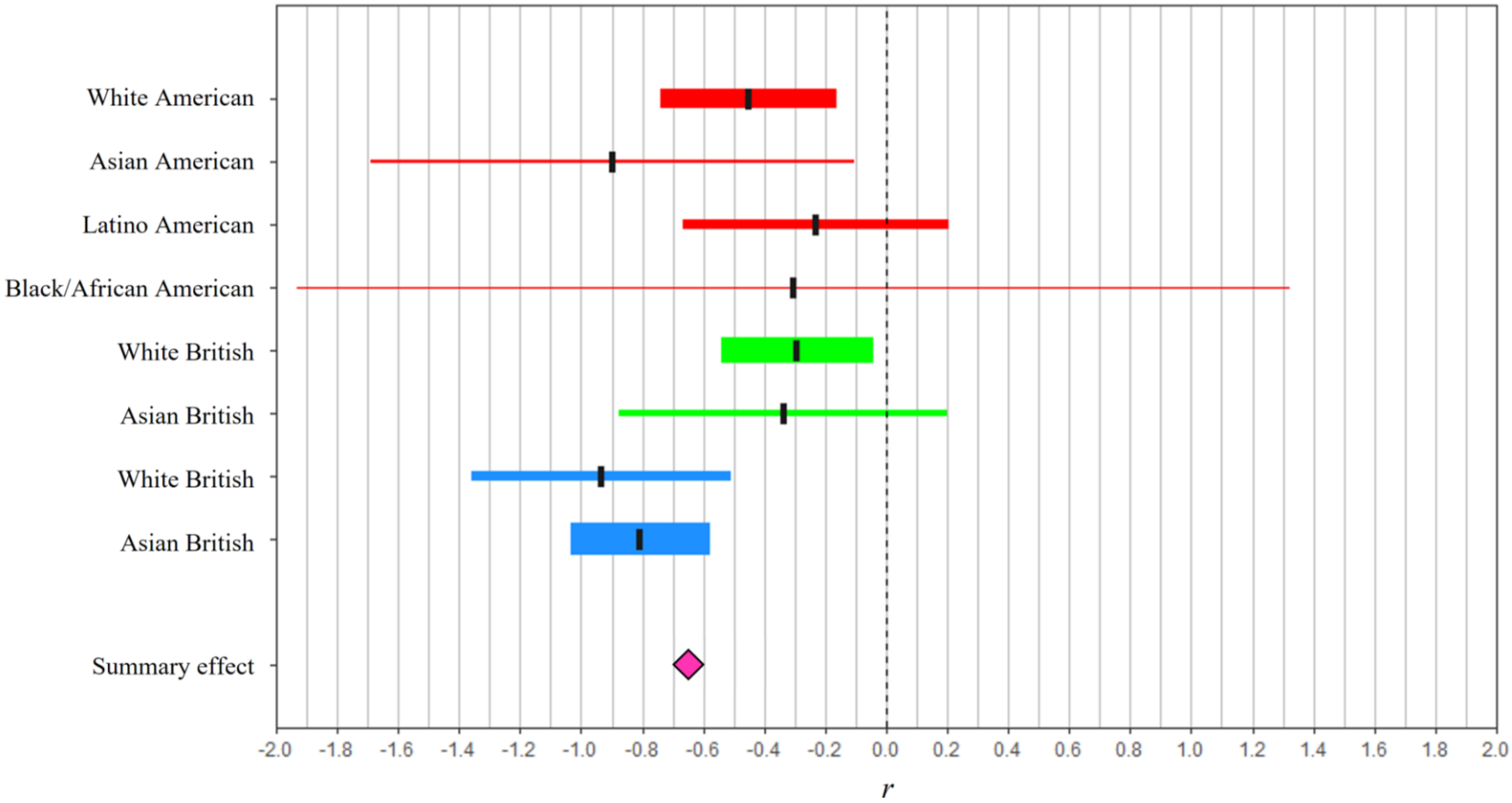


Figure 2.8. Forest plot depicting effect sizes for the association between changes in ingroup friends and changes in outgroup friends over time. The x-axis shows effect sizes (Pearson's *r*). Effect sizes are depicted for each subgroup in each study, as labelled on the y-axis. The studies are colour-coded as: Red = Study 2a; Green = Study 2b; Blue = Study 2c. The black vertical bars represent the estimated effect size for each subgroup in each study, and the corresponding colour-coded horizontal bars represent 95% confidence intervals for each effect size. The figure depicts a thick variant of the forest plot, developed by Schild and Voracek (2015), which enhances the classic forest plot by visualising meta-analytic weight. The horizontal bars are weighted (in terms of height) by their relative meta-analytic weight. This accurately emphasises larger subgroups (with more weight in the meta-analysis) over smaller subgroups (with less weight in the meta-analysis). The summary effect size across studies is represented by the pink diamond.

2.3 General Discussion

In this chapter, I have presented the findings from six cross-sectional studies and three longitudinal studies investigating the two hypotheses concerning the relationship between ingroup and outgroup contact. On the basis of prior research regarding cognitive and time constraints on individuals' social relationships and social interactions, I hypothesised that there would be a negative relationship between ingroup and outgroup contact. Furthermore, I hypothesised that the negative relationship would be stronger for friendship than more casual types of contact, owing to the greater constraints on friendship as compared to generic contact.

Across the studies, I identified different results depending on the type of contact under examination. The findings regarding friendship were drawn from 11 subgroups across four cross-sectional studies, and eight subgroups across three longitudinal studies. I identified negative associations between ingroup and outgroup friends across all seven cross-sectional and longitudinal studies. Furthermore, I synthesised the findings across the seven studies, and identified a significant negative meta-analytic effect. The findings regarding generic contact were drawn from nine subgroups across four cross-sectional studies. I identified significant positive associations between generic ingroup and outgroup contact in two studies (Studies 1c and 1d), and non-significant associations between generic ingroup and outgroup contact in two studies (Studies 1e and 1f). I identified an overall significant positive meta-analytic effect; however, the results were mixed across studies, which indicates that the effect is not robust, and renders the association between generic ingroup and outgroup contact uncertain.

I found evidence of both a cross-sectional and longitudinal negative relationship between ingroup and outgroup friends. The cross-sectional negative relationship indicates that individuals with more ingroup friends have fewer outgroup friends, and vice versa. The longitudinal negative relationship indicates that as an individual's number of ingroup friends increases over time, their number of outgroup friends concurrently decreases, and vice versa. I could not test the hypothesis for generic contact longitudinally, because the models did not converge.

Overall, the findings of the studies presented in this chapter provided mixed support for the hypotheses. I identified a significant negative relationship between ingroup and outgroup friends. I did not, however, identify a negative relationship between generic ingroup and outgroup contact. Therefore, beyond the hypothesis that the negative relationship would be stronger for friendship than more casual types of contact, my findings indicated that there is only a negative relationship between ingroup and outgroup friends, and not between generic ingroup and outgroup contact. The mixed findings regarding generic contact suggest that there may be either a positive association between generic ingroup and outgroup contact, or no association between generic ingroup and outgroup contact, and further research employing larger samples is required before firm conclusions are drawn.

The different findings regarding friendship and generic contact may result from variation in the limits imposed on different types of contact: friendship is limited by both cognitive and time constraints (e.g., Dunbar, 1998; Dunbar et al., 2009), whereas generic contact is limited only by time constraints (e.g., Saramäki et al., 2014; Tooby & Cosmides, 1996). Furthermore, the time constraints imposed on friendships are likely greater than the time constraints imposed on generic contact, because maintaining a friendship through frequent and meaningful interactions over a long period is more

time-consuming than short and superficial casual interactions. However, in the present research I only examined the relationship between ingroup and outgroup contact, and I did not test what mechanisms may have resulted in the relationships identified. Consequently, it remains unknown whether the negative relationship between ingroup and outgroup friends results from time constraints, cognitive restrictions, alternative mechanisms, or any combination of these factors. Accordingly, it is unclear whether the divergent findings for friendship and generic contact result from variation in the limits imposed on different types of contact. To address this remaining question, future research should explore the mechanisms behind the relationship between ingroup and outgroup contact.

In relation to prior research, the present findings build upon the findings of Pfister et al. (2020), who also examined capacity limits on ingroup and outgroup friendships. Pfister et al. found that the number of friends individuals reported at a given time negatively predicted the numbers of ingroup and outgroup friends individuals later reported. However, the network measure of friendship employed in the study restricted the number of friendship nominations to five friends. By artificially imposing a limit on friendship, the negative relationship between ingroup and outgroup friends could potentially have been a methodological artefact (although, as discussed in Chapter 1, the researchers found that few students reached the artificial limit of five friends). The present research extends the findings of Pfister et al. (2020), by demonstrating that the negative relationship is not a methodological artefact: I identified a negative relationship between ingroup and outgroup friends in Study 1f using an unrestricted network measure of friendship, in which individuals could nominate an unlimited number of friends.

The present research has several notable strengths. Firstly, the considerable number of studies, which together provided a total sample of 14,216 respondents, yielded an excellent database from which to draw conclusions. Secondly, the meta-analytic synthesis of the results across studies enabled the clear identification of patterns across both subsets of data, cross-sectional and longitudinal studies. Thirdly, the studies used different measures of contact, including both self-report and social network measures, which enabled me to assess the robustness of my findings across multiple measures. Finally, the studies examined relations between numerous ethnic and ethno-religious groups across three countries (the United Kingdom, United States, and South Africa), which enabled me to determine the generalisability of my findings across different intergroup contexts. I did not identify any consistent differences in the findings across either measures or intergroup contexts; thus, the findings appear to be reliable, generalisable, and robust.

The present research does, however, have some limitations, which should be acknowledged. Four of the nine studies were designed to test the hypotheses addressed in this chapter (Studies 1d, 1e, 1f and 2c), while five studies consisted of secondary data (Studies 1a, 1b, 1c, 2a and 2b). The secondary data contained adequate but imperfect measures with which to test my hypotheses. For example, one study provided standardised scores, rather than raw scores, for contact, while other studies only measured either generic contact *or* friendship, which prevented comparison between different types of contact. Furthermore, the sample sizes were not sufficient across all subgroups and studies, which in several instances led to a lack of power to detect effects. Future research should therefore investigate the present research questions in consistently larger samples, in order to increase confidence in the findings identified for the smaller subgroups.

Despite the differences in sample size, the present findings showed similar relationships between ingroup and outgroup contact for numerical majority groups and numerical minority groups. I did, however, identify significant differences between these two groups in the levels of ingroup contact and outgroup contact. Across studies, numerical majority group members reported significantly more ingroup contact, and less outgroup contact, than numerical minority group members. This is likely to have resulted from underlying differences in contact opportunity structures: numerical majority groups have more opportunities for ingroup contact, and fewer opportunities for outgroup contact, compared to numerical minority groups (Barlow et al., 2013; Smith et al., 2016). Even so, the relationship between ingroup and outgroup contact was stable across the variation in the levels of ingroup and outgroup contact.

Furthermore, although groups differed in their exact levels of ingroup contact and outgroup contact, ingroup contact was consistently more prevalent than outgroup contact across all groups. The prevalence of ingroup contact was most apparent in the social network studies, as high levels of ethnic segregation were visualised in the friendship networks in Figures 2.2, 2.3 and 2.7. This finding mirrors previous research which has shown persistently high levels of segregation between groups (e.g., McPherson et al., 2001; Smith et al., 2016; Windzio & Bicer, 2013), despite increasing levels of societal diversity (e.g., Koser & Laczko, 2010; United Nations, 2019; Vertovec, 2007).

Finally, the negative relationship identified between ingroup and outgroup friends in this chapter could have significant implications for individuals' attitudes towards outgroups. If individuals engage in ingroup friendship at the expense of outgroup friendship, the potential positive effects of outgroup friendship on outgroup attitudes will be constrained. I have, however, not yet examined the effects of outgroup

friendship on outgroup attitudes; thus, this implication requires further investigation. In the following chapter, I empirically consider the effects of ingroup and outgroup contact, including both friendship and generic contact, on ingroup and outgroup attitudes.

CHAPTER 3: THE EFFECTS OF INGROUP AND OUTGROUP CONTACT ON INGROUP AND OUTGROUP ATTITUDES

In Chapter 1, I reviewed prior research investigating the effects of outgroup and ingroup contact on outgroup and ingroup attitudes. To summarise, a wealth of research examining intergroup contact theory (Allport, 1954; Brown & Hewstone, 2005) has revealed a positive effect of outgroup contact on outgroup attitudes (Pettigrew & Tropp, 2006). In contrast, the effect of outgroup contact on ingroup attitudes has received little research attention, with the exception of a handful of studies examining the deprovincialisation hypothesis (Pettigrew, 1997). These studies have yielded mixed results regarding the effect of outgroup contact on ingroup attitudes, with some studies identifying a significant negative effect (e.g., Verkuyten et al., 2010) and other studies identifying no effect (e.g., Tausch et al., 2010). Thus, overall, the findings from many studies indicate that outgroup contact has a positive effect on outgroup attitudes, while scarce and disparate findings lead to uncertainty concerning the effect of outgroup contact on ingroup attitudes. An even smaller number of studies have examined the effects of *ingroup contact* on outgroup and ingroup attitudes. Specifically, three studies have sought to investigate the effects of ingroup contact on attitudinal outcome measures, of which two studies identified a positive effect of ingroup contact on ingroup bias (Levin et al., 2003; Wilder & Thompson, 1980), and one study identified no effect of ingroup contact on outgroup attitudes (Munniksma et al., 2015). Taken together, the findings of these three studies suggest that ingroup contact increases ingroup bias (i.e., the difference in attitudes towards the ingroup and outgroup) by improving ingroup attitudes, and not by worsening outgroup attitudes. However, none of the studies examined ingroup attitudes as an outcome variable; therefore, further

research is required in order to establish the effects of ingroup contact on both outgroup and ingroup attitudes.

Based on the sparse but nonetheless informative prior research, I proposed the following tentative hypotheses regarding the effects of outgroup and ingroup contact on outgroup and ingroup attitudes. I hypothesised that outgroup contact would have a positive effect on outgroup attitudes (but would not reliably affect ingroup attitudes), and that ingroup contact would have a positive effect on ingroup attitudes (but would not reliably affect outgroup attitudes). Figure 3.1 highlights these hypotheses in relation to the broader model proposed in this thesis. In accordance with my hypotheses, I expected to find evidence in support of Paths 2a and 2d, but not Paths 2b and 2c.

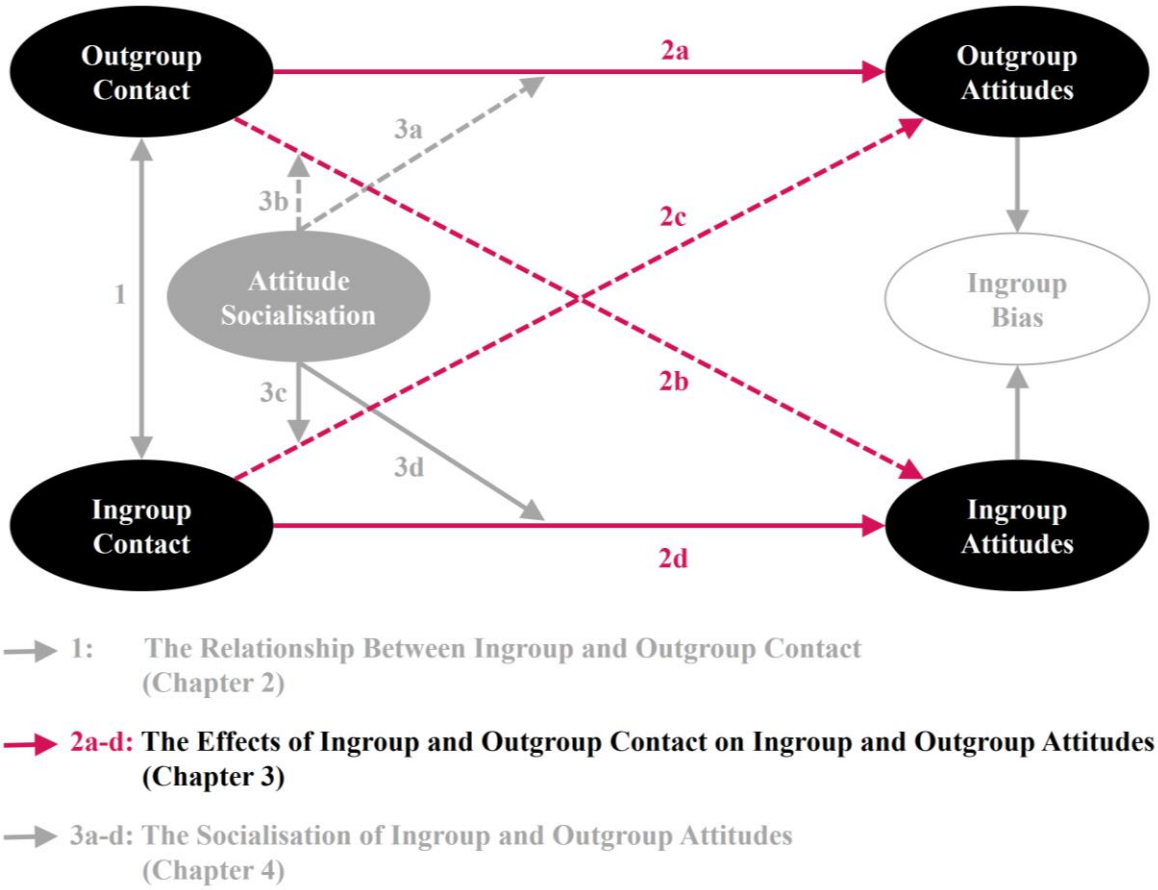


Figure 3.1. The effects of ingroup and outgroup contact on ingroup and outgroup attitudes. In this chapter, I examined Paths 2a-d (depicted in red). I hypothesised significant effects for Paths 2a and 2d (depicted as bold lines), but not Paths 2c and 2b (depicted as dashed lines).

In this chapter, I tested my hypotheses across four longitudinal studies, consisting of three secondary analyses (Studies 2a, 2b and 2d) and one new dataset (Study 2c). The four studies employed different measures of ingroup and outgroup contact, including both friendship and generic contact, and both self-report and network measures. This enabled me to assess the robustness of my findings across multiple measures of friendship and more casual forms of contact. Moreover, the studies examined different samples in different intergroup contexts, which enabled me to determine the generalisability of my findings.

In Chapter 1, I detailed how the effects of ingroup and outgroup contact on ingroup and outgroup attitudes are likely to vary depending on a number of factors. Research has suggested that there may be significant variation across different groups in the effects of both ingroup contact and outgroup contact. For example, Pettigrew and Tropp (2005) identified significant differences in the effects of *outgroup* contact for members of majority and minority status groups, and Phinney et al. (2001) found significant differences in the effects of *ingroup* contact for members of different ethnic minority groups. Furthermore, research indicates that the effects of ingroup and outgroup contact on ingroup and outgroup attitudes are likely to differ with regard to age. Individuals develop their ethnic identity and attitudes towards different groups during childhood and adolescence (Aboud, 2005; Jugert et al., 2020; Krosnick & Alwin, 1989), and attitudes are more amenable to change in youth as compared to later life (Sears, 1986; Wölfer et al., 2016). Accordingly, the increased malleability of attitudes during developmental periods may lead to contact having a greater effect in younger as compared to older age groups (Pettigrew & Tropp, 2006). Finally, there may also be differences in the effects of ingroup and outgroup contact on ingroup and outgroup attitudes dependent on the type of contact under consideration. For example, with regard to outgroup contact, research has shown that friendship has a stronger effect on outgroup attitudes than more casual types of contact (Pettigrew & Tropp, 2006; Davies et al., 2011). In this chapter, I investigate variation across each of these dimensions, in order to identify any important differences and assess the robustness of my findings.

This chapter is divided into two main sections. In the first section (3.1), I disentangle the ways in which ingroup and outgroup contact affect ingroup bias, in a secondary analysis of data from a key prior study of ingroup and outgroup contact conducted by Levin et al. (2003). I replicated the analysis method of the prior study, in

order to provide a direct examination of the differences in the results dependent only on the choice of outcome variable (i.e., ingroup and outgroup attitudes as compared to ingroup bias). In the second section (3.2), I investigate the effects of ingroup and outgroup contact on ingroup and outgroup attitudes across four studies, using a more sophisticated analysis method. I analyse the data from each of the four studies using random-intercept cross lagged panel modelling (RI-CLPM), in order to separate between-person stability and within-person change, and thus provide stronger evidence indicating the directionality of the observed relationships (Hamaker et al., 2015). The chapter concludes with a general discussion (3.3), in which I consider the findings across the two main sections in relation to prior research, and discuss the strengths and limitations of the present research.

3.1 Disentangling the Effects of Ingroup and Outgroup Contact on Ingroup Bias

Levin et al. (2003) investigated the effects of ingroup and outgroup contact on ingroup bias in a longitudinal survey study conducted at the University of California, Los Angeles (UCLA). The sample consisted of over 2,000 ethnic majority and minority students at UCLA, who completed annual surveys over six years. The extensive surveys contained, among many other measures, self-report measures of ingroup bias and students' numbers of ingroup and outgroup friends. The researchers found that over time having more ingroup friends increased ingroup bias, while having more outgroup friends decreased ingroup bias.

Levin et al. (2003) operationalised ingroup bias as the difference score between ingroup attitudes and outgroup attitudes. Accordingly, it is uncertain whether ingroup contact increased ingroup bias by improving attitudes towards the ingroup, worsening attitudes towards the outgroup, or both. Subsequent research examined the effects of

ingroup contact on outgroup attitudes (but not ingroup attitudes), and found that ingroup contact did not affect outgroup attitudes (Munniksma et al., 2015). Together, the findings from the two studies may suggest that ingroup contact increases ingroup bias by improving ingroup attitudes, and not by worsening outgroup attitudes. However, no study to date has examined the effects of ingroup contact on the outcome variable of ingroup attitudes. In order to establish the role of ingroup contact, research must examine both ingroup attitudes and outgroup attitudes as separate outcome variables.

Employing an outcome measure of ingroup bias may similarly obscure the effects of outgroup contact. Levin et al. (2003) found that outgroup contact decreased ingroup bias. The reduction in ingroup bias is most likely to have been the result of outgroup contact improving outgroup attitudes, as many studies have identified a positive effect of outgroup contact on outgroup attitudes (Pettigrew & Tropp, 2006). Outgroup contact may, however, have additionally, or alternatively, reduced ingroup bias by worsening ingroup attitudes, as prior research has indicated that outgroup contact can have a negative effect on ingroup attitudes (Verkuyten et al., 2010). It is not possible to determine whether outgroup contact affects ingroup attitudes using a measure of ingroup bias, because any reduction in ingroup bias may be attributed to an improvement in outgroup attitudes.

It is important to disentangle the effects of ingroup and outgroup contact on the components of ingroup bias, because ingroup attitudes and outgroup attitudes are distinct constructs, and each has important implications for the overarching relationships between groups (Brewer, 1999). For example, Greenwald and Pettigrew (2014) contended that positive ingroup attitudes account for the majority of subtle forms of discrimination, which are most prevalent in many societies, while negative outgroup attitudes are more likely the cause of more extreme forms of discrimination.

In this section, I replicate and extend the analysis conducted by Levin et al. (2003) in order to disentangle the ways in which ingroup and outgroup contact affect ingroup bias. Levin et al. granted me access to their data in order to test the effects of ingroup and outgroup contact on three separate outcome variables: ingroup bias, ingroup attitudes, and outgroup attitudes. To provide a direct examination of the differences in the results dependent only on the choice of outcome variable (i.e., ingroup bias as compared to ingroup attitudes and outgroup attitudes), I precisely replicated all aspects of the prior study. That is, I used an identical analytic sample, analytic technique, choice of measures, and use of waves.

I hypothesised that ingroup contact would have a positive effect on ingroup attitudes, a non-significant effect on outgroup attitudes, and would thereby increase ingroup bias. In contrast, I hypothesised that outgroup contact would have a positive effect on outgroup attitudes, a non-significant effect on ingroup attitudes, and would thereby decrease ingroup bias.

3.1.1 Study 2a

I outlined the context of this study in Chapter 2 (section 2.2.2), with regard to my analyses of the relationship between ingroup and outgroup contact. The analyses reported in this section used different parts of the study's data as compared to the analyses reported in section 2.2.2. For example, in the following analyses I used measures of ingroup and outgroup *attitudes*, in addition to measures of ingroup and outgroup contact. Accordingly, in this section, I briefly summarise, and reiterate when necessary, the essential aspects of the study's methods, while a comprehensive description of the Study's methods is located in section 2.2.2.

Method

Respondents and Procedure

Study 2a investigated the research questions among White, Asian, Latino and Black/African American college students attending UCLA in the United States. The sample consisted of 2,132 students (56% female, 44% male; M_{age} = 17.92, *SD* = 0.45) of whom 764 were White American, 758 were Asian American, 466 were Latino American, and 144 were Black/African American. Six waves of data were collected between 1996 and 2001. In this analysis, I only used data from Waves 1-5, in order to replicate the analysis of Levin et al. (2003).

Measures

Students completed surveys containing a variety of measures. Here, I only report measures relevant to the hypotheses. These consist of background variables (socioeconomic status, ethnicity, gender, religion, and pre-college friends), college friends, and attitudes. For each variable, I used identical measurement points and methods for creating composite measures as Levin et al. (2003) did. Background variables were measured in Waves 1 or 2 (depending on whether the students participated in the pre-college survey at Wave 1, or commenced participation in the study once attending UCLA at Wave 2). Friendships were measured in both Waves 3 and 4, and attitudes were measured in both Waves 2 and 5.

Socioeconomic Status. Three items measured socioeconomic status: "How would you describe your family's social class position?" (1 = *Poor*, 2 = *Working class*, 3 = *Lower middle class*, 4 = *Middle class*, 5 = *Upper middle class*, 6 = *Lower upper class*, 7 = *Upper class*), "What is the highest level of education your father completed?", and "What is the highest level of education your mother completed?" (1 = *Elementary*

school, 2 = *Some high school*, 3 = *Completed high school*, 4 = *Trade school*, 5 = *Some college*, 6 = *Completed degree (BA/BS degree)*, 7 = *Some graduate or professional school*, 8 = *Completed graduate or professional degree*). Socioeconomic status was computed as the average of the three items ($\alpha = .83$).

Ethnicity. Students reported their ethnicity on a single item. Ethnicity was broken down into eight categories: White, Asian, Latino, Black/African, Biracial, Middle Eastern, Native American, and other.

Gender. Students reported their gender on a single item. Gender was broken down into two categories: female and male.

Religion. Students reported their religion on a single item. Religion was broken down into seven categories: Protestant, Catholic, Jewish, Muslim, Buddhist, other, and no religion.

Pre-college Friends. Pre-college friendships were measured using four items. The stem question read: "In high school, how many of your closest friends were…" and the four individual items were "…Asian American?", "…African American?", "…Latino?", and "…Caucasian?" (1 = *None*, 5 = *All*). Measures of pre-college ingroup and outgroup friends were computed based on the respondents' self-reported ethnicity (White, Asian, Latino, or Black/African American). The measure of pre-college ingroup friends comprised the single item for friends of each respondent's own ethnic group. The measure of pre-college outgroup friends comprised the average of the three items for friends of the other ethnic groups.

Friends. College friendships were measured using four items at both Waves 3 and 4. The stem question read: "At UCLA, how many of your closest friends are…" and the individual items were "…Asian American?", "…African American?", "…Latino?", and

"…Caucasian?" (1 = *None*, 5 = *All*). For each wave, the measure of ingroup friends comprised the single item for friends of each respondent's own ethnic group, and the measure of outgroup friends comprised the average of the three items for friends of the other ethnic groups. Composite measures for ingroup friends and outgroup friends were then computed as the average of the ingroup friends and outgroup friends items measured at Waves 3 and 4.

Attitudes. Four items, included at both Waves 2 and 5, measured ethnic attitudes. The stem question read: "How positively or negatively do you feel toward the following groups?" and the individual items were "Caucasians/Whites", "Latinos/Hispanics", "Asians/Asian Americans", and "African Americans/Blacks" (1 = *Very negatively*, 7 = *Very positively*). For each wave, the measure of ingroup attitudes comprised the single item for attitudes towards each respondent's own ethnic group, while the measure of outgroup attitudes comprised the average of the three items for attitudes towards the other ethnic groups. For each wave, I computed ingroup bias as the measure of ingroup attitudes minus the measure of outgroup attitudes.

Analysis Strategy

This study examined the effects of students' ingroup and outgroup friendships during the second and third years of college on students' ingroup attitudes, outgroup attitudes and ingroup bias in the fourth year of college. Following the procedure detailed in Levin et al. (2003), I tested the hypotheses using multiple linear regression analyses. I estimated three separate models in order to examine each of the three outcome variables individually. Model 1 first assessed the outcome variable of ingroup bias, in order to replicate the analyses of Levin et al. I then extended the analyses of the prior study to examine outgroup attitudes (Model 2) and ingroup attitudes (Model 3), separately, as

outcome variables. I estimated each model using the full analytic sample (i.e., all four ethnic groups together), in order to replicate the analyses of Levin et al exactly. In section 3.2.2, I report more advanced and fine-grained analyses that enable me to identify any variation across the four different ethnic groups.

In Model 1, the outcome variable was ingroup bias (measured at Wave 5) and the predictor variables were ingroup friends and outgroup friends (measured at Waves 3 and 4). I controlled for prior ingroup bias (measured at Wave 2), in addition to gender, socioeconomic status, religion, pre-college ingroup friends and pre-college outgroup friends (measured at Wave 1 or Wave 2).

In Model 2, the outcome variable was outgroup attitudes (measured at Wave 5) and the predictor variables were ingroup friends and outgroup friends (measured at Waves 3 and 4). I controlled for prior outgroup attitudes (measured at Wave 2), in addition to gender, socioeconomic status, religion, pre-college ingroup friends and pre-college outgroup friends (measured at Wave 1 or Wave 2).

In Model 3, the outcome variable was ingroup attitudes (measured at Wave 5) and the predictor variables were ingroup friends and outgroup friends (measured at Waves 3 and 4). I controlled for prior ingroup attitudes (measured at Wave 2), in addition to gender, socioeconomic status, religion, pre-college ingroup friends and pre-college outgroup friends (measured at Wave 1 or Wave 2).

Results and Discussion

Descriptive Statistics

Table 3.1 shows the means and standard deviations for all predictor and outcome variables included across the three models. Paired samples *t*-tests indicated that students reported having significantly more ingroup than outgroup friends, $\Delta M = 1.34$, $t(999) =$

41.04, $p < .001$, $d = 1.30$, and held significantly more positive ingroup than outgroup attitudes, $\Delta M = 0.22$, $t(1010) = 9.01$, $p < .001$, $d = 0.28$.

Table 3.1. Means and Standard Deviations of Friends, Attitudes and Ingroup Bias by Group (Study 2a)

	All Respondents	White American	Asian American	Latino American	Black/African American
Ingroup friends	3.32 (0.78)	3.38 (0.67)	3.39 (0.73)	3.14 (0.87)	3.33 (0.95)
Outgroup friends	1.97 (0.43)	2.02 (0.38)	1.84 (0.41)	2.12 (0.45)	1.99 (0.51)
Ingroup attitudes	5.86 (1.12)	5.91 (1.20)	5.53 (1.05)	6.20 (1.07)	6.30 (0.80)
Outgroup attitudes	5.65 (1.09)	5.97 (1.07)	5.26 (1.00)	5.86 (1.05)	5.59 (1.08)
Ingroup bias	0.22 (0.77)	-0.06 (0.78)	0.27 (0.64)	0.33 (0.77)	0.70 (0.92)

Note. Standard deviations are shown in parentheses. Ingroup friends and outgroup friends were measured at Waves 3 and 4. Ingroup attitudes, outgroup attitudes and ingroup bias were measured at Wave 5.

Multiple Linear Regression Analyses

Table 3.2 shows the results of the three multiple linear regression analyses examining the effects of ingroup and outgroup friends on ingroup bias (Model 1), outgroup attitudes (Model 2), and ingroup attitudes (Model 3).

Table 3.2. Multiple Linear Regression Analyses Predicting Ingroup Bias, Outgroup Attitudes, and Ingroup Attitudes (Study 2a)

	Model 1: Ingroup Bias				Model 2: Outgroup Attitudes				Model 3: Ingroup Attitudes			
	b	*SE*	*β*	*p*	*b*	*SE*	*β*	*p*	*b*	*SE*	*β*	*p*
Ingroup friends	.23*	.05	.24	<.001	-.01	.06	-.01	.858	.15*	.06	.11	.017
Outgroup friends	-.27*	.09	-.15	.003	.33*	.12	.13	.005	.17	.12	.07	.141
Gender	-.03	.07	-.02	.657	-.09	.09	-.04	.306	-.16	.09	-.08	.073
Socioeconomic status	-.05	.03	-.08	.062	.03	.03	.04	.345	.00	.03	.00	.995
Religion	-.02	.01	-.04	.314	-.01	.02	-.01	.726	-.03	.02	-.06	.164
Prior attitudes	.11*	.03	.14	.002	.42*	.05	.40	<.001	.36*	.05	.34	<.001
Prior ingroup friends	-.01	.04	-.01	.894	.04	.05	.04	.430	.04	.05	.04	.443
Prior outgroup friends	-.09	.07	-.06	.204	.05	.09	.02	.643	-.03	.10	-.02	.751

Note. Prior attitudes refers to the Wave 2 measure of ingroup bias in Model 1, outgroup attitudes in Model 2, and ingroup attitudes in Model 3. The predictor variables of ingroup friends and outgroup friends were measured at Waves 3 and 4. The outcome variables of ingroup bias, outgroup attitudes and ingroup attitudes were measured at Wave 5. The control variables of gender, socioeconomic status, religion, prior (pre-college) ingroup friends and prior (pre-college) outgroup friends were measured at Wave 1 or Wave 2. * $p < .05$.

The results of Model 1 indicated that the model was a significant predictor of ingroup bias, $F(8,482) = 7.98$, $p < .001$, $R^2 = .12$. Students who had more outgroup friends were less biased in favour of their ethnic ingroup ($\beta = -.15$, $p = .003$), while students who had more ingroup friends were more biased in favour of their ethnic ingroup ($\beta = .24$, $p < .001$). Similarly, the results of Model 2 indicated that the model was a significant predictor of outgroup attitudes, $F(8,482) = 16.31$, $p < .001$, $R^2 = .21$. Students who had more outgroup friends had more positive outgroup attitudes ($\beta = .13$, $p = .005$). However, students' number of ingroup friends did not significantly predict outgroup attitudes ($\beta = -.01$, $p = .858$). Finally, the results of Model 3 indicated that the model was a significant predictor of ingroup attitudes, $F(8,484) = 13.08$, $p < .001$, $R^2 = .18$. Students who had more ingroup friends had more positive ingroup attitudes ($\beta = .11$, $p = .017$). In contrast, students' number of outgroup friends did not significantly predict ingroup attitudes ($\beta = .07$, $p = .141$).

Overall, the results from the three models provided consistent support for the hypotheses. In accordance with expectations, ingroup contact was positively associated with ingroup attitudes, not significantly associated with outgroup attitudes, and positively associated with ingroup bias. Also in accordance with predictions, outgroup contact was positively associated with outgroup attitudes, not significantly associated with ingroup attitudes, and negatively associated with ingroup bias.

With regard to the original study conducted by Levin et al. (2003), these findings provide further insight into the ways in which ingroup and outgroup contact shape ingroup bias. The present findings suggest that ingroup contact increases ingroup bias by improving attitudes towards the ingroup, and not by worsening attitudes towards the outgroup. Furthermore, the findings indicate, in line with intergroup contact theory, that outgroup contact decreases ingroup bias by improving attitudes towards the

outgroup, and not by worsening attitudes towards the ingroup. More broadly, these findings highlight the benefits of examining ingroup attitudes and outgroup attitudes as separate outcome variables, in comparison to combining the two measures in a difference score assessing ingroup bias. In order to disentangle the effects of ingroup and outgroup contact on the components of ingroup bias, research must examine both ingroup attitudes and outgroup attitudes.

Although the present findings improve our understanding of how ingroup and outgroup contact shape ingroup bias, this study has two key limitations. First, this study examined only one context (i.e., relations between White, Asian, Latino and Black/African American college students in the United States), and it remains uncertain whether the findings generalise to other samples and intergroup contexts. Secondly, the analysis technique employed in this study (i.e., multiple linear regression) provides poor evidence indicating the directionality of the observed associations. I precisely replicated the analyses of Levin et al. (2003) because doing so enabled me to demonstrate differences in the findings dependent solely on the choice of outcome measure, and enabled me to identify *how* ingroup and outgroup contact affected ingroup bias in prior research. However, this analysis technique offers little indication of whether the observed associations result from contact influencing attitudes, attitudes influencing contact, or any unobserved variables (e.g., personality traits or intergroup ideologies). These two issues respectively limit the generalisability and validity of the present study's findings. In the following section, I attempt to mitigate these two limitations, by examining my hypotheses across four different studies using random-intercept cross lagged panel modelling (RI-CLPM).

3.2 Advanced Analyses of the Effects of Ingroup and Outgroup Contact on Ingroup and Outgroup Attitudes

In Chapter 1, I discussed the standard analysis techniques employed in longitudinal survey research investigating intergroup contact theory. The majority of prior studies have used cross-lagged panel modelling (CLPM) and other similar techniques. Over the last few years, these analysis techniques have been criticised for conflating between-person stability and within-person change (Hamaker et al., 2015; Zyphur et al., 2020). This means that these techniques cannot disentangle the extent to which an observed association between outgroup contact and outgroup attitudes results from between-person stability (i.e., individuals with high contact *simultaneously* hold more positive attitudes) or within-person change (i.e., individuals with high contact *subsequently* hold more positive attitudes). Within-person change is consistent with an effect of outgroup contact on outgroup attitudes. In contrast, between-person stability is consistent with an effect of unobserved variables leading to positive correlations between individual differences in contact and attitudes across the population.

To address this issue, Hamaker et al. (2015) developed an alternative analysis technique, termed random-intercept cross lagged panel modelling (RI-CLPM). Through the inclusion of random intercepts, RI-CLPM can separate between-person stability and within-person change and accordingly provide better evidence indicating the directionality of the observed associations (for details, see the following Analysis Strategy section).

One study to date has used RI-CLPM to examine intergroup contact theory. Bohrer et al. (2019) examined the associations between outgroup contact and outgroup attitudes using RI-CLPM, and did not identify within-person change consistent with an

effect of outgroup contact on outgroup attitudes. In Chapter 1, I discussed potential explanations for this finding, most notably, that the study's timespan of 18 months may have not provided a long enough period in which to detect changes in attitudes. Barlow et al. (2019) also found limited evidence of a within-person effect of outgroup contact on outgroup attitudes using a similar analysis method to disentangle between-person and within-person effects (autoregressive latent-trajectory modelling; Curran et al., 2014). To date, no study has disentangled the between-person and within-person effects of outgroup contact on ingroup attitudes, or the effects of ingroup contact on ingroup or outgroup attitudes.

The present research extends the findings of Bohrer et al. (2019), by using RI-CLPM to explore the effects of both ingroup and outgroup contact on both ingroup and outgroup attitudes. I hypothesised that outgroup contact would have a positive effect on outgroup attitudes (but would not reliably affect ingroup attitudes), and that ingroup contact would have a positive effect on ingroup attitudes (but would not reliably affect outgroup attitudes).

I tested the hypotheses in four longitudinal studies, which enabled me to examine variation in the findings dependent on several key dimensions: the timespan (ranging from one to five years), the age of the sample (adolescents, college students and adults), the type of contact (friendship and generic contact), and the intergroup context (differing in terms of the participant group, target group and country). Investigating my research questions in multiple studies enabled me to determine the robustness and generalisability of my findings, and identify any important differences across the aforementioned dimensions.

Studies 2a, 2b and 2d comprised a secondary analysis of pre-existing data, while I conducted Study 2c specifically to examine the research questions addressed in this thesis. Together, the four studies provided a total sample of N = 25,233 respondents. Study 2a examined the hypotheses among White, Asian, Latino and Black/African American college students in the United States, using self-report measures of friendship collected over five years. Study 2b investigated the hypotheses among White and Asian British adolescents in England, using self-report measures of friendship collected over three years. Study 2c examined the hypotheses among White and Asian British adolescents in England, using self-report measures of generic contact and network measures of friendship collected over one year. Finally, Study 2d investigated the hypotheses among Māori and people of European descent in New Zealand, using self-report measures of generic contact collected over five years.

I employed identical analysis methods across the four studies. In the following sections, I first outline the analysis strategy used for all studies. I then sequentially present the unique methods and corresponding results for each individual study. In the final section, I summarise and discuss the overall findings across the four studies.[6]

3.2.1 Analysis Strategy

For each study, I first examined the descriptive statistics for the measures of ingroup and outgroup contact and ingroup and outgroup attitudes. I expected to identify

[6] In Chapter 2, I conducted fixed-effect meta-analyses to synthesise the results across studies (Goh et al., 2016). It was possible to meta-analytically combine the results of the studies in Chapter 2 because the key effects were correlations (*r*). In contrast, the key effects reported in this chapter are unstandardised coefficients (*b*), which, unlike effect sizes such as correlations, cannot be meta-analytically combined. As it is not possible to accurately compute and combine effect sizes for the unstandardised coefficients reported in this chapter, I provide an overall summary of the findings across the four studies, but I do not use meta-analysis to synthesise the results of this chapter.

significantly more positive ingroup attitudes than outgroup attitudes, indicating ingroup bias, in accordance with prior research (e.g., Hewstone et al., 2002). To determine whether ingroup attitudes and outgroup attitudes significantly differed, I conducted paired samples *t*-tests. I do not discuss differences in ingroup and outgroup contact in the following sections, because I provided a detailed examination of contact in Chapter 2.

To test the main hypotheses regarding the effects of ingroup and outgroup contact on ingroup and outgroup attitudes, I used RI-CLPM (Hamaker et al., 2015). I applied this new technique to disentangle (a) between-person stability in the correlations between (ingroup/outgroup) contact and (ingroup/outgroup) attitudes from (b) within-person change in (ingroup/outgroup) attitudes predicted by prior levels of (ingroup/outgroup) contact.

I analysed the data following the procedure detailed in Hamaker et al. (2015). Figure 3.2 shows the RI-CLPM estimated in each study. I modelled each observed variable as a function of two latent variables. The first latent variable was the time-invariant random intercept, which loaded equally on the indicator for the corresponding observed variable at every wave. As such, it modelled the mean response of a participant across time points. The second latent variable loaded only on the corresponding indicator at each individual wave, and accordingly represented time-specific variance. As such, it modelled the time-specific deviation from the participants' mean response across time points. To identify the model, I constrained all residual variances of the observed indicators to zero (i.e., all variation in the observed scores was explained by the within-person and between-person factor structure).

