Timing is Everything: Developmental Changes in the Associations between Intergroup Contact and Bias

**Abstract**

Identifying developmental patterns in the links between intergroup contact and bias is crucial for the development of effective strategies to combat negative intergroup attitudes and behaviors. Using a novel exploratory approach, the current study applied time-varying effects modeling (TVEM) to examine age-based changes in relations between intergroup contact and intergroup bias in a divided community. TVEM enables estimation of the true nature of change, rather than a pre-determined change function. Participants included 667 youth (*M* age = 15.74, *SD* = 1.97) from Belfast, Northern Ireland, a conflict-affected setting. First, the results suggest no change in the relation between contact frequency and bias through adolescence. Second, results found the relation between contact quality and bias increases from ages 10-14 and then levels off in later adolescence. Finally, differences in the association between contact quality and bias between Catholics, the historic minority group, and Protestants, the historic majority group, also emerged. The findings offer unique insight into the developmental changes in contact and bias; through advanced exploratory modelling, greater insight and precision of age-related changes emerges. The paper concludes with implications for future research and implications for interventions for the nearly one-fifth of children worldwide growing up amid conflict.

**Timing is Everything: Developmental Changes in the Associations between Intergroup Contact and Bias**

The vast literature on intergroup contact suggests positive contact is associated with more positive intergroup attitudes (Al Ramiah & Hewstone, 2013; Brown & Hewstone, 2005; Pettigrew & Tropp, 2006). Meta-analyses have established the overall effect of contact and also identified the mediating mechanisms that explain this link (e.g., Pettigrew & Tropp, 2008). Previous research has also identified moderators of contact, most notably that the success of contact depends on contact quality, or the degree to which the contact is cooperative, promotes equal status between groups and promotes intergroup friendships (Allport, 1954; Tausch, Tam, Hewstone, Kenworthy, & Cairns, 2007). Growing out of social psychological traditions, much of this research focuses on adult populations and utilizes cross-sectional and experimental designs.

More recently, researchers have expanded this work to understand the development of intergroup processes and how social processes such as contact affect the development of intergroup attitudes (e.g. Christ et al., 2014; Merrilees et al., 2018), including assessing these processes in adolescents. These models of change generally rely on the assumption of linear models, suggesting that if social processes and their outcomes change, they do so in uniform ways, simply going up or down throughout the tested age-period. The current study extends these developmental models by applying an exploratory time-varying effects modeling (TVEM; Tan, Shiyko, Li, Li, & Dierker, 2012) to the relation between contact and intergroup bias throughout adolescence. TVEM allows for the examination of age as a moderator using a semi-parametric approach that estimates regression coefficients as functions of continuous time. In other words, one of the major advantages of the TVEM approach is that investigators do not have to specify a change function (e.g. linear, quadratic, cubic); instead the true nature of change, which might deviate from these specific patterns, can be captured. Thus, TVEM approach has the benefit of allowing researchers to accurately visualize and capture age-related changes across developmental periods. This exploratory, nuanced understanding of change has implications for evaluating theory and developing intervention efforts.

The exploratory modelling approach, however, is guided by theories from a developmental intergroup framework (Abrams & Killen, 2014). Recent models of change in prejudice and intergroup attitudes have combined research from social psychology with the models of change in cognition and social processes from developmental psychology.These models have advanced our understanding of how changes in social cognition, social identity, patterns of intergroup contact and group norms impact youth development of intergroup attitudes (Bennett & Sani, 2004; Bigler & Liben, 2007; Levy & Killen, 2008; Nasie, Diamond, & Bar-Tal, 2015; Nesdale, 2004). For example, the social cognitive model (Aboud, 1988; Aboud & Doyle, 1996) suggests that children’s prejudice increases until age 7 and then declines as children develop cognitive abilities that help them perceive individual differences. Social identity development theory (Nesdale, 2004) suggests that youths’ increasing awareness of social relationships impacts their attitudes, and thus the model of change depends on context. Raabe and Beelmann (2011) found that while developmental patterns of change in prejudice appeared in childhood, no clear trend emerged in adolescence suggesting the importance of individual differences due to context effects. For example, Merrilees et al. (2018) found that above and beyond individual contact experiences, neighborhood-level contact quantity and quality predicted trajectories of intergroup bias through adolescence.