To estimate between-person effects, I correlated the random intercepts for all observed variables (i.e., ingroup contact, outgroup contact, ingroup attitudes and outgroup attitudes). These correlations indicate to what extent individual differences in ingroup and outgroup contact across all waves are associated with individual differences in ingroup and outgroup attitudes across all waves. To estimate within-person effects, I regressed all time-specific latent variables on each other, which yielded autoregressive and cross-lagged coefficients. These coefficients indicate to what extent an individual's deviation from their expected score on the predictor variable at a given time explains their deviation from their expected score on the outcome variable at a later time. I constrained to equality the coefficients between different waves (i.e., the coefficients for Waves 1-2, 2-3, 3-4 and 4-5 were identical). This approach maximizes power and assumes a continuous process with an unknown starting point (McArdle, 2009). Missing data were treated using full information maximum likelihood (FIML). I estimated separate models for each ethnic group, because prior research has suggested that the effects of ingroup and outgroup contact on ingroup and outgroup attitudes may vary across groups (e.g., Pettigrew & Tropp, 2005; Phinney et al., 2001).

I hypothesised that outgroup contact would have a positive effect on outgroup attitudes (but would not reliably affect ingroup attitudes), and that ingroup contact would have a positive effect on ingroup attitudes (but would not reliably affect outgroup attitudes). Support for my hypotheses would be indicated by a positive within-person coefficient for the effect of prior outgroup (ingroup) contact on later outgroup (ingroup) attitudes. Such an effect would show that individuals who report more outgroup (ingroup) contact than expected at a given time subsequently report more positive outgroup (ingroup) attitudes than expected at a later time. The RI-CLPM subtracts each individual's random intercept from their observed score at each time point, so that only

the residual remains (i.e., the difference between an individual's average score and their score at a given time). If an above-average outgroup (ingroup) attitude residual follows an above-average outgroup (ingroup) contact residual, this is consistent with an effect of outgroup (ingroup) contact on outgroup (ingroup) attitudes.

In RI-CLPM, all time-specific latent variables are regressed on each other, which yields 16 within-person coefficients when modelling four observed variables (i.e., ingroup contact, outgroup contact, ingroup attitudes, and outgroup attitudes). In the following results section for each study, I report only the coefficients for the within-person effects relating to my hypotheses. For example, I report the effect of prior outgroup contact on later outgroup attitudes, but not the effect of prior ingroup attitudes on later outgroup attitudes (which is theoretically uninteresting). Furthermore, I report the between-person effects corresponding to each within-person effect reported in the main text. For example, I report the correlation between outgroup contact and outgroup attitudes, but not the correlation between ingroup attitudes and outgroup attitudes. Importantly, only the within-person effects test my hypotheses, but I additionally report the between-person effects because they provide further insight into the associations between (ingroup/outgroup) contact and (ingroup/outgroup) attitudes. Appendix D shows the full results of each RI-CLPM, including all within-person and between-person effects estimated in the models.

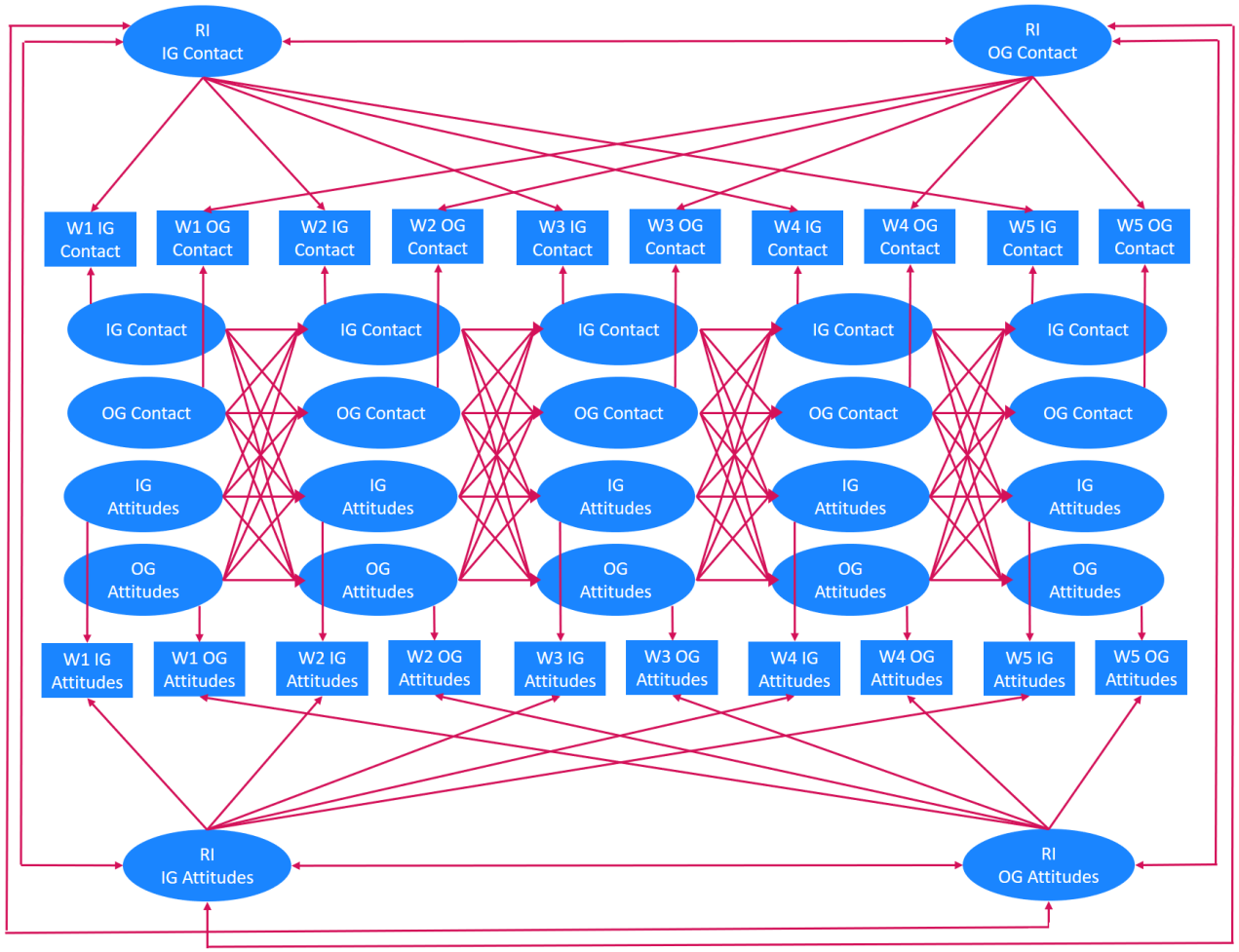


Figure 3.2. Random-intercept cross lagged panel model (RI-CLPM). RI = Random intercept; IG = Ingroup; OG = Outgroup; W1 = Wave 1; W2 = Wave 2; W3 = Wave 3; W4 = Wave 4; W5 = Wave 5. Rectangles represent observed variables (i.e., ingroup contact, outgroup contact, ingroup attitudes and outgroup attitudes measured at each wave). Ellipses represent latent variables. The associations between the latent variables for ingroup contact, outgroup contact, ingroup attitudes and outgroup attitudes represent the within-person effects. The associations between the latent variables for the random intercepts of ingroup contact, outgroup contact, ingroup attitudes and outgroup attitudes represent the between-person effects.

3.2.2 Study 2a

In section 3.1.1, I analysed the data from Study 2a to disentangle the ways in which ingroup and outgroup contact affect ingroup bias. I precisely replicated the analyses of Levin et al. (2003), to provide a direct examination of the differences in the results dependent only on the choice of outcome variable (i.e., ingroup attitudes and outgroup attitudes, in comparison to ingroup bias). Using multiple linear regression analyses, I found that ingroup contact was positively associated with ingroup attitudes (and not outgroup attitudes), and that outgroup contact was positively associated with outgroup attitudes (and not ingroup attitudes).

In this section, I instead analysed the data from Study 2a using RI-CLPM, in order to separate between-person stability and within-person change. By analysing the same research questions using two different techniques, I can compare the findings obtained from traditional analysis methods and more recently developed advanced analysis methods. RI-CLPM can provide an indication of whether the significant associations identified in the previous multiple linear regression analyses result from contact influencing attitudes, attitudes influencing contact, or unobserved variables (e.g., personality traits or intergroup ideologies). If the results of the RI-CLPM and multiple linear regression analyses lead to different conclusions, this would provide evidence for the benefits of RI-CLPM over more traditional analysis methods.

The analyses reported in this section used different parts of the study's data as compared to the analyses reported in section 3.1.1. For example, in the following analyses I used individual measures of (ingroup/outgroup) contact at each wave, in contrast to the aggregate measure of (ingroup/outgroup) contact at waves 3 and 4 used

in section 3.1.1 to replicate the analyses of Levin et al. (2003). In this section, I only report the aspects of the methods that differ from section 3.1.1.

Method

Respondents and Procedure

The details regarding the respondents and procedure are identical to those reported in section 3.1.1, with the exception of the use of waves. Six waves of data were collected between 1996 and 2001. Wave 1 was conducted in the summer prior to college entry (1996), and Waves 2-6 were conducted in the spring of each subsequent college year (1997-2001). Consequently, Wave 1 used a retrospective measure of friendships in high school, whereas Waves 2-6 used a measure of current friendships in college. This analysis requires identical measures of ingroup and outgroup friends (and ingroup and outgroup attitudes) at each wave; therefore, I only used data from Waves 2-6 in this analysis. This differs from the analysis reported in section 3.1.1, in which I analysed data from Waves 1-5.

Measures

Here, I only report measures relevant to the hypotheses, which consist of the self-report measures of friends and attitudes that were included in Waves 2-6.

Friends. Four items measured friendships. The stem question read: "At UCLA, how many of your closest friends are…" and the individual items were "…Asian American?", "…African American?", "…Latino?", and "…Caucasian?" (1 = *None*, 5 = *All*). Separate measures of ingroup friends and outgroup friends were computed based on the respondents' self-reported ethnicity. For each wave, the measure of ingroup friends comprised the single item for friends of each respondent's own ethnic group,

and the measure of outgroup friends comprised the average of the three items for friends of the other ethnic groups.

Attitudes. Four items measured ethnic attitudes. The stem question read: "How positively or negatively do you feel toward the following groups?" and the individual items were "Caucasians/Whites", "Latinos/Hispanics", "Asians/Asian Americans", and "African Americans/Blacks" (1 = *Very negatively*, 7 = *Very positively*). For each wave, the measure of ingroup attitudes comprised the single item for attitudes towards each respondent's own ethnic group, and the measure of outgroup attitudes comprised the average of the three items for attitudes towards the other ethnic groups.

Results and Discussion

Descriptive Statistics

Table 3.3 shows the means and standard deviations for the measures of ingroup and outgroup friends, and ingroup and outgroup attitudes, for each group at each wave.

Table 3.3. Means and Standard Deviations of Friends and Attitudes by Group and Wave (Study 2a)

	Wave 2	Wave 3	Wave 4	Wave 5	Wave 6
White American					
Ingroup friends	3.38 (0.79)	3.39 (0.76)	3.41 (0.76)	3.35 (0.74)	3.34 (0.69)
Outgroup friends	1.93 (0.43)	2.01 (0.43)	2.01 (0.43)	2.04 (0.42)	2.08 (0.36)
Ingroup attitudes	5.92 (1.04)	5.96 (1.02)	5.92 (1.12)	5.91 (1.20)	6.02 (1.08)
Outgroup attitudes	5.81 (1.03)	5.87 (1.02)	5.83 (1.08)	5.97 (1.07)	6.09 (0.94)
Asian American					
Ingroup friends	3.28 (0.89)	3.38 (0.87)	3.37 (0.86)	3.36 (0.85)	3.36 (0.83)
Outgroup friends	1.80 (0.45)	1.85 (0.46)	1.83 (0.47)	1.84 (0.45)	1.91 (0.48)
Ingroup attitudes	5.74 (1.14)	5.54 (1.08)	5.55 (1.08)	5.53 (1.05)	5.44 (1.15)
Outgroup attitudes	5.33 (1.04)	5.21 (1.03)	5.23 (1.04)	5.26 (1.00)	5.13 (1.10)
Latino American					
Ingroup friends	3.03 (0.96)	3.16 (0.97)	3.09 (0.95)	3.20 (0.97)	3.16 (0.95)
Outgroup friends	2.10 (0.48)	2.13 (0.48)	2.10 (0.51)	2.07 (0.47)	2.05 (0.49)
Ingroup attitudes	6.21 (0.96)	6.18 (0.94)	6.24 (0.90)	6.19 (1.07)	6.35 (0.80)
Outgroup attitudes	5.89 (1.03)	5.86 (1.03)	5.83 (1.05)	5.86 (1.05)	5.99 (0.94)
Black/African American					
Ingroup friends	3.40 (1.09)	3.36 (1.00)	3.26 (1.09)	3.29 (1.07)	3.15 (1.17)
Outgroup friends	1.97 (0.53)	2.07 (0.52)	2.00 (0.56)	2.07 (0.48)	2.14 (0.73)
Ingroup attitudes	6.26 (0.94)	6.25 (0.94)	6.08 (1.05)	6.30 (0.80)	6.15 (0.87)
Outgroup attitudes	5.56 (1.11)	5.64 (1.12)	5.39 (1.10)	5.60 (1.07)	5.55 (0.99)

Note. Standard deviations are shown in parentheses.

Paired samples *t*-tests conducted at each wave indicated that students reported significantly more positive ingroup attitudes than outgroup attitudes, $\Delta M > 0.22$, $t > 8.10$, $p < .001$, $d > 0.28$. Notably, both ingroup attitudes ($M > 5.44$) and outgroup attitudes ($M > 5.13$) were, however, above the midpoint (4.00) on the attitude scales. These findings indicate ingroup bias in accordance with prior research (e.g., Hewstone et al., 2002), but also demonstrate, in line with Greenwald and Pettigrew (2014), that despite ingroup attitudes being comparatively more positive than outgroup attitudes, outgroup attitudes were still moderately positive, not negative.

Correlations between measures across waves are shown in Appendix B. Each individual measure was significantly correlated between waves (mean absolute $|r| = .52$, $p < .001$).

Random-Intercept Cross Lagged Panel Models

I estimated a separate RI-CLPM for each of the four ethnic groups. The results showed that the RI-CLPM fit the data very well for White American respondents, $\chi^2_{(134)} = 162.24$; *CFI* = .99; *TLI* = .99; *RMSEA* = .02, *95% CI* [.01, .03]; *SRMR* = .07, Asian American respondents, $\chi^2_{(134)} = 162.48$; *CFI* = .99; *TLI* = .99; *RMSEA* = .02, *95% CI* [.01, .03]; *SRMR* = .04, and Latino American respondents, $\chi^2_{(134)} = 145.64$; *CFI* = .99; *TLI* = .99; *RMSEA* = .01, *95% CI* [.00, .03]; *SRMR* = .06. The RI-CLPM did not fit the data very well for Black/African American respondents, $\chi^2_{(134)} = 254.27$; *CFI* = .88; *TLI* = .83; *RMSEA* = .08, *95% CI* [.07, .10]; *SRMR* = .12. Accordingly, the results for Black/African American respondents should be considered with caution. The

suboptimal model fit is likely to have resulted from the small sample size of Black/African American students (n = 144).[7]

Within-Person Coefficients. I first examined the within-person effects of ingroup and outgroup contact on ingroup and outgroup attitudes. The within-person coefficients indicate to what extent an individual's deviation from their expected score on the predictor variable at a given time explains their deviation from their expected score on the outcome variable at a later time. Accordingly, significant within-person coefficients are consistent with an effect of prior (ingroup/outgroup) contact on subsequent (ingroup/outgroup) attitudes. Here, I only report the within-person coefficients relating to the hypotheses. Appendix D shows the full results of each RI-CLPM.

The within-person effects of ingroup and outgroup contact on ingroup and outgroup attitudes are shown in Figure 3.3. For each of the four ethnic groups, all within-person effects testing the hypotheses were non-significant, with one exception: there was a significant negative effect of ingroup contact on outgroup attitudes for Black/African American respondents (b = -0.21, se = 0.09, p = .019; *95% CI* [-0.39, -0.04]). On consideration of the small sample size and suboptimal model fit for this group, combined with the wide confidence interval for this effect, it is uncertain

[7] RI-CLPM is a recently developed analytic technique (Hamaker et al., 2015), and power calculations to determine the sample size required for this modelling strategy have not yet been conducted. Thus, it is currently uncertain whether or not the sample size for Black/African American students (n = 144) is adequate for RI-CLPM. The suboptimal fit and wide confidence intervals for the effects obtained in the model for Black/African American students, in comparison to the models for White American students (n = 764), Asian American students (n = 758), and Latino American students (n = 466), suggest that the sample size of n = 144 may not provide sufficient power for RI-CLPM, although this is not certain.

whether this reflects a true effect of ingroup contact on outgroup attitudes for Black/African American respondents.

Overall, the results did not provide support for my hypotheses. I hypothesised that outgroup contact would have a positive effect on outgroup attitudes, and that ingroup contact would have a positive effect on ingroup attitudes. The results indicated that individuals' deviation from their expected score on outgroup contact at a given time was not associated with their deviation from their expected score on outgroup attitudes at a later time, as shown in Panel (d) of Figure 3.3. Similarly, the results indicated that individuals' deviation from their expected score on ingroup contact at a given time was not associated with their deviation from their expected score on ingroup attitudes at a later time, as depicted in Panel (a). These findings are not consistent with an effect of outgroup (ingroup) contact on outgroup (ingroup) attitudes. I also predicted a non-significant effect of outgroup contact on ingroup attitudes, and a non-significant effect of ingroup contact on outgroup attitudes. In accordance with expectations, these within-person effects were non-significant (with the exception of Black/African American respondents), as shown in Panels (b) and (c) respectively.

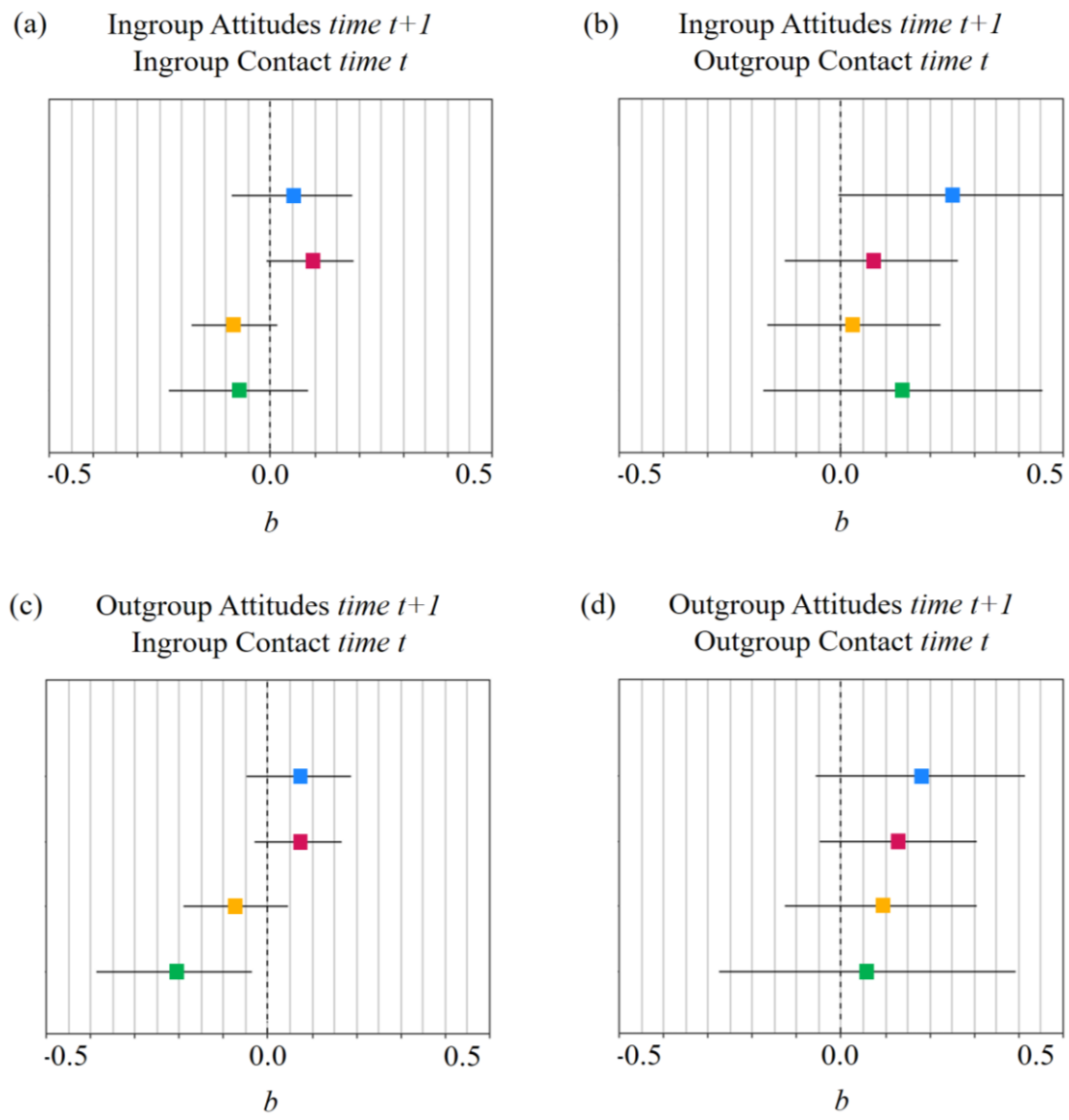


Figure 3.3. Within-person coefficients for Study 2a. Panel (a) shows the within-person effect of ingroup contact on ingroup attitudes, panel (b) shows the within-person effect of outgroup contact on ingroup attitudes, panel (c) shows the within-person effect of ingroup contact on outgroup attitudes, and panel (d) shows the within-person effect of outgroup contact on outgroup attitudes. Coefficients (with 95% confidence intervals) are shown for each group. Blue = White American respondents; Red = Asian American respondents; Yellow = Latino American respondents; Green = Black/African American respondents.

Between-Person Correlations. I next examined the between-person effects, which consisted of correlations between the random intercepts for *outgroup contact* and ingroup and outgroup attitudes, and correlations between the random intercepts for

ingroup contact and ingroup and outgroup attitudes. These correlations indicate to what extent individual differences in (ingroup/outgroup) contact across all waves were associated with individual differences in (ingroup/outgroup) attitudes across all waves. Accordingly, significant between-person correlations are consistent with a time-invariant association between (ingroup/outgroup) contact and (ingroup/outgroup) attitudes (i.e., a possible third-variable effect). The between-person correlations do not test the hypotheses, nonetheless, I report the between-person correlations here because they offer further insight into the direction of the associations between contact and attitudes identified in prior research. Here, I only report the between-person correlations corresponding to the within-person coefficients reported in the previous section. Appendix D shows the full results of each RI-CLPM.

The random intercept for outgroup contact was positively correlated with the random intercept for outgroup attitudes for White American respondents (r = .38, se = .06, p < .001; *95% CI* [.25, .50]), Asian American respondents (r = .28, se = .06, p < .001; *95% CI* [.16, .39]), Latino American respondents (r = .21, se = .08, p = .012; *95% CI* [.05, .37]), and Black/African American respondents (r = .55, se = .11, p < .001; *95% CI* [.34, .76]). This indicates that students who reported more outgroup contact across the five-wave assessment period also reported more positive outgroup attitudes across the same period.

In contrast, the random intercept for outgroup contact was not significantly correlated with the random intercept for ingroup attitudes for White American respondents (r = .14, se = .08, p = .073; *95% CI* [-.01, .29]), Asian American respondents (r = -.02, se = .06, p = .777; *95% CI* [-.14, .11]), Latino American respondents (r = .05, se = .09, p = .551; *95% CI* [-.12, .22]), or Black/African American respondents (r = .15, se = .13, p = .234; *95% CI* [-.10, .40]).

The random intercept for ingroup contact was positively correlated with the random intercept for ingroup attitudes for Asian American respondents (r = .21, se = .06, p = .001; *95% CI* [.09, .33]), Latino American respondents (r = .19, se = .09, p = .025; *95% CI* [.02, .36]), and Black/African American respondents (r = .41, se = .14, p = .003; *95% CI* [.14, .69]). This indicates that Asian, Latino and Black/African American students who reported more ingroup contact across the five-wave assessment period also reported more positive ingroup attitudes across the same period. In contrast, there was no association between ingroup contact and ingroup attitudes across the assessment period for White American respondents (r = -.11, se = .09, p = .200; *95% CI* [-.28, .06]).

Finally, the random intercept for ingroup contact was not significantly correlated with the random intercept for outgroup attitudes for Asian American respondents (r = -.04, se = .06, p = .528; *95% CI* [-.16, .08]), Latino American respondents (r = -.13, se = .09, p = .135; *95% CI* [-.29, .04]), and Black/African American respondents (r = .03, se = .15, p = .846; *95% CI* [-.26, .31]). In contrast, there was a negative association between ingroup contact and outgroup attitudes across the assessment period for White American respondents (r = -.42, se = .08, p < .001; *95% CI* [-.57, -.27]).

Summary. The findings of the RI-CLPMs revealed important insights into the effects of ingroup and outgroup contact on ingroup and outgroup attitudes. Regarding *outgroup contact*, I hypothesised that outgroup contact would have a positive effect on outgroup attitudes. I found that students who reported more outgroup contact than expected at a given time did not report more positive outgroup attitudes than expected at a later time. This finding is not consistent with a positive effect of outgroup contact on outgroup attitudes. Instead, I found that students who reported more outgroup contact across all waves also expressed more positive outgroup attitudes across all waves. This finding is

consistent with an effect of unobserved variables leading to positive correlations between individual differences in outgroup contact and outgroup attitudes across the sample.

I additionally predicted that outgroup contact would not affect ingroup attitudes. In accordance with expectations, deviations in prior outgroup contact were not significantly associated with deviations in subsequent ingroup attitudes. Furthermore, there was no association between outgroup contact and ingroup attitudes across all five waves.

Regarding *ingroup contact*, I hypothesised that ingroup contact would have a positive effect on ingroup attitudes. I found that students who reported more ingroup contact than expected at a given time did not report more positive ingroup attitudes than expected at a later time. This finding is not consistent with a positive effect of ingroup contact on ingroup attitudes. Instead, I found that students who reported more ingroup contact across all waves also expressed more positive ingroup attitudes across all waves, which indicates that unobserved variables may result in positive correlations between ingroup contact and ingroup attitudes. I only identified this association, however, for Asian, Latino and Black/African American students; there was no association between ingroup contact and ingroup attitudes for White American students.

I additionally predicted that ingroup contact would not affect outgroup attitudes. In accordance with expectations, deviations in prior ingroup contact were not significantly associated with deviations in subsequent outgroup attitudes (with the exception of Black/African American respondents). Furthermore, there was no association between ingroup contact and outgroup attitudes across all five waves for Asian, Latino and Black/African American students. There was, however, a negative

association between ingroup contact and outgroup attitudes across the assessment period for White American students.

The RI-CLPM results extend the findings of the multiple linear regression analyses reported in section 3.1.1, by providing better evidence indicating the directionality of the observed associations. In the previous section, I replicated the analyses of Levin et al. (2003), and found that ingroup contact was positively associated with ingroup attitudes, and outgroup contact was positively associated with outgroup attitudes. The multiple linear regression analyses offered little indication of whether or not the positive associations resulted from outgroup (ingroup) contact influencing outgroup (ingroup) attitudes. Using RI-CLPM, I disentangled between-person stability in the correlations between (ingroup/outgroup) contact and (ingroup/outgroup) attitudes from within-person change in (ingroup/outgroup) attitudes predicted by prior (ingroup/outgroup) contact. The findings indicated that the positive associations identified between outgroup (ingroup) contact and outgroup (ingroup) attitudes resulted from between-person stability (i.e., individuals with high contact *simultaneously* held more positive attitudes), and did not result from within-person change (i.e., individuals with high contact did not *subsequently* hold more positive attitudes). Thus, the present findings did not provide evidence in support of an effect of outgroup (ingroup) contact on outgroup (ingroup) attitudes. Instead, the present findings indicated that the results of the multiple regression analyses reported in section 3.1.1 may have been capturing the time-invariant association between outgroup (ingroup) contact and outgroup (ingroup) attitudes (i.e., possible third-variable effects). More broadly, this difference in the conclusions drawn from the RI-CLPM and multiple linear regression analyses demonstrates the benefits of RI-CLPM over more traditional analysis methods.

Thus far, however, I have only reported the findings from one study, and the robustness and generalisability of my findings remains uncertain. This study only examined one intergroup context (i.e., relations between four different ethnic groups in the United States), and it remains uncertain to what extent the findings generalise to other contexts. Furthermore, this study has a potential limitation in combining contact with, and attitudes towards, three different ethnic outgroups. This was necessary in order to reduce the number of models estimated (modelling relations between each unique pair of ethnic groups separately would result in 12 RI-CLPMs). However, the outgroup is therefore heterogeneous, and the lack of an effect of outgroup contact on outgroup attitudes for one group (e.g., White American students' contact with and attitudes towards Asian American students) could mask a significant effect for other groups (e.g., White American students' contact with and attitudes towards Black/African American students). This issue is avoided in Studies 2b, 2c, and 2d, which each examined relations between only two ethnic groups.

Therefore, to assess the robustness and generalisability of my findings, in the following sections I replicate the RI-CLPM analyses in three different studies, before I consider the implications, strengths and limitations of my findings in detail in the general discussion.

3.2.3 Study 2b

Study 2b examined the research questions addressed in this chapter in a new intergroup context: among White British and Asian British adolescents in Oldham, a town in North West England. This study comprised a secondary analysis of data reported in Study 3 of Hewstone et al. (2018). I detailed the context and methods of this study in Chapter 2 (section 2.2.3). The analyses reported in this section used different parts of the study's

data as compared to the analyses reported in the previous chapter. For example, the following analyses required measures of ingroup and outgroup attitudes, in addition to measures of ingroup and outgroup contact. Accordingly, in this section, I briefly summarise, and reiterate when necessary, the relevant aspects of this study's methods.

Method

Respondents and Procedure

Five waves of data were collected at three schools, which each comprised sizeable numbers of students from the White and Asian communities in Oldham (School 1: 39% White British, 48% Asian British; School 2: 61% White British, 22% Asian British; School 3: 85% White British, 6% Asian British). The sample consisted of 1,203 students (61% boys, 39% girls; M_{age} = 13.72, *SD* = 0.94) of whom 806 were White British and 397 were Asian British.

Measures

Students completed surveys containing a variety of measures. Here, I only report measures relevant to the hypotheses, which consist of self-report measures of demographics (ethnicity, age and gender), friends and attitudes. Identical measures were included at each of the five waves.

Demographic Information. Students reported their own ethnicity, age and gender. To determine ethnicity, students were asked, "Which ethnic group do you belong to?", and responded by selecting one of 17 options. The sample included only students who selected either White/White British or Asian/Asian British.

Friends. Friendships with White British and Asian British people were measured using two identical items: "How many of your friends are [White/Asian] British?" (1 = *None*,

5 = *All*). Ingroup and outgroup friendships were identified based on the correspondence between each item and individuals' self-reported ethnicity.

Attitudes. Attitudes towards White British and Asian British pupils were measured using two identical items: "How much do you like [White/Asian] British pupils?" (1 = *Not at all*, 5 = *Very much*). Ingroup attitudes and outgroup attitudes were identified based on the correspondence between each item and individuals' self-reported ethnicity. Notably, by assessing students' attitudes towards *pupils* (not *people*), this measure of attitudes differs from the other measures of attitudes reported across the four studies. This study assessed students' attitudes towards ethnic groups within the boundary of the school, in comparison to ethnic groups more widely.

Results and Discussion

Descriptive Statistics

Table 3.4 shows the means and standard deviations for the measures of ingroup and outgroup friends, and ingroup and outgroup attitudes, for each ethnic group at each wave.

Table 3.4. Means and Standard Deviations of Friends and Attitudes by Group and Wave (Study 2b)

	Wave 1	Wave 2	Wave 3	Wave 4	Wave 5
White British					
Ingroup friends	4.75 (0.61)	4.74 (0.65)	4.70 (0.63)	4.81 (0.47)	4.68 (0.63)
Outgroup friends	2.29 (1.06)	2.44 (1.01)	2.39 (1.01)	2.30 (0.98)	2.47 (0.95)
Ingroup attitudes	4.55 (0.79)	4.51 (0.73)	4.45 (0.78)	4.42 (0.72)	4.38 (0.75)
Outgroup attitudes	3.29 (1.22)	3.23 (1.15)	3.12 (1.13)	3.21 (1.05)	3.20 (1.09)
Asian British					
Ingroup friends	4.57 (0.97)	4.71 (0.78)	4.65 (0.75)	4.65 (0.79)	4.64 (0.88)
Outgroup friends	3.10 (1.29)	3.25 (1.23)	3.16 (1.24)	2.96 (1.23)	2.86 (1.14)
Ingroup attitudes	4.42 (0.88)	4.63 (0.66)	4.55 (0.67)	4.38 (0.89)	4.42 (0.84)
Outgroup attitudes	3.38 (1.12)	3.49 (1.09)	3.63 (0.98)	3.45 (0.98)	3.49 (0.99)

Note. Standard deviations are shown in parentheses.

Paired samples *t*-tests conducted at each wave indicated that students reported significantly more positive ingroup attitudes than outgroup attitudes, $\Delta M > 1.09$, $t > 16.07$, $p < .001$, $d > 0.82$. Both ingroup attitudes ($M > 4.38$) and outgroup attitudes ($M > 3.12$) were above the midpoint (3.00) on the attitude scales, showing that outgroup attitudes were still moderately positive, not negative, while being significantly less positive than ingroup attitudes. Correlations between measures across waves are shown in Appendix B. Each individual measure was significantly correlated between waves (mean absolute $|r| = .42$, $p < .001$).

Random-Intercept Cross Lagged Panel Models

I estimated a separate RI-CLPM for each ethnic group. The results showed that the RI-CLPM fit the data well for White British students, $\chi^2_{(134)}$ = 217.71; *CFI* = .96; *TLI* = .94; *RMSEA* = .03, *95% CI* [.02, .03]; *SRMR* = .07, and Asian British students, $\chi^2_{(134)}$ = 221.97; *CFI* = .93; *TLI* = .90; *RMSEA* = .04, *95% CI* [.03, .05]; *SRMR* = .10.

Within-Person Coefficients. First, I examined the within-person coefficients that tested the hypotheses regarding the effects of ingroup and outgroup contact on ingroup and outgroup attitudes. Here, I only report the within-person coefficients relating to the hypotheses. The full results of each RI-CLPM are shown in Appendix D.

Figure 3.4 shows the within-person effects of ingroup and outgroup contact on ingroup and outgroup attitudes. I hypothesised that outgroup contact would have a positive effect on outgroup attitudes. The results did not support this hypothesis: individuals' deviation from their expected score on outgroup contact at a given time was not associated with their deviation from their expected score on outgroup attitudes at a later time, as shown in Panel (d) of Figure 3.4. I also hypothesised that ingroup contact would have a positive effect on ingroup attitudes. In support of this hypothesis, the results for White British students indicated that individuals' deviation from their expected score on ingroup contact at a given time positively predicted their deviation from their expected score on ingroup attitudes at a later time (*b* = 0.13, *se* = 0.05, *p* = .018; *95% CI* [0.02, 0.24]), as depicted in Panel (a). However, this effect was not significant for Asian British students. Finally, I predicted a non-significant effect of outgroup contact on ingroup attitudes, and a non-significant effect of ingroup contact on outgroup attitudes. In accordance with expectations, the results indicated that outgroup

contact did not affect ingroup attitudes, and that ingroup contact did not affect outgroup attitudes, as shown in Panels (b) and (c) respectively.

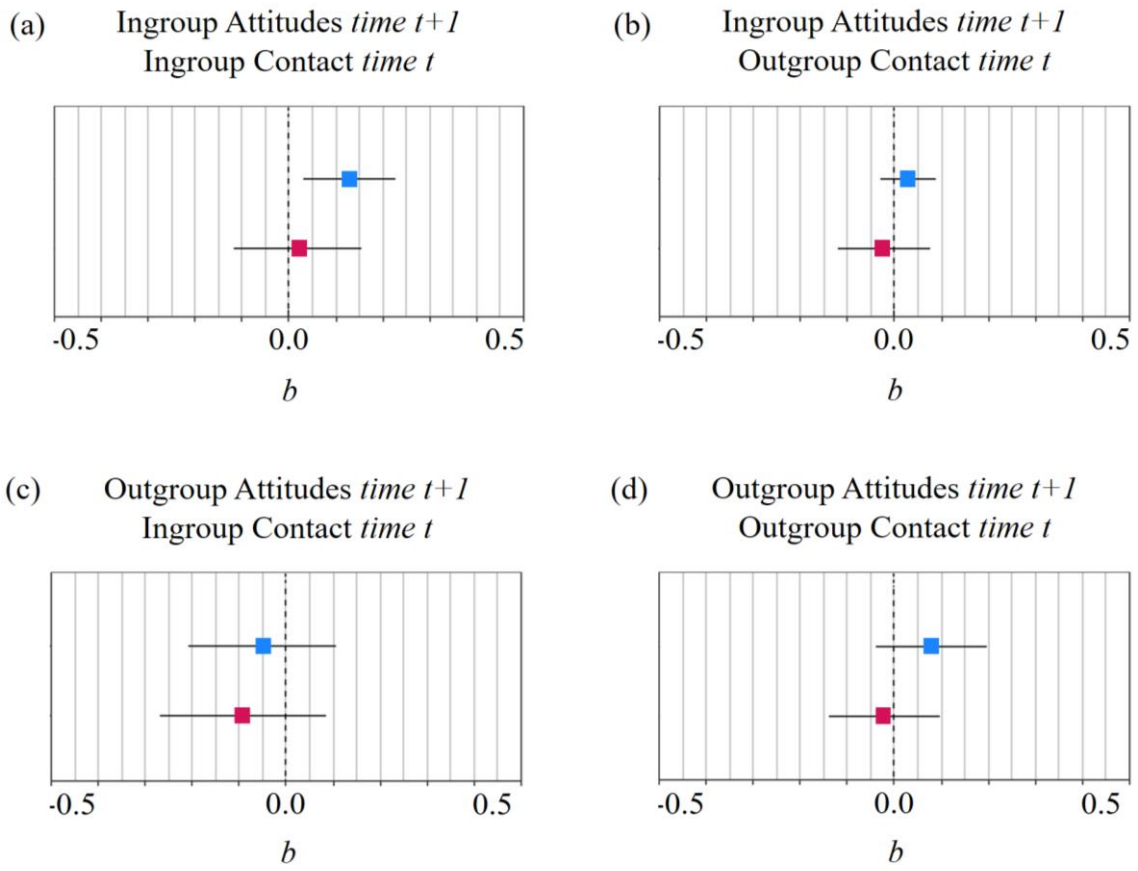


Figure 3.4. Within-person coefficients for Study 2b. Panel (a) shows the within-person effect of ingroup contact on ingroup attitudes, panel (b) shows the within-person effect of outgroup contact on ingroup attitudes, panel (c) shows the within-person effect of ingroup contact on outgroup attitudes, and panel (d) shows the within-person effect of outgroup contact on outgroup attitudes. Coefficients (with 95% confidence intervals) are shown for each group. Blue = White British respondents; Red = Asian British respondents.

Between-Person Correlations. I next examined the between-person effects, which consisted of correlations between the random intercepts for ingroup and outgroup contact and ingroup and outgroup attitudes. Here, I only report the between-person effects corresponding to the hypothesised within-person effects. Appendix D shows the full results of each RI-CLPM.

The random intercept for outgroup contact was positively correlated with the random intercept for outgroup attitudes for White British students (r = .76, se = .09, p < .001; *95% CI* [.59, .92]) and Asian British students (r = .62, se = .08, p < .001; *95% CI* [.46, .78]). This indicates that students who reported more outgroup contact across the five-wave assessment period also reported more positive outgroup attitudes across the same period. In contrast, the random intercept for outgroup contact was not significantly correlated with the random intercept for ingroup attitudes for White British students (r = -.20, se = .14, p = .170; *95% CI* [-.48, .09]) or Asian British students (r = -.11, se = .11, p = .322; *95% CI* [-.32, .10]).

The random intercept for ingroup contact was positively correlated with the random intercept for ingroup attitudes for White British students (r = .47, se = .10, p < .001; *95% CI* [.27, .66) and Asian British students (r = .52, se = .09, p < .001; *95% CI* [.34, .70). This indicates that students who reported more ingroup contact across the five-wave assessment period also reported more positive ingroup attitudes across the same period. Finally, the random intercept for ingroup contact was negatively correlated with the random intercept for outgroup attitudes for White British students (r = -.24, se = .12, p = .043; *95% CI* [-.47, -.01]) and Asian British students (r = -.31, se = .11, p = .004; *95% CI* [-.52, -.09]). This indicates that students who reported more ingroup contact across the five-wave assessment period reported less positive outgroup attitudes across the same period.

Summary. The findings of the RI-CLPMs provided limited support for my hypotheses regarding the within-person effects of outgroup (ingroup) contact on outgroup (ingroup) attitudes. The results did not support my hypothesis that outgroup contact would have a positive effect on outgroup attitudes: students who reported more outgroup contact than expected at a given time did not report more positive outgroup attitudes than expected at

a later time. In contrast, the results provided mixed support for my hypothesis that ingroup contact would have a positive effect on ingroup attitudes. In accordance with this hypothesis, White British students who reported more ingroup contact than expected at a given time reported more positive ingroup attitudes than expected at a later time. However, this effect was not significant for Asian British students. Additionally, for both White and Asian British students, I found that prior outgroup contact did not affect subsequent ingroup attitudes, and that prior ingroup contact did not affect subsequent outgroup attitudes, in accordance with expectations.

I identified several consistent time-invariant associations between (ingroup/outgroup) contact and (ingroup/outgroup) attitudes (i.e., between-person effects). Across all waves, outgroup contact was positively correlated with outgroup attitudes, ingroup contact was positively correlated with ingroup attitudes, ingroup contact was negatively correlated with outgroup attitudes, and outgroup contact was not significantly correlated with ingroup attitudes.

Overall, the findings provided more evidence in support of the positive association between outgroup (ingroup) contact and outgroup (ingroup) attitudes resulting from between-person stability than within-person change. Accordingly, Studies 2a and 2b revealed similar findings. I did, however, identify a significant effect of prior ingroup contact on subsequent ingroup attitudes for White British students in this study. In order to assess the robustness of this effect, I tested my hypotheses in the same intergroup context in Study 2c, and, more broadly, examined the replicability of my findings thus far across alternative measures of contact.

3.2.4 Study 2c

Study 2c examined the research questions in the same intergroup context as Study 2b (i.e., among White British and Asian British adolescents in Oldham). The two studies differed, however, with regard to their measures of contact. Study 2b used a self-report measure of friendship. In contrast, Study 2c used a self-report measure of generic contact and a network measure of friendship.

The measures of contact employed in the present study have two key advantages. Firstly, assessing both generic contact and friendship enabled me to determine whether the findings differed depending on the type of contact examined. Secondly, as previously discussed (see Chapter 1), self-report measures of contact (whether friendship or generic contact) are susceptible to social desirability bias, which can lead individuals to exaggerate their frequency and intimacy of contact (Smith, 2002). In contrast, network measures reduce social desirability bias, as respondents nominate specific individuals as friends without reference to group membership.

I outlined the context and methods of this study in Chapter 2 (section 2.2.4). As the present analyses required different parts of the study's data as compared to section 2.2.4, I briefly summarise, and reiterate when necessary, the relevant aspects of this study's methods. Notably, in contrast to Studies 2a, 2b and 2d, which comprised secondary data, I conducted Study 2c specifically to investigate the research questions addressed in this thesis.

Method

Respondents and Procedure

I collected five waves of data at two schools, which each contained sizeable numbers of students from the White and Asian communities in Oldham (School 1: 16% White

British, 82% Asian British; School 2: 39% White British, 55% Asian British). The sample consisted of 1,170 students (M_{age} = 12.11, *SD* = 0.89) of whom 341 were White British (171 boys, 170 girls) and 829 were Asian British (387 boys, 442 girls).

Measures

Students completed surveys containing a variety of measures. Here, I only report measures relevant to the hypotheses. These consist of a network measure of friendship and self-report measures of ethnicity, generic contact, and attitudes. Identical measures were included at each of the five waves.

Friends. Friendship networks within each year group were elicited using peer-nomination procedures. Students nominated up to ten friends in response to the question, "Who are your friends (in your year group)?". Accordingly, I examined six friendship networks: year groups 7, 8 and 9 at each of the two schools. The six friendship networks are shown in Figure 2.7 in Chapter 2. The networks ranged in size from *n* = 163 to *n* = 221 students. On average, students nominated seven friends (*M* = 7.04, *SD* = 1.99). Ingroup friends and outgroup friends were identified based on the correspondence between individuals' self-reported ethnicity and their friends' self-reported ethnicity.

Demographic Information. The schools provided information about students' age and gender, while students reported their own ethnicity. Students were asked, "Which of the following ethnic groups do you think best describes you?", and responded by selecting one of ten options. The sample included only students who selected either White/White British or Asian/Asian British.

Generic Contact. Generic contact with White British and Asian British people was measured using two identical items: "How often do you have positive contact with

[White/Asian] people?" (1 = *Never*, 5 = *Every day*). Measures of generic ingroup contact and generic outgroup contact were identified based on the correspondence between each item and individuals' self-reported ethnicity.

Attitudes. Attitudes towards White British and Asian British people were measured using two identical items: "Please tell us how you feel about each of the following ethnic groups using the scales below: a) White people, b) Asian people" (1 = *Very cold*, 5 = *Very warm*). Ingroup attitudes and outgroup attitudes were identified based on the correspondence between each item and individuals' self-reported ethnicity.

Results and Discussion

Descriptive Statistics

Table 3.5 shows the means and standard deviations for the measures of generic ingroup and outgroup contact, ingroup and outgroup friends, and ingroup and outgroup attitudes, for each ethnic group at each wave.

Table 3.5. Means and Standard Deviations of Generic Contact, Friends and Attitudes by Group and Wave (Study 2c)

	Wave 1	Wave 2	Wave 3	Wave 4	Wave 5
White British					
Generic ingroup contact	4.82 (0.51)	4.78 (0.59)	4.67 (0.70)	4.75 (0.55)	4.67 (0.69)
Generic outgroup contact	3.98 (1.23)	4.05 (1.16)	4.19 (0.99)	4.19 (1.01)	4.29 (0.92)
Ingroup friends	5.40 (2.40)	5.08 (2.44)	5.02 (2.55)	5.07 (2.42)	4.92 (2.24)
Outgroup friends	1.21 (1.67)	1.48 (1.82)	1.40 (1.77)	1.56 (2.00)	1.58 (1.86)
Ingroup attitudes	4.18 (0.85)	4.19 (0.83)	4.16 (0.85)	4.25 (0.77)	4.11 (0.88)
Outgroup attitudes	3.64 (0.93)	3.55 (0.97)	3.57 (0.93)	3.68 (0.90)	3.68 (0.87)
Asian British					
Generic ingroup contact	4.72 (0.66)	4.79 (0.52)	4.75 (0.59)	4.75 (0.56)	4.71 (0.69)
Generic outgroup contact	4.03 (1.06)	4.14 (0.99)	4.08 (0.94)	4.10 (0.99)	4.13 (0.91)
Ingroup friends	6.53 (2.50)	6.67 (2.41)	6.75 (2.44)	6.78 (2.41)	6.86 (2.37)
Outgroup friends	0.82 (1.30)	0.84 (1.26)	0.84 (1.33)	0.83 (1.29)	0.74 (1.22)
Ingroup attitudes	4.16 (0.85)	4.31 (0.72)	4.27 (0.73)	4.26 (0.73)	4.27 (0.74)
Outgroup attitudes	3.62 (0.88)	3.76 (0.83)	3.74 (0.78)	3.71 (0.82)	3.77 (0.79)

Note. Standard deviations are shown in parentheses. Number of friends refers to outgoing friendship nominations.

Paired samples *t*-tests conducted at each wave indicated that students reported significantly more positive ingroup attitudes than outgroup attitudes, $\Delta M > 0.43$, $t > 16.51$, $p < .001$, $d > 0.50$. Both ingroup attitudes ($M > 4.11$) and outgroup attitudes ($M > 3.55$) were above the midpoint (3.00) on the attitude scales. Correlations between measures across waves are shown in Appendix B. Each individual measure was significantly correlated between waves (mean absolute $|r| = .59$, $p < .001$).

Random-Intercept Cross Lagged Panel Models

I estimated a separate RI-CLPM for each type of contact (i.e., friendship and generic contact) for each ethnic group. The results showed that the RI-CLPM for *friendship* fit the data very well for White British students, $\chi^2_{(134)}$ = 195.14; *CFI* = .98; *TLI* = .97; *RMSEA* = .04, *95% CI* [.03, .05]; *SRMR* = .06, and Asian British students, $\chi^2_{(134)}$ = 221.44; *CFI* = .99; *TLI* = .98; *RMSEA* = .03, *95% CI* [.02, .03]; *SRMR* = .04. Similarly, the results showed that the RI-CLPM for *generic contact* fit the data very well for White British students, $\chi^2_{(134)}$ = 184.72; *CFI* = .97; *TLI* = .96; *RMSEA* = .03, *95% CI* [.02, .05]; *SRMR* = .07, and Asian British students, $\chi^2_{(134)}$ = 288.19; *CFI* = .97; *TLI* = .96; *RMSEA* = .04, *95% CI* [.03, .04]; *SRMR* = .05.

Within-Person Coefficients. Here, I only report the within-person effects testing my hypotheses. Appendix D shows the full results of each RI-CLPM.

Figure 3.5 shows the within-person effects of ingroup and outgroup contact on ingroup and outgroup attitudes. I hypothesised that outgroup contact would have a positive effect on outgroup attitudes. The results, shown in Panel (d) of Figure 3.5, provided little support for this hypothesis. I found that individuals' deviation from their expected score on *outgroup friendship* at a given time was not associated with their deviation from their expected score on outgroup attitudes at a later time. For White British students, individuals' deviation from their expected score on *generic outgroup contact* at a given time positively predicted their deviation from their expected score on outgroup attitudes at a later time (*b* = 0.09, *se* = 0.05, *p* = .049; *95% CI* [0.00, 0.18]). However, the wide confidence interval for this effect reached (but did not cross) zero, and the corresponding effect was not significant for Asian British students. I also hypothesised that ingroup contact would have a positive effect on ingroup attitudes. The

results, shown in Panel (a), did not support this hypothesis, for either type of contact or ethnic group. Finally, in accordance with expectations, the results indicated that outgroup contact did not affect ingroup attitudes, and that ingroup contact did not affect outgroup attitudes, as shown in Panels (b) and (c) respectively. Although, for Asian British students, individuals' deviation from their expected score on *ingroup friendship* at a given time negatively predicted their deviation from their expected score on outgroup attitudes at a later time (b = -0.03, se = 0.01, p = .026; *95% CI* [-0.05, 0.00]), but again the confidence interval for this effect reached (but did not cross) zero.

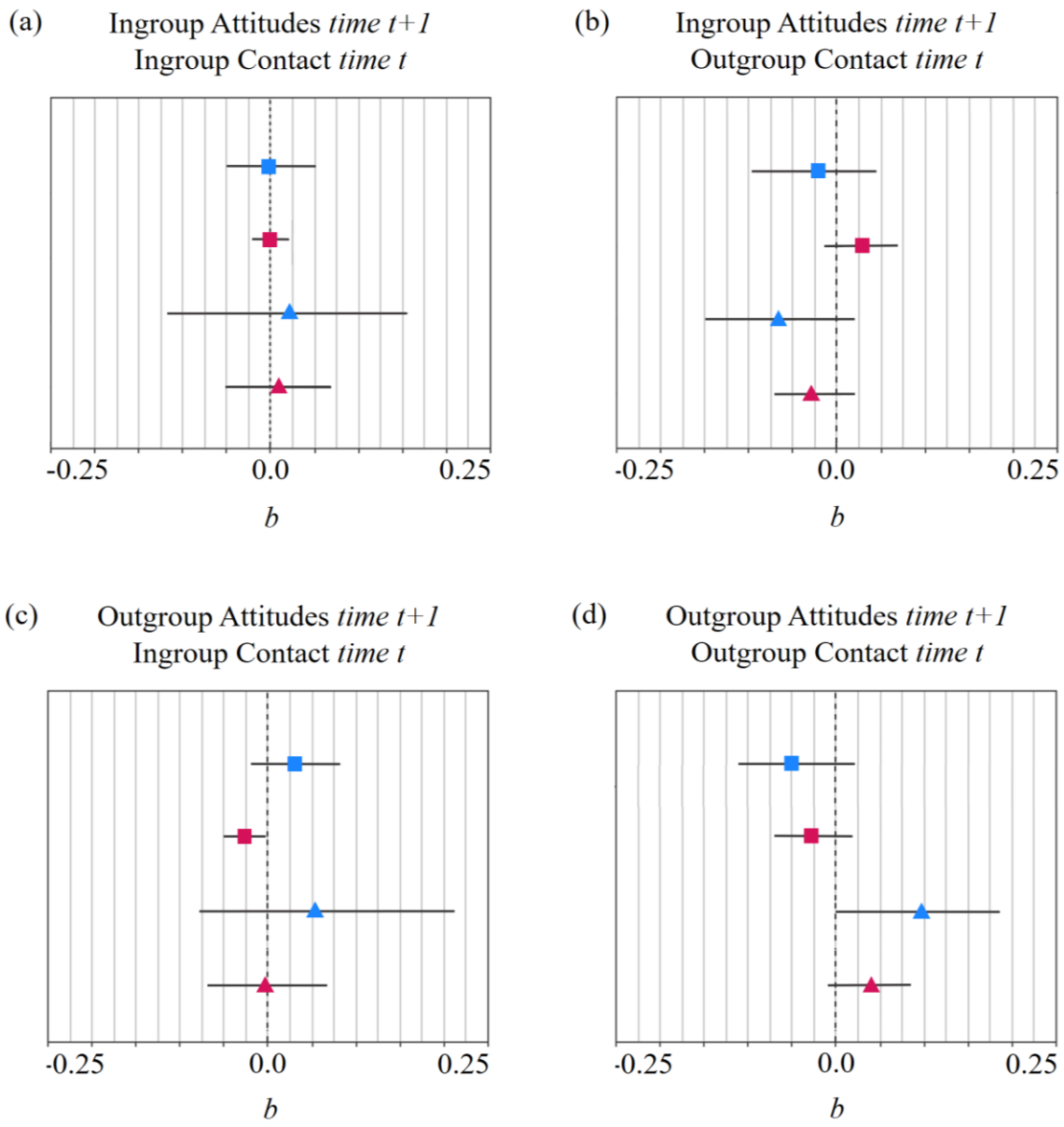


Figure 3.5. Within-person coefficients for Study 2c. Panel (a) shows the within-person effect of ingroup contact on ingroup attitudes, panel (b) shows the within-person effect of outgroup contact on ingroup attitudes, panel (c) shows the within-person effect of ingroup contact on outgroup attitudes, and panel (d) shows the within-person effect of outgroup contact on outgroup attitudes. Coefficients (with 95% confidence intervals) are shown for each type of contact for each group. Square = friendship; Triangle = generic contact; Blue = White British respondents; Red = Asian British respondents.

Between-Person Correlations. Here, I only report the between-person effects corresponding to the hypothesised within-person effects, in order to examine the most relevant time-invariant associations. The full results of each RI-CLPM are shown in Appendix D.

The results revealed consistent positive associations between outgroup contact and outgroup attitudes across the five-wave assessment period, for both ethnic groups and types of contact ($r > .27$, $p < .001$). Similarly, the results revealed consistent positive associations between ingroup contact and ingroup attitudes across the five-wave assessment period ($r > .26$, $p < .001$). The associations between ingroup contact and outgroup attitudes differed depending on the type of contact: there were non-significant associations between *ingroup friendship* and outgroup attitudes ($r < .08$, $p > .077$), and positive associations between *generic ingroup contact* and outgroup attitudes ($r > .22$, $p < .001$). The associations between outgroup contact and ingroup attitudes across the five-wave assessment period differed depending on both the type of contact and ethnic group. There was a non-significant association between *outgroup friendship* and ingroup attitudes for White British students ($r = .08$, $p = .346$), a negative association between *outgroup friendship* and ingroup attitudes for Asian British students ($r = -.11$, $p = .014$), and positive associations between *generic outgroup contact* and ingroup attitudes for both White and Asian British students ($r > .15$, $p < .003$).

Overall, the between-person effects indicated two consistent time-invariant associations: in accordance with the findings of Studies 2a and 2b, outgroup contact was positively associated with outgroup attitudes, and ingroup contact was positively associated with ingroup attitudes.

Summary. The findings of the present study closely resembled the findings of Studies 2a and 2b. The results provided little support for the hypotheses regarding the positive within-person effects of outgroup (ingroup) contact on outgroup (ingroup) attitudes. Overall, I found that deviations in prior outgroup contact were not consistently associated with deviations in subsequent outgroup attitudes, and that deviations in prior ingroup contact were not associated with deviations in subsequent ingroup attitudes. Instead, I identified consistent positive time-invariant associations between outgroup (ingroup) contact and outgroup (ingroup) attitudes.

Notably, two aspects of the present study's findings differ from the findings of Studies 2a and 2b. Firstly, Study 2b identified a significant positive within-person effect of prior ingroup friendship on subsequent ingroup attitudes for White British students. In the present study, I sought to replicate this effect, but here I found no evidence of an effect of prior ingroup friendship on subsequent ingroup attitudes for White British students, which suggests that the effect is not robust. Secondly, in the present study, I identified a significant positive within-person effect of prior generic outgroup contact on subsequent outgroup attitudes for White British students. This finding is consistent with my hypothesis that outgroup contact will have a positive effect on outgroup attitudes. Study 2c provided the first test of the hypotheses using a measure of *generic contact*, in contrast to friendship, and the present findings suggest that the results may differ depending on the type of contact assessed. To further investigate the potential effects of generic contact on attitudes, the following study examined generic contact in an alternative intergroup context.

3.2.5 Study 2d

Study 2d provided a further examination of the associations between generic contact with ingroup and outgroup members and attitudes towards ingroup and outgroup members. In this study, I investigated the research questions addressed in this chapter in a new intergroup context. In New Zealand, the two largest ethnic groups are Māori, who are the indigenous peoples of New Zealand, and New Zealanders of European descent (referred to hereafter as Europeans). Europeans comprise the largest (70%) proportion of the population in New Zealand, while Māori comprise the second largest (17%) proportion (Statistics New Zealand, 2018). Māori are disadvantaged relative to Europeans on a range of socioeconomic indicators, including employment, income, and political representation (Sibley & Ward, 2013; The Social Report, 2014). This study examined intergroup relations between Māori and Europeans in New Zealand, in a secondary analysis of data from the New Zealand Attitudes and Values Study (NZAVS), which is an ongoing large-scale national longitudinal study. For full details regarding the NZAVS, see Sibley (2020), and for previous analyses of this dataset addressing different research questions, see, for example, Barlow et al. (2013), Sengupta and Sibley (2013), and Sengupta et al. (2017).

Method

Respondents and Procedure

Data were drawn from the NZAVS (Sibley, 2020). Time 1 data were collected in 2009 and annual surveys have been conducted each subsequent year. At Time 1, invitations to participate in the study were sent to 40,500 people selected at random from the electoral roll. Of those invited to participate, 6,518 people (16%) completed the surveys at Time 1. For each subsequent year, surveys were sent to all people who responded at Time 1.

Additionally, booster sampling was conducted at Time 3, Time 4 and Time 5 in order to increase the overall sample size.

The present study used data from Time 3 (2011) to Time 7 (2015), because the required measures of contact were only included at these time points. Hereafter, Time 3 to Time 7 are referred to as Wave 1 to Wave 5 respectively. Wave 1 contained responses from 6,844 respondents, Wave 2 contained responses from 12,182 respondents, Wave 3 contained responses from 18,264 respondents, Wave 4 contained responses from 15,822 respondents, and Wave 5 contained responses from 13,944 respondents. I examined whether drop-out correlated with participant attributes measured at each wave. Participant attributes were, at most, weakly correlated (mean absolute $|r| = .020$) with participation in each wave. At each wave, paper surveys were sent to respondents' homes and completed surveys were returned via post.

A total of 23,135 respondents participated in the study across Waves 1-5. Of these, I excluded 318 respondents who did not report their ethnicity, and 2,089 respondents who reported an ethnicity other than European or Māori. This left a final sample of 20,728 respondents (62% female, 38% male; $M_{age} = 50.41$, $SD = 14.62$) of whom 16,726 were European and 4,002 were Māori.

Measures

Respondents completed surveys containing a variety of measures. Here, I only report measures relevant to the hypotheses. These consist of self-report measures of demographics (ethnicity, age and gender), generic contact, and attitudes. Identical measures were included at each of the five waves.

Demographic Information. Respondents reported their own ethnicity, gender and age. To determine ethnicity, respondents were asked, "Which ethnic group do you belong

to?", and the sample included only respondents who reported either New Zealand European or Māori.

Generic Contact. Generic contact with Māori and Europeans were measured using two identical items: "How frequently do you have positive/good contact with [Māori/New Zealand Europeans]?" (1 = *Never*, 7 = *Extremely frequently*). Measures of generic ingroup contact and generic outgroup contact were identified based on the correspondence between each item and individuals' self-reported ethnicity.

Attitudes. Attitudes towards Māori and Europeans were measured using two identical items: "Please rate your feelings of warmth toward the following groups using the 'feeling thermometer scale' for each group: a) New Zealand Europeans, b) Māori" (1 = *Least warm*, 7 = *Most warm*). Ingroup attitudes and outgroup attitudes were identified based on the correspondence between each item and individuals' self-reported ethnicity.

Results and Discussion

Descriptive Statistics

Table 3.6 shows the means and standard deviations for the measures of generic ingroup and outgroup contact, and ingroup and outgroup attitudes, for each ethnic group at each wave.

Table 3.6. Means and Standard Deviations of Generic Contact and Attitudes by Group and Wave (Study 2d)

	Wave 1	Wave 2	Wave 3	Wave 4	Wave 5
European Respondents					
Generic ingroup contact	5.98 (1.13)	6.20 (0.99)	6.23 (0.98)	6.27 (0.91)	6.19 (0.92)
Generic outgroup contact	4.97 (1.45)	5.13 (1.42)	5.26 (1.39)	5.37 (1.37)	5.26 (1.35)
Ingroup attitudes	5.65 (1.18)	5.71 (1.19)	5.76 (1.21)	5.78 (1.17)	5.69 (1.16)
Outgroup attitudes	4.75 (1.30)	4.75 (1.32)	4.86 (1.31)	4.97 (1.27)	4.90 (1.24)
Māori Respondents					
Generic ingroup contact	5.63 (1.31)	5.74 (1.30)	5.77 (1.30)	5.85 (1.21)	5.75 (1.25)
Generic outgroup contact	5.78 (1.30)	5.82 (1.29)	5.91 (1.20)	6.02 (1.13)	5.93 (1.17)
Ingroup attitudes	5.57 (1.29)	5.64 (1.30)	5.68 (1.30)	5.63 (1.25)	5.58 (1.29)
Outgroup attitudes	5.50 (1.30)	5.34 (1.34)	5.46 (1.35)	5.46 (1.28)	5.41 (1.29)

Note. Standard deviations are shown in parentheses.

Paired samples *t*-tests conducted at each wave indicated that respondents reported significantly more positive ingroup attitudes than outgroup attitudes, $\Delta M > 0.77$, $t > 42.02$, $p < .001$, $d > 0.53$, with one exception: ingroup attitudes and outgroup attitudes did not significantly differ for Māori respondents at Wave 1, $\Delta M = 0.07$, $t(969) = 1.60$, $p = .109$, $d = 0.05$. Both ingroup attitudes ($M > 5.57$) and outgroup attitudes ($M > 5.34$) were above the midpoint (4.00) on the attitude scales. Correlations between measures across waves are shown in Appendix B. Each individual measure was significantly correlated between waves (mean absolute $|r| = .48$, $p < .001$).

Random-Intercept Cross Lagged Panel Models

I estimated a separate RI-CLPM for each ethnic group. The results showed that the RI-CLPM fit the data very well for European respondents, $\chi^2_{(134)} = 418.56$; *CFI* = .99; *TLI* = .99; *RMSEA* = .01, *95% CI* [.01, .01]; *SRMR* = .02, and Māori respondents, $\chi^2_{(134)} = 206.88$; *CFI* = .99; *TLI* = .99; *RMSEA* = .01, *95% CI* [.01, .02]; *SRMR* = .03.

Within-Person Coefficients. Here, I only report the within-person effects testing my hypotheses. Appendix D shows the full results of each RI-CLPM.

Figure 3.6 shows the within-person effects of ingroup and outgroup contact on ingroup and outgroup attitudes. I hypothesised that outgroup contact would have a positive effect on outgroup attitudes (but would not reliably affect ingroup attitudes), and that ingroup contact would have a positive effect on ingroup attitudes (but would not reliably affect outgroup attitudes). The results for European respondents provided consistent support for my hypotheses. As shown in Panel (d) of Figure 3.6, European respondents' deviation from their expected score on outgroup contact at a given time positively predicted their deviation from their expected score on outgroup attitudes at a later time ($b = 0.04$, $se = 0.01$, $p < .001$; *95% CI* [0.02, 0.05]). Similarly, European respondents' deviation from their expected score on ingroup contact at a given time positively predicted their deviation from their expected score on ingroup attitudes at a later time ($b = 0.02$, $se = 0.01$, $p = .042$; *95% CI* [0.00, 0.04]), as shown in Panel (a). In contrast, the results for European respondents indicated, in accordance with expectations, that outgroup contact did not affect ingroup attitudes, and that ingroup contact did not affect outgroup attitudes, as shown in Panels (b) and (c) respectively.

However, the results for Māori respondents did not provide consistent support for my hypotheses. In line with my hypotheses, Māori respondents' deviation from their

expected score on ingroup contact at a given time positively predicted their deviation from their expected score on ingroup attitudes at a later time (b = 0.05, se = 0.02, p = .008; *95% CI* [0.01, 0.09]), as shown in Panel (a). Also in accordance with expectations, there was no association between prior ingroup contact and subsequent outgroup attitudes for Māori respondents, as shown in Panel (c). Yet, in contrast to expectations, Māori respondents' deviation from their expected score on outgroup contact at a given time was not associated with their deviation from their expected score on outgroup attitudes at a later time, as shown in Panel (d). Furthermore, Māori respondents' deviation from their expected score on outgroup contact at a given time negatively predicted their deviation from their expected score on ingroup attitudes at a later time (b = -0.07, se = 0.02, p = .001; *95% CI* [-0.12, -0.03]), as shown in Panel (b).

In summary, the results for European respondents provided consistent support for my hypotheses, while the results for Māori respondents were inconsistent. Notably, all the significant within-person effects identified were very small, and the confidence intervals consistently approached zero.

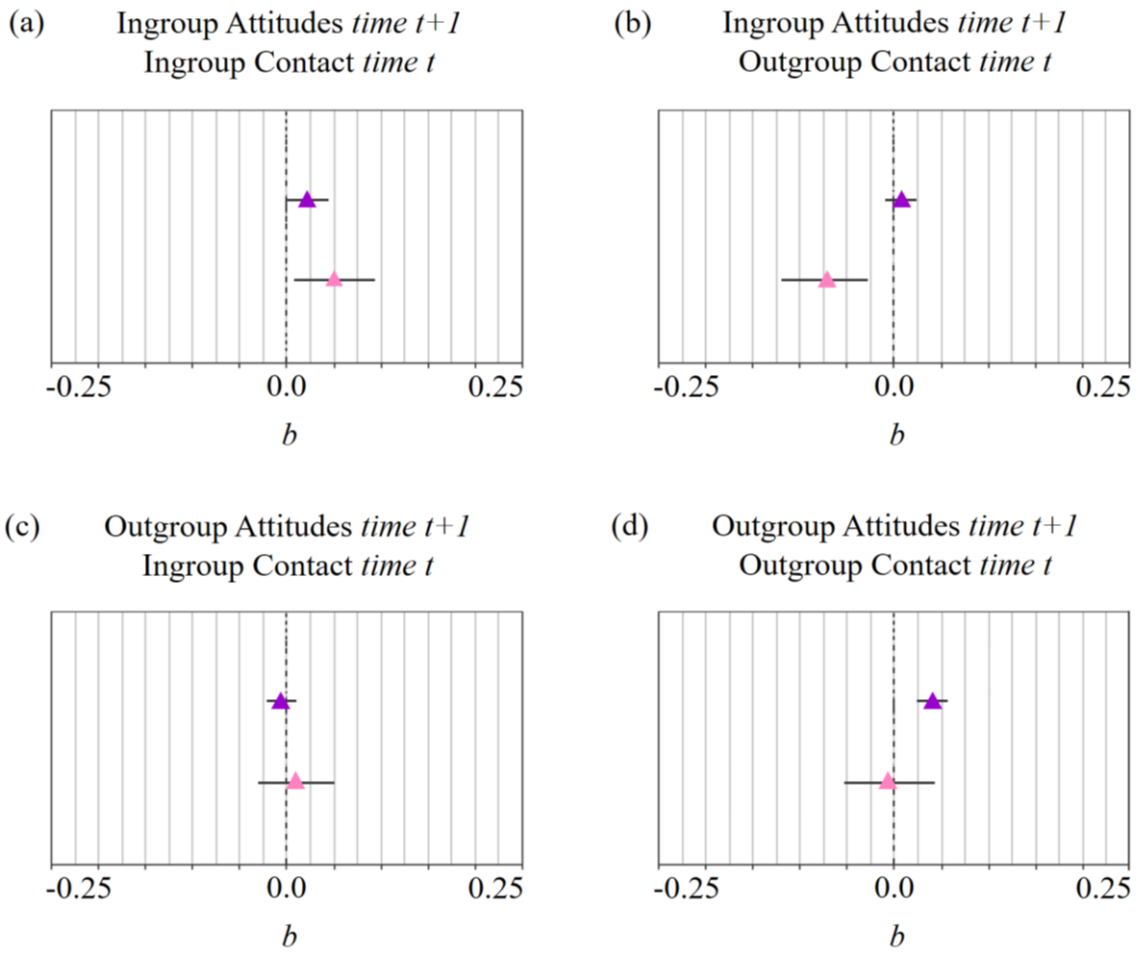


Figure 3.6. Within-person coefficients for Study 2d. Panel (a) shows the within-person effect of ingroup contact on ingroup attitudes, panel (b) shows the within-person effect of outgroup contact on ingroup attitudes, panel (c) shows the within-person effect of ingroup contact on outgroup attitudes, and panel (d) shows the within-person effect of outgroup contact on outgroup attitudes. Coefficients (with 95% confidence intervals) are shown for each group. Purple = European respondents; Pink = Māori respondents.

Between-Person Correlations. Here, I only report the between-person effects corresponding to the hypothesised within-person effects. The full results of each RI-CLPM are shown in Appendix D.

The results revealed consistent significant positive associations between all key variables. This indicates that individuals who reported more (ingroup/outgroup) contact across the five-wave assessment period also reported more positive (ingroup/outgroup)

attitudes across the same period. Specifically, for both European and Māori respondents, there were positive associations between outgroup contact and outgroup attitudes ($r > .67$, $p < .001$), ingroup contact and ingroup attitudes ($r > .55$, $p < .001$), outgroup contact and ingroup attitudes ($r > .07$, $p < .001$), and ingroup contact and outgroup attitudes ($r > .23$, $p < .001$). The associations between outgroup contact and outgroup attitudes, and between ingroup contact and ingroup attitudes, were considerably stronger than the associations between outgroup contact and ingroup attitudes, and between ingroup contact and outgroup attitudes.

Summary. The findings provided mixed support for the hypotheses regarding the within-person effects of outgroup (ingroup) contact on outgroup (ingroup) attitudes. In accordance with the hypotheses, I found that, for European respondents, deviations in prior outgroup contact predicted deviations in subsequent outgroup attitudes (but not ingroup attitudes), and that deviations in prior ingroup contact predicted deviations in subsequent ingroup attitudes (but not outgroup attitudes). However, the results for Māori respondents were not consistently in line with my hypotheses; for example, deviations in prior outgroup contact were not significantly associated with deviations in subsequent outgroup attitudes. In contrast to the inconsistent within-person effects, I identified consistent positive time-invariant associations between outgroup (ingroup) contact and outgroup (ingroup) attitudes. Therefore, the findings of Study 2d, akin to the findings of Studies 2a, 2b and 2c, provided more evidence in support of between-person stability, rather than within-person change, resulting in the positive associations between outgroup (ingroup) contact and outgroup (ingroup) attitudes.

Nonetheless, the findings from Study 2d do suggest that there may be an effect of outgroup (ingroup) contact on outgroup (ingroup) attitudes for Europeans in New Zealand. Although, in light of the findings from Studies 2a, 2b, and 2c, the effects

identified in the present study could be considered either highly context-specific or spurious. In the following section, I summarise the results across the four studies, in order to provide a more comprehensive account of my findings.

3.2.6 Synthesis of Results

Across four longitudinal studies, I assessed the associations between contact with ingroup and outgroup members and attitudes towards ingroup and outgroup members. Using RI-CLPM, I disentangled the extent to which the observed associations between outgroup (ingroup) contact and outgroup (ingroup) attitudes resulted from between-person stability or within-person change. Only within-person change would give strong support to the hypotheses that outgroup contact would have a positive effect on outgroup attitudes (but would not reliably affect ingroup attitudes), and that ingroup contact would have a positive effect on ingroup attitudes (but would not reliably affect outgroup attitudes).

Figure 3.7 shows, for Studies 2a, 2b, 2c and 2d, the four within-person effects corresponding to the hypotheses. Upon visual inspection of the figure, the overall pattern indicates that the estimates for every effect clustered around zero. Regarding the hypothesis that outgroup contact would have a positive effect on outgroup attitudes, Figure 3.7 shows that only two of the twelve hypothesised effects were significant. Similarly, regarding the hypothesis that ingroup contact would have a positive effect on ingroup attitudes, only three of the twelve hypothesised effects were significant. Furthermore, as visualised in Figure 3.7, all the significant within-person effects identified were very small, and the confidence intervals consistently approached zero. Together, the findings across the four studies therefore provided little evidence in

support of a within-person effect of outgroup (ingroup) contact on outgroup (ingroup) attitudes.

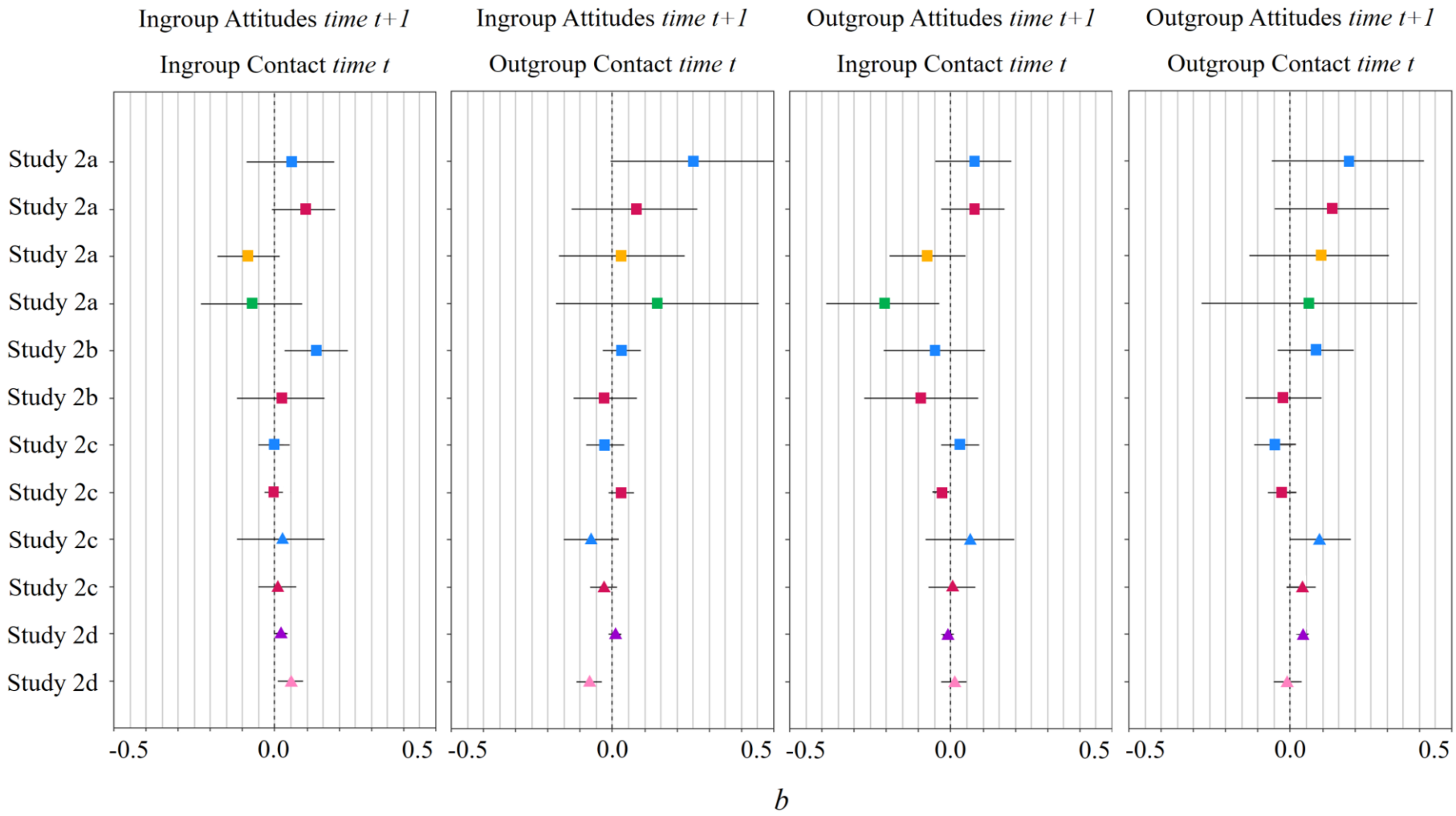


Figure 3.7. Within-person coefficients across all studies. Coefficients (with 95% confidence intervals) are shown for each type of contact and each group. Contact type is coded by shape. Square = friendship; Triangle = generic contact. Ethnic group is coded by colour. Blue = White respondents; Red = Asian respondents; Yellow = Latino respondents; Green = Black/African respondents; Purple = European respondents; Pink = Māori respondents.

I examined the findings in detail, in order to determine whether there were any consistent patterns across studies in the presence of the significant effects. The studies varied with regard to several key dimensions, consisting of the type of contact examined (i.e., generic contact or friendship), the participant age group, the participant ethnic group, and the target ethnic group. I sought to assess the robustness of my findings, and identify any important differences, across each of these dimensions. The findings indicated that the effects of outgroup (ingroup) contact on outgroup (ingroup) attitudes were not robust across the dimensions. However, I identified two consistent patterns in the effects.

First, I identified a consistent positive effect of generic outgroup contact on outgroup attitudes for majority status groups. Only Studies 2c and 2d assessed generic contact, but the studies respectively identified a significant effect of generic outgroup contact on outgroup attitudes for White British respondents and New Zealand European respondents. This pattern is consistent with prior research suggesting that the effects of outgroup contact are stronger for majority than minority status groups (Pettigrew & Tropp, 2005). However, this pattern is not consistent with prior research showing that outgroup friendship has a stronger effect on outgroup attitudes than generic outgroup contact (Pettigrew & Tropp, 2006). Instead, the present findings indicated that *only* generic outgroup contact influenced outgroup attitudes. This is unlikely considering the strong evidence and rationale for the effectiveness of outgroup friendship detailed in prior research (Davies et al., 2011).

Second, in Study 2d, I identified a consistent positive effect of generic ingroup contact on ingroup attitudes for both Māori and European respondents in New Zealand. Combined with the significant positive effect of generic outgroup contact on outgroup attitudes for European respondents, the findings provided more evidence of contact

influencing attitudes in this intergroup context (i.e., among Māori and European people in New Zealand) as compared to the other intergroup contexts examined. However, it remains uncertain why these effects would be identified among Māori and European respondents in New Zealand, and not in other intergroup contexts. Considering the large number of effects estimated, this may simply be a chance finding, rather than a context specific effect. To provide an indication of whether the significant effects could result from chance, I applied the Bonferroni correction to account for the 12 tests of each within-person effect. This set a corrected alpha value of $p < .004$. Across all four studies, only one hypothesised within-person effect met this threshold, that is, the effect of generic outgroup contact on outgroup attitudes for European respondents in study 2d.

Alternatively, the differences in the findings of Study 2d, as compared to Studies 2a, 2b and 2c, may result from variation in the sample sizes across studies. The sample of Study 2d consisted of 16,726 European respondents and 4,002 Māori respondents. In contrast, the mean sample size across Studies 2a, 2b and 2c was 563 respondents (ranging from 144 to 829 respondents). The significant within-person effects identified in Study 2d were very small (i.e., $b = 0.02$; $b = 0.04$; $b = 0.05$), and perhaps a sample size of $N > 829$ is required for RI-CLPM to detect the small within-person effects that may result from separating between-person stability and within-person change. RI-CLPM is a recently developed analytic technique, and power calculations to determine the required sample size have not yet been conducted. Nonetheless, the model fit indices showed excellent fit for all samples (with the exception of $n = 144$ Black/African American respondents in Study 2a), which suggests that all but one sample was of a sufficient size. Furthermore, the present studies' samples were larger than those recommended for various other complex modelling techniques, such as longitudinal structural equation modelling (e.g., Siddiqui, 2013; Stevens, 2009). Accordingly, it

remains uncertain whether the differences in the findings of Study 2d, as compared to Studies 2a, 2b and 2c, resulted from a lack of power to detect small effects.

Notably, the results of Study 2d were inconsistent despite the large sample size: I did not identify an effect of outgroup contact on outgroup attitudes for Māori respondents (n = 4,002). Moreover, all significant effects identified were very small, which is not in accordance with the intergroup contact literature showing a medium effect size (mean r = .21) of outgroup contact on outgroup attitudes (Pettigrew & Tropp, 2006), although this effect size is not based on research that separated between-person and within-person effects.

In order to examine differences in the results depending on sample size, I re-ran the RI-CLPM for each study using the total combined sample of all ethnic groups, in contrast to estimating a separate RI-CLPM for each ethnic group. This provided an analytic sample of N = 2,132 in Study 2a, N = 1,203 in Study 2b, N =1,170 in Study 2c, and N = 20,728 in Study 2d. The results obtained from the larger analytic samples did not provide increased support for my hypotheses. Across studies 2a, 2b and 2c, all hypothesised within-person effects were non-significant, with one exception: I identified a positive effect of generic outgroup contact on outgroup attitudes (b = 0.06, se = 0.02, p = .005; *95% CI* [0.02, 0.09]) in Study 2c, identical to the effect obtained for White British respondents in my previous analyses conducted separately for each ethnic group. These results suggest that the present findings are unlikely to have resulted from a lack of power alone, as the results did not change even with a combined sample of N = 2,132 in Study 2a. Although, perhaps a sample of N > 2,132 is required.

Overall, the findings did not provide robust evidence in support of my hypotheses that outgroup contact would have a positive effect on outgroup attitudes, or

that ingroup contact would have a positive effect on ingroup attitudes. In the following section, I consider my findings in relation to prior research, and discuss the implications, strengths, limitations and future directions of the present research.

3.3 General Discussion

In this chapter, I have presented the findings from four longitudinal studies investigating the effects of ingroup and outgroup contact on ingroup and outgroup attitudes. Across the four studies, I tested the hypotheses that outgroup contact would have a positive effect on outgroup attitudes (but would not reliably affect ingroup attitudes), and that ingroup contact would have a positive effect on ingroup attitudes (but would not reliably affect outgroup attitudes).

In my initial investigation, reported in section 3.1, I analysed the data using traditional analysis methods and obtained consistent evidence in support of my hypotheses. Specifically, having first replicated exactly the analysis and findings of Levin et al. (2003), I then extended the research, again using their dataset, in order to disentangle the ways in which ingroup and outgroup contact affect ingroup bias. In accordance with the hypotheses, I found that outgroup contact was positively associated with outgroup attitudes, and that ingroup contact was positively associated with ingroup attitudes. Subsequently, in section 3.2, I used RI-CLPM to explore the extent to which the observed associations between outgroup (ingroup) contact and outgroup (ingroup) attitudes resulted from between-person stability or within-person change. Within-person change is consistent with the hypotheses that prior outgroup (ingroup) contact would have a positive effect on subsequent outgroup (ingroup) attitudes. In contrast, between-person stability is consistent with an effect of unobserved variables leading to positive time-invariant correlations between individual differences in outgroup (ingroup) contact

and outgroup (ingroup) attitudes across the population. The overall findings across the four studies indicated that the positive associations between outgroup (ingroup) contact and outgroup (ingroup) attitudes were more likely the result of between-person stability than within-person change. Therefore, the findings did not provide consistent evidence in support of my hypotheses that outgroup (ingroup) contact would have a positive effect on outgroup (ingroup) attitudes.

In the present research, I did not examine the factors that may lead to the time-invariant associations identified between outgroup (ingroup) contact and outgroup (ingroup) attitudes. Potential mechanisms could include unobserved variables such as personality traits, intergroup ideologies, or intergroup contact opportunity structures. Future research could examine the factors that explain this association.

In relation to prior research, the present findings build upon the findings of Bohrer et al. (2019), who also examined the associations between outgroup contact and outgroup attitudes using RI-CLPM, and similarly did not identify within-person change consistent with an effect of outgroup contact on outgroup attitudes. The present research extends the findings of Bohrer et al., by additionally examining, and not consistently identifying, an effect of ingroup contact on ingroup attitudes. Only three studies to date have examined the effects of ingroup contact on attitudinal outcome measures, and the studies obtained mixed results (Levin et al., 2003; Munniksma et al., 2015; Wilder & Thompson, 1980). Therefore, the findings regarding ingroup contact do not appear to have substantial implications for prior research. However, a wealth of research examining intergroup contact theory (Allport, 1954; Brown & Hewstone, 2005) has demonstrated a positive effect of outgroup contact on outgroup attitudes (Pettigrew & Tropp, 2006). Accordingly, the present findings regarding the non-significant within-person effects of outgroup contact on outgroup attitudes are particularly noteworthy.

Arguably, the present findings could indicate that the positive association between outgroup contact and outgroup attitudes identified in prior intergroup contact research may have resulted from between-person stability. That is, prior research could have captured the positive time-invariant associations between individual differences in outgroup contact and outgroup attitudes across the population. This is because the standard longitudinal analysis methods currently used in the field of intergroup contact research (e.g., cross-lagged panel modelling) conflate between-person stability and within-person change (Hamaker et al., 2015; Zyphur et al., 2020). The difference in the conclusions drawn depending on the analysis methods employed is exemplified through the comparison of the findings I obtained for Study 2a in sections 3.1 and 3.2 using different analysis techniques. Analysing the same data with multiple strategically-chosen techniques is an approach rarely reported in the literature, but clearly a useful one.

The potential issue of conflating between-person stability and within-person change only applies, however, to longitudinal survey studies, and while the intergroup contact literature relies heavily on survey data (MacInnis & Page-Gould, 2015), there have also been many experimental studies examining intergroup contact theory (Pettigrew & Tropp, 2006). Experimental studies have provided evidence of a within-person effect of outgroup contact on outgroup attitudes (e.g., Brown et al., 1999; Ioannou et al., 2018; Van Oudenhoven et al., 1996; Wilder, 1984) that cannot be attributed to between-person stability. Therefore, it is surprising that within-person effects of outgroup contact on outgroup attitudes were not similarly identified in the present research.

There are several potential explanations for the largely non-significant within-person effects identified in this chapter. First, as discussed in the previous section, the

sample sizes across the four studies may not have been sufficiently large to detect the small within-person effects. Accordingly, future research should replicate the present analyses in larger samples in order to determine the presence of small within-person effects.

Second, the four studies assessed attitude change over a fixed set of time periods, ranging from a total assessment period of one year (with intervals between waves of six to eight weeks) to a total assessment period of five years (with intervals between waves of one year). RI-CLPM estimates the effects of the predictor variable at a given wave on the outcome variable at the subsequent wave. Accordingly, if attitude change resulting from contact is a gradual process which unfolds over a time period of beyond one year, the present studies would not have been able to detect this effect. Further research is required in order to reveal the timescale on which attitude change occurs, following which studies could be designed to target the ideal time points in which attitude change would be detected.

Although I did not find evidence of within-person effects within each study's timespan, I did identify consistent positive time-invariant associations between outgroup (ingroup) contact and outgroup (ingroup) attitudes. These between-person associations could be the result of unobserved variables (e.g., contact opportunity structures or intergroup ideologies), but could equally be the result of a within-person effect of outgroup (ingroup) contact on outgroup (ingroup) attitudes prior to the onset of the study. That is, the significant between-person associations could result from the hypothesised within-person effects playing out before, but not during, the study.

Relatedly, the identification of within-person effects in longitudinal survey data requires sufficient naturally occurring change in the levels of contact, which may not be

present within a study's timespan. This may account for the identification of within-person effects in prior experimental studies, which manipulated levels of contact, in contrast to the lack of within-person effects identified in the present longitudinal survey studies, which relied on naturally occurring change in the levels of contact.

Finally, although the four studies enabled me to test the hypotheses in a range of intergroup contexts (i.e., among various ethnic groups in the United States, England, and New Zealand), the contexts examined were similar, and provided a limited and unrepresentative sample of all intergroup contexts. Most pertinently, in all four contexts, I found that outgroup attitudes were comparatively less positive than ingroup attitudes, yet still moderately positive, not negative. This is in accordance with prior research contending that in many Western societies, the overt expression of prejudice has decreased, and ingroup bias is more commonly expressed in a relatively subtle and indirect manner (e.g., Dovidio & Gaertner, 1993; Greenwald & Pettigrew, 2014; Hodson et al., 2005). Perhaps the effect of outgroup contact on outgroup attitudes may be more pronounced when the sample has initially less positive attitudes, as there would be more room for attitude improvement. Indeed, prior research has suggested that outgroup contact may be more effective for those with more negative intergroup attitudes (e.g., Dhont & Van Hiel, 2009; Hodson, 2008). Furthermore, I only examined relations between different ethnic groups, thus the findings cannot be generalised to alternative group dimensions. Research has demonstrated stronger effects of outgroup contact on outgroup attitudes for target groups based on other dimensions, such as sexual orientation and physical disability, as compared to ethnicity (Pettigrew & Tropp, 2006). This suggests that stronger within-person effects could be identified for alternative groups. Further research is required in order for the present findings to be generalised beyond the intergroup contexts considered in the present studies. Such

research could especially focus on alternative group dimensions and contexts in which more negative intergroup relations persist.

Despite the potential limitations regarding the sample sizes, time periods, and intergroup contexts studied in the present research, this research nonetheless provides a notable methodological advance through the use of RI-CLPM. This analysis method enabled me to disentangle between-person stability and within-person change in an attempt to provide stronger evidence for the direction of the observed associations between outgroup (ingroup) contact and outgroup (ingroup) attitudes. Comparing the substantially different conclusions drawn from the findings of the RI-CLPM in section 3.2, and multiple linear regression analyses in section 3.1, illustrates the benefits of RI-CLPM over more traditional analysis methods. Importantly, survey data cannot demonstrate causality, regardless of the analysis method used, because there may be omitted confounders. However, the choice of analysis method affects the strength of the evidence indicating the most likely direction of the observed associations. Traditional analysis methods, such as multiple linear regression and cross-lagged panel modelling, provide weak evidence. In contrast, longitudinal within-person effects, after adjusting for between-person stability, provide considerably stronger evidence indicating the direction of the observed associations (Hamaker et al., 2015). Although the results obtained using RI-CLPM in this chapter were unexpected, the findings demonstrate the critical requirement for further longitudinal research investigating intergroup contact theory using RI-CLPM to disentangle between-person stability and within-person change. The present research provides only the second examination of intergroup contact using RI-CLPM (following Bohrer et al., 2019), and, though it is an oft-stated academic imperative, it is especially warranted to state here: more research is required

before strong conclusions are drawn regarding the within-person effects of outgroup (ingroup) contact on outgroup (ingroup) attitudes.

CHAPTER 4: THE SOCIALISATION OF INGROUP AND OUTGROUP ATTITUDES

In Chapter 1, I reviewed research concerning the socialisation of ingroup and outgroup attitudes. To summarise this literature, friends may influence individuals' attitudes through the process of socialisation (Kandel, 1978). Studies on socialisation have shown that individuals' attitudes towards social groups (e.g., ethnic minority groups) are influenced by the attitudes held by their friends, which leads friends' attitudes to become more similar over time (Hjerm et al., 2018; Miklikowska, 2017; Van Zalk et al., 2013; Zingora et al., 2020). Research further suggests that individuals' attitudes may be influenced to a greater extent by their ingroup friends' attitudes than their outgroup friends' attitudes (e.g., Thijs & Verkuyten, 2011); however, no study to date has compared these effects. The few studies that have investigated how friends influence each other's attitudes towards social groups have considered all friends to be equal sources of influence, regardless of whether they were ingroup or outgroup friends. The proposal that attitude socialisation is likely to occur primarily through ingroup, not outgroup, friends, is based on research examining norms, which has shown that individuals adjust their attitudes towards social groups in accordance with ingroup norms, rather than outgroup norms (e.g., Festinger, 1954, 1957; Sherif, 1936; Sherif & Sherif, 1953; Stangor et al., 2001; Turner et al., 1987).

In this chapter, I examine the extent to which attitude socialisation occurs through ingroup friends, outgroup friends, or both. I investigate the socialisation of both ingroup attitudes and outgroup attitudes, and expect to find similar results for each (i.e., that individuals' attitudes towards the ingroup and outgroup will be influenced by the attitudes of their ingroup friends). Specifically, I test the hypotheses that ingroup friends' attitudes will influence individuals' attitudes so that their attitudes become more similar over time, while outgroup friends' attitudes will not influence individuals'

attitudes. Figure 4.1 highlights these hypotheses in relation to the broader model proposed in this thesis. In accordance with my hypotheses, I expect to find evidence in support of Path 3c (i.e., the influence of *ingroup* friends' attitudes on individuals' *outgroup* attitudes) and Path 3d (i.e., the influence of *ingroup* friends' attitudes on individuals' *ingroup* attitudes). In contrast, I do not expect to find evidence in support of Path 3a (i.e., the influence of *outgroup* friends' attitudes on individuals' *outgroup* attitudes) or Path 3b (i.e., the influence of *outgroup* friends' attitudes on individuals' *ingroup* attitudes).

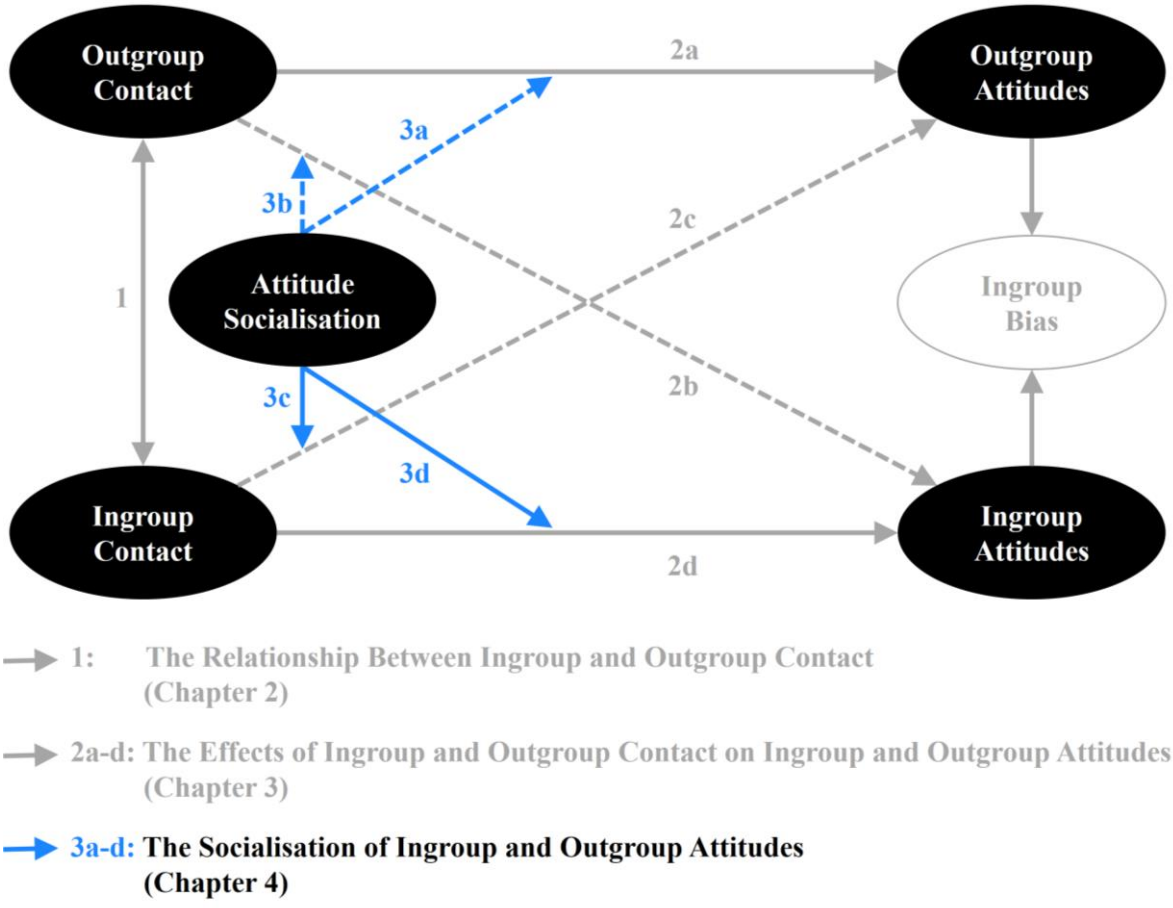


Figure 4.1. The socialisation of ingroup and outgroup attitudes. In this chapter, I examine Paths 3a-d (depicted in blue). I hypothesise significant effects for Paths 3c and 3d (depicted as bold lines), but not Paths 3a and 3b (depicted as dashed lines).

Figure 4.1 visualises the hypotheses addressed in this chapter as moderation, because attitude socialisation can be conceptualised as a moderation of the relationship between friends and attitudes. That is, the relationship between the number of (ingroup/outgroup) friends and (ingroup/outgroup) attitudes may be moderated by the friends' attitudes. If individuals' attitudes are influenced by the attitudes held by their friends, then friendships with those holding negative attitudes may worsen individuals' own attitudes, while friendships with those holding positive attitudes may improve individuals' own attitudes. Accordingly, attitude socialisation could be examined using moderation analysis. However, attitude socialisation is best examined through the use of longitudinal social network analysis, which can accurately assess directionality by estimating both socialisation and selection effects (as detailed in the following Analysis Strategy section).

In Chapter 3, I examined the effects of having more (as compared to fewer) ingroup friends and outgroup friends on individuals' ingroup attitudes and outgroup attitudes. In order to distinguish between (a) the effects of the number of (ingroup/outgroup) friends on individuals' attitudes, and (b) the effects of these (ingroup/outgroup) friends' attitudes on individuals' attitudes, I hereafter refer to these effects respectively as (a) *contact effects* (Allport, 1954), and (b) *socialisation effects* (Kandel, 1978).

Previous research examining how friendships influence individuals' attitudes has studied *either* contact effects for ingroup and outgroup friends separately (e.g., Levin et al., 2003) *or* socialisation effects for all friends, irrespective of their ethnicity (e.g., Van Zalk et al., 2013). In this chapter, I focus on investigating socialisation effects for ingroup and outgroup friends; however, I additionally examine contact effects for ingroup and outgroup friends. This is because the unique impact of each effect can only

be determined by analysing contact and socialisation effects in conjunction. That is, socialisation (contact) effects cannot be accurately determined without controlling for contact (socialisation) effects. As an example, the positive association between having outgroup friends and outgroup attitudes, which is well-documented in the intergroup contact literature (Davies et al., 2011), may, theoretically, result from contact or socialisation effects, or both. Having more outgroup friends may in and of itself improve outgroup attitudes. Alternatively, or additionally, outgroup attitudes may be improved via influence from outgroup friends' more positive attitudes towards their own ingroup. Past research has examined either contact effects or socialisation effects in isolation, which precludes discerning whether having friends, or the attitudes held by friends, are both important in shaping individuals' attitudes, and, if so, which is more important. In order to disentangle these effects, I simultaneously examined the effects of having ingroup and outgroup friends on individuals' attitudes (contact effects), and the effects of ingroup and outgroup friends' attitudes on individuals' attitudes (socialisation effects). Figure 4.2 visualises the distinction between these four effects.

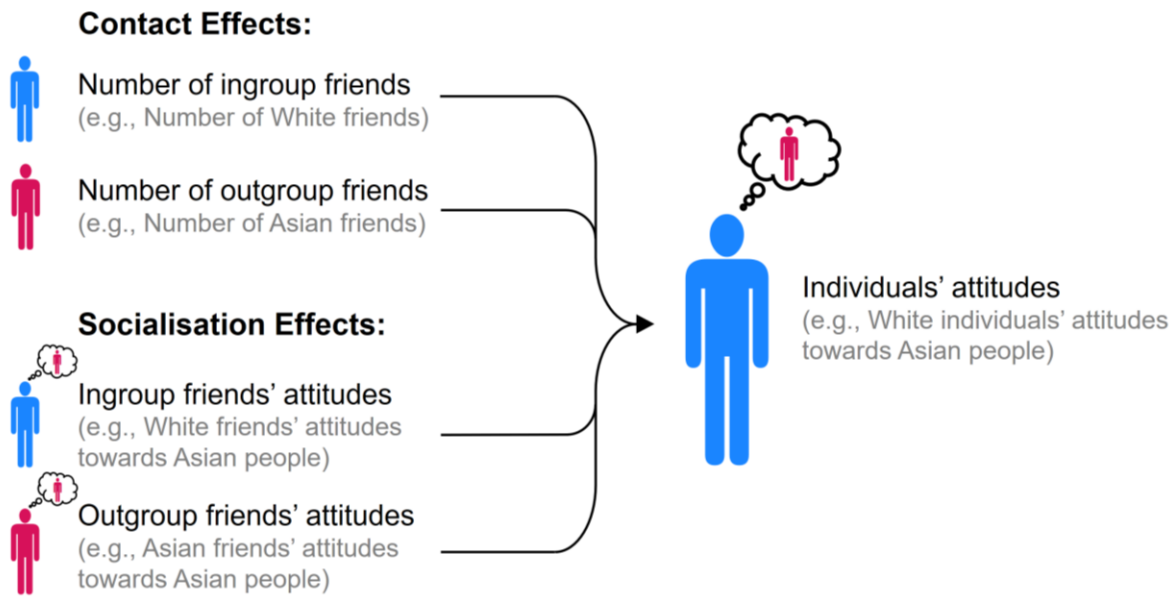


Figure 4.2. An illustration of ingroup contact, outgroup contact, ingroup socialisation and outgroup socialisation effects. In the grey text, I provide an example of these effects for White individuals' attitudes towards Asian people (i.e., outgroup attitudes). Blue figures represent White individuals, while red figures represent Asian individuals.

Previous research has not disentangled the effects of ingroup and outgroup contact, and ingroup and outgroup socialisation, because of the hitherto insuperable problem of statistically separating these effects. Building on recent methodological advances in longitudinal social network analysis (Ripley et al., 2019; Snijders et al., 2010), I have developed a novel analysis technique that enables me to disentangle contact and socialisation effects for ingroup and outgroup friends. Accordingly, this new adaptation of longitudinal social network analysis uniquely enables me to test hypotheses concerning the effects of ingroup friends' attitudes and outgroup friends' attitudes on individuals' attitudes. I describe this analysis method in detail in the following Analysis Strategy section.

I tested the hypotheses addressed in this chapter in only one study (Study 2c). This is because attitude socialisation is best examined using longitudinal social network

analysis. As discussed in Chapter 1, longitudinal social network analysis is required in order to obtain objective estimates of the attitudes held by individuals' friends, and to control for friendship selection based on attitudinal similarity (for details, see the Analysis Strategy section). Accordingly, I conducted Study 2c, a longitudinal social network study, specifically to examine the research questions addressed in this thesis.

Study 2c examined friendships and attitudes among White British and Asian British adolescents in England. This sample enabled me to examine attitude socialisation for members of both an ethnic majority group (White British) and an ethnic minority group (Asian British). This is important because prior research suggests that attitude socialisation may differ for members of majority and minority status groups. As discussed in Chapter 1, research has shown that racial attitude similarity among friends is particularly important for minority group members, as compared to majority group members (Garcia et al., 2017). The researchers contended that this may be due to shared racial attitudes providing a crucial source of social support for minority group members, who are often subject to prejudice and discrimination. These findings suggest that attitude socialisation may be more pronounced for ethnic minority groups as compared to ethnic majority groups (i.e., the attitudes of ethnic minority group members and their friends may become more similar over time), because of the importance of shared attitudes regarding intergroup relations for ethnic minority groups. I examined my hypotheses separately for White British and Asian British respondents, in order to provide an indication of whether attitude socialisation differed between the two groups. Notably, in the two schools in which I conducted Study 2c, Asian British students were the numerical majority, while White British students were the numerical minority. The potential differences in attitude socialisation between majority and

minority groups relate to the ethnic majority/minority status, rather than the size, of the group.

In the following sections of this chapter, I first outline the methods of Study 2c. I then provide a detailed description of the novel method of analysis employed in this chapter, and present the results obtained using this analytic technique. I conclude with a discussion, in which I consider the findings in relation to prior research, and discuss the strengths, limitations and future directions of the present research.

4.1 Study 2c

I provided details of the methods employed in Study 2c in Chapter 2 (section 2.2.4) and Chapter 3 (section 3.2.4). Accordingly, in the following sections, I provide only essential information to remind the reader of key study details, and refer to the location of detailed aspects of the methods in the previous chapters.

4.1.1 Method

Respondents and Procedure

The details regarding the respondents and procedure were identical to those reported in Chapter 2 (section 2.2.4). To reiterate, I collected five waves of data at two schools, which each contained sizeable numbers of students from the White and Asian communities in Oldham (School 1: 16% White British, 82% Asian British; School 2: 39% White British, 55% Asian British). The sample consisted of 1,170 students (M_{age} = 12.11, *SD* = 0.89), of whom 341 were White British (171 boys, 170 girls) and 829 were Asian British (387 boys, 442 girls).

Measures

The analyses reported in this chapter used identical measures to those used in Chapter 3 (section 3.2.4). These consisted of a network measure of friends and self-report measures of ethnicity and attitudes. Identical measures were included at each of the five waves.

Friends

Friendship networks within each year group were elicited using peer-nomination procedures. Students nominated up to ten friends in response to the question, "Who are your friends (in your year group)?". I examined six friendship networks: year groups 7, 8 and 9 at each of the two schools. The six friendship networks are shown in Figure 2.7 in Chapter 2. The networks ranged in size from n = 163 to n = 221 students. On average, students nominated seven friends (M = 7.04, SD = 1.99). Ingroup friends and outgroup friends were identified based on the correspondence between individuals' self-reported ethnicity and their friends' self-reported ethnicity.

Demographic Information

The schools provided information about students' age and gender, while students reported their own ethnicity. Students were asked, "Which of the following ethnic groups do you think best describes you?", and responded by selecting one of ten options. The sample included only students who selected either White/White British or Asian/Asian British.

Attitudes

Attitudes towards White British and Asian British people were measured using two identical items: "Please tell us how you feel about each of the following ethnic groups

using the scales below: a) White people, b) Asian people" (1 = *Very cold*, 5 = *Very warm*). Ingroup attitudes and outgroup attitudes were identified based on the correspondence between each item and individuals' self-reported ethnicity.

4.1.2 Analysis Strategy

In this analysis, I examined the effects of ingroup and outgroup friends' attitudes on both individuals' *outgroup* attitudes, and individuals' *ingroup* attitudes. I refer to these four effects as *socialisation* effects. I additionally controlled for the effects of the number of ingroup and outgroup friends on both individuals' *outgroup* attitudes, and individuals' *ingroup* attitudes. I refer to these four effects as *contact* effects. Simultaneously estimating the two sets of effects enabled me to disentangle socialisation and contact effects, for both ingroup and outgroup friends.

To provide an indication of the most likely causal direction of these effects, I also controlled for friendship selection processes (i.e., the extent to which individuals' attitudes influence whom they select as friends). Individuals select those who are similar as friends, regarding characteristics including attitudes (McPherson et al., 2001). Accordingly, I tested not only whether friends' attitudes influence individuals' attitudes (socialisation effects), but also whether individuals choose to befriend others with more similar attitudes to themselves (selection effects). Furthermore, individuals with more positive outgroup attitudes are more likely to befriend outgroup members (Binder et al., 2009). Therefore, I tested not only whether the number of ingroup and outgroup friends affects individuals' attitudes (contact effects), but also whether individuals' attitudes influence their tendencies to befriend ingroup or outgroup members (selection effects). Thus, the present research disentangled socialisation, contact and selection effects, by analysing five waves of data using longitudinal social network analysis.

I examined the co-evolution of friendship networks, outgroup attitudes and ingroup attitudes using stochastic actor-oriented models (Snijders et al., 2010) implemented in RSiena (Ripley et al., 2019). RSiena co-evolution models use simulation methods to determine how the network and individuals' attributes (e.g., attitudes) change over time, given specific effects that are predicted to influence change. This analysis method is unique in being able to model simultaneously the development of friendship networks and attitudes. Only by estimating all effects in one model was I able to examine whether socialisation and contact effects influence attitudes, and whether attitudes influence friendship choices (selection effects).

RSiena co-evolution models consist of two types of components, which are termed *behavioural dynamics* and *network dynamics* (Steglich et al., 2006).[8] The behavioural dynamics models the development of ingroup and outgroup attitudes, and enables me to test socialisation and contact effects. The estimated effects can be seen as multinomial logistic regression coefficients for ordered dependent outcomes, indicating to what extent each effect influences how attitudes change over time. The network dynamics models friendship choices and enables me to test selection effects. The estimated effects can be interpreted as categorical logistic regression coefficients for binary outcomes, indicating to what extent each effect influences whom students form and maintain friendships with. For example, an effect with an estimate of 1.5 represents the initial log-odds ratio that indicates that individuals are $e^{1.5} = 4.5$ times more likely to befriend a network member based on this effect.

[8] In this chapter, I use established RSiena terminology consistent with prior literature. The term *behavioural* should not be taken literally here: the behavioural dynamics can model any attributes of individuals, including attitudes, in addition to behaviours.

As this study examined the development of both outgroup attitudes and ingroup attitudes, I simultaneously modelled two behavioural dynamics components: attitudes towards Asian British people and attitudes towards White British people. For White British students, the Asian British attitude dynamics modelled outgroup attitudes, while the White British attitude dynamics modelled ingroup attitudes. For Asian British students, the White British attitude dynamics modelled outgroup attitudes, while the Asian British attitude dynamics modelled ingroup attitudes. In order to distinguish between ingroup attitudes and outgroup attitudes, I estimated separate effects for White British and Asian British students. Furthermore, as I hypothesised divergent effects for ingroup and outgroup friends, I estimated separate effects for ingroup and outgroup friends. In this way, my novel model specification enabled me to examine *group-dependent* effects on *ingroup* and *outgroup* attitudes. The distinctions between ingroup and outgroup attitudes, and between ingroup and outgroup friends, comprise the extension of the present research beyond previous studies of attitude socialisation (e.g., Van Zalk et al., 2013).

In order to distinguish between ingroup and outgroup attitudes, and between ingroup and outgroup friends, I created four constant dyadic covariates, which specified (a) ingroup friends for White British students, (b) ingroup friends for Asian British students, (c) outgroup friends for White British students, and (d) outgroup friends for Asian British students.

Figure 4.3 illustrates five matrices: one standard network adjacency matrix (1) and the four constant dyadic covariates (2a, 2b, 2c, 2d). The five matrices depict an example set of five students, consisting of three White British students (students 1W, 3W and 4W) and two Asian British students (students 2A and 5A). Accordingly, there are 5 by 5 cells per matrix. For the present analyses, I created the five matrices for each

of the six year group networks at each of the five waves, and so each matrix included 163 to 221 (the range in size of the year group) students (i.e., 163-221 by 163-221 cells per matrix). The network adjacency matrix (1) represents friendship nominations. The rows indicate which peers each of the five students nominated as friends (coded as 1 = *friend* and 0 = *non-friend*). For example, student 4W nominated two peers as friends (1W and 2A). The columns indicate for each student which peers nominated them as a friend. For example, student 4W was nominated as a friend by three peers (1W, 2A, 3W). Thus, outgoing friendship nominations are depicted in rows and incoming friendship nominations are depicted in columns. In contrast, each of the four dyadic covariate matrices (2a, 2b, 2c, 2d) specifies a subset of friendships, regarding possible friendship nominations that could be made, not friendship nominations that were made. For example, matrix 2b specifies only ingroup friendships for Asian British students, and so for each Asian British student all possible friendship nominations to other Asian British students are coded as 1, and all other possible friendship nominations are coded as 0. Similarly, matrix 2c specifies only outgroup friendships for White British students, and so for each White British student all possible friendship nominations to Asian British students are coded as 1, and all other possible friendship nominations are coded as 0.

1) Network Adjacency Matrix

	1W	2A	3W	4W	5A
1W	-	0	1	1	0
2A	0	-	0	1	1
3W	1	0	-	1	0
4W	1	1	0	-	0
5A	0	1	0	0	-

2a) Ingroup Friends for White Students

	1W	2A	3W	4W	5A
1W	-	0	1	1	0
2A	0	-	0	0	0
3W	1	0	-	1	0
4W	1	0	1	-	0
5A	0	0	0	0	-

2b) Ingroup Friends for Asian Students

	1W	2A	3W	4W	5A
1W	-	0	0	0	0
2A	0	-	0	0	1
3W	0	0	-	0	0
4W	0	0	0	-	0
5A	0	1	0	0	-

2c) Outgroup Friends for White Students

	1W	2A	3W	4W	5A
1W	-	1	0	0	1
2A	0	-	0	0	0
3W	0	1	-	0	1
4W	0	1	0	-	1
5A	0	0	0	0	-

2d) Outgroup Friends for Asian Students

	1W	2A	3W	4W	5A
1W	-	0	0	0	0
2A	1	-	1	1	0
3W	0	0	-	0	0
4W	0	0	0	-	0
5A	1	0	1	1	-

Figure 4.3. Network adjacency and constant dyadic covariate matrices. The standard network adjacency matrix is depicted in (1), and the four constant dyadic covariate matrices are depicted in (2a-d). Each matrix shows an example set of three White British students (1W, 3W and 4W) and two Asian British students (2A and 5A).

In the RSiena co-evolution model, the four dyadic covariates were each interacted with the contact, socialisation, and selection effects. This enabled me to estimate the unique effects of ingroup and outgroup friends on ingroup and outgroup attitudes. For example, in order to estimate the effect of ingroup friends' attitudes on White British students' outgroup attitudes, I modelled an interaction between the socialisation effect (*totSimW*, see Table 4.1) and the constant dyadic covariate 2a (i.e., ingroup friends for White British students) in the behavioural dynamics for attitudes towards Asian British people. The creation and use of these four dyadic covariates comprises the novel adaptation of RSiena co-evolution modelling introduced in the present research.

The following sections summarise the effects I included in the RSiena co-evolution model. Table 4.1 provides explanations of, and the RSiena terminology for, these effects. In the table, I specify the interactions between the dyadic covariates and contact, socialisation, and selection effects (denoted by asterisks). I provide details of RSiena co-evolution modelling relevant to the present study, and refer the reader to prior work (e.g., Snijders et al., 2007; Steglich et al., 2006) for a more general overview of RSiena co-evolution modelling.

Table 4.1. Explanation of RSiena Effects

Effect (RSiena terminology)	Explanation
Behavioural Dynamics	
Socialisation and Contact Effects	
Ingroup friends' attitudes (totSimW)*	Tendency for students to adopt the attitudes of their ingroup friends
Outgroup friends' attitudes (totSimW)*	Tendency for students to adopt the attitudes of their outgroup friends
Number of ingroup friends (totWAlt)*	Tendency for students with more ingroup friends to develop more positive attitudes
Number of outgroup friends (totWAlt)*	Tendency for students with more outgroup friends to develop more positive attitudes
Control Effects	
Linear shape (linear)	Basic drive toward higher values on the dependent variable (attitudes)
Quadratic shape (quad)	Tendency for students with very positive or very negative attitudes to develop even more extreme attitudes
Ethnicity (effFrom)	Effect of ethnicity (White British/Asian British) on attitudes
Gender (effFrom)	Effect of gender (boy/girl) on attitudes
Attitude (effFrom)	Effect of attitudes towards White (Asian) British people on attitudes towards Asian (White) British people
Network Dynamics	
Selection Effects	
Ingroup friends' attitude similarity (simX)*	Tendency for students to befriend ingroup members with similar attitudes to themselves
Outgroup friends' attitude similarity (simX)*	Tendency for students to befriend outgroup members with similar attitudes to themselves
Ego attitude x Ingroup friends (egoX)*	Tendency for students with more positive attitudes to befriend more ingroup members
Ego attitude x Outgroup friends (egoX)*	Tendency for students with more positive attitudes to befriend more outgroup members

Control Effects

Alter gender (altX)	Tendency for girls to receive more incoming friendship nominations than boys
Ego gender (egoX)	Tendency for girls to send more outgoing friendship nominations than boys
Same gender (sameX)	Tendency to befriend those of the same gender
Alter ethnicity (altX)	Tendency for Asian British students to receive more incoming friendship nominations than White British students
Ego ethnicity (egoX)	Tendency for Asian British students to send more outgoing friendship nominations than White British students
Same ethnicity (sameX)	Tendency to befriend those of the same ethnicity
Outdegree (density)	Tendency to form new friendship ties
Reciprocity (recip)	Tendency to reciprocate friendship ties
GWESP I→K→J (gwespFF)	Tendency to befriend the friends of friends (transitive)
GWESP I←K←J (gwespBB)	Tendency to befriend the friends of friends (cyclical)
Transitive reciprocated triplets (transRecTrip)	Tendency to have reciprocated friendship ties to friends of friends
Three-cycles (cycle3)	Tendency against local hierarchy
Indegree popularity (inPopSqrt)	Tendency for those with many incoming nominations to receive even more incoming nominations
Outdegree popularity (outPop)	Tendency for those with many outgoing nominations to receive more incoming nominations
Outdegree activity (outAct)	Tendency for those with many outgoing nominations to send even more outgoing nominations
Reciprocal degree popularity (reciPop)	Tendency for those with many reciprocal nominations to receive more incoming nominations
Reciprocal degree activity (reciAct)	Tendency for those with many reciprocal nominations to send more outgoing nominations
Truncated outdegree (outTrunc 1)	Tendency to send no outgoing nominations

Note. The effect names correspond to the effects listed in the results tables (Tables 4.3 and 4.4). Asterisks indicate that the respective effects were interacted with each of the four dyadic covariates.

Behavioural Dynamics

I simultaneously modelled two behavioural dynamics: attitudes towards Asian British people and attitudes towards White British people. I included the following identical sets of effects in these two components.

I included two socialisation effects. First, I included the effect of ingroup friends' attitudes on individuals' attitudes, which tested whether individuals' attitudes became more similar to their ingroup friends' attitudes over time. Second, I included the effect of outgroup friends' attitudes on individuals' attitudes, which tested whether individuals' attitudes became more similar to their outgroup friends' attitudes over time. I modelled each effect separately (but simultaneously) for White British and Asian British students, and for both ingroup and outgroup attitudes.

I also included two contact effects. First, I included the effect of number of outgroup friends on attitudes, which tested whether individuals with more outgroup friends developed more positive or negative attitudes than individuals with fewer outgroup friends over time. Second, I included the effect of number of ingroup friends on attitudes, which tested whether individuals with more ingroup friends developed more positive or negative attitudes than individuals with fewer ingroup friends over time. I modelled each effect separately (but simultaneously) for White British and Asian British students, and for both ingroup and outgroup attitudes.

Finally, I included five control variables: the linear and quadratic shape effects (which reflect overall changes in attitudes with time), the effect of attitudes towards White (Asian) British people on attitudes towards Asian (White) British people, and the main effects of ethnicity and gender.

Network Dynamics

To obtain accurate estimates of the hypothesised effects, I controlled for confounding network selection processes in the network dynamics.

Firstly, I controlled for the potential influences of attitudes on friendship choices (selection effects), using two types of effects. The attitude similarity effect reflects to what extent individuals befriend ingroup and outgroup peers with similar attitudes to themselves. The ego attitude effect captures the influence of individuals' attitudes on the number of friendship nominations sent to ingroup and outgroup peers. I modelled each effect separately (but simultaneously) for White British and Asian British students, and for both ingroup and outgroup attitudes.

Secondly, I included six effects controlling for demographic variables known to influence network structure: ethnic and gender differences in the number of friendship nominations sent (ego effect) and received (alter effect), and the well-documented homophilous preferences for same-ethnic and same-gender friends (McPherson et al., 2001).

Finally, I controlled for structural effects, which capture how the network itself influences friendship choices. For example, I included the reciprocity effect, which reflects individuals' tendencies to reciprocate friendships. Based on iterative goodness-of-fit tests and recommended practice (Ripley et al., 2019), I included twelve structural effects, which are described in Table 4.1.[9]

[9] I included structural effects because these effects significantly influence friendship network evolution and, therefore, represent important confounding effects (Snijders et al., 2007). The exclusion of structural effects can lead to biases in the estimates for other effects, including those used in testing the hypotheses. I initially included four structural

Statistical Power

Regarding sample size and power, I used multiple strategies to obtain a sample large enough to detect even small effects. Firstly, I recruited six year groups from two schools, totalling 1,445 students, and obtained a high participation rate of 92%. Of the final sample of 1,170 students, 77% to 84% of students participated in each wave. The proportion of non-participating students was well within the limits for social network analysis (Huisman & Steglich, 2008). I treated the missing data using model-based imputation (Huisman & Steglich, 2008; Zandberg & Huisman, 2019). Secondly, I used year group rather than classroom network boundaries, which resulted in larger networks, ranging from 163 to 221 students. Such large networks are well-suited for estimating the complex model specification required to test the present hypotheses. Finally, I combined the six year group networks using the RSiena multi-group option, which allowed me to synthesise estimations from the six separate networks. Although statistical power in data which is (by definition) built on interdependencies cannot be assessed with traditional power analysis methods (Ripley et al., 2019), simulation studies show that this large sample provided sufficient power. Specifically, simulation studies addressing statistical power in longitudinal network designs show that in studies

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effects recommended from prior research (Ripley et al., 2019): outdegree, reciprocity, gwespFF and transitive reciprocated triplets. On the basis of iterative goodness-of-fit testing (Lospinoso & Snijders, 2019), I included eight further structural effects: gwespBB, three-cycles, indegree popularity, outdegree popularity, outdegree activity, reciprocal degree popularity, reciprocal degree activity, and truncated outdegree. For detailed explanations of these structural effects, see Ripley et al. (2019). I ran the analyses with and without the eight additional structural effects included on the basis of the goodness-of-fit tests. The inclusion versus exclusion of the additional structural effects only impacted goodness-of-fit, and did not impact the results relating to the hypotheses (for details, see the following Robustness Checks section and Appendix E).

with five waves, a sample size of $N \geq 120$ yields sufficient power (Stadtfeld et al., 2018).

Convergence and Goodness of Fit

To determine whether the model provided reliable results, I assessed convergence and goodness-of-fit. Well-estimated models produce overall maximum convergence ratios smaller than 0.25 (Ripley et al., 2019). The model showed good convergence, with an overall maximum convergence ratio of 0.19.[10]

To determine whether the model fitted the data, I assessed goodness-of-fit following the standard procedure (detailed in Lospinoso & Snijders, 2019; Ripley et al., 2019). I compared the observed data (i.e., the observed network parameters, for example, the observed number of friendship nominations) and simulated data (i.e., the estimated network parameters, for example, the estimated number of friendship nominations) with respect to five auxiliary statistics. The simulated data were produced from the RSiena co-evolution model: $n = 5000$ simulations were carried out, and the violin plots show the simulated data distribution for each auxiliary statistic. The auxiliary statistics were the indegree (i.e., the distribution of incoming friendship nominations), outdegree (i.e., the distribution of outgoing friendship nominations), triad census (i.e., the different kinds of relations between three individuals), attitudes towards White British people, and attitudes towards Asian British people.

The following five violin plots, depicted in Figures 4.4, 4.5, 4.6, 4.7 and 4.8, show the observed and estimated network parameters together for each auxiliary

[10] I estimated the model with a high ($n = 5{,}000$) number of iterations, and re-estimated the model once based on the previous estimation (recommended practice, see Ripley et al., 2019).

statistic. Visual inspection of the violin plots indicated that that the model adequately fit the data, as the observed parameters (shown in red) were predominantly inside the confidence intervals of the simulated networks (grey dashed lines), in all five figures.

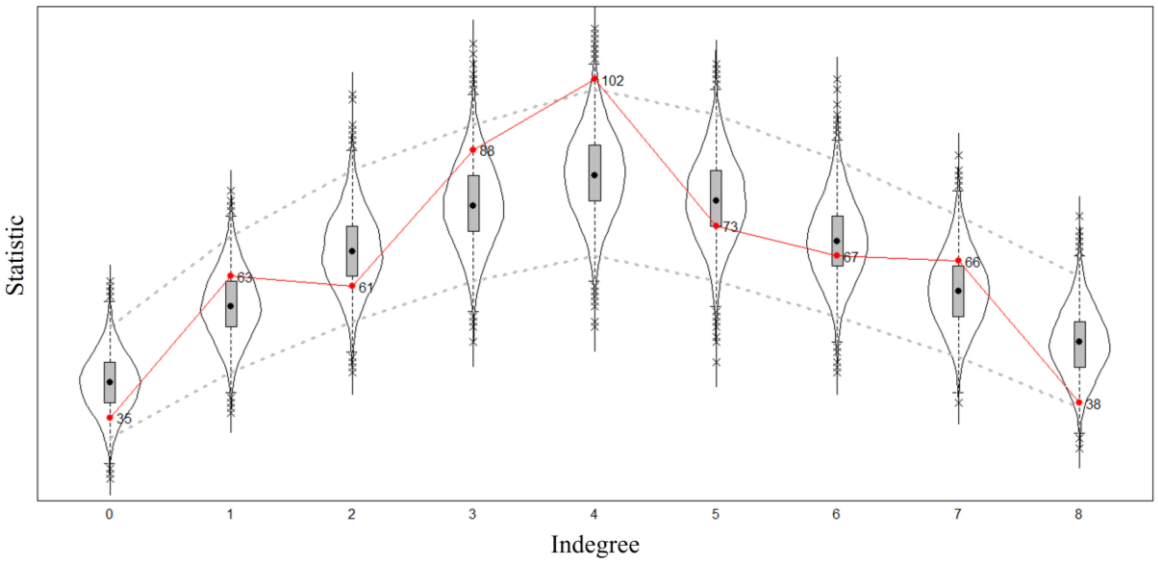


Figure 4.4. Goodness of fit of indegree distribution.

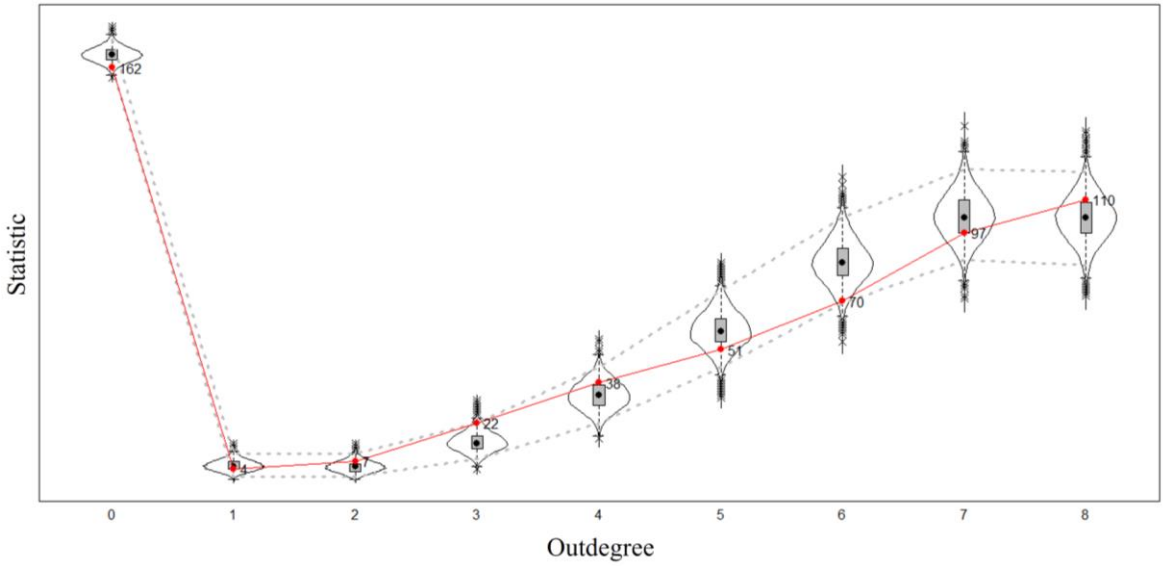


Figure 4.5. Goodness of fit of outdegree distribution.

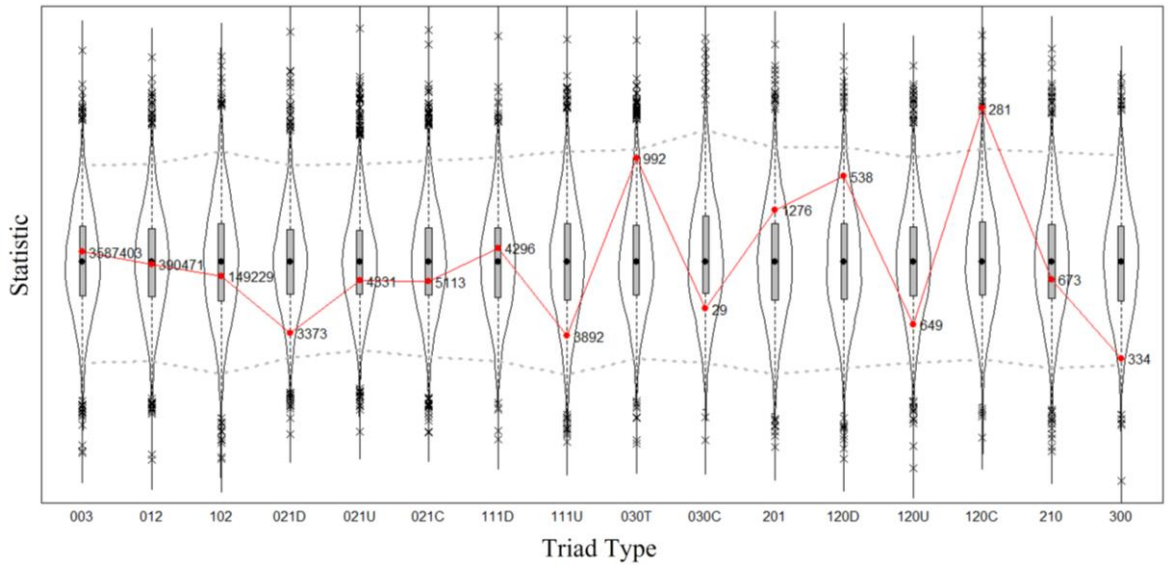


Figure 4.6. Goodness of fit of triad census.

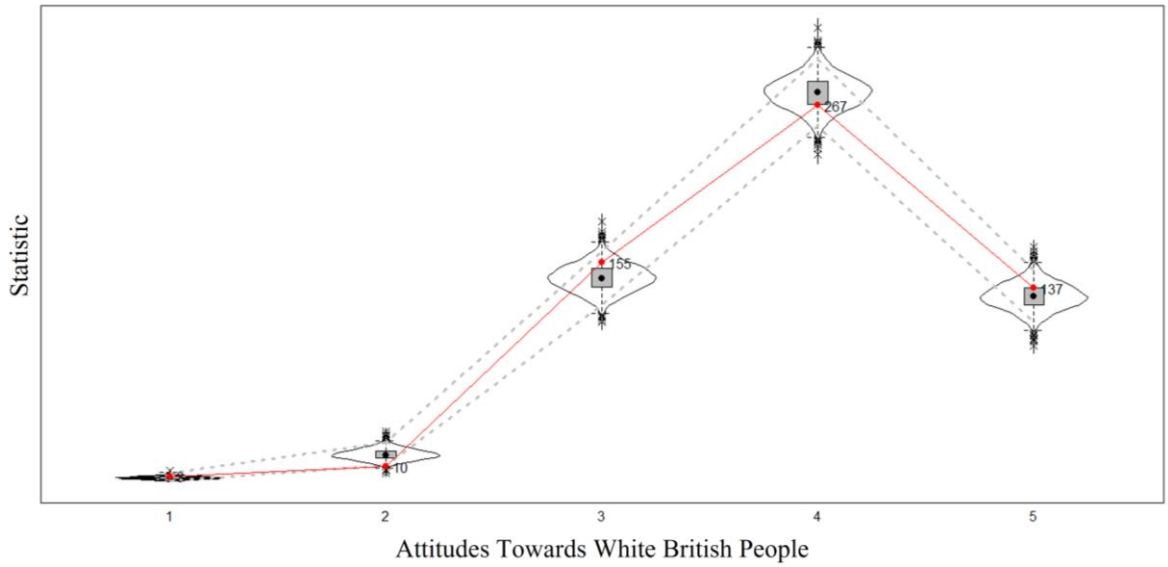


Figure 4.7. Goodness of fit of attitudes towards White British people.

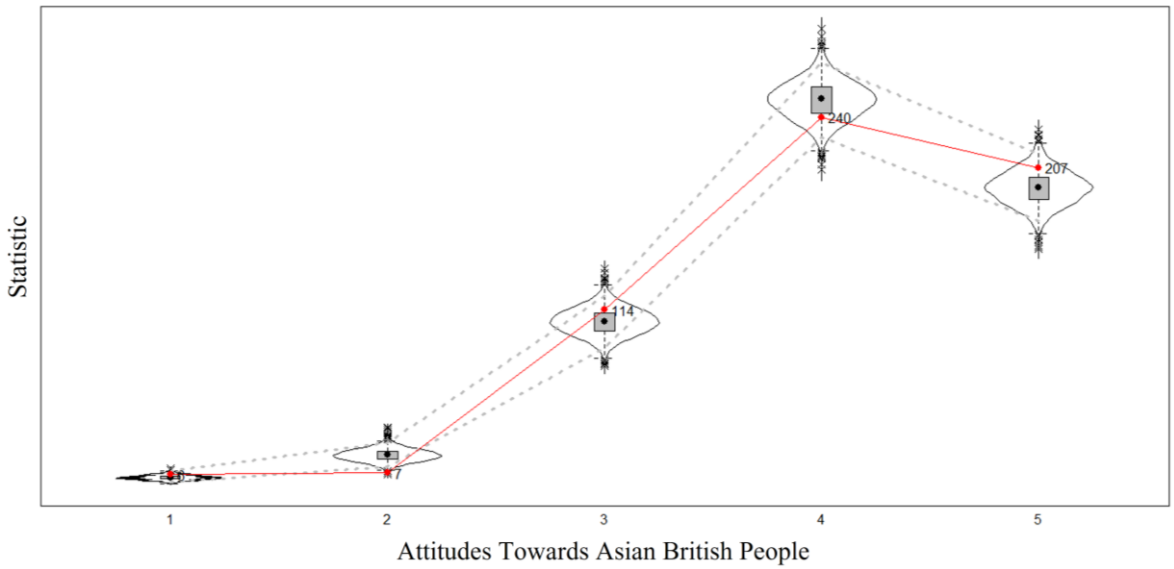


Figure 4.8. Goodness of fit of attitudes towards Asian British people.

4.1.3 Results

Descriptive Statistics

Table 4.2 shows the means and standard deviations for the measures of ingroup and outgroup friends, and ingroup and outgroup attitudes, for each ethnic group at each wave.

Table 4.2. Means and Standard Deviations of Friends and Attitudes by Group and Wave (Study 2c)

	Wave 1	Wave 2	Wave 3	Wave 4	Wave 5
White British					
Ingroup friends	5.40 (2.40)	5.08 (2.44)	5.02 (2.55)	5.07 (2.42)	4.92 (2.24)
Outgroup friends	1.21 (1.67)	1.48 (1.82)	1.40 (1.77)	1.56 (2.00)	1.58 (1.86)
Ingroup attitudes	4.18 (0.85)	4.19 (0.83)	4.16 (0.85)	4.25 (0.77)	4.11 (0.88)
Outgroup attitudes	3.64 (0.93)	3.55 (0.97)	3.57 (0.93)	3.68 (0.90)	3.68 (0.87)
Asian British					
Ingroup friends	6.53 (2.50)	6.67 (2.41)	6.75 (2.44)	6.78 (2.41)	6.86 (2.37)
Outgroup friends	0.82 (1.30)	0.84 (1.26)	0.84 (1.33)	0.83 (1.29)	0.74 (1.22)
Ingroup attitudes	4.16 (0.85)	4.31 (0.72)	4.27 (0.73)	4.26 (0.73)	4.27 (0.74)
Outgroup attitudes	3.62 (0.88)	3.76 (0.83)	3.74 (0.78)	3.71 (0.82)	3.77 (0.79)

Note. Standard deviations are shown in parentheses.

I reported comparisons of ingroup and outgroup friends in Chapter 2 (section 2.2.4), and comparisons of ingroup and outgroup attitudes in Chapter 3 (section 3.2.4). To reiterate, students reported significantly more ingroup than outgroup friends, a large difference ($d > 0.94$). This reflects a high level of ethnic segregation in the networks, as shown in Figure 2.7 in Chapter 2. Furthermore, students reported significantly more positive ingroup than outgroup attitudes ($d > 0.50$).

Behavioural Dynamics

Table 4.3 shows the results for the two behavioural dynamics (i.e., White British attitude dynamics and Asian British attitude dynamics).

The estimates (log-odds ratios) for the socialisation effects (i.e., the effects of *ingroup friends' attitudes* and *outgroup friends' attitudes*) represent the likelihood that an individual's attitude will become more similar to their friends' attitudes over time. I hypothesised that ingroup friends' attitudes would influence individuals' attitudes so that their attitudes become more similar over time. With regard to individuals' *outgroup attitudes*, the results for both White British and Asian British students supported this hypothesis. Students' outgroup attitudes became more similar to their ingroup friends' attitudes over time, as indicated by the positive estimates identified for both White British students (est = 0.60, *SE* = 0.21, $p = .005$) and Asian British students (est = 0.43, *SE* = 0.09, $p < .001$). With regard to individuals' *ingroup attitudes*, only the results for Asian British students supported the hypothesis. Asian British students' ingroup attitudes became more similar to their ingroup friends' attitudes over time (est = 0.34, *SE* = 0.11, $p = .003$), while this effect was not significant for White British students (est = 0.37, *SE* = 0.24, $p = .126$). I additionally predicted that *outgroup friends' attitudes* would not influence individuals' attitudes. In accordance with expectations, all estimates for the effects of *outgroup friends' attitudes* were non-significant ($p > .366$), which indicates that students' attitudes did not become more similar to their outgroup friends' attitudes over time.

Together, the findings regarding the socialisation effects showed that individuals' attitudes were influenced by the attitudes of their ingroup (but not their outgroup) friends. Importantly, I identified these effects while controlling for the possible tendency to select friends with similar attitudes. The only exception concerned White British students' ingroup attitudes, which were influenced by neither their ingroup nor outgroup friends' attitudes.

I controlled for the effects of ingroup and outgroup contact on ingroup and outgroup attitudes. The estimates (log-odds ratios) for the contact effects (i.e., the effects of *number of ingroup friends* and *number of outgroup friends*) represent the likelihood that an individual's attitude will become more positive or negative depending on their number of friends. All estimates for the effects of *number of ingroup friends* and *number of outgroup friends* were non-significant. These findings were anticipated, as I identified non-significant contact effects in Study 2c when analysing the data using RI-CLPM in Chapter 3 (section 3.2.4). Both RSiena co-evolution modelling and RI-CLPM assess within-person effects, albeit in different ways, therefore, the two analysis methods are likely to obtain similar results.

Regarding the additional control effects, the significant negative estimates for the quadratic shape effects indicate that students tended not to develop more extreme attitudes over time. Additionally, the significant positive estimate for the ethnicity effect in the Asian British attitude dynamics indicates that Asian British students tended towards more positive attitudes than White British students. No other control effects were significant.

Table 4.3. Multi-Group RSiena Co-Evolution Model: Behavioural Dynamics

	Estimate	*SE*	*p*
White British Attitude Dynamics			
Asian British Students (Outgroup Attitudes)			
Ingroup friends' attitudes	0.43*	0.09	<.001
Outgroup friends' attitudes	0.76	1.15	.508
Number of ingroup friends	0.02	0.02	.315
Number of outgroup friends	0.08	0.08	.308
White British Students (Ingroup Attitudes)			
Ingroup friends' attitudes	0.37	0.24	.126
Outgroup friends' attitudes	-0.51	0.75	.491
Number of ingroup friends	0.03	0.04	.517
Number of outgroup friends	0.06	0.06	.285
Controls			
Linear shape	-0.13	0.16	.433
Quadratic shape	-0.24*	0.06	<.001
Ethnicity	-0.29	0.31	.343
Gender	-0.02	0.06	.715
Attitude towards Asian British people	0.08	0.06	.188
Asian British Attitude Dynamics			
White British Students (Outgroup Attitudes)			
Ingroup friends' attitudes	0.60*	0.21	.005
Outgroup friends' attitudes	-0.99	1.21	.410
Number of ingroup friends	0.02	0.03	.585
Number of outgroup friends	0.19	0.15	.227
Asian British Students (Ingroup Attitudes)			
Ingroup friends' attitudes	0.34*	0.11	.003
Outgroup friends' attitudes	2.20	2.43	.366
Number of ingroup friends	0.01	0.03	.720
Number of outgroup friends	0.21	0.26	.423
Controls			
Linear shape	0.09	0.17	.596
Quadratic shape	-0.15*	0.06	.014
Ethnicity	0.57*	0.28	.048
Gender	-0.08	0.07	.257
Attitude towards White British people	0.13	0.07	.055

Note. Models include the network dynamics shown in Table 4.4. *SE* = standard error. N = 1,170. * Denotes significant estimates ($p < .05$).

Network Dynamics

Table 4.4 shows the results for the network dynamics (which were simultaneously estimated with the behavioural dynamics, but are presented separately to improve readability). The estimates (log-odds ratios) represent the likelihood that an individual will form or maintain a friendship tie based on each respective effect. Positive estimates indicate a higher likelihood of friendship, and negative estimates indicate a lower likelihood of friendship.

I controlled for the potential influences of attitudes on friendship selection (i.e., selection effects). First, I tested whether individuals befriended (ingroup/outgroup) members with similar (ingroup/outgroup) attitudes to themselves (i.e., the effects of *ingroup friends' attitude similarity* and *outgroup friends' attitude similarity*). I found that attitude similarity did not influence friendship selection, as indicated by the non-significant estimates, with one exception: Asian British students tended to befriend ingroup members with more similar ingroup attitudes (est = 0.34, *SE* = 0.13, $p = .007$). Second, I tested the effects of individuals' (ingroup/outgroup) attitudes (in terms of positivity or negativity) on their tendency to befriend (ingroup/outgroup) peers (i.e., the effects of *ego attitude x ingroup friends* and *ego attitude x outgroup friends*). As expected, students with more positive outgroup attitudes befriended more outgroup members, indicated by the positive estimates identified for both White British students (est = 0.25, *SE* = 0.06, $p < .001$) and Asian British students (est = 0.21, *SE* = 0.05, $p < .001$). The estimates additionally showed that Asian British students with more positive outgroup attitudes befriended more ingroup members (est = 0.04, *SE* = 0.02, $p = .023$), and that White British students with more positive ingroup attitudes befriended fewer outgroup members (est = -0.12, *SE* = 0.06, $p = .027$) and fewer ingroup members (est = -0.09, *SE* = 0.05, $p = .031$).

Regarding the demographic control effects, the positive estimates for the same-ethnicity and same-gender effects indicate that friendships were more likely between students of the same ethnicity or gender. Additionally, I found that White British students received more friendship nominations than Asian British students (indicated by the negative alter ethnicity effect), and that girls sent more friendship nominations than boys (indicated by the positive ego gender effect). The twelve structural control effects followed the pattern expected based on previous research (see Ripley et al., 2019).

Table 4.4. Multi-Group RSiena Co-Evolution Model: Network Dynamics

	Estimate	*SE*	*p*
Effects of Attitudes towards White British People			
Asian British Students (Outgroup Attitudes)			
Ingroup friends' attitude similarity	0.03	0.10	.727
Outgroup friends' attitude similarity	0.41	0.30	.175
Ego attitude x Ingroup friends	0.04*	0.02	.023
Ego attitude x Outgroup friends	0.21*	0.05	<.001
White British Students (Ingroup Attitudes)			
Ingroup friends' attitude similarity	0.41	0.23	.072
Outgroup friends' attitude similarity	0.28	0.29	.325
Ego attitude x Ingroup friends	-0.09*	0.05	.031
Ego attitude x Outgroup friends	-0.12*	0.06	.027
Effects of Attitudes towards Asian British People			
White British Students (Outgroup Attitudes)			
Ingroup friends' attitude similarity	0.21	0.19	.271
Outgroup friends' attitude similarity	-0.63	0.36	.084
Ego attitude x Ingroup friends	-0.01	0.04	.933
Ego attitude x Outgroup friends	0.25*	0.06	<.001
Asian British Students (Ingroup Attitudes)			
Ingroup friends' attitude similarity	0.34*	0.13	.007
Outgroup friends' attitude similarity	0.29	0.21	.168
Ego attitude x Ingroup friends	-0.03	0.03	.275
Ego attitude x Outgroup friends	-0.04	0.05	.402
Controls			
Demographic Effects			
Alter gender	-0.01	0.02	.753
Ego gender	0.05*	0.03	.033
Same gender	0.60*	0.02	<.001
Alter ethnicity	-0.08*	0.03	.006
Ego ethnicity	0.05	0.03	.121
Same ethnicity	0.19*	0.03	<.001
Structural Effects			
Outdegree	-2.54*	0.09	<.001
Reciprocity	2.49*	0.07	<.001
GWESP I→K→J	1.54*	0.03	<.001
GWESP I←K←J	-0.02	0.08	.851
Transitive reciprocated triplets	-0.09*	0.02	<.001
Three-cycles	0.13*	0.04	.003
Indegree popularity	0.14*	0.03	<.001
Outdegree popularity	0.02	0.01	.068
Outdegree activity	-0.05*	0.01	<.001
Reciprocal degree popularity	-0.14*	0.02	<.001
Reciprocal degree activity	-0.09*	0.01	<.001
Truncated outdegree	-3.83*	0.21	<.001

Note. Models include the behavioural dynamics shown in Table 4.3. *SE* = standard error; GWESP = geometrically weighted edgewise shared partners. *N* = 1,170.

* Denotes significant estimates ($p < .05$).

Robustness Checks

To verify that the findings were robust across alternative model specifications, I conducted four robustness checks. Firstly, I re-ran the analyses without including discretionary control effects (gender, ethnicity and attitudes) in the behavioural dynamics. Secondly, I re-ran the analyses including only fundamental structural effects (specified in Ripley et al., 2019) in the network dynamics. Thirdly, I re-ran the analyses with an alternative specification of attitude socialisation (average attitude similarity, instead of total attitude similarity). Finally, I re-ran the analyses separately for White British and Asian British students. These four analyses are shown in Appendix E. The robustness checks produced highly similar results to the main analysis, increasing confidence in the findings.

4.1.4 Discussion

In this chapter, I investigated the socialisation of both ingroup and outgroup attitudes. I examined, for the first time, the extent to which attitude socialisation occurs through ingroup friends, outgroup friends, or both. I hypothesised that ingroup friends' attitudes would influence individuals' attitudes so that their attitudes become more similar over time, while outgroup friends' attitudes would not influence individuals' attitudes. I tested the hypotheses in a five-wave social network study, and analysed the data using an innovative analytic approach.

In support of the hypotheses, my findings revealed that individuals' *outgroup attitudes* were influenced by the attitudes of their ingroup (but not their outgroup) friends. My findings regarding *ingroup attitudes* provided partial support for the hypotheses: Asian British students' ingroup attitudes were influenced by the attitudes of their ingroup (but not their outgroup) friends, while White British students' ingroup

attitudes were influenced by neither their ingroup nor outgroup friends' attitudes. Importantly, I identified these socialisation effects while controlling for selection effects, that is, the possible tendency for individuals to select friends with similar attitudes. Overall, these findings highlight, for the first time, the important influence of ingroup friends' attitudes on individuals' attitudes, particularly for individuals' attitudes towards outgroups.

In relation to prior research, the present findings build upon previous studies of socialisation, which have shown that friends' attitudes influence individuals' attitudes towards social groups (Hjerm et al., 2018; Miklikowska, 2017; Van Zalk et al., 2013; Zingora et al., 2020). The present findings qualify and expand upon this; I found that only ingroup friends' attitudes, and not outgroup friends' attitudes, shaped individuals' attitudes. My findings are consistent with theoretical and empirical work positing that individuals are influenced by similar others (Festinger, 1954) and the groups with which they identify (Abrams et al., 1990; Stangor et al., 2001). Additionally, the findings revealed no effect for the number of ingroup friends on attitudes, which suggests that ingroup friends influence individuals' attitudes only through attitude socialisation.

The present findings also have implications for studies of intergroup contact theory. An extensive body of research examining intergroup contact theory (Allport, 1954; Brown & Hewstone, 2005) has shown that having more outgroup friends improves outgroup attitudes (Davies et al., 2011). In the present study, I went beyond this well-established idea, to ask whether individuals' outgroup attitudes may be shaped not only by their number of friends, but also by their friends' attitudes (i.e., socialisation). The findings suggest that, when examining friendship more broadly, the number of outgroup friends may not always be the most important determinant of outgroup attitudes, despite having been a focus of research on intergroup contact. In the

present study, I did not identify significant effects of outgroup (or ingroup) contact on outgroup attitudes (ehcoing the findings of the RI-CLPM analyses presented in Chapter 3). Instead, I found that individuals' outgroup attitudes were most strongly influenced by the attitudes of their ingroup friends.

By simultaneously examining contact and socialisation effects, I theoretically and empirically integrated two well-established yet isolated research perspectives (intergroup contact and socialisation), in order to determine *how* friendships shape outgroup attitudes. Research to date has examined *either* contact effects (e.g., Levin et al., 2003) *or* socialisation effects (e.g., Van Zalk et al., 2013), but these effects have to be investigated simultaneously in order to disentangle them. Using novel longitudinal social network analysis, I disentangled the effects of having ingroup and outgroup friends (contact effects), and the effects of those friends' attitudes (socialisation effects). Doing so enabled me to compare, for the first time, the theoretical predictions from the two perspectives of intergroup contact and socialisation, and I found stronger evidence of attitude socialisation through ingroup friends than intergroup contact via outgroup friends. This demonstrates the importance of considering multiple ways in which friendships, with both ingroup and outgroup members, can influence outgroup attitudes. The findings suggest that intergroup contact theory and socialisation theory should be integrated in order to better understand how friendships shape outgroup attitudes.

To provide an indication of the most likely causal direction of the observed effects, I also examined the effects of ingroup and outgroup attitudes on friendship selection. I found that individuals with more positive outgroup attitudes befriended more outgroup members, in accordance with prior research (e.g., Binder et al., 2009). In contrast to prior research (e.g., Van Zalk et al., 2013), however, I found little evidence that attitude similarity influenced friendship selection. Notably, this finding emphasises

the strength of attitude socialisation through ingroup friends, confirming that attitude similarity among ingroup friends occurs because individuals adopt the attitudes of their friends (socialisation) and not because they select friends with similar attitudes (selection).

The key finding (i.e., that ingroup friends' attitudes influence individuals' outgroup attitudes) has potential implications for the spread of prejudice in contemporary society. With increasing ethnic diversity individuals have more opportunities to inform their outgroup attitudes through interactions with outgroup members (Schmid et al., 2014). However, I identified high levels of ethnic segregation in the present study, indicating that individuals were seldom choosing to avail themselves of the opportunities for outgroup contact available in their diverse schools. If individuals interact predominantly with ingroup members, and are influenced only by each other's outgroup attitudes, this may increase the spread of potentially uninformed or biased outgroup attitudes based on ingroup perceptions of the outgroup rather than experiences with the outgroup. This may also lead to group polarisation, as individuals' outgroup attitudes become more extreme through group discussion (Moscovici & Zavalloni, 1969). Recent research has shown that online echo chambers cause individuals' attitudes to become more extreme through exposure to only opinions which reinforce their existing views (Barberá et al., 2015; Conover et al., 2011). The present findings suggest that similar processes could operate in offline friendship networks, which show high segregation and social influence within, but not between, groups.

It is important to consider the context in which I identified these effects. The sample consisted of secondary school students from an ethnically diverse town. The multi-ethnic and multi-religious school setting is an increasingly typical environment in which adolescents grow up. This town has a history of interethnic conflict, and

persistent residential and educational segregation (Al Ramiah et al., 2015). Accordingly, I examined the development of ingroup and outgroup attitudes in a challenging intergroup climate, which is an important context in which to examine, and consequently better understand, intergroup relations (Hewstone et al., 2014). The ethnically diverse context also enabled me to examine attitude development for both the traditionally advantaged ethnic majority group and the, often neglected, disadvantaged ethnic minority group (see Wölfer et al., 2016). Together, the diversity of the sample and real life setting indicate that this study's findings are high in ecological validity.

However, attitudes may develop differently depending on the intergroup context. In environments with challenging intergroup climates, such as the context of the present study, individuals may be less inclined to interact with outgroup members, and more inclined to rely on ingroup members to inform their attitudes. Therefore, the intergroup context may account for differences in the findings of the present study and previous studies examining intergroup contact theory; outgroup contact effects may be stronger in more integrated harmonious environments, and weaker in more segregated hostile environments. Future research should therefore study how the effects of ingroup and outgroup friendships differ across a range of environments.

Furthermore, as the sample consisted of adolescents, I examined the development of ingroup and outgroup attitudes during a limited age range. Adolescence marks a key period in the development of outgroup attitudes (Aboud, 2005), and individuals develop their ethnic identity during this time (Jugert et al., 2020), making examination of this period crucial to understand how ingroup and outgroup attitudes develop. Nonetheless, as adolescents are particularly susceptible to social influence (Brechwald & Prinstein, 2011; Telzer et al., 2018), friends may have a more pronounced effect on ingroup and outgroup attitudes at this age. Perhaps the relative

strength of socialisation effects as compared to contact effects identified in the present study may be unique to adolescence. To determine whether the present findings generalise across the lifespan, future research should examine how friends influence attitudes in earlier life, when attitudes originate, and later life, after attitudes have stabilised.

As the hypotheses addressed in this chapter can only be tested using longitudinal social network analysis, I could only use data from Study 2c, and not the additional nine studies this thesis comprises. Hence, I could only examine the research questions in one intergroup context and age group. Future research should examine alternative intergroup contexts and age groups, to assess the generalisability of my findings. To disentangle ingroup and outgroup contact and socialisation effects, future studies will need to use the novel analysis method introduced in the present research. To enable researchers to make use of this analytic tool, I have made all analysis scripts (in R), and the associated information and materials, available online, on the open access platform OSF.[11]

I examined attitude socialisation for members of both an ethnic majority group (White British) and ethnic minority group (Asian British). Prior research has shown that racial attitude similarity among friends is particularly important for ethnic minority group members, as compared to ethnic majority group members (Garcia et al., 2017). This suggests that attitude socialisation may be more pronounced for members of ethnic minority groups as compared to ethnic majority groups. The present findings regarding *outgroup attitude* socialisation were similar for ethnic majority and minority groups; however, I only identified a significant effect of *ingroup attitude* socialisation for the ethnic minority, not majority, group. It is possible that shared ingroup attitudes may be

[11] All materials required to replicate the present analyses can be found at https://osf.io/4n9as/?view_only=eeed26c98ffb4344a55232f376a81b99

more important for ethnic minority than majority groups. Following the propositions of Garcia et al. (2017), perhaps shared ingroup attitudes could provide a more important source of identity and value for minority (as compared to majority) group members, and shared ingroup attitudes could buffer against the more commonly negative attitudes of outgroup members towards minority (as compared to majority) groups. This, however, is mere speculation, and as it is not possible to statistically compare the estimates for socialisation effects obtained from RSiena co-evolution models, the majority-minority differences identified in the present research only suggest that there may be differences between the two groups. Further research is required in order to examine whether the majority-minority differences indicated in the present research replicate, and, if so, future research could attempt to identify *why* ingroup attitude socialisation differs between majority and minority groups.

Another important avenue for future research concerns identifying the mechanisms underlying attitude socialisation through ingroup friends. The present study is the first to separate contact and socialisation effects for ingroup and outgroup friends, and I sought only to identify the effects, and not to examine the mechanisms underlying the observed effects. Consequently, it remains unclear *how* ingroup friends influence each other's ingroup and outgroup attitudes. Multiple mechanisms could be operating, such as modelling, peer pressure, and communication. For example, Aboud and Doyle (1996) found that individuals' outgroup attitudes could be changed through discussion with ingroup friends holding differing outgroup attitudes. Other studies have highlighted the potential role of ethnic jokes and humour in influencing friends' attitudes towards social groups (e.g., Lampert & Ervin-Tripp, 2006; Stangor & Leary, 2006). Future research should examine which specific mechanisms underlie attitude socialisation through ingroup friends.

The present study has several notable strengths, particularly regarding the use of longitudinal social network analysis. The key contribution of this study is to advance our understanding of whether, and if so how, ingroup and outgroup friendships shape ingroup and outgroup attitudes. This was made possible by using state-of-the-art longitudinal social network analysis, which disentangled four potential effects on individuals' attitudes: the number of ingroup and outgroup friends (contact effects), and the influence of ingroup and outgroup friends' attitudes (socialisation effects). By using this analysis method, I was further able to separate contact and socialisation effects from selection processes, and thus to provide strong evidence indicating directionality. Longitudinal social network analysis, still rare in social psychological research, also has more widely applicable advantages. As discussed in Chapter 1, this analysis method enabled me to obtain more objective measures of friendship (Smith, 2002), and more accurate estimates of the attitudes held by individuals' friends (Thijs & Verkuyten, 2016; Thijs & Zee, 2019). Furthermore, I was able to examine friendships within the social context, controlling for important contextual influences on friendships, particularly the influential effects of network structure (Snijders et al., 2010).

Although the use of longitudinal social network analysis is a definite strength of this study, it also has limitations. Social network analysis is restricted to a specific network boundary. I examined friendships within school year group networks. Adolescents spend most of their waking hours in school, and most adolescent friendships are formed within school environments (George & Hartmann, 1996). Still, I miss the potentially important effects that both friends outside of school and also family members may have on attitude development (Miklikowska, 2017). Future research could investigate the influence of all relationships an individual has on attitude development by using egocentric networks. This would, however, result in the loss of

the benefits of complete social network analysis, such as measurement objectivity and consideration of the wider social context (Clifton & Webster, 2017). Nonetheless, the results of egocentric network studies could complement the present findings.

In this chapter, I have demonstrated the important influence that ingroup friends have on individuals' attitudes through the process of socialisation. In the following and final chapter, I integrate and discuss the findings obtained across all three empirical chapters, in order to comprehensively detail the role of ingroup contact, in addition to outgroup contact, in shaping ingroup and outgroup attitudes.

CHAPTER 5: SUMMARY AND CONCLUSION

Since the initial formulation of the contact hypothesis (Allport, 1954), an extensive body of research examining intergroup contact theory has shown that outgroup contact has a positive effect on outgroup attitudes (Pettigrew & Tropp, 2006). The corresponding effect of ingroup contact on outgroup attitudes has, however, been largely neglected in research to date, which is surprising considering the prevalence of ingroup contact (McPherson et al., 2001) and initial evidence suggesting that ingroup contact may influence intergroup relations (e.g., Levin et al., 2003; Wilder & Thompson, 1980). Similarly, the focus on outgroup attitudes has led researchers to relatively overlook the possible impact of outgroup and ingroup contact on ingroup attitudes. In this thesis, I extended the body of research investigating intergroup contact theory to consider the role of ingroup, in addition to outgroup, contact in shaping both ingroup and outgroup attitudes. Across three empirical chapters, I examined the relationship between ingroup and outgroup contact (Chapter 2), the effects of ingroup and outgroup contact on ingroup and outgroup attitudes (Chapter 3), and the socialisation of ingroup and outgroup attitudes (Chapter 4). My findings revealed that ingroup contact has an important role in shaping both ingroup and outgroup attitudes. I found that, relative to other forms of ingroup contact, ingroup friendship had the most notable effects as it limits outgroup friendship and shapes individuals' attitudes through the process of socialisation.

In the following sections of this final chapter, I first summarise the key findings of the research presented in this thesis, situate them in relation to the wider literature, and identify the most promising avenues for future research (5.1). I then discuss the implications of the present research for social psychological theory, research

methodology, and broader societal questions (5.2). Finally, I acknowledge several qualifications that apply to the findings I have presented (5.3).

5.1 Key Findings

In the following three subsections, I consider the key findings from each empirical chapter in relation to the wider literature. Furthermore, in each subsection, I outline the research questions that this thesis raises that are currently unaddressed, and suggest the ways in which future research can build upon the present research. As a nascent area of study, ingroup contact presents a rich topic for future research: with over six decades of research on outgroup contact to catch up on, there are many aspects of ingroup contact that require further investigation. To conclude this section, I summarise the overall findings across the three empirical chapters and integrate them in relation to the theoretical model proposed in this thesis.

5.1.1 The Relationship Between Ingroup and Outgroup Contact

I first sought to determine the relationship between individuals' levels of engagement in ingroup and outgroup contact. Prior research suggests that individuals can only maintain a limited number of social relationships and engage in a limited amount of contact with others (e.g., Dunbar, 1998; Saramäki et al., 2014; Tooby & Cosmides, 1996). Accordingly, engagement in ingroup contact may necessarily limit engagement in outgroup contact, and vice versa. I examined this proposition with regard to two different types of contact: friendship and generic contact. Research examining intergroup contact theory often distinguishes between these two key types of contact, which differ in various ways such as intimacy and duration (Voci et al., 2015). I hypothesised that there would be a negative relationship between ingroup and outgroup

contact, and that the relationship would be stronger for friendship than for generic contact.

In Chapter 2, I tested these hypotheses across nine studies. The findings differed depending on the type of contact under consideration. Regarding *friendship*, across four cross-sectional studies (Studies 1a, 1b, 1e and 1f) and three longitudinal studies (Studies 2a, 2b and 2c), I identified significant negative associations between individuals' numbers of ingroup and outgroup friends so that individuals with more ingroup friends tended to have fewer outgroup friends and vice versa. Moreover, I synthesised the findings across the studies in a meta-analysis, and identified a significant negative meta-analytic effect. In contrast, I obtained mixed findings across the four cross-sectional studies that examined *generic contact*. Specifically, I identified a positive association between generic ingroup and outgroup contact in two studies (Studies 1c and 1d), and no association between generic ingroup and outgroup contact in two studies (Studies 1e and 1f). I found an overall significant positive meta-analytic effect; however, as the results were mixed across studies, the effect did not appear robust, and the association between generic ingroup and outgroup contact remains uncertain.

My findings thus provided mixed support for the hypotheses concerning the relationship between ingroup and outgroup contact. While I identified a significant negative relationship between ingroup and outgroup friends, I did not identify a negative relationship between generic ingroup and outgroup contact. Therefore, beyond the hypothesis that the negative relationship would be stronger for friendship than generic contact, my findings only provided evidence for a negative relationship between ingroup and outgroup friends, and not one between generic ingroup and outgroup contact.

These findings raise the question of *why* there may only be a negative relationship for friendship and not for generic contact. I believe the most likely explanation is variation in the limits imposed on different types of contact. As discussed in Chapter 1, past research contends that the number of relationships, including friendships, that an individual can maintain is limited by both cognitive constraints (Dunbar, 1998) and time constraints (Dunbar et al., 2009). In contrast, the amount of generic contact an individual can engage in is likely to be limited only by time constraints (Saramäki et al., 2014; Tooby & Cosmides, 1996). Moreover, the time constraints imposed on generic contact are likely weaker than the time constraints imposed on friendship, as friendship is comparatively more time-consuming. The present findings suggest that the constraints on generic contact are not so great that engagement in generic contact with some individuals will reduce the time available to engage in contact with other individuals. Accordingly, engagement in generic ingroup (outgroup) contact does not necessarily limit engagement in generic outgroup (ingroup) contact.

Prior research concerning the capacity limits on different types of contact has focused primarily on the number of social relationships (e.g., friends, kin) that individuals can maintain (e.g., Hill & Dunbar, 2003; Pfister et al., 2020; Roberts et al., 2009), while few studies have investigated limits on frequency of contact (e.g., Saramäki et al., 2014). Consequently, the present hypotheses regarding generic contact were based on a weaker research base than the hypotheses regarding friendship. The mixed findings for generic contact do not contradict prior research, as no study to date has examined the relationship between generic ingroup and outgroup contact. This renders the unpredicted findings for generic contact less surprising, as the present investigation comprised an initial venture into the unknown. In contrast, the present

findings regarding friendship corroborate the findings of Pfister et al. (2020), who also examined limits on ingroup and outgroup friendship, and found that individuals' numbers of friends at a given time negatively predicted their numbers of ingroup and outgroup friends at a later time.

The negative relationship identified between ingroup and outgroup friends could have significant implications for individuals' attitudes towards outgroups. If individuals form and maintain ingroup friendships at the expense of outgroup friendships, the potential positive effects of outgroup friendship on outgroup attitudes will be constrained, and possibly even be prevented from manifesting. The present research provided limited support for a positive effect of outgroup friendship on outgroup attitudes (as discussed in the following section). Nonetheless, a wealth of prior research investigating intergroup contact theory has shown that having more outgroup friends improves outgroup attitudes (Davies et al., 2011; Pettigrew & Tropp, 2006). Therefore, assuming a positive effect of outgroup friends on outgroup attitudes, having a greater number of ingroup friends could hinder the improvement of outgroup attitudes, due to the necessarily smaller concurrent number of outgroup friends.

In addition to investigating the relationship between ingroup and outgroup contact, I also examined the amount of ingroup and outgroup contact that individuals engage in. A wealth of research has shown that ingroup contact is more prevalent than outgroup contact, as individuals predominantly choose to engage in contact with members of the same group (e.g., McPherson et al., 2001; Windzio & Bicer, 2013). In accordance with prior research, I found consistently higher levels of ingroup contact as compared to outgroup contact across all studies. The prevalence of ingroup contact was particularly apparent in the social network studies (Studies 1e, 1f and 2c), as the friendship networks exhibited high levels of segregation between groups. I further

found that numerical minority group members reported, on average, less ingroup contact, and more outgroup contact, than numerical majority group members. Nonetheless, ingroup contact was still more prevalent than outgroup contact for minority groups. The differences in ingroup and outgroup contact identified between numerical majority and minority groups are likely to have resulted from underlying differences in contact opportunity structures (Barlow et al., 2013; Smith et al., 2016).

My findings show that despite the ample opportunities for outgroup contact available in the diverse contexts in which the present studies were conducted, individuals predominantly chose to engage in contact with ingroup members. More broadly, this suggests that the increasing levels of diversity in many contemporary societies (Fong & Shibuya, 2005; Koser & Laczko, 2010; United Nations, 2019) are by no means guaranteed to increase levels of outgroup contact, as greater opportunities for contact do not always transform into actual contact.

The difference in the levels of ingroup and outgroup contact was larger for friendship than generic contact. The prevalence of ingroup friendship, combined with the negative relationship identified between ingroup and outgroup friends, could potentially further reduce the likelihood of increased integration over time in friendship networks. If individuals' friendship networks are already saturated with ingroup friends, they may be less likely, or even less able, to form new outgroup friendships in the future, because doing so would require the termination of pre-existing ingroup friendships. That is, pre-existing ingroup friendships may be lost through a lack of maintenance if new outgroup friendships are formed, because of the necessary redistribution of time and cognitive resources. Therefore, as social environments become increasingly diverse, individuals may not take up the new opportunities for outgroup friendship, because doing so would require individuals to lose ingroup

friendships. This could potentially account in part for the failure of increases in diversity to generate corresponding increases in outgroup friendship, and the consequently continued high levels of segregation between groups.

I conclude this section by highlighting two key avenues for future research. First, while my findings revealed a consistent negative relationship between ingroup and outgroup friends, the mixed findings for generic contact render the association between generic ingroup and outgroup contact uncertain. The present findings suggest that there may be either a positive association between generic ingroup and outgroup contact, or no association between generic ingroup and outgroup contact. Future research should employ consistently larger samples in order to examine and determine the relationship between generic ingroup and outgroup contact.

Second, I proposed that the divergent findings identified for friendship and generic contact may result from the different limits constraining different types of contact. However, I only examined the relationship between ingroup and outgroup contact, and I did not test the mechanisms underlying the observed relationships. Consequently, it remains unknown whether the negative relationship identified between ingroup and outgroup friends resulted from time constraints, cognitive constraints, alternative mechanisms, or a combination of these factors. It is therefore unclear whether the divergent findings for friendship and generic contact result from variation in these potential underlying mechanisms. To address this remaining question, future research should explore the mechanisms underlying the relationship between ingroup and outgroup contact, for both friendship and generic contact. Additionally, as there may be a *positive* relationship between generic ingroup and outgroup contact, future studies should be designed to pre-emptively identify any causes for the potential identification of a positive relationship. Individual differences in extraversion could

provide a promising explanation for why some individuals engage in more generic ingroup and outgroup contact, while other individuals engage in less generic ingroup and outgroup contact (see Pollet et al., 2011). Hence, future studies could examine extraversion as a potential explanation for a positive relationship between generic ingroup and outgroup contact, in addition to the potential mechanisms underlying the negative relationship between ingroup and outgroup friends.

5.1.2 The Effects of Ingroup and Outgroup Contact on Ingroup and Outgroup Attitudes

The extensive body of research examining intergroup contact theory has focused on the positive effect of outgroup contact on outgroup attitudes (Pettigrew & Tropp, 2006). In contrast, few studies have investigated ingroup contact or ingroup attitudes, and those that did revealed mixed results. Regarding the effects of ingroup contact, Wilder and Thompson (1980) and Levin et al. (2003) identified a positive effect of ingroup contact on ingroup bias (operationalised as the difference between ingroup and outgroup attitudes), while Munniksma et al. (2015) identified no effect of ingroup contact on outgroup attitudes. Together, the findings suggest that ingroup contact can increase ingroup bias by improving ingroup attitudes, not worsening outgroup attitudes; no study, however, has examined ingroup attitudes as an outcome variable. A similarly small number of studies has investigated the effect of outgroup contact on ingroup attitudes. Research examining the deprovincialisation hypothesis (Pettigrew, 1997) has yielded mixed results: some studies have identified a negative effect of outgroup contact on ingroup attitudes (e.g., Verkuyten et al., 2010), while other studies have identified no such effect (e.g., Tausch et al., 2010). Overall, the scarcity of studies and the disparity in the findings leads to uncertainty regarding the effects of ingroup contact on ingroup and outgroup attitudes, and the effect of outgroup contact on ingroup attitudes.

In this thesis, I sought to determine the effects of ingroup and outgroup contact on ingroup and outgroup attitudes. Based on the sparse but nonetheless informative prior research, I hypothesised that ingroup contact would have a positive effect on ingroup attitudes (but would not reliably affect outgroup attitudes), and that outgroup contact would have a positive effect on outgroup attitudes (but would not reliably affect ingroup attitudes).

To test the hypotheses, I first replicated and extended the study conducted by Levin et al. (2003), in order to disentangle the ways in which ingroup and outgroup contact affect ingroup bias. In a secondary analysis of the data from Levin et al. (Study 2a), I provided a direct examination of the differences in the results as a function of the dependent variable (i.e., ingroup and outgroup attitudes as compared to ingroup bias). In accordance with the hypotheses, I found that ingroup contact was positively associated with ingroup attitudes (and not significantly associated with outgroup attitudes), and that outgroup contact was positively associated with outgroup attitudes (and not significantly associated with ingroup attitudes).

These findings provided important initial insights into the ways in which ingroup and outgroup contact may shape ingroup bias. The results suggested that ingroup contact increases ingroup bias by improving attitudes towards the ingroup, and not by worsening attitudes towards the outgroup. Additionally, the findings indicated, in line with intergroup contact theory, that outgroup contact decreases ingroup bias by improving attitudes towards the outgroup, and not by worsening attitudes towards the ingroup.

However, the analysis method I used (necessitated by direct replication) had a key limitation in conflating between-person stability and within-person change

(Hamaker et al., 2015; Zyphur et al., 2020). This meant that I could not disentangle the extent to which the observed associations between ingroup (outgroup) contact and ingroup (outgroup) attitudes resulted from between-person stability (i.e., individuals with high contact *simultaneously* hold more positive attitudes) or within-person change (i.e., individuals with high contact *subsequently* hold more positive attitudes).

To address this issue, I tested the hypotheses across four longitudinal studies (Studies 2a, 2b, 2c and 2d) using RI-CLPM (Hamaker et al., 2015), in order to disentangle within-person and between-person effects and accordingly provide better evidence concerning the direction of the observed associations. My findings across the four studies provided little evidence of a *within-person effect* of ingroup (outgroup) contact on ingroup (outgroup) attitudes. Instead, I identified consistent *between-person effects*: there were consistent positive time-invariant associations between ingroup contact and ingroup attitudes, and between outgroup contact and outgroup attitudes. These findings extend previous research that has failed to identify a within-person effect of outgroup contact on outgroup attitudes using RI-CLPM (Bohrer et al., 2019).

Do the present findings reveal that there are in actuality no within-person effects of contact on attitudes? My tentative answer would be no, and that further research is required in order to answer this question. I believe there are three key reasons to await further research before forming conclusions, as detailed in Chapter 3. First, experimental studies have demonstrated a within-person effect of outgroup contact on outgroup attitudes (e.g., Brown et al., 1999; Ioannou et al., 2018) and a within-person effect of ingroup contact on ingroup bias (Wilder & Thompson, 1980). Second, I identified within-person effects of ingroup (outgroup) contact on ingroup (outgroup) attitudes in one of the four studies (Study 2d). As Study 2d employed a substantially larger sample than Studies 2a, 2b and 2c, the non-significant within-person effects

identified in the studies with smaller samples ($N \leq 2{,}132$) may have resulted from a lack of power to detect very small within-person effects. Finally, I identified positive time-invariant associations between ingroup (outgroup) contact and ingroup (outgroup) attitudes. These between-person associations could be the result of unobserved variables (e.g., contact opportunity structures or intergroup ideologies), but could also be the result of a within-person effect of ingroup (outgroup) contact on ingroup (outgroup) attitudes prior to the onset of the study. The four studies assessed attitude change over a fixed set of time periods, ranging from a total assessment period of one to five years. Although I did not find evidence of within-person effects within each study's timespan, the significant between-person associations could potentially be the result of the hypothesised within-person effects playing out before, but not during, the study.

The key novel aspect of this research comprises the examination of the effects of *ingroup contact* on ingroup and outgroup attitudes. Surprisingly, I found a similar degree of evidence supporting an effect of ingroup contact on ingroup attitudes as for the effect of outgroup contact on outgroup attitudes. As this evidence consists of positive associations between ingroup contact and ingroup attitudes identified in the replication analysis, and similar positive between-person associations identified using RI-CLPM, the cause of the association remains unknown. Nonetheless, the present research identified, for the first time, a positive association between ingroup contact and ingroup attitudes, which warrants further research attention. Future research should attempt to determine the most likely explanation for this positive association.

The present research is unusual not only in considering ingroup contact (in addition to outgroup contact), but also in considering ingroup attitudes (in addition to outgroup attitudes). The investigation of both ingroup and outgroup attitudes is important because they are distinct constructs, and each has implications for the

overarching relationships between groups (Brewer, 1999). Greenwald and Pettigrew (2014) contended that the majority of subtle forms of discrimination, which are most prevalent in many societies, are likely to result not from negative outgroup attitudes, but from comparatively more positive ingroup attitudes. Across all studies and social groups, I found that individuals had more positive ingroup attitudes than outgroup attitudes, which indicates ingroup bias in accordance with prior research (e.g., Hewstone et al., 2002). Yet despite the difference between ingroup and outgroup attitudes, I consistently found that outgroup attitudes were still moderately positive, not negative. This suggests, in line with Greenwald and Pettigrew (2014), that the prevailing issue in the intergroup contexts I examined comprises comparatively more positive ingroup attitudes, rather than negative outgroup attitudes. Thus, perhaps the most effective route to improved intergroup relations in many contemporary societies may be through focusing on reducing ingroup bias, rather than eliminating negative outgroup attitudes, which appear uncommon. This suggests that future research should investigate both ingroup and outgroup attitudes, rather than outgroup attitudes alone.

I believe there are three key avenues for future research. First, as the present research provides only the second examination of intergroup contact theory using RI-CLPM (following Bohrer et al., 2019), more studies using RI-CLPM are required before conclusions can be drawn concerning the within-person effects of ingroup (outgroup) contact on ingroup (outgroup) attitudes. As my findings may have been influenced by insufficient power, future studies should employ large samples.

Second, future research should examine the effects of ingroup contact on ingroup attitudes using experimental designs. Experimental studies can provide an indication of causal effects, and thus specify whether the positive associations between ingroup contact and ingroup attitudes identified in the present research may be the result

of a within-person effect of ingroup contact on ingroup attitudes. Studies should examine ingroup attitudes as the outcome variable, rather than the outcome variable of ingroup bias employed in previous experimental investigations of ingroup contact (Wilder & Thompson, 1980). Experimental studies should focus on the effects of generic ingroup contact, owing to the difficulties in experimentally manipulating friendship discussed in Chapter 1.

Finally, future research should seek to determine the most likely explanation for the positive association between ingroup contact and ingroup attitudes demonstrated in the present research. If future research identifies a within-person effect of ingroup contact on ingroup attitudes, then further research should investigate potential mediators of this effect. Wilder and Thompson (1980) highlighted several potential mediators, including ingroup identification and the salience of norms favouring the ingroup. If future research fails to identify a within-person effect of ingroup contact on ingroup attitudes, then further research should investigate alternative explanations for the positive between-person association I identified between ingroup contact and ingroup attitudes. For example, these explanations may include personality traits or demographic characteristics.

5.1.3 The Socialisation of Ingroup and Outgroup Attitudes

Prior research has shown that individuals' attitudes are shaped not only by having friends, but also by their friends' attitudes (e.g., Van Zalk et al., 2013) through the process of socialisation (Kandel, 1978). Studies on socialisation have shown that individuals' attitudes towards social groups are influenced by the attitudes held by their friends, which leads friends' attitudes to become more similar over time (Hjerm et al., 2018; Miklikowska, 2017; Zingora et al., 2020). Furthermore, prior research on ingroup

and outgroup norms suggests that individuals' attitudes may be influenced to a greater extent by their ingroup friends' attitudes than their outgroup friends' attitudes (e.g., Stangor et al., 2001; Thijs & Verkuyten, 2011); however, no study to date has compared these effects.

This thesis examined the extent to which attitude socialisation occurs though ingroup friends, outgroup friends, or both. I investigated the socialisation of ingroup attitudes and outgroup attitudes, and formed identical hypotheses for each. Specifically, I hypothesised that ingroup friends' attitudes would influence individuals' attitudes so that their attitudes become more similar over time, while outgroup friends' attitudes would not influence individuals' attitudes. These hypotheses are best examined using longitudinal social network analysis, thus I tested the hypotheses in one longitudinal social network study (Study 2c), which I designed specifically to examine the research questions addressed in this thesis.

In support of the hypotheses, I found that individuals' *outgroup attitudes* were influenced by the attitudes held by their ingroup (but not their outgroup) friends. My findings regarding *ingroup attitudes* provided partial support for the hypotheses: Minority group (Asian British) members' ingroup attitudes were influenced by the attitudes of their ingroup (but not their outgroup) friends, while majority group (White British) members' ingroup attitudes were influenced by neither their ingroup nor outgroup friends' attitudes. I examined socialisation effects while controlling for selection effects, that is, the possible tendency for individuals to select friends with similar attitudes. I found little evidence that attitude similarity influenced friendship selection. This finding emphasises the strength of attitude socialisation through ingroup friends, confirming that attitude similarity among ingroup friends occurs because

individuals adopt the attitudes of their friends (socialisation) and not because they select friends with similar attitudes (selection).

In summary, the findings highlighted, for the first time, the important influence of ingroup friends' attitudes on individuals' attitudes, particularly for individuals' attitudes towards outgroups. These findings build upon previous research in three different areas of study: socialisation, norms, and intergroup contact. In the following sections, I discuss the present findings in relation to each area of study.

With regard to prior research on *socialisation*, studies have shown that friends' attitudes influence individuals' attitudes towards immigrant groups (Hjerm et al., 2018; Miklikowska, 2017; Van Zalk et al., 2013), sexual minority groups (Poteat, 2007) and ethnic minority groups (Zingora et al., 2020). Prior studies failed, however, to account for group membership in two ways. First, prior studies did not separate and compare socialisation through ingroup and outgroup friends, and instead considered friends to be equivalent sources of influence regardless of the friends' group memberships. Second, prior studies examined attitudes towards specific minority groups, but the samples included participants belonging to these minority groups. Accordingly, for majority group participants outgroup attitudes were examined, while for minority group participants ingroup attitudes were examined. Socialisation was not assessed separately for majority and minority participants, thus, prior studies provide evidence for the socialisation of attitudes towards social groups, but not necessarily ingroups or outgroups in particular. The present research built upon previous research by accounting for group membership: I investigated the influence of ingroup and outgroup friends' attitudes on individuals' ingroup and outgroup attitudes. I found that only ingroup friends' attitudes, and not outgroup friends' attitudes, shaped individuals' attitudes. Furthermore, I found evidence for the socialisation of outgroup attitudes in both the

majority and minority group, while I only found evidence for the socialisation of ingroup attitudes in the minority group. The findings thus identified interesting differences depending on group membership, which have implications for the spread of attitudes in social networks, and suggest that future research on socialisation should account for group membership.

With regard to prior research on *norms*, group norm theory (Sherif, 1936; Sherif & Sherif, 1953), social comparison theory (Festinger, 1954, 1957) and self-categorisation theory (Turner et al., 1987) all contend that individuals are influenced by ingroup norms, rather than outgroup norms. In support of these theories, studies have shown that social influence is stronger when exerted through ingroup than outgroup sources (Abrams et al., 1990), and that attitudes towards social groups are shaped by ingroup rather than outgroup norms (Stangor et al., 2001). The present findings revealed that the group-dependent difference in the influence of norms, which inspired the present research, extends to socialisation through friends. That is, I found that individuals' attitudes were influenced only by the attitudes held by their ingroup, not outgroup, friends. It is possible that ingroup friends may function as effective carriers of ingroup norms: individuals may view their ingroup friends as prototypical ingroup members, and ingroup norms may be spread through socialisation in frequent interactions with ingroup friends. Of course, the attitudes of the ingroup as a whole (i.e., the ingroup norm) will often differ from the attitudes held by each individual's specific ingroup friends. Nonetheless, future research could improve our understanding of the interrelations between norms and socialisation by investigating the extent to which ingroup norms are spread via socialisation through ingroup friends.

With regard to prior research on *intergroup contact*, studies have focused on the effects of the number of friends on individuals' attitudes (contact effects), rather than

the effects of these friends' attitudes (socialisation effects). The distinction between the effects of having friends and those friends' attributes, such as attitudes, is well established in developmental psychology (Bukowski et al., 1998), but less so in social psychology. Hartup (1996) argued that the effects of friendships cannot be specified without distinguishing between "having friends" (contact effects) and "who friends are" (socialisation effects). Only by analysing contact and socialisation effects in conjunction can the unique impact of each be determined. In the present research, I simultaneously examined contact and socialisation effects, and found that it is the attitudes of ingroup friends that principally shape individuals' attitudes, not either outgroup friends' attitudes or having ingroup and outgroup friends. These findings suggest that future intergroup contact research investigating how friendships shape attitudes should consider socialisation effects in addition to contact effects, which are more commonly studied.

More broadly, the present findings may have implications for the spread of outgroup attitudes in contemporary societies. I found that individuals' outgroup attitudes were influenced only by the attitudes of their ingroup friends, and were not in any way influenced by their outgroup friends. If individuals interact predominantly with ingroup members, and are influenced only by each other's outgroup attitudes, this may increase the spread of potentially uninformed or biased outgroup attitudes, which are based on ingroup perceptions of the outgroup rather than experiences with the outgroup.

I conclude this section by highlighting three key avenues for future research. First, future studies should replicate the present analyses in alternative intergroup contexts and age groups. I could only test the hypotheses regarding socialisation in Study 2c, and not the additional nine studies this thesis comprises, because these hypotheses can only be accurately tested using longitudinal social network analysis.

Therefore, I only examined the hypotheses in one highly specific context, that is, among White British and Asian British adolescents in English schools. It is possible that the relative effects of ingroup and outgroup contact and socialisation may differ depending on both age and the intergroup context, as discussed in detail in Chapter 4. For example, socialisation effects may be particularly pronounced during adolescence, because adolescents are especially susceptible to social influence as compared to other age groups (Brechwald & Prinstein, 2011; Telzer et al., 2018). Accordingly, future research should test the hypotheses in alternative intergroup contexts and age groups, in order to assess the generalisability of the findings.

Second, research should further investigate the differences I identified with regard to group status and attitude target. The present findings regarding *outgroup attitude* socialisation were similar for majority and minority groups, while I only identified a significant effect of *ingroup attitude* socialisation for the minority, not majority, group. In Chapter 4, I outlined potential explanations for this finding, most notably, that shared ingroup attitudes may be more important for minority than majority groups (see Garcia et al., 2017). Further research is required in order to examine whether the majority-minority differences indicated in the present research replicate, and, if so, future research could attempt to ascertain *why* ingroup attitude socialisation differs between majority and minority groups.

Finally, future research could consider how outgroup attitudes are shaped by extended contact, in addition to direct contact and socialisation. The extended contact hypothesis (Wright et al., 1997) states that individuals' attitudes can be improved through knowledge that other ingroup members have outgroup friends. An interesting question for future research concerns to what extent outgroup attitudes are shaped by socialisation, direct contact *and* extended contact. Theoretically, attitude socialisation

could mediate the effects of extended contact; outgroup contact could improve individuals' attitudes, which in turn influence other ingroup members' attitudes through socialisation. This line of future research could also examine the potential interrelations between norms and socialisation (as previously discussed), because prior research has identified norms as a mediator of the relationship between extended contact and outgroup attitudes (Turner et al., 2008).

5.1.4 Summary

This thesis aimed to improve our understanding of the ways in which ingroup and outgroup contact shape ingroup and outgroup attitudes. To this end, I proposed a new theoretical model, shown again for clarification in Figure 5.1, which depicts the ways in which contact may shape attitudes. I tested each component of the model across the three empirical chapters, and obtained a moderate degree of evidence in support of the model.

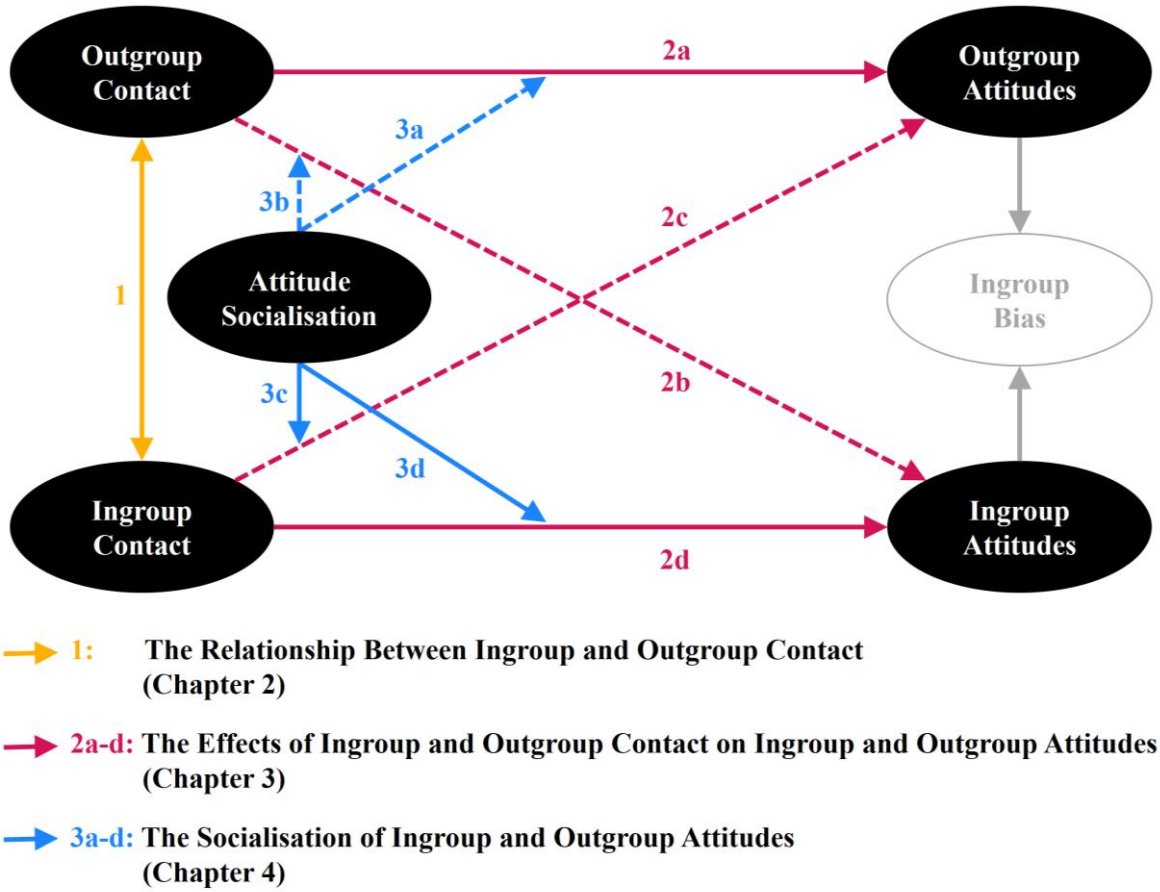


Figure 5.1. Proposed model of how ingroup and outgroup contact shape ingroup and outgroup attitudes. In Chapter 2, I examined Path 1 (depicted in yellow), in Chapter 3, I examined Paths 2a-d (depicted in red), and in Chapter 4, I examined Paths 3a-d (depicted in blue). I hypothesised significant effects for Paths 1, 2a, 2d, 3c and 3d (depicted as bold lines), but not Paths 2b, 2c, 3a and 3b (depicted as dashed lines).

In Chapter 2, I tested the hypotheses that there would be a negative relationship between ingroup and outgroup contact (Path 1 in Figure 5.1), and that the relationship would be stronger for friendship than for generic contact. My findings revealed that there is a negative relationship between ingroup and outgroup friends, but not between generic ingroup and outgroup contact. Therefore, with regard to the model shown in Figure 5.1, my findings indicate that Path 1 is dependent on the type of contact under consideration.

In Chapter 3, I tested the hypotheses that ingroup contact would have a positive effect on ingroup attitudes (but would not reliably affect outgroup attitudes), and that outgroup contact would have a positive effect on outgroup attitudes (but would not reliably affect ingroup attitudes). These hypotheses are represented by Paths 2a-d in Figure 5.1. I found consistent positive between-person associations between ingroup contact and ingroup attitudes, and between outgroup contact and outgroup attitudes, but I did not find evidence of any within-person effects. Hence, with regard to the model, my findings provide support for the presence of Paths 2a and 2d, but do not provide support for the hypothesised directionality of the paths from ingroup (outgroup) contact to ingroup (outgroup) attitudes. In accordance with expectations, I did not find evidence of Paths 2b or 2c.

Finally, in Chapter 4, I tested the hypotheses that ingroup friends' attitudes would influence individuals' attitudes (Paths 3c and 3d), while outgroup friends' attitudes would not influence individuals' attitudes (Paths 3a and 3b). I found that individuals' *outgroup attitudes* were influenced by the attitudes held by their ingroup (but not their outgroup) friends. This finding provides support for Path 3c. I found that minority group members' *ingroup attitudes* were influenced by the attitudes of their ingroup (but not their outgroup) friends, while majority group members' *ingroup attitudes* were influenced by neither their ingroup nor outgroup friends' attitudes. Therefore, I found that Path 3d is dependent on group status. In accordance with expectations, I did not find evidence of Paths 3a or 3b.

Overall, the findings across the three empirical chapters (and 10 empirical studies) provided evidence in support of the new theoretical model. There were, however, qualifications: Path 1 appears dependent on the type of contact, Path 3d appears dependent on group status, and the directionality of Paths 2a and 2d remains

uncertain. This thesis provides the first examination of many components of the model, and the findings provide sufficient support for the model so as to warrant further research attention.

Most importantly, the findings show that future research should investigate ingroup contact. The key novel aspect of the present research comprised the examination of the ways in which *ingroup contact* shapes ingroup and outgroup attitudes, as the effects of outgroup contact are well documented in previous empirical investigations of intergroup contact theory. I identified a positive association between ingroup contact and ingroup attitudes (Path 2d), akin to the association between outgroup contact and outgroup attitudes (Path 2a), and I further found that ingroup contact (Paths 3c and 3d), but not outgroup contact (Paths 3a and 3b), shapes attitudes through the process of socialisation. Thus, the present findings surprisingly provide more evidence of ingroup contact shaping ingroup and outgroup attitudes than outgroup contact, which suggests that ingroup contact should be a key focus of future research.

5.2 Wider Implications

The findings presented in this thesis have implications for social psychological theory, research methodology, and broader societal questions. In the following three subsections, I respectively detail the theoretical, methodological and practical implications of the present research.

5.2.1 Theoretical Implications

I conducted the present research using the framework of intergroup contact theory, which has been a focus of the field of social psychology for over 60 years, since Allport's (1954) initial formulation of the contact hypothesis. In this section, I discuss the theoretical implications of the present research for intergroup contact theory. I

propose that intergroup contact theory should be extended to consider ingroup contact, socialisation, and ingroup attitudes, in order to provide a more comprehensive account of the ways in which contact shapes intergroup relations.

To date, intergroup contact research has prioritised the study of the effects of outgroup contact, while the effects of ingroup contact have largely been ignored. In this thesis, I have shown that ingroup contact has an important role in shaping both ingroup and outgroup attitudes. Furthermore, the relative prevalence of ingroup contact as compared to outgroup contact, shown in the present research, indicates that ingroup contact may be more likely to commonly affect attitudes. The present findings therefore suggest that intergroup contact theory should be extended to consider the role of contact with ingroup members, in addition to outgroup members, in shaping attitudes, as both types of contact affect intergroup relations.

The present findings further indicate that intergroup contact theory should be extended to incorporate socialisation effects. One focus of intergroup contact research has been the effects of the number of friends on individuals' attitudes (e.g., Davies et al., 2011), while the influence of those friends' attitudes on individuals' attitudes (i.e., socialisation effects) has been neglected in research to date. In the present research, I identified socialisation through ingroup friends as the principal way in which friendships shape individuals' ingroup and outgroup attitudes. In order to determine *how* friendships shape attitudes, research must distinguish between the effects of having friends and the attitudes of friends (Bukowski et al., 1998; Hartup, 1996). Thus, intergroup contact theory should be extended to consider the role of socialisation in shaping ingroup and outgroup attitudes.

Finally, intergroup contact research focuses on outgroup attitudes (i.e., prejudice) as an outcome variable (Pettigrew & Tropp, 2006), while ingroup attitudes and ingroup bias are not commonly considered. In the present research, I devoted equal attention to the outcome variables of ingroup attitudes and outgroup attitudes. I found, as expected, that individuals had, on average, more positive ingroup attitudes than outgroup attitudes, yet individuals' outgroup attitudes were still moderately positive, not negative. This suggests that the prevailing issue in the intergroup contexts I examined comprises ingroup bias, rather than negative outgroup attitudes. Future research should therefore investigate both ingroup and outgroup attitudes as outcome variables, rather than outgroup attitudes alone, in order to understand how contact shapes present day intergroup relations, in which the overt expression of prejudice has decreased.

5.2.2 Methodological Implications

The present findings have implications for the statistical methods used to examine how contact affects attitudes. Importantly, no particular analysis technique is best; instead, there are better and worse analysis methods with which to test particular research questions, and the choice of analysis technique should be made in light of the specific research questions under investigation, as explained below.[12]

First, if examining the effects of generic contact on attitudes, studies should use analysis methods that can disentangle between-person and within-person effects. Such analysis methods include RI-CLPM, as demonstrated in Chapter 3, in addition to

[12] I distinguish between the best analysis methods with which to examine generic contact and relationships (e.g., friendship) because social network measures cannot accurately capture the wide range of interactions that comprise generic contact. That is, individuals are unlikely to be able to name, and subsequently nominate as a network connection, all the people they have positive interactions with, whereas individuals are likely to be able to name all the people with which they have a relationship.

alternative methods such as ALT-SR (Mund & Nestler, 2019). The standard longitudinal analysis methods currently used in the field of intergroup contact research (e.g., cross-lagged panel modelling) conflate between-person stability and within-person change (Hamaker et al., 2015; Zyphur et al., 2020). This can lead to inaccurate conclusions concerning the effects of contact on attitudes. I illustrated this in Chapter 3 by applying two different methods to analyse the Study 2a data, and comparing the substantially different conclusions drawn from the two sets of findings. The findings suggest that the positive association between outgroup contact and outgroup attitudes identified in prior intergroup contact research may have resulted from between-person stability, not within-person change. In order to determine whether there are within-person effects of contact on attitudes, future research should use analysis methods that separate between-person stability and within-person change.

Second, if examining how attitudes are shaped by relationships that can be assessed using social network measures (e.g., friends, colleagues, neighbours, kin), studies should use longitudinal social network analysis. Social network analysis has several important advantages for research examining intergroup relations, as discussed in Chapter 1. One of the most widely applicable advantages consists of providing more robust estimates of contact (Wölfer et al., 2015; Wölfer & Hewstone, 2017), particularly outgroup contact, by reducing social desirability bias (Smith, 2002). Furthermore, social network analysis enables researchers to examine the effects of contact within the social context under investigation and consequently control for contextual effects (Snijders et al., 2010).

Importantly, I hope that future research will utilise the novel adaptation of longitudinal social network analysis that I introduced in Chapter 4, in order to investigate socialisation. As previously discussed, research should examine socialisation

effects in addition to contact effects, because the two effects can only be disentangled through concurrent examination. The new analysis technique introduced in this thesis enables researchers to separate contact and socialisation effects for ingroup and outgroup friends. Through the development of this analytic tool, the present research contributes to the methods available for studying intergroup relations.[13]

5.2.3 Practical Implications

The implications of the present research concern not only theoretical and methodological advancement, but the findings also hold potential practical applications. The present findings contribute to our understanding of intergroup relations in real life, and could inform the design of social interventions aimed at improving intergroup relations.

In this thesis, I identified high levels of ingroup contact, and found that ingroup contact shaped individuals' attitudes through the process of socialisation. In contrast, I identified low levels of outgroup contact, and found little evidence that outgroup contact affected individuals' attitudes. Uninformed and biased outgroup attitudes may spread through social networks if individuals' attitudes are shaped only by ingroup perceptions of the outgroup, rather than by contact with the outgroup. The relative impact of ingroup socialisation over outgroup contact identified in the present research may have resulted from the significantly higher levels of ingroup contact as compared to outgroup contact. Thus, the present research reemphasises the importance of attempting to increase the level of outgroup contact, so that individuals' attitudes may be shaped

[13] To enable researchers to make use of this analytic tool, I have made all analysis scripts (in R), and the associated information and materials, available on the open access platform OSF: https://osf.io/4n9as/?view_only=eeed26c98ffb4344a55232f376a81b99

through outgroup contact experiences, and increased outgroup contact may reduce individuals' reliance on ingroup members to inform their attitudes towards outgroups. Therefore, interventions aimed at increasing the level of outgroup contact (e.g., McKeown et al., 2017; Schroeder & Risen, 2016) should be continued, as such interventions provide a promising way in which to improve intergroup relations.

Conversely, instead of attempting to increase outgroup contact, interventions could attempt to harness the powerful effects of ingroup socialisation. Over the past decade, interventions in schools have begun to utilise socialisation to improve intergroup relations (Paluck, 2011; Paluck et al., 2016). Traditional intervention programs aimed at improving intergroup relations in schools have targeted large groups such as entire classrooms (e.g., Houlette et al., 2004; Stathi et al., 2014), which are complex and expensive. More recently, *network interventions* have been implemented, which improve the attitudes of a small subset of individuals within the network, who subsequently influence the attitudes of their peers in the wider network (Paluck, 2011; Paluck et al., 2016). By targeting only a subset of students, network interventions are more efficient and effective (Valente, 2012). To further increase effectiveness, it is important to identify which individuals to target (Zingora et al., 2020). Ideally, target individuals are those most likely to have the greatest and widest influence on the attitudes of others in the network. The present findings revealed that socialisation only occurs through ingroup members, which could guide the development of future interventions in the identification of target individuals. As interventions aim to reduce prejudice and discrimination from the advantaged majority group towards disadvantaged minority groups, the present findings suggest that interventions should target a subset of the majority group. Because attitude socialisation occurs through

ingroup, not outgroup, members, these individuals are more likely to subsequently influence the wider majority group.[14]

Importantly, attitude socialisation in and of itself is unlikely to improve intergroup relations. Positive attitudes must first be developed among certain individuals, in order for these attitudes to subsequently spread through socialisation. Although the present findings provided little support for a within-person effect of outgroup friendship on outgroup attitudes, outgroup friendship remains one of the most well-substantiated means of improving individuals' outgroup attitudes (Davies et al., 2011), and this improvement could have a wider impact on other ingroup members through subsequent attitude socialisation. Therefore, combined interventions that promote both outgroup friendship (to improve outgroup attitudes) and 'targeted' ingroup friendship (with ingroup members holding more positive attitudes, which may then spread through socialisation) may be a promising dual-pronged approach to investigate. This approach highlights how ingroup socialisation effects are indirectly related to outgroup contact; the attitudes of one's ingroup friends may be driven, in part, by those friends' own outgroup contact experiences.

5.3 Caveats and Qualifications

In addition to the strengths and limitations discussed in each empirical chapter, several more general qualifications apply to the findings that I have presented in this thesis.

[14] Additionally, the present findings suggest that the target group in a network intervention should include both boys and girls. The present findings revealed high levels of gender homophily and gender segregation in friendship networks, which suggests that attitude socialisation is unlikely to occur across gender group boundaries. Therefore, the target group should consist of both boys and girls in order to ensure that any improvement in attitudes resulting from the intervention is not restricted to within a single gender group.

First, I attempted to determine the robustness and generalisability of the findings obtained in this thesis by examining the research questions in 10 studies. The studies varied with regard to several key dimensions: the type of contact (friendship and generic contact), measure of contact (self-report and social network), age of the sample (adolescents, college students and adults), social context (differing in terms of the ethnic/ethno-religious participant groups and target groups), and country (the United Kingdom, United States, South Africa and New Zealand). Investigating my research questions in multiple studies enabled me to assess robustness and generalisability, and identify any important differences in the findings across the aforementioned dimensions. The research questions addressed in each chapter, however, had specific data requirements, which resulted in the analysis of nine studies in Chapter 2, four studies in Chapter 3, and one study in Chapter 4. Therefore, the number of studies from which the findings were drawn varied for each research question. Moreover, although the multiple studies enabled me to demonstrate the generalisability of my findings across different intergroup contexts, the findings cannot be generalised to all intergroup contexts. The intergroup contexts examined were similar, and provided a limited and unrepresentative sample of all intergroup contexts. For example, across all studies, I identified high levels of ingroup contact and low levels of outgroup contact, and I found, on average, moderately positive outgroup attitudes, despite substantial ingroup bias. With the exception of Study 1a, which was conducted in South Africa, the studies examined intergroup relations in western, educated, industrialised, rich, and democratic (WEIRD; Henrich et al., 2010) societies, which dominate psychological research. In order to assess the generalisability of the present findings beyond these contexts, future

research should investigate the present research questions in more varied intergroup contexts.[15]

Another important qualification regards the sample sizes across the 10 studies. Together, the studies provided a total sample of 34,944 respondents. However, the sample sizes differed substantially between studies, and certain studies had small samples: the smallest consisted of $N = 178$ respondents in Study 1f. The suboptimal sample sizes in some studies may have provided insufficient power to detect the hypothesised effects. This limitation is particularly relevant to the RI-CLPM analyses conducted in Chapter 3 and the investigation of generic contact in Chapter 2. Accordingly, future research should investigate the present research questions in consistently larger samples, in order to determine whether a lack of power influenced the present findings.

These important qualifications highlight the fundamental need to replicate the present research, particularly in different intergroup contexts and with large samples. As with any scientific investigation, the findings require replication; however, this is especially true for the findings presented in this thesis, because this thesis provides the first examination of several research questions. The requirement for replication is

[15] Here I provide examples of the ways in which the findings from each empirical chapter may vary across different intergroup contexts. Regarding the findings from Chapter 2, it remains uncertain whether there would be a negative relationship between ingroup and outgroup friends in areas of the world where more negative intergroup relations persist, as individuals may not have opportunities to interact with outgroup members in such contexts (West et al., 2015). Regarding the findings from Chapter 3, the within-person effects of contact on attitudes may be more pronounced in intergroup contexts where attitudes are initially less positive, because there would be greater room for improvement (Dhont & Van Hiel, 2009; Hodson, 2008). Finally, regarding the findings from Chapter 4, the relative influence of outgroup contact and ingroup socialisation may differ depending on the levels of ingroup and outgroup contact.

particularly important in light of the current reproducibility crisis in psychological science (Open Science Collaboration, 2015). In response to the reproducibility crisis, I conducted the present research following the guidelines for recommended research practice (Munafò et al., 2017; Simmons et al., 2011) whenever possible. To this end, I tested my research questions in 10 studies, synthesised the results using meta-analysis when appropriate, conducted robustness checks when there were multiple equally valid analysis choices, and used a range of state-of-the-art analysis techniques tailored to best assess the specific hypothesis under examination, even when the results obtained using more sophisticated techniques did not confirm the hypothesis. Conducting many studies is often not feasible, due to time and monetary requirements, thus collaborations and the analysis of pre-existing data can provide effective alternatives (Munafò et al., 2017). The utility of this approach is demonstrated in this thesis; I was fortunate to be granted access to six secondary datasets (see Appendix A), which enabled me to test the hypotheses in more studies. Nonetheless, replication is required in order to further increase confidence in the present findings. I hope that any replication studies will be pre-registered based on the methods detailed in the present research, in line with the guidelines for recommended practice.

Although further research is required, the 10 studies that comprise this thesis dramatically increase the quantity of research investigating ingroup contact (in addition to outgroup contact). Hitherto, only one study had examined the relationship between ingroup and outgroup contact (Pfister et al., 2020), three studies had examined the effects of ingroup contact on attitudes (Levin et al., 2003; Munniksma et al., 2015; Wilder & Thompson, 1980), and no study had examined attitude socialisation through ingroup and outgroup friends. Accordingly, this thesis significantly increases the volume of empirical data on ingroup contact.

5.4 Conclusion

This thesis has aimed to improve our understanding of the ways in which ingroup contact, in addition to outgroup contact, influences ingroup and outgroup attitudes. Through the three empirical chapters, the important role of ingroup contact in shaping attitudes became apparent. I found that ingroup friendship limits outgroup friendship and shapes attitudes through the process of socialisation. I additionally identified a positive association between ingroup contact and ingroup attitudes, akin to the association between outgroup contact and outgroup attitudes, although I did not find evidence of within-person effects. The findings presented in this thesis have implications for intergroup contact theory, which has prioritised the study of the effects of outgroup contact on outgroup attitudes. The present findings suggest that intergroup contact theory should be extended to consider the role of ingroup contact, in addition to outgroup contact, in order to provide a more comprehensive account of the ways in which contact shapes intergroup relations. The findings also have implications for the analysis methods used to examine intergroup contact theory, demonstrating the importance of disentangling between-person and within-person effects, and using longitudinal social network analysis to recognise attitude socialisation.

This thesis provides an initial examination of ingroup contact and the findings open new avenues for future research in this nascent area of study. Most importantly, future studies should replicate the present research with large samples in a range of intergroup contexts. Future research should also seek to determine the mechanisms underlying the novel effects identified in this thesis, and pay particular attention to the under-examined role of socialisation in shaping attitudes. Furthermore, the present findings may inform the development of future social interventions aimed at improving intergroup relations. As societies become increasingly diverse, strategies should be

developed to increase outgroup contact and thus integration, and to harness ingroup socialisation to promote more positive outgroup attitudes. In summary, I hope that this thesis inspires future research to consider the hitherto neglected role of ingroup contact in shaping ingroup and outgroup attitudes, in order to achieve a comprehensive understanding of how contact shapes intergroup relations.

APPENDICES

Appendix A: Studies

This thesis comprises 10 studies, of which four studies consist of primary data, and six studies consist of secondary data. Here, I present acknowledgements of the researchers, other than my supervisors (Professor Miles Hewstone, Professor Ralf Wölfer, Dr Nils Reimer, Professor Lucy Bowes, and Dr Ben Fell), involved in each study.

Primary Data

I conducted Study 1d in collaboration with Dr James Rae and Project Implicit (www.implicit.harvard.edu). I conducted Study 1f in collaboration with an undergraduate project student, Emma Jackson. I conducted Study 1e and Study 2c. I would like to thank each of my collaborators and supervisors for their invaluable contributions to these studies.

Secondary Data

Dr Hermann Swart granted me access to the data that comprises Study 1a (Crankshaw, 2011). Professor Miles Hewstone and Dr Ben Fell granted me access to the data that comprises Study 1b (Schmid et al., 2008) and Study 1c (Social Integration Commission, 2015). Professor Shana Levin granted me access to the data that comprises Study 2a (Levin et al., 2003; Sidanius et al., 2004; Van Laar et al., 2005; Van Laar et al., 2008). Professor Maarten van Zalk granted me access to the data that comprises Study 2b (Hewstone et al., 2018). Dr Nikhil Sengupta and Professor Fiona Barlow granted me access to the data that comprises Study 2d (Sibley, 2020). I would like to thank each of the researchers who conducted these studies and who were kind enough to grant me access to their data. I would further like to thank Dr Nikhil Sengupta, Professor Fiona Barlow, Professor Maarten van Zalk, and Dr Hermann Swart for providing feedback on my analysis of their respective datasets.

Appendix B: Correlation Matrices

Study 2a Correlation Matrix

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.
1. Ingroup Friends W2	1	.569**	.489**	.511**	.524**	-.295**	-.298**	-.281**	-.343**	-.278**	.058*	.060*	0.034	0.055	.102*	-.097**	-.057*	-.080**	-0.054	-0.021
2. Ingroup Friends W3	.569**	1	.574**	.558**	.595**	-.303**	-.320**	-.343**	-.357**	-.337**	.057*	.089**	0.033	-0.015	.146**	-.088**	-.058*	-.111**	-.109**	-0.021
3. Ingroup Friends W4	.489**	.574**	1	.619**	.606**	-.291**	-.318**	-.326**	-.418**	-.324**	0.029	0.052	0.031	0.018	.160**	-.116**	-.091**	-.135**	-.121**	-0.021
4. Ingroup Friends W5	.511**	.558**	.619**	1	.701**	-.273**	-.316**	-.352**	-.392**	-.386**	0.019	.070*	0.054	0.046	.151**	-.142**	-.077*	-.120**	-.099**	-0.041
5. Ingroup Friends W6	.524**	.595**	.606**	.701**	1	-.262**	-.343**	-.385**	-.430**	-.374**	-0.022	0.025	0.015	-0.017	0.066	-.121**	-.170**	-.134**	-.160**	-0.084
6. Outgroup Friends W2	-.295**	-.303**	-.291**	-.273**	-.262**	1	.572**	.541**	.528**	.464**	.085**	.085**	.077**	.098**	.091*	.237**	.207**	.175**	.192**	.171**
7. Outgroup Friends W3	-.298**	-.320**	-.318**	-.316**	-.343**	.572**	1	.612**	.568**	.449**	.097**	.092**	.107**	.071*	0.044	.212**	.203**	.216**	.177**	.174**
8. Outgroup Friends W4	-.281**	-.343**	-.326**	-.352**	-.385**	.541**	.612**	1	.633**	.567**	.089**	.101**	.108**	.117**	0.020	.227**	.246**	.267**	.267**	.160**
9. Outgroup Friends W5	-.343**	-.357**	-.418**	-.392**	-.430**	.528**	.568**	.633**	1	.602**	0.043	.089**	.107**	.166**	0.055	.209**	.231**	.265**	.309**	.189**
10. Outgroup Friends W6	-.278**	-.337**	-.324**	-.386**	-.374**	.464**	.449**	.567**	.602**	1	0.034	0.003	0.013	.106*	0.006	.170**	.130**	.162**	.228**	.150**
11. Ingroup Attitudes W2	.058*	.057*	0.029	0.019	-0.022	.085**	.097**	.089**	0.043	0.034	1	.498**	.417**	.442**	.378**	.710**	.393**	.332**	.343**	.286**
12. Ingroup Attitudes W3	.060*	.089**	0.052	.070*	0.025	.085**	.092**	.101**	.089**	0.003	.498**	1	.545**	.479**	.439**	.398**	.757**	.445**	.396**	.343**
13. Ingroup Attitudes W4	0.034	0.033	0.031	0.054	0.015	.077**	.107**	.108**	.107**	0.013	.417**	.545**	1	.539**	.466**	.345**	.458**	.734**	.427**	.333**
14. Ingroup Attitudes W5	0.055	-0.015	0.018	0.046	-0.017	.098**	.071*	.117**	.166**	.106*	.442**	.479**	.539**	1	.535**	.338**	.407**	.414**	.759**	.392**
15. Ingroup Attitudes W6	.102*	.146**	.160**	.151**	0.066	.091*	0.044	0.020	0.055	0.006	.378**	.439**	.466**	.535**	1	.320**	.316**	.339**	.386**	.754**
16. Outgroup Attitudes W2	-.097**	-.088**	-.116**	-.142**	-.121**	.237**	.212**	.227**	.209**	.170**	.710**	.398**	.345**	.338**	.320**	1	.573**	.510**	.472**	.438**
17. Outgroup Attitudes W3	-.057*	-.058*	-.091**	-.077*	-.170**	.207**	.203**	.246**	.231**	.130**	.393**	.757**	.458**	.407**	.316**	.573**	1	.633**	.565**	.453**
18. Outgroup Attitudes W4	-.080**	-.111**	-.135**	-.120**	-.134**	.175**	.216**	.267**	.265**	.162**	.332**	.445**	.734**	.414**	.339**	.510**	.633**	1	.593**	.483**
19. Outgroup Attitudes W5	-0.054	-.109**	-.121**	-.099**	-.160**	.192**	.177**	.267**	.309**	.228**	.343**	.396**	.427**	.759**	.386**	.472**	.565**	.593**	1	.580**
20. Outgroup Attitudes W6	-0.021	-0.021	-0.021	-0.041	-0.084	.171**	.174**	.160**	.189**	.150**	.286**	.343**	.333**	.392**	.754**	.438**	.453**	.483**	.580**	1

Note. ** $p < .01$; * $p < .05$. W2 = Wave 2; W3 = Wave 3; W4 = Wave 4; W5 = Wave 5; W6 = Wave 6.

Study 2b Correlation Matrix

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.
1. Ingroup Friends W1	1	.473**	.328**	.308**	.410**	-.184**	-.282**	-.198**	-.088*	-.158**	.359**	.271**	.134**	.215**	.137**	-.115**	-.167**	-.109*	.056	-.131*
2. Ingroup Friends W2	.473**	1	.350**	.281**	.296**	-.280**	-.233**	-.259**	-.145*	-.085	.257**	.403**	.130*	.251**	.151*	-.162**	-.061	-.051	-.005	.011
3. Ingroup Friends W3	.328**	.350**	1	.458**	.447**	-.147**	-.157*	-.277**	-.230**	-.230**	.155**	.145*	.395**	.260**	.117	-.147**	-.135*	-.159**	-.011	-.104
4. Ingroup Friends W4	.308**	.281**	.458**	1	.537**	-.162**	-.151*	-.257**	-.179**	-.241**	.080	.023	.141*	.419**	.117	-.174**	-.165*	-.192**	.003	-.144*
5. Ingroup Friends W5	.410**	.296**	.447**	.537**	1	-.226**	-.206**	-.234**	-.183**	-.255**	.181**	.124	.150*	.330**	.389**	-.184**	-.164*	-.171*	-.099	-.215**
6. Outgroup Friends W1	-.184**	-.280**	-.147**	-.162**	-.226**	1	.570**	.490**	.416**	.286**	-.103**	-.039	-.024	-.043	-.098	.458**	.371**	.381**	.291**	.216**
7. Outgroup Friends W2	-.282**	-.233**	-.157*	-.151*	-.206**	.570**	1	.628**	.416**	.288**	-.063	-.060	-.036	-.039	-.015	.283**	.491**	.378**	.209**	.231**
8. Outgroup Friends W3	-.198**	-.259**	-.277**	-.257**	-.234**	.490**	.628**	1	.594**	.435**	-.075	-.067	-.045	-.087	-.198**	.263**	.402**	.539**	.226**	.185*
9. Outgroup Friends W4	-.088*	-.145*	-.230**	-.179**	-.183**	.416**	.416**	.594**	1	.507**	.019	-.124	.054	-.083	-.044	.233**	.284**	.379**	.489**	.348**
10. Outgroup Friends W5	-.158**	-.085	-.230**	-.241**	-.255**	.286**	.288**	.435**	.507**	1	-.085	-.062	.067	-.188**	-.078	.200**	.259**	.404**	.290**	.526**
11. Ingroup Attitudes W1	.359**	.257**	.155**	.080	.181**	-.103**	-.063	-.075	.019	-.085	1	.468**	.333**	.246**	.244**	.087**	.010	-.014	.047	.009
12. Ingroup Attitudes W2	.271**	.403**	.145*	.023	.124	-.039	-.060	-.067	-.124	-.062	.468**	1	.356**	.303**	.400**	.043	.119*	.080	-.023	.055
13. Ingroup Attitudes W3	.134**	.130*	.395**	.141*	.150*	-.024	-.036	-.045	.054	.067	.333**	.356**	1	.435**	.378**	-.041	.038	.085	.145*	.049
14. Ingroup Attitudes W4	.215**	.251**	.260**	.419**	.330**	-.043	-.039	-.087	-.083	-.188**	.246**	.303**	.435**	1	.477**	-.043	-.012	-.039	.082	-.044
15. Ingroup Attitudes W5	.137**	.151*	.117	.117	.389**	-.098	-.015	-.198**	-.044	-.078	.244**	.400**	.378**	.477**	1	-.053	-.016	-.087	-.060	.018
16. Outgroup Attitudes W1	-.115**	-.162**	-.147**	-.174**	-.184**	.458**	.283**	.263**	.233**	.200**	.087**	.043	-.041	-.043	-.053	1	.465**	.489**	.368**	.277**
17. Outgroup Attitudes W2	-.167**	-.061	-.135*	-.165*	-.164*	.371**	.491**	.402**	.284**	.259**	.010	.119*	.038	-.012	-.016	.465**	1	.635**	.316**	.331**
18. Outgroup Attitudes W3	-.109*	-.051	-.159**	-.192**	-.171*	.381**	.378**	.539**	.379**	.404**	-.014	.080	.085	-.039	-.087	.489**	.635**	1	.497**	.441**
19. Outgroup Attitudes W4	.056	-.005	-.011	.003	-.099	.291**	.209**	.226**	.489**	.290**	.047	-.023	.145*	.082	-.060	.368**	.316**	.497**	1	.494**
20. Outgroup Attitudes W5	-.131*	.011	-.104	-.144*	-.215**	.216**	.231**	.185*	.348**	.526**	.009	.055	.049	-.044	.018	.277**	.331**	.441**	.494**	1

Note. ** $p < .01$; * $p < .05$. W1 = Wave 1; W2 = Wave 2; W3 = Wave 3; W4 = Wave 4; W5 = Wave 5.

Study 2c Correlation Matrix (Friends and Attitudes)

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.
1. Ingroup Friends W1	1	.692**	.662**	.645**	.615**	-.435**	-.375**	-.422**	-.408**	-.381**	.109**	.081*	.112**	.067*	.101**	.098**	.083*	.106**	.061	.096**
2. Ingroup Friends W2	.692**	1	.732**	.690**	.680**	-.361**	-.419**	-.408**	-.383**	-.368**	.086**	.150**	.151**	.046	.143**	.079*	.145**	.146**	.044	.130**
3. Ingroup Friends W3	.662**	.732**	1	.784**	.726**	-.370**	-.405**	-.485**	-.442**	-.434**	.093**	.110**	.161**	.029	.115**	.085*	.111**	.157**	.031	.105**
4. Ingroup Friends W4	.645**	.690**	.784**	1	.745**	-.355**	-.358**	-.439**	-.491**	-.434**	.051	.071*	.093**	.092**	.124**	.059	.067*	.080*	.090**	.109**
5. Ingroup Friends W5	.615**	.680**	.726**	.745**	1	-.336**	-.343**	-.424**	-.435**	-.469**	.048	.088**	.135**	.065	.154**	.048	.092**	.123**	.059	.130**
6. Outgroup Friends W1	-.435**	-.361**	-.370**	-.355**	-.336**	1	.680**	.688**	.632**	.600**	-.015	-.034	-.010	.012	-.019	-.003	-.030	-.009	.011	-.017
7. Outgroup Friends W2	-.375**	-.419**	-.405**	-.358**	-.343**	.680**	1	.726**	.656**	.675**	.031	.026	-.001	.001	.025	.035	.035	-.004	.007	.029
8. Outgroup Friends W3	-.422**	-.408**	-.485**	-.439**	-.424**	.688**	.726**	1	.774**	.755**	.001	-.041	-.028	.065*	.020	-.014	-.037	-.029	.068*	.022
9. Outgroup Friends W4	-.408**	-.383**	-.442**	-.491**	-.435**	.632**	.656**	.774**	1	.758**	.025	-.103**	-.043	.012	-.045	.010	-.096**	-.042	.022	-.038
10. Outgroup Friends W5	-.381**	-.368**	-.434**	-.434**	-.469**	.600**	.675**	.755**	.758**	1	.072*	-.006	-.062	.004	.024	.068*	-.001	-.059	.011	.034
11. Ingroup Attitudes W1	.109**	.086**	.093**	.051	.048	-.015	.031	.001	.025	.072*	1	.130**	.050	.074*	.123**	.938**	.130**	.070*	.082**	.123**
12. Ingroup Attitudes W2	.081*	.150**	.110**	.071*	.088**	-.034	.026	-.041	-.103**	-.006	.130**	1	.236**	.225**	.277**	.143**	.986**	.258**	.223**	.272**
13. Ingroup Attitudes W3	.112**	.151**	.161**	.093**	.135**	-.010	-.001	-.028	-.043	-.062	.050	.236**	1	.378**	.358**	.052	.240**	.965**	.373**	.357**
14. Ingroup Attitudes W4	.067*	.046	.029	.092**	.065	.012	.001	.065*	.012	.004	.074*	.225**	.378**	1	.384**	.063*	.228**	.393**	.986**	.378**
15. Ingroup Attitudes W5	.101**	.143**	.115**	.124**	.154**	-.019	.025	.020	-.045	.024	.123**	.277**	.358**	.384**	1	.124**	.280**	.372**	.392**	.991**
16. Outgroup Attitudes W1	.098**	.079*	.085*	.059	.048	-.003	.035	-.014	.010	.068*	.938**	.143**	.052	.063*	.124**	1	.147**	.072*	.060*	.125**
17. Outgroup Attitudes W2	.083*	.145**	.111**	.067*	.092**	-.030	.035	-.037	-.096**	-.001	.130**	.986**	.240**	.228**	.280**	.147**	1	.270**	.226**	.274**
18. Outgroup Attitudes W3	.106**	.146**	.157**	.080*	.123**	-.009	-.004	-.029	-.042	-.059	.070*	.258**	.965**	.393**	.372**	.072*	.270**	1	.387**	.371**
19. Outgroup Attitudes W4	.061	.044	.031	.090**	.059	.011	.007	.068*	.022	.011	.082**	.223**	.373**	.986**	.392**	.060*	.226**	.387**	1	.386**
20. Outgroup Attitudes W5	.096**	.130**	.105**	.109**	.130**	-.017	.029	.022	-.038	.034	.123**	.272**	.357**	.378**	.991**	.125**	.274**	.371**	.386**	1

Note. ** $p < .01$; * $p < .05$. W1 = Wave 1; W2 = Wave 2; W3 = Wave 3; W4 = Wave 4; W5 = Wave 5.

Study 2c Correlation Matrix (Generic Contact and Attitudes)

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.
1. Ingroup Contact W1	1	.215**	.139**	.136**	.175**	.963**	.201**	.135**	.132**	.192**	.808**	.191**	.086**	.110**	.167**	.811**	.200**	.099**	.108**	.167**
2. Ingroup Contact W2	.215**	1	.309**	.289**	.318**	.203**	.978**	.294**	.283**	.312**	.155**	.904**	.264**	.245**	.305**	.160**	.899**	.283**	.239**	.299**
3. Ingroup Contact W3	.139**	.309**	1	.402**	.376**	.141**	.303**	.957**	.408**	.374**	.081**	.287**	.882**	.379**	.379**	.082**	.289**	.868**	.378**	.376**
4. Ingroup Contact W4	.136**	.289**	.402**	1	.379**	.147**	.287**	.386**	.973**	.369**	.098**	.258**	.386**	.915**	.368**	.081**	.261**	.399**	.906**	.362**
5. Ingroup Contact W5	.175**	.318**	.376**	.379**	1	.172**	.316**	.376**	.377**	.970**	.144**	.284**	.354**	.379**	.964**	.140**	.287**	.371**	.387**	.960**
6. Outgroup Contact W1	.963**	.203**	.141**	.147**	.172**	1	.189**	.136**	.143**	.189**	.804**	.179**	.083**	.117**	.164**	.802**	.188**	.096**	.115**	.164**
7. Outgroup Contact W2	.201**	.978**	.303**	.287**	.316**	.189**	1	.288**	.282**	.310**	.146**	.896**	.259**	.244**	.304**	.151**	.891**	.278**	.238**	.298**
8. Outgroup Contact W3	.135**	.294**	.957**	.386**	.376**	.136**	.288**	1	.387**	.370**	.093**	.268**	.862**	.360**	.375**	.088**	.275**	.857**	.359**	.373**
9. Outgroup Contact W4	.132**	.283**	.408**	.973**	.377**	.143**	.282**	.387**	1	.366**	.095**	.249**	.393**	.905**	.366**	.078**	.252**	.401**	.897**	.360**
10. Outgroup Contact W5	.192**	.312**	.374**	.369**	.970**	.189**	.310**	.370**	.366**	1	.158**	.274**	.348**	.369**	.952**	.158**	.272**	.366**	.377**	.947**
11. Ingroup Attitudes W1	.808**	.155**	.081**	.098**	.144**	.804**	.146**	.093**	.095**	.158**	1	.130**	.050	.074*	.123**	.938**	.130**	.070*	.082**	.123**
12. Ingroup Attitudes W2	.191**	.904**	.287**	.258**	.284**	.179**	.896**	.268**	.249**	.274**	.130**	1	.236**	.225**	.277**	.143**	.986**	.258**	.223**	.272**
13. Ingroup Attitudes W3	.086**	.264**	.882**	.386**	.354**	.083**	.259**	.862**	.393**	.348**	.050	.236**	1	.378**	.358**	.052	.240**	.965**	.373**	.357**
14. Ingroup Attitudes W4	.110**	.245**	.379**	.915**	.379**	.117**	.244**	.360**	.905**	.369**	.074*	.225**	.378**	1	.384**	.063*	.228**	.393**	.986**	.378**
15. Ingroup Attitudes W5	.167**	.305**	.379**	.368**	.964**	.164**	.304**	.375**	.366**	.952**	.123**	.277**	.358**	.384**	1	.124**	.280**	.372**	.392**	.991**
16. Outgroup Attitudes W1	.811**	.160**	.082**	.081**	.140**	.802**	.151**	.088**	.078**	.158**	.938**	.143**	.052	.063*	.124**	1	.147**	.072*	.060*	.125**
17. Outgroup Attitudes W2	.200**	.899**	.289**	.261**	.287**	.188**	.891**	.275**	.252**	.272**	.130**	.986**	.240**	.228**	.280**	.147**	1	.270**	.226**	.274**
18. Outgroup Attitudes W3	.099**	.283**	.868**	.399**	.371**	.096**	.278**	.857**	.401**	.366**	.070*	.258**	.965**	.393**	.372**	.072*	.270**	1	.387**	.371**
19. Outgroup Attitudes W4	.108**	.239**	.378**	.906**	.387**	.115**	.238**	.359**	.897**	.377**	.082**	.223**	.373**	.986**	.392**	.060*	.226**	.387**	1	.386**
20. Outgroup Attitudes W5	.167**	.299**	.376**	.362**	.960**	.164**	.298**	.373**	.360**	.947**	.123**	.272**	.357**	.378**	.991**	.125**	.274**	.371**	.386**	1

Note. ** $p < .01$; * $p < .05$. W1 = Wave 1; W2 = Wave 2; W3 = Wave 3; W4 = Wave 4; W5 = Wave 5.

Study 2d Correlation Matrix

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.
1. Ingroup Contact W1	1	.373**	.349**	.358**	.334**	.402**	.127**	.116**	.112**	.099**	.325**	.221**	.214**	.226**	.216**	.150**	.091**	.077**	.099**	.092**
2. Ingroup Contact W2	.373**	1	.437**	.429**	.430**	.138**	.354**	.145**	.137**	.135**	.256**	.328**	.250**	.262**	.247**	.074**	.136**	.104**	.124**	.106**
3. Ingroup Contact W3	.349**	.437**	1	.459**	.448**	.112**	.147**	.369**	.158**	.147**	.254**	.252**	.342**	.300**	.263**	.092**	.097**	.157**	.144**	.125**
4. Ingroup Contact W4	.358**	.429**	.459**	1	.500**	.120**	.141**	.177**	.378**	.172**	.252**	.248**	.259**	.338**	.272**	.095**	.102**	.114**	.164**	.125**
5. Ingroup Contact W5	.334**	.430**	.448**	.500**	1	.115**	.152**	.156**	.177**	.363**	.251**	.249**	.261**	.319**	.332**	.081**	.087**	.104**	.153**	.166**
6. Outgroup Contact W1	.402**	.138**	.112**	.120**	.115**	1	.516**	.477**	.467**	.438**	.066**	-.003	-.003	.016	-.009	.470**	.381**	.359**	.340**	.347**
7. Outgroup Contact W2	.127**	.354**	.147**	.141**	.152**	.516**	1	.542**	.523**	.519**	.035*	.061**	.034**	.032**	.023*	.375**	.449**	.372**	.366**	.356**
8. Outgroup Contact W3	.116**	.145**	.369**	.177**	.156**	.477**	.542**	1	.538**	.523**	.032*	.049**	.075**	.053**	.034**	.371**	.373**	.438**	.372**	.363**
9. Outgroup Contact W4	.112**	.137**	.158**	.378**	.177**	.467**	.523**	.538**	1	.570**	.044**	.043**	.035**	.073**	.034**	.334**	.348**	.352**	.412**	.360**
10. Outgroup Contact W5	.099**	.135**	.147**	.172**	.363**	.438**	.519**	.523**	.570**	1	.030*	.037**	.034**	.062**	.066**	.320**	.349**	.341**	.371**	.417**
11. Ingroup Attitudes W1	.325**	.256**	.254**	.252**	.251**	.066**	.035*	.032*	.044**	.030*	1	.461**	.454**	.453**	.442**	.343**	.115**	.115**	.147**	.158**
12. Ingroup Attitudes W2	.221**	.328**	.252**	.248**	.249**	-.003	.061**	.049**	.043**	.037**	.461**	1	.468**	.442**	.447**	.089**	.378**	.117**	.119**	.130**
13. Ingroup Attitudes W3	.214**	.250**	.342**	.259**	.261**	-.003	.034**	.075**	.035**	.034**	.454**	.468**	1	.483**	.480**	.092**	.108**	.409**	.153**	.154**
14. Ingroup Attitudes W4	.226**	.262**	.300**	.338**	.319**	.016	.032**	.053**	.073**	.062**	.453**	.442**	.483**	1	.521**	.090**	.091**	.124**	.438**	.157**
15. Ingroup Attitudes W5	.216**	.247**	.263**	.272**	.332**	-.009	.023*	.034**	.034**	.066**	.442**	.447**	.480**	.521**	1	.077**	.090**	.117**	.153**	.428**
16. Outgroup Attitudes W1	.150**	.074**	.092**	.095**	.081**	.470**	.375**	.371**	.334**	.320**	.343**	.089**	.092**	.090**	.077**	1	.559**	.550**	.528**	.536**
17. Outgroup Attitudes W2	.091**	.136**	.097**	.102**	.087**	.381**	.449**	.373**	.348**	.349**	.115**	.378**	.108**	.091**	.090**	.559**	1	.545**	.513**	.521**
18. Outgroup Attitudes W3	.077**	.104**	.157**	.114**	.104**	.359**	.372**	.438**	.352**	.341**	.115**	.117**	.409**	.124**	.117**	.550**	.545**	1	.548**	.538**
19. Outgroup Attitudes W4	.099**	.124**	.144**	.164**	.153**	.340**	.366**	.372**	.412**	.371**	.147**	.119**	.153**	.438**	.153**	.528**	.513**	.548**	1	.572**
20. Outgroup Attitudes W5	.092**	.106**	.125**	.125**	.166**	.347**	.356**	.363**	.360**	.417**	.158**	.130**	.154**	.157**	.428**	.536**	.521**	.538**	.572**	1

Note. ** $p < .01$; * $p < .05$. W1 = Wave 1; W2 = Wave 2; W3 = Wave 3; W4 = Wave 4; W5 = Wave 5.

Appendix C: Multivariate Latent Growth Models

In this appendix, I report the full results of the multivariate latent growth models detailed in Chapter 2. The three subsections included in this appendix present the results of the multivariate latent growth models for Studies 2a, 2b and 2c respectively. In each subsection, I report the means and variances for the four latent variables modelled in each analysis, that is, the intercept of ingroup friends, slope of ingroup friends, intercept of outgroup friends, and slope of outgroup friends. Additionally, I report the correlations between all four latent variables. As I estimated separate multivariate latent growth models for each ethnic group, I present the results for each ethnic group in a separate table.

Study 2a

Table C1. Means and variances of the intercepts and slopes of ingroup friends and outgroup friends (White American respondents)

			Mean			Variance
	estimate	*se*	*p*	*estimate*	*se*	*p*
Intercept of ingroup friends	3.41	0.03	<.001	0.33	0.04	<.001
Slope of ingroup friends	-0.01	0.01	.712	0.02	0.01	.001
Intercept of outgroup friends	1.94	0.02	<.001	0.13	0.01	<.001
Slope of outgroup friends	0.03	0.01	<.001	0.01	0.00	<.001

Table C2. Correlations between the intercepts and slopes of ingroup friends and outgroup friends (White American respondents)

		1.		2.		3.
	r	*se*	*r*	*se*	*r*	*se*
1. Intercept of ingroup friends	-	-				
2. Slope of ingroup friends	-0.41*	0.10	-	-		
3. Intercept of outgroup friends	-0.60*	0.05	0.29*	0.11	-	-
4. Slope of outgroup friends	0.18	0.10	-0.45*	0.15	-0.49*	0.07

Note. * significant correlation ($p < .05$).

Table C3. Means and variances of the intercepts and slopes of ingroup friends and outgroup friends (Asian American respondents)

			Mean			Variance
	estimate	*se*	*p*	*estimate*	*se*	*p*
Intercept of ingroup friends	3.30	0.03	<.001	0.48	0.04	<.001
Slope of ingroup friends	0.02	0.01	.057	0.02	0.01	<.001
Intercept of outgroup friends	1.81	0.02	<.001	0.11	0.01	<.001
Slope of outgroup friends	0.02	0.01	.009	0.01	0.00	.230

Table C4. Correlations between the intercepts and slopes of ingroup friends and outgroup friends (Asian American respondents)

		1.		2.		3.
	r	*se*	*r*	*se*	*r*	*se*
1. Intercept of ingroup friends	-	-				
2. Slope of ingroup friends	-0.34*	0.09	-	-		
3. Intercept of outgroup friends	-0.54*	0.06	0.26*	0.11	-	-
4. Slope of outgroup friends	0.06	0.17	-0.89*	0.40	0.09	0.27

Note. * significant correlation ($p < .05$).

Table C5. Means and variances of the intercepts and slopes of ingroup friends and outgroup friends (Latino American respondents)

			Mean			Variance
	estimate	*se*	*p*	*estimate*	*se*	*p*
Intercept of ingroup friends	3.08	0.04	<.001	0.46	0.06	<.001
Slope of ingroup friends	0.02	0.02	.166	0.01	0.01	.020
Intercept of outgroup friends	2.12	0.02	<.001	0.13	0.02	<.001
Slope of outgroup friends	-0.01	0.02	.145	0.01	0.00	.002

Table C6. Correlations between the intercepts and slopes of ingroup friends and outgroup friends (Latino American respondents)

		1.		2.		3.
	r	*se*	*r*	*se*	*r*	*se*
1. Intercept of ingroup friends	-	-				
2. Slope of ingroup friends	0.16	0.21	-	-		
3. Intercept of outgroup friends	-0.45*	0.07	-0.37*	0.15	-	-
4. Slope of outgroup friends	-0.28*	0.13	-0.23	0.22	-0.14	0.14

Note. * significant correlation ($p < .05$).

Table C7. Means and variances of the intercepts and slopes of ingroup friends and outgroup friends (Black/African American respondents)

			Mean			Variance
	estimate	*se*	*p*	*estimate*	*se*	*p*
Intercept of ingroup friends	3.37	0.09	<.001	0.78	0.14	<.001
Slope of ingroup friends	-0.04	0.03	.160	0.03	0.01	.040
Intercept of outgroup friends	1.98	0.04	<.001	0.17	0.03	<.001
Slope of outgroup friends	0.04	0.01	.007	0.01	0.00	.755

Table C8. Correlations between the intercepts and slopes of ingroup friends and outgroup friends (Black/African American respondents)

		1.		2.		3.
	r	*se*	*r*	*se*	*r*	*se*
1. Intercept of ingroup friends	-	-				
2. Slope of ingroup friends	-0.29	0.18	-	-		
3. Intercept of outgroup friends	-0.34*	0.12	-0.06	0.22	-	-
4. Slope of outgroup friends	-0.40	0.84	-0.30	0.83	-0.16	0.51

Note. * significant correlation ($p < .05$).

Study 2b

Table C9. Means and variances of the intercepts and slopes of ingroup friends and outgroup friends (White British respondents)

	Mean			Variance		
	estimate	*se*	*p*	*estimate*	*se*	*p*
Intercept of ingroup friends	4.75	0.02	<.001	0.14	0.03	<.001
Slope of ingroup friends	-0.01	0.01	.818	0.01	0.00	.001
Intercept of outgroup friends	2.31	0.04	<.001	0.59	0.07	<.001
Slope of outgroup friends	0.02	0.02	.262	0.06	0.01	<.001

Table C10. Correlations between the intercepts and slopes of ingroup friends and outgroup friends (White British respondents)

		1.		2.		3.
	r	*se*	*r*	*se*	*r*	*se*
1. Intercept of ingroup friends	-	-				
2. Slope of ingroup friends	-0.54*	0.12	-	-		
3. Intercept of outgroup friends	-0.34*	0.08	0.07	0.10	-	-
4. Slope of outgroup friends	0.23*	0.10	-0.29*	0.13	-0.56*	0.06

Note. * significant correlation ($p < .05$).

Table C11. Means and variances of the intercepts and slopes of ingroup friends and outgroup friends (Asian British respondents)

	Mean			Variance		
	estimate	*se*	*p*	*estimate*	*se*	*p*
Intercept of ingroup friends	4.63	0.05	<.001	0.42	0.07	<.001
Slope of ingroup friends	0.01	0.02	.489	0.02	0.01	.078
Intercept of outgroup friends	3.13	0.06	<.001	0.99	0.14	<.001
Slope of outgroup friends	-0.05	0.02	.031	0.03	0.01	.028

Table C12. Correlations between the intercepts and slopes of ingroup friends and outgroup friends (Asian British respondents)

		1.		2.		3.
	r	*se*	*r*	*se*	*r*	*se*
1. Intercept of ingroup friends	-	-				
2. Slope of ingroup friends	-0.33	0.17	-	-		
3. Intercept of outgroup friends	-0.39*	0.09	0.05	0.16	-	-
4. Slope of outgroup friends	0.23	0.17	-0.34	0.28	-0.55*	0.12

Note. * significant correlation ($p < .05$).

Study 2c

Table C13. Means and variances of the intercepts and slopes of ingroup friends and outgroup friends (White British respondents)

			Mean			Variance
	estimate	*se*	*p*	*estimate*	*se*	*p*
Intercept of ingroup friends	5.24	0.13	<.001	4.51	0.48	<.001
Slope of ingroup friends	-0.08	0.03	.006	0.07	0.03	.007
Intercept of outgroup friends	1.25	0.09	<.001	2.16	0.22	<.001
Slope of outgroup friends	0.06	0.03	.019	0.06	0.02	<.001

Table C14. Correlations between the intercepts and slopes of ingroup friends and outgroup friends (White British respondents)

		1.		2.		3.
	r	*se*	*r*	*se*	*r*	*se*
1. Intercept of ingroup friends	-	-				
2. Slope of ingroup friends	-0.27*	0.12	-	-		
3. Intercept of outgroup friends	-0.53*	0.06	0.42*	0.13	-	-
4. Slope of outgroup friends	0.14	0.11	-0.94*	0.22	-0.14	0.11

Note. * significant correlation ($p < .05$).

Table C15. Means and variances of the intercepts and slopes of ingroup friends and outgroup friends (Asian British respondents)

			Mean			Variance
	estimate	*se*	*p*	*estimate*	*se*	*p*
Intercept of ingroup friends	6.47	0.09	<.001	4.51	0.31	<.001
Slope of ingroup friends	0.08	0.02	<.001	0.10	0.02	<.001
Intercept of outgroup friends	0.87	0.04	<.001	1.16	0.08	<.001
Slope of outgroup friends	-0.02	0.01	.048	0.03	0.01	<.001

Table C16. Correlations between the intercepts and slopes of ingroup friends and outgroup friends (Asian British respondents)

		1.		2.		3.
	r	*se*	*r*	*se*	*r*	*se*
1. Intercept of ingroup friends	-	-				
2. Slope of ingroup friends	-0.30*	0.07	-	-		
3. Intercept of outgroup friends	-0.58*	0.04	0.29*	0.08	-	-
4. Slope of outgroup friends	0.18*	0.07	-0.81*	0.12	-0.25*	0.07

Note. * significant correlation ($p < .05$).

Appendix D: Random-Intercept Cross Lagged Panel Models

In this appendix, I report the full results of the random-intercept cross lagged panel models (RI-CLPM) detailed in Chapter 3. The four sections of this appendix present the results of the RI-CLPMs for Studies 2a, 2b, 2c and 2d respectively. In each section, I report all the within-person effects in the first table, and all the between-person effects in the second table. Study 2c uniquely assessed two types of contact (i.e., generic contact and friendship), and for this study I present the results for each type of contact in a separate table.

Study 2a

Table D1. Within-Person Coefficients for Study 2a

	White American				Asian American				Latino American				Black/African American			
Time t+1			*95% CI*				*95% CI*				*95% CI*				*95% CI*	
Time t	*b*	*p*	*low*	*high*	*b*	*p*	*low*	*high*	*b*	*p*	*low*	*high*	*b*	*p*	*low*	*high*
Ingroup Friends																
Ingroup friends	0.24	<.001	0.14	0.34	0.12	.003	0.04	0.20	0.19	.008	0.05	0.33	0.35	<.001	0.17	0.54
Outgroup friends	-0.12	.136	-0.29	0.04	-0.12	.071	-0.26	0.01	-0.14	.195	-0.35	0.07	0.14	.390	-0.18	0.45
Ingroup attitudes	-0.05	.269	-0.13	0.04	0.08	.032	0.01	0.15	-0.03	.584	-0.14	0.08	0.06	.540	-0.14	0.27
Outgroup attitudes	0.09	.094	-0.01	0.18	-0.02	.685	-0.09	0.06	-0.03	.683	-0.16	0.11	-0.12	.242	-0.31	0.08
Outgroup Friends																
Ingroup friends	-0.07	.002	-0.12	-0.03	-0.05	.021	-0.09	-0.01	-0.03	.305	-0.09	0.03	0.04	.318	-0.04	.0.13
Outgroup friends	0.20	<.001	0.09	0.31	0.10	.033	0.01	0.19	0.19	.001	0.08	0.30	0.07	.483	-0.13	0.26
Ingroup attitudes	0.03	.205	-0.02	0.07	0.03	.153	-0.01	0.07	-0.07	.022	-0.13	-0.01	0.05	.331	-0.05	0.16
Outgroup attitudes	0.01	.868	-0.05	0.06	0.01	.728	-0.04	0.05	0.09	.004	0.03	0.16	-0.09	.074	-0.20	0.01
Ingroup Attitudes																
Ingroup friends	**0.05**	**.447**	**-0.08**	**0.18**	**0.09**	**.070**	**-0.01**	**0.19**	**-0.08**	**.146**	**-0.18**	**0.03**	**-0.07**	**.372**	**-0.23**	**0.09**
Outgroup friends	**0.25**	**.052**	**-0.01**	**0.50**	**0.07**	**.411**	**-0.11**	**0.27**	**0.03**	**.797**	**-0.16**	**0.21**	**0.14**	**.359**	**-0.17**	**0.45**
Ingroup attitudes	0.26	<.001	0.12	0.40	0.10	.077	-0.01	0.20	0.05	.437	-0.08	0.17	0.21	.060	-0.01	0.42
Outgroup attitudes	-0.15	.050	-0.31	0.00	0.05	.375	-0.06	0.17	0.12	.074	-0.01	0.25	-0.03	.773	-0.22	0.16
Outgroup Attitudes																
Ingroup friends	**0.07**	**.211**	**-0.04**	**0.18**	**0.07**	**.117**	**-0.02**	**0.17**	**-0.07**	**.229**	**-0.19**	**0.05**	**-0.21**	**.019**	**-0.39**	**-0.04**
Outgroup friends	**0.18**	**.124**	**-0.05**	**0.41**	**0.13**	**.160**	**-0.05**	**0.31**	**0.09**	**.404**	**-0.12**	**0.30**	**0.06**	**.735**	**-0.28**	**0.39**
Ingroup attitudes	-0.03	.629	-0.15	0.09	-0.04	.375	-0.14	0.05	-0.04	.515	-0.18	0.09	0.37	.001	0.16	0.59
Outgroup attitudes	0.16	.041	0.01	0.31	0.17	.002	0.06	0.28	0.30	.001	0.13	0.46	-0.08	.498	-0.30	0.15

Note. Results in bold indicate the effects relating to the hypotheses.

Table D2. Between-Person Correlations for Study 2a

	White American				Asian American				Latino American				Black/African American			
	1.	2.	3.	4.	1.	2.	3.	4.	1.	2.	3.	4.	1.	2.	3.	4.
1. Ingroup friends	-	-.63*	**-.11**	**-.42***	-	-.48*	**.21***	**-.04**	-	-.65*	**.19***	**-.13**	-	-.55*	**.41***	**.03**
2. Outgroup friends		-	**.14**	**.38***		-	**-.02**	**.28***		-	**.05**	**.21***		-	**.15**	**.55***
3. Ingroup attitudes			-	.83*			-	.75*			-	.72*			-	.58*
4. Outgroup attitudes				-				-				-				-

Note. Results in bold indicate the correlations relating to the hypotheses. * denotes significant correlations ($p < .05$).

Study 2b

Table D3. Within-Person Coefficients for Study 2b

				White British					Asian British	
Time t+1				*95% CI*					*95% CI*	
Time t	*b*	*se*	*p*	*low*	*high*	*b*	*se*	*p*	*low*	*high*
Ingroup Friends										
Ingroup friends	0.13	0.05	.006	0.04	0.23	0.23	0.07	.002	0.09	0.37
Outgroup friends	-0.06	0.03	.028	-0.12	-0.01	-0.04	0.05	.415	-0.13	0.05
Ingroup attitudes	0.12	0.04	.005	0.04	0.20	-0.03	0.07	.678	-0.17	0.11
Outgroup attitudes	-0.02	0.03	.511	-0.08	0.04	-0.06	0.05	.232	-0.17	0.04
Outgroup Friends										
Ingroup friends	-0.17	0.08	.028	-0.32	-0.02	-0.21	0.10	.038	-0.40	-0.01
Outgroup friends	0.32	0.06	<.001	0.21	0.44	0.17	0.08	.032	0.02	0.33
Ingroup attitudes	0.02	0.07	.771	-0.12	0.16	0.10	0.11	.357	-0.11	0.31
Outgroup attitudes	0.08	0.05	.121	-0.02	0.17	-0.01	0.08	.879	-0.17	0.15
Ingroup Attitudes										
Ingroup friends	**0.13**	**0.05**	**.018**	**0.02**	**0.24**	**0.02**	**0.07**	**.817**	**-0.12**	**0.15**
Outgroup friends	**0.03**	**0.03**	**.419**	**-0.04**	**0.09**	**-0.02**	**0.05**	**.766**	**-0.11**	**0.08**
Ingroup attitudes	0.24	0.06	<.001	0.13	0.34	0.08	0.08	.339	-0.08	0.24
Outgroup attitudes	-0.01	0.03	.682	-0.08	0.05	0.01	0.06	.857	-0.10	0.12
Outgroup Attitudes										
Ingroup friends	**-0.05**	**0.08**	**.575**	**-0.21**	**0.12**	**-0.09**	**0.09**	**.273**	**-0.26**	**0.07**
Outgroup friends	**0.08**	**0.06**	**.144**	**-0.03**	**0.19**	**-0.02**	**0.06**	**.701**	**-0.14**	**0.09**
Ingroup attitudes	0.10	0.08	.179	-0.05	0.25	-0.07	0.09	.485	-0.25	0.12
Outgroup attitudes	0.22	0.06	<.001	0.10	0.34	0.20	0.08	.008	0.05	0.35

Note. Results in bold indicate the effects relating to the hypotheses.

Table D4. Between-Person Correlations for Study 2b

	1.	2.	3.	4.
1. Ingroup friends	-	-.30*	**.47***	**-.24***
2. Outgroup friends	-.36*	-	**-.20**	**.76***
3. Ingroup attitudes	**.52***	**-.11**	-	-.03
4. Outgroup attitudes	**-.31***	**.62***	-.04	-

Note. Results for White British students are above the diagonal, and results for Asian British students are below the diagonal. Results in bold indicate the correlations relating to the hypotheses. * denotes significant correlations ($p < .05$).

Study 2c

Table D5. Within-Person Coefficients for Study 2c (Friendship)

	White British					Asian British				
Time t+1				*95% CI*					*95% CI*	
Time t	*b*	*se*	*p*	*low*	high	*b*	*se*	*p*	*low*	high
Ingroup Friends										
Ingroup friends	0.18	0.06	.004	0.06	0.29	0.20	0.04	<.001	0.13	0.27
Outgroup friends	-0.04	0.07	.519	-0.18	0.09	-0.07	0.05	.185	-0.18	0.03
Ingroup attitudes	0.07	0.13	.602	-0.19	0.33	0.00	0.07	.956	-0.14	0.15
Outgroup attitudes	0.13	0.12	.285	-0.11	0.37	-0.07	0.08	.332	-0.22	0.07
Outgroup Friends										
Ingroup friends	-0.04	0.04	.337	-0.11	0.04	-0.01	0.02	.638	-0.04	0.02
Outgroup friends	0.20	0.06	.001	0.08	0.31	0.21	0.04	<.001	0.14	0.28
Ingroup attitudes	-0.03	0.10	.776	-0.23	0.17	0.05	0.04	.227	-0.03	0.13
Outgroup attitudes	-0.05	0.09	.580	-0.23	0.13	0.00	0.04	.925	-0.08	0.08
Ingroup Attitudes										
Ingroup friends	**0.00**	**0.02**	**.998**	**-0.05**	**0.05**	**0.00**	**0.01**	**.832**	**-0.02**	**0.02**
Outgroup friends	**-0.02**	**0.03**	**.488**	**-0.09**	**0.04**	**0.03**	**0.02**	**.160**	**-0.01**	**0.07**
Ingroup attitudes	0.21	0.08	.006	0.06	0.36	0.05	0.03	.095	-0.01	0.11
Outgroup attitudes	-0.11	0.06	.047	-0.23	0.00	0.06	0.03	.040	0.00	0.11
Outgroup Attitudes										
Ingroup friends	**0.03**	**0.03**	**.248**	**-0.02**	**0.08**	**-0.03**	**0.01**	**.026**	**-0.05**	**0.00**
Outgroup friends	**-0.05**	**0.03**	**.161**	**-0.11**	**0.02**	**-0.03**	**0.02**	**.234**	**-0.07**	**0.02**
Ingroup attitudes	-0.07	0.07	.325	-0.19	0.06	0.01	0.03	.738	-0.05	0.06
Outgroup attitudes	0.25	0.07	.001	0.11	0.39	0.10	0.03	.002	0.04	0.17

Note. Results in bold indicate the effects relating to the hypotheses.

Table D6. Between-Person Correlations for Study 2c (Friendship)

	1.	2.	3.	4.
1. Ingroup friends	-	-.44*	**.26***	**.04**
2. Outgroup friends	-.54*	-	**.08**	**.36***
3. Ingroup attitudes	**.30***	**-.11***	-	.58*
4. Outgroup attitudes	**.08**	**.27***	.37*	-

Note. Results for White British students are above the diagonal, and results for Asian British students are below the diagonal. Results in bold indicate the correlations relating to the hypotheses. * denotes significant correlations ($p < .05$).

Table D7. Within-Person Coefficients for Study 2c (Generic Contact)

	White British					Asian British				
Time t+1				*95% CI*					*95% CI*	
Time t	*b*	*se*	*p*	*low*	high	*b*	*se*	*p*	*low*	high
Ingroup Contact										
Ingroup contact	0.24	0.07	<.001	0.11	0.37	0.07	0.03	.034	0.01	0.13
Outgroup contact	-0.03	0.04	.345	-0.10	0.04	0.04	0.02	.040	0.00	0.07
Ingroup attitudes	-0.02	0.05	.662	-0.13	0.08	-0.01	0.02	.724	-0.05	0.03
Outgroup attitudes	-0.04	0.05	.425	-0.14	0.06	0.00	0.02	.945	-0.05	0.04
Outgroup Contact										
Ingroup contact	0.20	0.08	.017	0.04	0.36	0.16	0.05	.001	0.07	0.26
Outgroup contact	0.18	0.06	.004	0.06	0.30	0.11	0.03	.001	0.04	0.18
Ingroup attitudes	-0.24	0.08	.002	-0.40	-0.09	-0.10	0.04	.006	-0.18	-0.03
Outgroup attitudes	0.19	0.07	.008	0.05	0.34	0.04	0.04	.346	-0.04	0.11
Ingroup Attitudes										
Ingroup contact	**0.02**	**0.07**	**.801**	**-0.12**	**0.15**	**0.011**	**0.034**	**.736**	**-0.05**	**0.07**
Outgroup contact	**-0.07**	**0.04**	**.118**	**-0.15**	**0.02**	**-0.03**	**0.02**	**.231**	**-0.07**	**0.02**
Ingroup attitudes	0.13	0.07	.070	-0.01	0.26	0.05	0.03	.076	-0.01	0.11
Outgroup attitudes	-0.08	0.06	.167	-0.19	0.03	0.06	0.03	.031	0.01	0.12
Outgroup Attitudes										
Ingroup contact	**0.06**	**0.07**	**.401**	**-0.08**	**0.21**	**0.00**	**0.04**	**.949**	**-0.07**	**0.07**
Outgroup contact	**0.09**	**0.05**	**.049**	**0.00**	**0.18**	**0.04**	**0.02**	**.078**	**-0.01**	**0.08**
Ingroup attitudes	-0.09	0.07	.175	-0.22	0.04	0.01	0.03	.725	-0.05	0.06
Outgroup attitudes	0.22	0.08	.004	0.07	0.37	0.09	0.03	.006	0.03	0.16

Note. Results in bold indicate the effects relating to the hypotheses.

Table D8. Between-Person Correlations for Study 2c (Generic Contact)

	1.	2.	3.	4.
1. Ingroup contact	-	.83*	**.61***	**.51***
2. Outgroup contact	.35*	-	**.46***	**.72***
3. Ingroup attitudes	**.53***	**.15***	-	.62*
4. Outgroup attitudes	**.22***	**.71***	.37*	-

Note. Results for White British students are above the diagonal, and results for Asian British students are below the diagonal. Results in bold indicate the correlations relating to the hypotheses. * denotes significant correlations ($p < .05$).

Study 2d

Table D9. Within-Person Coefficients for Study 2d

	European Respondents					Māori Respondents				
Time t+1				*95% CI*					*95% CI*	
Time t	*b*	*se*	*p*	*low*	high	*b*	*se*	*p*	*low*	high
Ingroup Contact										
Ingroup contact	0.04	0.01	<.001	0.02	0.06	0.02	0.02	.328	-0.02	0.07
Outgroup contact	0.02	0.01	.001	0.01	0.03	0.03	0.02	.239	-0.02	0.07
Ingroup attitudes	0.02	0.01	.007	0.01	0.04	0.02	0.03	.387	-0.03	0.07
Outgroup attitudes	-0.01	0.01	.455	-0.02	0.01	0.00	0.02	.994	-0.05	0.05
Outgroup Contact										
Ingroup contact	-0.02	0.01	.031	-0.04	-0.00	0.02	0.02	.335	-0.02	0.06
Outgroup contact	0.10	0.01	<.001	0.08	0.12	0.03	0.02	.229	-0.02	0.08
Ingroup attitudes	-0.00	0.01	.893	-0.02	0.02	-0.02	0.02	.345	-0.07	0.03
Outgroup attitudes	0.03	0.01	.010	0.01	0.05	0.04	0.02	.062	-0.00	0.09
Ingroup Attitudes										
Ingroup contact	**0.02**	**0.01**	**.042**	**0.00**	**0.04**	**0.05**	**0.02**	**.008**	**0.01**	**0.09**
Outgroup contact	**0.01**	**0.01**	**.244**	**-0.01**	**0.02**	**-0.07**	**0.02**	**.001**	**-0.12**	**-0.03**
Ingroup attitudes	0.06	0.01	<.001	0.04	0.08	0.09	0.03	.002	0.03	0.14
Outgroup attitudes	-0.00	0.01	.792	-0.02	0.02	-0.06	0.02	.011	-0.10	-0.01
Outgroup Attitudes										
Ingroup contact	**-0.01**	**0.01**	**.607**	**-0.02**	**0.01**	**0.01**	**0.02**	**.607**	**-0.03**	**0.05**
Outgroup contact	**0.04**	**0.01**	**<.001**	**0.02**	**0.05**	**-0.01**	**0.02**	**.760**	**-0.05**	**0.04**
Ingroup attitudes	-0.01	0.01	.247	-0.03	0.01	-0.02	0.03	.537	-0.07	0.04
Outgroup attitudes	0.08	0.01	<.001	0.06	0.10	0.02	0.03	.376	-0.03	0.08

Note. Results in bold indicate the effects relating to the hypotheses.

Table D10. Between-Person Correlations for Study 2d

	1.	2.	3.	4.
1. Ingroup contact	-	.41*	**.55***	**.33***
2. Outgroup contact	.49*	-	**.07***	**.67***
3. Ingroup attitudes	**.72***	**.19***	-	.26*
4. Outgroup attitudes	**.23***	**.69***	.26*	-

Note. Results for European respondents are above the diagonal, and results for Māori respondents are below the diagonal. Results in bold indicate the correlations relating to the hypotheses. * denotes significant correlations ($p < .05$).

Appendix E: Robustness Checks

To verify that the findings reported in Chapter 4 were robust across alternative model specifications, I conducted four robustness checks, which I detail in the following sections. The robustness checks produced highly similar results to the main analysis, increasing confidence in the findings. Most notably, in all four robustness checks, the results regarding the hypotheses remained the same. Specifically, the findings concerning the socialisation effects showed that individuals' attitudes were influenced by the attitudes of their ingroup friends, and were not influenced by the attitudes of their outgroup friends (with the exception of White British students' ingroup attitudes, which were influenced by neither their ingroup nor outgroup friends' attitudes).

Robustness Check 1

Firstly, I re-ran the analysis without including discretionary control effects (gender, ethnicity and attitudes) in the behavioural dynamics. All other aspects of the model were identical to the main analysis, including the mandatory control effects (linear shape and quadratic shape) in the behavioural dynamics (Ripley et al., 2019).

The results of this robustness check are shown in Table E1. The results remained almost identical to the results of the main analysis, with only minor changes in the exact estimates. Importantly, the estimates for all effects testing the hypotheses remained the same. For both White British and Asian British students, the estimates for ingroup friends' attitudes were positive and significant (with the exception of White British students' ingroup attitudes, which were influenced by neither their ingroup nor outgroup friends' attitudes). Furthermore, for both White British and Asian British students, all estimates for outgroup friends' attitudes were non-significant.

Table E1. Robustness Check 1: Multi-Group RSiena Co-Evolution Model

	Estimate	*SE*	*p*
White British attitude dynamics			
Controls			
Linear shape	-0.141	0.156	.367
Quadratic shape	-0.221	0.058	<.001
Asian British students (outgroup attitudes)			
Number of ingroup friends	0.018	0.020	.377
Number of outgroup friends	0.066	0.079	.401
Ingroup friends' attitudes	0.433	0.095	<.001
Outgroup friends' attitudes	0.766	1.183	.518
White British students (ingroup attitudes)			
Number of ingroup friends	0.051	0.032	.126
Number of outgroup friends	0.093	0.045	.038
Ingroup friends' attitudes	0.386	0.253	.126
Outgroup friends' attitudes	-0.523	0.768	.496
Asian British attitude dynamics			
Controls			
Linear shape	-0.007	0.165	.965
Quadratic shape	-0.127	0.060	.036
White British students (outgroup attitudes)			
Number of ingroup friends	-0.014	0.023	.546
Number of outgroup friends	0.142	0.136	.296
Ingroup friends' attitudes	0.600	0.193	.002
Outgroup friends' attitudes	-0.966	1.071	.367
Asian British students (ingroup attitudes)			
Number of ingroup friends	0.038	0.024	.121
Number of outgroup friends	0.271	0.293	.355
Ingroup friends' attitudes	0.349	0.115	.002
Outgroup friends' attitudes	2.238	2.518	.374
Network dynamics			
Demographic Controls			
Alter gender	-0.008	0.023	.743
Ego gender	0.052	0.025	.036
Same gender	0.602	0.024	<.001
Alter ethnicity	-0.078	0.027	.004
Ego ethnicity	0.049	0.029	.094
Same ethnicity	0.188	0.025	<.001
Asian British students (outgroup attitudes)			
Ego attitude x Ingroup friends	0.044	0.020	.027
Ego attitude x Outgroup friends	0.204	0.050	<.001
Ingroup friends' attitude similarity	0.035	0.099	.723
Outgroup friends' attitude similarity	0.409	0.292	.162

White British students (outgroup attitudes)			
Ego attitude x Ingroup friends	-0.005	0.034	.892
Ego attitude x Outgroup friends	0.242	0.061	<.001
Ingroup friends' attitude similarity	0.214	0.186	.249
Outgroup friends' attitude similarity	-0.617	0.352	.079
Asian British students (ingroup attitudes)			
Ego attitude x Ingroup friends	-0.025	0.024	.294
Ego attitude x Outgroup friends	-0.034	0.047	.467
Ingroup friends' attitude similarity	0.339	0.127	.007
Outgroup friends' attitude similarity	0.292	0.213	.170
White British students (ingroup attitudes)			
Ego attitude x Ingroup friends	-0.096	0.044	.028
Ego attitude x Outgroup friends	-0.110	0.053	.038
Ingroup friends' attitude similarity	0.406	0.225	.071
Outgroup friends' attitude similarity	0.281	0.298	.346

Note. SE = standard error. *N* = 1170.

Robustness Check 2

Secondly, I re-ran the analysis including only fundamental structural effects in the network dynamics. The inclusion of four basic structural network effects is recommended for all RSiena models (Ripley et al., 2019): outdegree, reciprocity, gwespFF, and transitive reciprocated triplets. The goodness-of-fit tests (Lospinoso & Snijders, 2019) I conducted recommended the inclusion of eight further structural effects: gwespBB, three-cycles, indegree popularity, outdegree popularity, outdegree activity, reciprocal degree popularity, reciprocal degree activity, and truncated outdegree. In the main analysis, I included all 12 structural effects. In this analysis, I included only the four basic structural effects. All other aspects of the model were identical to the main analysis.

The results of this analysis are shown in Table E2. The results remained almost identical to the results of the main analysis, with only minor changes in the exact estimates. The estimates for all effects testing the hypotheses remained the same. For both White British and Asian British students, the estimates for ingroup friends' attitudes were positive and significant (with the exception of White British students' ingroup attitudes, which were influenced by neither their ingroup nor outgroup friends' attitudes). Furthermore, for both White British and Asian British students, all estimates for outgroup friends' attitudes were non-significant.

Table E2. Robustness Check 2: Multi-Group RSiena Co-Evolution Model

	Estimate	*SE*	*p*
White British attitude dynamics			
Controls			
Linear shape	-0.034	0.114	.764
Quadratic shape	-0.251	0.056	<.001
Ethnicity	-0.292	0.234	.212
Gender	-0.014	0.063	.822
Attitude towards Asian British people	0.095	0.063	.128
Asian British students (outgroup attitudes)			
Number of ingroup friends	0.010	0.017	.549
Number of outgroup friends	0.068	0.082	.403
Ingroup friends' attitudes	0.398	0.095	<.001
Outgroup friends' attitudes	0.814	1.215	.503
White British students (ingroup attitudes)			
Number of ingroup friends	0.015	0.033	.646
Number of outgroup friends	0.048	0.049	.318
Ingroup friends' attitudes	0.373	0.250	.136
Outgroup friends' attitudes	-0.564	0.749	.451
Asian British attitude dynamics			
Controls			
Linear shape	0.145	0.118	.219
Quadratic shape	-0.157	0.055	.005
Ethnicity	0.567	0.220	.009
Gender	-0.085	0.072	.238
Attitude towards White British people	0.138	0.066	.036
White British students (outgroup attitudes)			
Number of ingroup friends	0.009	0.026	.729
Number of outgroup friends	0.183	0.129	.156
Ingroup friends' attitudes	0.611	0.204	.003
Outgroup friends' attitudes	2.292	2.131	.282
Asian British students (ingroup attitudes)			
Number of ingroup friends	0.004	0.020	.857
Number of outgroup friends	0.212	0.241	.380
Ingroup friends' attitudes	0.318	0.101	.002
Outgroup friends' attitudes	2.292	2.131	.282
Network dynamics			
Controls			
Outdegree	-3.601	0.030	<.001
Reciprocity	1.821	0.036	<.001
GWESP I→K→J	1.431	0.022	<.001
Transitive reciprocated triplets	-0.139	0.010	<.001
Alter gender	-0.059	0.023	.009

Ego gender	-0.034	0.023	.147
Same gender	0.729	0.024	<.001
Alter ethnicity	-0.109	0.026	<.001
Ego ethnicity	-0.040	0.027	.133
Same ethnicity	0.247	0.026	<.001
Asian British students (outgroup attitudes)			
Ego attitude x Ingroup friends	-0.019	0.017	.279
Ego attitude x Outgroup friends	0.164	0.052	.001
Ingroup friends' attitude similarity	-0.045	0.093	.630
Outgroup friends' attitude similarity	0.333	0.291	.251
White British students (outgroup attitudes)			
Ego attitude x Ingroup friends	-0.025	0.032	.425
Ego attitude x Outgroup friends	0.215	0.060	<.001
Ingroup friends' attitude similarity	0.265	0.187	.156
Outgroup friends' attitude similarity	-0.458	0.342	.181
Asian British students (ingroup attitudes)			
Ego attitude x Ingroup friends	-0.054	0.022	.012
Ego attitude x Outgroup friends	-0.156	0.046	<.001
Ingroup friends' attitude similarity	0.184	0.122	.129
Outgroup friends' attitude similarity	0.236	0.213	.267
White British students (ingroup attitudes)			
Ego attitude x Ingroup friends	-0.078	0.040	.053
Ego attitude x Outgroup friends	-0.169	0.050	<.001
Ingroup friends' attitude similarity	0.344	0.221	.119
Outgroup friends' attitude similarity	0.085	0.274	.756

Note. SE = standard error. *N* = 1170.

Robustness Check 3

Thirdly, I re-ran the analysis with an alternative specification of attitude socialisation. In the main analysis reported in the chapter, I used the weighted *total* similarity effect to examine whether individuals' attitudes were influenced by the attitudes held by their ingroup or outgroup friends. This effect expresses the tendency of individuals to adopt the attitudes of their friends, where the total influence of the friends is proportional to the number of friends. In contrast, in this robustness check I used the weighted *average* similarity effect. This effect expresses the tendency of individuals to adopt the attitudes of their friends, where the total influence of the friends is the same regardless of the number of friends. I did not have strong predictions regarding whether or not the number of friends would be important for the socialisation effect, and so I tested attitude socialisation using both effects, and here report the results of the alternative specification of attitude socialisation.

The results of this analysis (using weighted *average* similarity for the effects of ingroup friends' attitudes and outgroup friends' attitudes) are shown in Table E3. The results remained largely the same as the results of the main analysis. White British and Asian British students' *outgroup attitudes* were significantly influenced by their ingroup friends' attitudes. However, White British and Asian British students' *ingroup attitudes* were not significantly influenced by their ingroup friends' attitudes. Therefore, this robustness check only provided support for the hypothesis regarding the socialisation of outgroup attitudes, not ingroup attitudes. In accordance with the hypotheses, all estimates for outgroup friends' attitudes were non-significant, for both White British and Asian British students.

Table E3. Robustness Check 3: Multi-Group RSiena Co-Evolution Model

	Estimate	*SE*	*p*
White British attitude dynamics			
Controls			
Linear shape	-0.273	0.208	.190
Quadratic shape	-0.281	0.102	.006
Ethnicity	-0.238	0.327	.466
Gender	-0.030	0.067	.654
Attitude towards Asian British people	0.080	0.068	.241
Asian British students (outgroup attitudes)			
Number of ingroup friends	0.036	0.027	.176
Number of outgroup friends	0.106	0.065	.101
Ingroup friends' attitudes	2.430	1.118	.029
Outgroup friends' attitudes	1.811	2.467	.463
White British students (ingroup attitudes)			
Number of ingroup friends	0.051	0.043	.228
Number of outgroup friends	0.081	0.061	.187
Ingroup friends' attitudes	3.016	2.132	.157
Outgroup friends' attitudes	-3.109	3.699	.401
Asian British attitude dynamics			
Controls			
Linear shape	0.050	0.175	.776
Quadratic shape	-0.199	0.090	.027
Ethnicity	0.549	0.324	.089
Gender	-0.122	0.087	.162
Attitude towards White British people	0.135	0.073	.065
White British students (outgroup attitudes)			
Number of ingroup friends	0.046	0.039	.241
Number of outgroup friends	0.186	0.099	.061
Ingroup friends' attitudes	4.110	1.701	.015
Outgroup friends' attitudes	-4.328	3.337	.195
Asian British students (ingroup attitudes)			
Number of ingroup friends	0.033	0.029	.247
Number of outgroup friends	0.099	0.093	.285
Ingroup friends' attitudes	1.593	0.945	.091
Outgroup friends' attitudes	3.826	2.751	.164
Network dynamics			
Controls			
Alter gender	-0.008	0.023	.730
Ego gender	0.052	0.024	.031
Same gender	0.603	0.024	<.001
Alter ethnicity	-0.075	0.028	.007
Ego ethnicity	0.045	0.030	.137

Same ethnicity	0.185	0.026	<.001
Asian British students (outgroup attitudes)			
Ego attitude x Ingroup friends	0.045	0.020	.027
Ego attitude x Outgroup friends	0.210	0.053	<.001
Ingroup friends' attitude similarity	0.035	0.098	.719
Outgroup friends' attitude similarity	0.415	0.290	.152
White British students (outgroup attitudes)			
Ego attitude x Ingroup friends	-0.003	0.034	.931
Ego attitude x Outgroup friends	0.248	0.062	<.001
Ingroup friends' attitude similarity	0.212	0.193	.273
Outgroup friends' attitude similarity	-0.608	0.348	.081
Asian British students (ingroup attitudes)			
Ego attitude x Ingroup friends	-0.027	0.025	.287
Ego attitude x Outgroup friends	-0.041	0.047	.384
Ingroup friends' attitude similarity	0.338	0.125	.007
Outgroup friends' attitude similarity	0.293	0.220	.184
White British students (ingroup attitudes)			
Ego attitude x Ingroup friends	-0.096	0.045	.035
Ego attitude x Outgroup friends	-0.122	0.054	.025
Ingroup friends' attitude similarity	0.403	0.231	.081
Outgroup friends' attitude similarity	0.278	0.294	.344

Note. SE = standard error. *N* = 1170.

Robustness Check 4

Finally, I re-ran the analysis separately for White British and Asian British students. This model specification differed substantially from the model specification in the main analysis. I conducted this robustness check in order to demonstrate the effect of ingroup attitude socialisation without the use of dyadic covariates. To do so, I created separate friendship networks for White British and Asian British students, so that each network only included ingroup members. Accordingly, I was not able to test any effects regarding outgroup members or ethnicity in this analysis (as each network only included members of the ethnic ingroup). I included the equivalent of all other effects from the main analysis. I included the following effects in the behavioural dynamics: linear shape, quadratic shape, number of ingroup friends, and ingroup friends' attitudes. I included the following effects in the network dynamics: alter attitude, ego attitude, attitude similarity, alter gender, ego gender, same gender, outdegree, reciprocity, gwespFF, transitive reciprocated triplets, gwespBB, three-cycles, indegree popularity, outdegree popularity, outdegree activity, reciprocal degree popularity, reciprocal degree activity, and truncated outdegree. I created separate and identical models for White British and Asian British students.

The results of this analysis are shown in Table E4. Despite the substantial differences between the model specifications in the main analysis and this robustness check, the results were largely the same. Importantly, the estimates for the effects testing the hypotheses remained the same: for both White British and Asian British students, the estimates for ingroup friends' attitudes were positive and significant. As the models did not include outgroup members, I was unable to estimate the effects of outgroup friends' attitudes. This is a severe limitation of the model specification in this robustness check, as is the loss of network data concerning members of the other ethnic

group who were removed from the model. Nonetheless, this robustness check enabled me to demonstrate the effect of attitude socialisation through ingroup friends using a substantially different model specification.

Table E4. Robustness Check 4: Multi-Group RSiena Co-Evolution Models

	White British Students			Asian British Students		
	Estimate	*SE*	*p*	*Estimate*	*SE*	*p*
Attitude dynamics						
Linear shape	0.008	0.146	.959	0.111	0.135	.409
Quadratic shape	-0.172	0.075	.022	-0.261	0.068	<.001
Number of ingroup friends	0.011	0.027	.681	-0.002	0.020	.934
Ingroup friends' attitudes	0.367	0.171	.032	0.408	0.105	<.001
Network dynamics						
Alter attitude	-0.012	0.033	.712	0.036	0.016	.025
Ego attitude	-0.059	0.033	.075	0.000	0.017	.986
Attitude similarity	0.555	0.204	.007	0.119	0.094	.208
Alter gender	-0.042	0.050	.406	-0.034	0.036	.335
Ego gender	0.019	0.051	.714	0.106	0.036	.003
Same gender	0.253	0.051	<.001	0.837	0.036	<.001
Outdegree	-2.410	0.237	<.001	-2.787	0.094	<.001
Reciprocity	2.807	0.230	<.001	2.480	0.085	<.001
GWESP I→K→J	1.824	0.130	<.001	1.439	0.040	<.001
GWESP I←K←J	-0.067	0.280	.809	-0.044	0.093	.637
Transitive reciprocated triplets	-0.166	0.060	.006	-0.023	0.021	.281
Three-cycles	0.166	0.144	.248	0.117	0.051	.021
Indegree popularity	0.046	0.147	.754	0.184	0.036	<.001
Outdegree popularity	0.025	0.039	.516	0.028	0.014	.044
Outdegree activity	-0.017	0.011	.139	-0.036	0.004	<.001
Reciprocal degree popularity	-0.159	0.081	.049	-0.164	0.022	<.001
Reciprocal degree activity	-0.151	0.029	<.001	-0.118	0.009	<.001
Truncated outdegree	-0.763	0.330	.021	-2.688	0.211	<.001

Note. Model for White British Students (N = 341); Model for Asian British Students (N = 829). *SE* = standard error.

Appendix F: Surveys

In this final appendix, I provide full copies of the surveys for the four studies that consisted of primary data: Studies 1d, 1e, 1f and 2c.

Survey for Study 1d

Friendship Measures

"How many [INGROUP/OUTGROUP] friends do you have?"
(0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, >10)
"How often do you spend time with [INGROUP/OUTGROUP] friends?"
(1= Never to 5 = Very often)
"How often do you talk to [INGROUP/OUTGROUP] friends?"
(1= Never to 5 = Very often)

Generic Contact Measures

"On average, how often do you have pleasant interactions with [INGROUP/OUTGROUP] people?"
(1 = Never to 5 = Everyday)
"On average, how often are [INGROUP/OUTGROUP] people polite toward you?"
(1 = Never to 5 = Everyday)
"On average, how often are [INGROUP/OUTGROUP] people friendly toward you?"
(1 = Never to 5 = Everyday)
"On average, how often do you have unpleasant interactions with [INGROUP/OUTGROUP] people?"
(1 = Never to 5 = Everyday)
"On average, how often are [INGROUP/OUTGROUP] people rude to you?"
(1 = Never to 5 = Everyday)
"On average, how often are [INGROUP/OUTGROUP] people unfriendly toward you?"
(1 = Never to 5 = Everyday)

Explicit Attitudes Measure

"Please describe how you feel about [INGROUP/OUTGROUP] in general:"
1. Negative - Positive
2. Hostile - Friendly
3. Suspicious - Trusting
4. Contempt – Respect

Implicit Attitudes Measure

Participants complete Implicit Association Test (IAT)

Survey for Study 1e

SECTION ONE

What is your tutor group? *Please write in:*

_____

Are you male or female? *Please tick:*
□ Male
□ Female
□ Prefer not to say

Which of the following ethnic groups do you belong to? *Please tick:*
□ White British
□ Asian or Asian British: Bangladeshi
□ Asian or Asian British: Pakistani
□ Asian or Asian British: Indian
□ Black or Black British: Caribbean
□ Black or Black British: African
□ Chinese or Chinese British
□ Other (please specify): _____
□ Prefer not to say

SECTION TWO

Who are your **best** friends in class? Please nominate **up to five** friends by indicating their full name.

	First Name	Last Name
1.		
2.		
3.		
4.		
5.		

Who else are you friends with in class? Please nominate **up to fifteen** friends by indicating their full name. Please do **not** include the best friends you nominated in the previous question.

First Name Last Name

1. .....
2. .....
3. .....
4. .....
5. .....
6. .....
7. .....
8. .....
9. .....
10. .....
11. .....
12. .....
13. .....
14. .....
15. .....

Please nominate up to five schoolmates with whom you are least friendly.

First Name Last Name

1. .....
2. .....
3. .....
4. .....
5. .....

SECTION THREE

On average, how frequently do you have POSITIVE/GOOD contact with Asian British people?

Never □	□	□	□	Very Frequently □

On average, how frequently do you have NEGATIVE/BAD contact with Asian British people?

Never □	□	□	□	Very Frequently □

On average, how frequently do you have POSITIVE/GOOD contact with White British people?

Never □	□	□	□	Very Frequently □

On average, how frequently do you have NEGATIVE/BAD contact with White British people?

Never □	□	□	□	Very Frequently □

SECTION FOUR

Based on your experience, please rate the extent to which you have the following feelings about Asian British people

Negative ☐	☐	☐	☐	Positive ☐
Hostile ☐	☐	☐	☐	Friendly ☐
Suspicious ☐	☐	☐	☐	Trusting ☐
Contempt ☐	☐	☐	☐	Respect ☐

Based on your experience, please rate the extent to which you have the following feelings about White British people

Negative ☐	☐	☐	☐	Positive ☐
Hostile ☐	☐	☐	☐	Friendly ☐
Suspicious ☐	☐	☐	☐	Trusting ☐
Contempt ☐	☐	☐	☐	Respect ☐

Survey for Study 1f

SECTION ONE

In this part of the questionnaire we will ask you a few questions about how well you get on with other students in your school year group. There will always be some people you get on well with, and some people you get on less well with.

On the lines below, please write down the names of **students in YOUR SCHOOL YEAR GROUP** that you are **friends** with. Please write down as many names as you think makes sense. **If you run out of space on this page and would like to include more names, you can write on the extra lines on page 8.**

Please write down their **FULL names (first name and last name).**

1. Who are your friends (in your year group)?

First Name Last Name

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

Please tell us how old you were when you joined this school _____

What is your tutor group? *Please write in:* _____

What is your religion? *Please tick:*
□ I don't have a religion
□ Christianity
□ Hinduism
□ Islam
□ Other (please specify): _____
□ Prefer not to say

Which of the following ethnic groups do you think best describes you? *Please tick:*
□ White British
□ Asian or Asian British: Bangladeshi
□ Asian or Asian British: Pakistani
□ Asian or Asian British: Indian
□ Black or Black British: Caribbean
□ Black or Black British: African
□ Chinese or Chinese British
□ Mixed (please specify): _____
□ Other (please specify): _____
□ Prefer not to say

What best describes your living situation?
□ I live with my parent(s)
□ I live with my guardian(s)
□ I live with one parent/guardian and their partner
□ I spend time living with both of my parents/guardians, who live separately
□ Other (please specify):_____
□ Prefer not to say

SECTION TWO

In the next part of the questionnaire we will ask you some questions about people who are Asian British and White British, because these are the biggest groups in Oldham.

For each question, choose only ONE answer by ticking the box that fits your answer best.

If any of the questions do not apply (for example, if you don't have siblings) leave them blank and don't tick any of the boxes.

Please tell us how you feel about each of the following ethnic groups using the scales below.

"Warm" means you like this group of people, you have generally good feelings towards them. "Cold" means you dislike this group of people, you have generally bad feelings towards them. If you don't have strong feelings either way, you can tick the middle box.

a) White people

Very cold	Cold	Neither particularly warm nor particularly cold	Warm	Very warm
☐	☐	☐	☐	☐

b) Asian people

Very cold	Cold	Neither particularly warm nor particularly cold	Warm	Very warm
☐	☐	☐	☐	☐

Please tell us about your positive and negative contact experiences with each of the following ethnic groups using the scales below.

"Positive contact" is when you speak to or communicate with someone face-to-face and it is friendly, or makes you feel good. "Negative contact" is when you speak to or communicate with someone face-to-face and it is unfriendly, or makes you feel bad.

How often do you have positive contact with White British people?

Never	Once or twice a month	Once a week	Several times a week	Every day
☐	☐	☐	☐	☐

How often do you have negative contact with White British people?

Never	Once or twice a month	Once a week	Several times a week	Every day
☐	☐	☐	☐	☐

How often do you have positive contact with Asian British people?

Never	Once or twice a month	Once a week	Several times a week	Every day
☐	☐	☐	☐	☐

How often do you have negative contact with Asian British people?

Never	Once or twice a month	Once a week	Several times a week	Every day
☐	☐	☐	☐	☐

Now a few questions about your family.

Overall, how do you think your parents or guardians (if applicable) feel about Asian British people?

Very cold	Cold	Neither particularly warm nor particularly cold	Warm	Very warm
□	□	□	□	□

Overall, how do you think your siblings (if you have any) feel about Asian British people?

Very cold	Cold	Neither particularly warm nor particularly cold	Warm	Very warm
□	□	□	□	□

Overall, how do you think your grandparents (if you have any) feel about Asian British people?

Very cold	Cold	Neither particularly warm nor particularly cold	Warm	Very warm
□	□	□	□	□

Overall, how do you think your parents or guardians (if applicable) feel about White British people?

Very cold	Cold	Neither particularly warm nor particularly cold	Warm	Very warm
□	□	□	□	□

Overall, how do you think your siblings (if you have any) feel about White British people?

Very cold	Cold	Neither particularly warm nor particularly cold	Warm	Very warm
□	□	□	□	□

Overall, how do you think your grandparents (if you have any) feel about White British people?

Very cold	Cold	Neither particularly warm nor particularly cold	Warm	Very warm
□	□	□	□	□

How often do you see your parents or guardians (if applicable) having positive contact with White British people?

Never	Once or twice a month	Once a week	Several times a week	Every day
□	□	□	□	□

How often do you see your parents or guardians (if applicable) having negative contact with White British people?

Never	Once or twice a month	Once a week	Several times a week	Every day
□	□	□	□	□

How often do you see your parents or guardians (if applicable) having positive contact with Asian British people?

Never	Once or twice a month	Once a week	Several times a week	Every day
□	□	□	□	□

How often do you see your parents or guardians (if applicable) having negative contact with Asian British people?

Never	Once or twice a month	Once a week	Several times a week	Every day
□	□	□	□	□

SECTION THREE

In this part of the questionnaire we will ask you a few questions about your parents or guardians and their friendships. If you don't know or can't remember, just recall as much as you can. If you do not live or have contact with parents or guardians and so do not think the questions are applicable, please cross them out. If your parents have different friends, think about the parent you spend the most time with.

For the next question please write down the names of **UP TO TEN students in YOUR SCHOOL YEAR GROUP** on the dotted lines. Please write down as many names as you think makes sense.

1. **Are your parents/guardians friends with, or do they have positive contact with, the parents/guardians of anybody in your year group? Please write up to ten students' names.**

First Name Last Name

1. .....

2. .....

3. .....

4. .....

5. .....

6. .....

7. .....

8. .....

9. .....

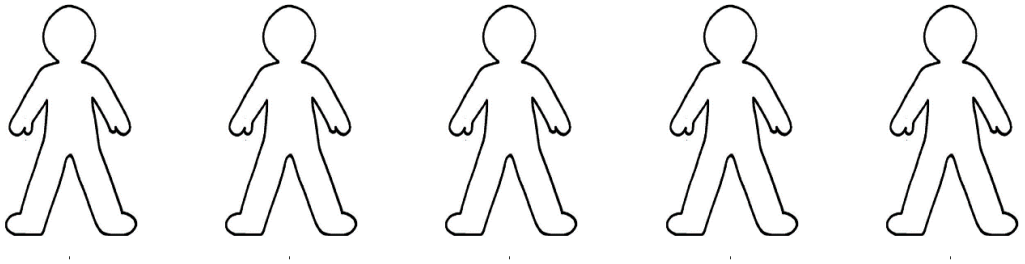
10. .....

2. Now, please think about who your parents or guardians most often socialise or have friendly contact with. It's okay if these people are family members. It's okay if you're not entirely sure. Just try as best as you can to think of the people who know your parent(s)/guardian(s). If you can't think of anyone, or would prefer not to say, you can cross the question out.

2a. Please think about the **FIVE closest friends of your parent(s)/guardian(s)**. For each of these five people, think of what their ethnicities are, or what you would guess their ethnicities are. Please label these five figures with whether you think each of the people are:

- **[1]White ([1.1]British or [1.2]other)**
- **[2]Asian or Asian British ([2.1]Bangladeshi, [2.2]Pakistani or [2.3]Indian)**
- **[3]Black or Black British ([3.1]Caribbean or [3.2]African)**
- **[4]Chinese or Chinese British**
- **[5]Mixed (please specify)**
- **[6]Other (please specify)**

You can just label the figures using words like "White British" or "Asian British", or you can use the numbers next to each ethnicity to make labelling easier.

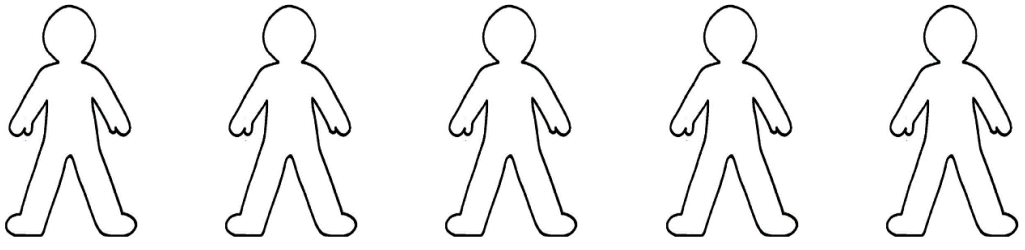


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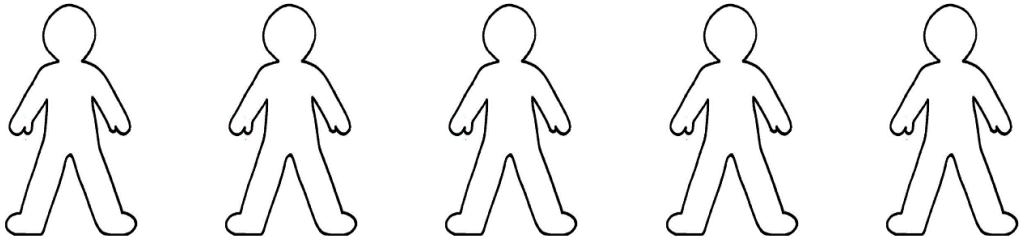
FOR EXAMPLE:



2b. Next, think about **TEN** different people that your parent(s)/guardian(s) are also friends with, or just who they often have friendly contact with. For each of these ten people, think of what their ethnicities are, or what you would guess their ethnicities are. Please label these in the same way:



…… …… …… …… ……



…… …… …… …… ……

Survey for Study 2c

SECTION ONE

In this part of the questionnaire we will ask you a few questions about how you get on with other students in your school year group. There will always be some people you get on well with, and some you get on less well with.

For each question please write down the names of **UP TO TEN students in YOUR SCHOOL YEAR GROUP** on the dotted lines. Please write down as many names as you think makes sense. You may write down the same name for different questions. If you don't think anyone from your year group is right for a specific question, please cross out that question and continue with the next question. Please write down their **FULL names (first name and last name).**

1. Who are your friends (in your year group)?

First Name Last Name

1. .....
2. .....
3. .....
4. .....
5. .....
6. .....
7. .....
8. .....
9. .....
10. .....

2. Who bullies you (in your year group)?

For example, this could include students who have insulted you, gossiped about you, physically hurt you, or sent you mean messages using their phone/computer.

First Name Last Name

1. .....
2. .....
3. .....
4. .....
5. .....
6. .....
7. .....
8. .....
9. .....
10. .....

3. Who do you tend to have positive contact with (in your year group)?

"Positive contact" is when you have a good face-to-face experience with another person. For example, a conversation with someone who is nice to you but is not one of your friends.

First Name Last Name

1. .....
2. .....
3. .....
4. .....
5. .....
6. .....
7. .....
8. .....
9. .....
10. .....

4. Who do you tend to have negative contact with (in your year group)?

"Negative contact" is when you have a bad face-to-face experience with another person. For example, a conversation with someone who is unfriendly to you (but does not necessarily bully you).

First Name Last Name

1. .....
2. .....
3. .....
4. .....
5. .....
6. .....
7. .....
8. .....
9. .....
10. .....

SECTION TWO: Please now fill in a few details about yourself.

Which school year are you in? *Please tick:*
□ Year 7
□ Year 8
□ Year 9

What is your tutor group? *Please write in:* _____

What is your religion? *Please tick:*
□ I don't have a religion
□ Christianity
□ Hinduism
□ Islam
□ Other (please specify): _____
□ Prefer not to say

Which of the following ethnic groups do you think best describes you? *Please tick:*
□ White British
□ Asian or Asian British: Bangladeshi
□ Asian or Asian British: Pakistani
□ Asian or Asian British: Indian
□ Black or Black British: Caribbean
□ Black or Black British: African
□ Chinese or Chinese British
□ Mixed (please specify): _____
□ Other (please specify): _____
□ Prefer not to say

➔ If you ticked "White British" please turn to **page 7** and fill in **SECTION THREE**

➔ If you **did not** tick "White British" please turn to **page 10** and fill in **SECTION FOUR**

SECTION THREE

ONLY FILL IN THIS SECTION IF YOU TICKED "WHITE BRITISH"

In this part of the questionnaire we will ask you some questions about people who are Asian British and White British, because these are the biggest groups in your town.

For each question, choose only ONE answer by ticking the box that fits your answer best.
For example:

EXAMPLE QUESTION: How often do you eat apples?

Never	Once or twice a month	Once a week	Several times a week	Every day
☐	☐	☐	☐	☐ ✓

Please tell us how you feel about each of the following ethnic groups using the scales below.

"Warm" means you like this group of people, you have generally good feelings towards them.
"Cold" means you dislike this group of people, you have generally bad feelings towards them.
If you don't have strong feelings either way, you can tick the middle box.

a) White people

Very cold	Cold	Neither particularly warm nor particularly cold	Warm	Very warm
☐	☐	☐	☐	☐

b) Asian people

Very cold	Cold	Neither particularly warm nor particularly cold	Warm	Very warm
☐	☐	☐	☐	☐

How certain are you about your feelings towards Asian people?

Very uncertain	Uncertain	Neither certain nor uncertain	Certain	Very certain
☐	☐	☐	☐	☐

In general, do you think that Asian people are very different from one another or very similar to one another?

Very different	Somewhat different	Neither different nor similar	Somewhat similar	Very similar
☐	☐	☐	☐	☐

Overall, how do you think your White friends feel about Asian people?

Very cold	Cold	Neither particularly warm nor particularly cold	Warm	Very warm
☐	☐	☐	☐	☐

If you were interacting with an Asian person who you had never met before, how would you expect to feel?

a) Anxious

Not at all	Slightly	Somewhat	Very	Extremely
□	□	□	□	□

b) Confident

Not at all	Slightly	Somewhat	Very	Extremely
□	□	□	□	□

c) Relaxed

Not at all	Slightly	Somewhat	Very	Extremely
□	□	□	□	□

How much do you agree or disagree with the following sentences?

a) Being White British is an important part of who I am.

Disagree strongly	Disagree	Neither agree nor disagree	Agree	Agree strongly
□	□	□	□	□

b) My White friends consider it a good thing to have Asian friends.

Disagree strongly	Disagree	Neither agree nor disagree	Agree	Agree strongly
□	□	□	□	□

c) My family consider it a good thing to have Asian friends.

Disagree strongly	Disagree	Neither agree nor disagree	Agree	Agree strongly
□	□	□	□	□

d) In general, Asian people in Britain consider it a good thing to have White friends.

Disagree strongly	Disagree	Neither agree nor disagree	Agree	Agree strongly
□	□	□	□	□

e) There is a lot of unfair treatment towards White people in Britain today.

Disagree strongly	Disagree	Neither agree nor disagree	Agree	Agree strongly
□	□	□	□	□

How often do you have positive contact with White people?

Never	Once or twice a month	Once a week	Several times a week	Every day
□	□	□	□	□

How often do you have negative contact with White people?

Never	Once or twice a month	Once a week	Several times a week	Every day
□	□	□	□	□

How often do you have positive contact with Asian people?

Never	Once or twice a month	Once a week	Several times a week	Every day
□	□	□	□	□

How often do you have negative contact with Asian people?

Never	Once or twice a month	Once a week	Several times a week	Every day
□	□	□	□	□

During conversations with Asian people, how much do you think about the fact that they are Asian?

Not at all	A little	Somewhat	Quite a lot	Very much
□	□	□	□	□

During your contact with Asian people, how aware are you of belonging to different ethnic groups?

Not at all	A little	Somewhat	Quite a lot	Very much
□	□	□	□	□

STOP

You have finished the required sections of the questionnaire.

Thank you very much for taking part!

SECTION FOUR

ONLY FILL IN THIS SECTION IF YOU DID NOT TICK "WHITE BRITISH"

In this part of the questionnaire we will ask you some questions about people who are Asian British and White British, because these are the biggest groups in your town.

For each question, choose only ONE answer by ticking the box that fits your answer best.
For example:

EXAMPLE QUESTION: How often do you eat apples?

Never	Once or twice a month	Once a week	Several times a week	Every day
☐	☐	☐	☐	☑

Please tell us how you feel about each of the following ethnic groups using the scales below.

"Warm" means you like this group of people, you have generally good feelings towards them.
"Cold" means you dislike this group of people, you have generally bad feelings towards them.
If you don't have strong feelings either way, you can tick the middle box.

a) Asian people

Very cold	Cold	Neither particularly warm nor particularly cold	Warm	Very warm
☐	☐	☐	☐	☐

b) White people

Very cold	Cold	Neither particularly warm nor particularly cold	Warm	Very warm
☐	☐	☐	☐	☐

How certain are you about your feelings towards White people?

Very uncertain	Uncertain	Neither certain nor uncertain	Certain	Very certain
☐	☐	☐	☐	☐

In general, do you think that White people are very different from one another or very similar to one another?

Very different	Somewhat different	Neither different nor similar	Somewhat similar	Very similar
☐	☐	☐	☐	☐

Overall, how do you think your Asian friends feel about White people?

Very cold	Cold	Neither particularly warm nor particularly cold	Warm	Very warm
☐	☐	☐	☐	☐

If you were interacting with a White person who you had never met before, how would you expect to feel?

a) Anxious

Not at all	Slightly	Somewhat	Very	Extremely
□	□	□	□	□

b) Confident

Not at all	Slightly	Somewhat	Very	Extremely
□	□	□	□	□

c) Relaxed

Not at all	Slightly	Somewhat	Very	Extremely
□	□	□	□	□

How much do you agree or disagree with the following sentences?

a) Being Asian British is an important part of who I am.

Disagree strongly	Disagree	Neither agree nor disagree	Agree	Agree strongly
□	□	□	□	□

b) My Asian friends consider it a good thing to have White friends.

Disagree strongly	Disagree	Neither agree nor disagree	Agree	Agree strongly
□	□	□	□	□

c) My family consider it a good thing to have White friends.

Disagree strongly	Disagree	Neither agree nor disagree	Agree	Agree strongly
□	□	□	□	□

d) In general, White people in Britain consider it a good thing to have Asian friends.

Disagree strongly	Disagree	Neither agree nor disagree	Agree	Agree strongly
□	□	□	□	□

e) There is a lot of unfair treatment towards Asian people in Britain today.

Disagree strongly	Disagree	Neither agree nor disagree	Agree	Agree strongly
□	□	□	□	□

How often do you have positive contact with Asian people?

Never	Once or twice a month	Once a week	Several times a week	Every day
□	□	□	□	□

How often do you have negative contact with Asian people?

Never	Once or twice a month	Once a week	Several times a week	Every day
□	□	□	□	□

How often do you have positive contact with White people?

Never	Once or twice a month	Once a week	Several times a week	Every day
□	□	□	□	□

How often do you have negative contact with White people?

Never	Once or twice a month	Once a week	Several times a week	Every day
□	□	□	□	□

During conversations with White people, how much do you think about the fact that they are White?

Not at all	A little	Somewhat	Quite a lot	Very much
□	□	□	□	□

During your contact with White people, how aware are you of belonging to different ethnic groups?

Not at all	A little	Somewhat	Quite a lot	Very much
□	□	□	□	□

STOP

You have finished the required sections of the questionnaire.

Thank you very much for taking part!

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