Examining contact in adolescence may be especially important given the changes in cognitive abilities and the emerging importance of social relationships during this period. For example, research has shown that adolescents are increasingly aware of and incorporate social norms into their attitudes and behaviors (McKeown & Taylor, 2018; Mulvey, Hitti, Rutland, Abrams, & Killen, 2014; Schiefer, Mӧllering, Daniel, Benish-Weisman, & Boehnke, 2010). Wolfer, Schmid, Hewstone, and van Zalk (2016) examined the relations between contact and attitudes toward other ethnic groups from adolescence through early adulthood in Western Europe. They found that positive intergroup contact predicted positive changes in intergroup attitudes in adolescence and that positive changes in intergroup attitudes buffered against a decline in intergroup contact that occurred in adulthood. Titzmann, Brenick, and Silbereisen (2015) found differences in linear trajectories of negative prejudice based on whether German adolescents had an immigrant friend over the study period. Most notably youth who gained a friendship over the study period decreased in negative prejudice. Other research on university students in Northern Ireland has shown that the earlier out-group friendships are formed, the more likely friendships with members of the out-group will continue in later life, and that these links between intergroup contact and friendship indirectly decrease bias (Al Ramiah, Hewstone, Voci, Cairns, & Hughes, 2013). The current study will extend these developmental findings regarding the association between intergroup contact and intergroup attitudes by assessing links over continuous time. Examining patterns of change over continuous time could identify key shifts or points over development during which contact intervention could be particularly impactful (Tan et al., 2012).

Contact quality and contact quantity are examined independently in the current study as frequent contact does not necessarily ensure positive contact. Frequent negative contact experiences have been shown to be predictive of affective (feelings and emotions) and cognitive (stereotyping) prejudice in emerging adults (Aberson, 2015), and negative contact can have more long lasting effects than positive contact. Barlow et al. (2012) found that low quality contact, which involves negative emotions (e.g. uncomfortableness, anger, fear) of group members, negatively affected intergroup attitudes; detrimental effects of poor quality contact were also found for physiological and psychological health in a large age span of adults. This is important to consider in the context of intergroup contact during adolescence as the educational environment and subsequent transition allow for variability in quantity of intergroup contact, though do not guarantee that any such interactions are positive or promoting of friendship.

Research has shown that the effects of intergroup contact are not the same for majority and minority group members. Tropp and Pettigrew (2005) found that the relation between contact and prejudice reduction is weaker for minority groups compared to majority groups. This makes sense given that contact or anticipation of it, may lead to increased intergroup anxiety. Status differences between groups, a history of conflict, or perceived threats all increase intergroup anxiety and lead to poor assumptions about these interactions (Stephan, 2014). For example, research has shown that direct cross-ethnic friendships have predicted positive out-group evaluations over-time for majority German middle school children, though not for minority Turkish middle school children (ages 7-11; Feddes, Noack, & Rutland, 2009). Liebkind, Mähönen, Solares, Solheim, and Jasinskaja‐Lahti (2014) examined both developmental and group-based differences in adolescents’ (ages 13-19) reactions to a prejudice reduction program in mixed classrooms in Finland. They found that the positive effect of the intervention was significant for both majority Finnish and minority immigrant students, but it was strongest for the youngest group of students. They also found an unexpected increase in post-intervention intergroup anxiety for the oldest group. The authors hypothesized that this unexpected finding could have been due to the fact that adolescents have increased awareness and processing of social information. In sum, research has indicated that intergroup interactions do not result in equivalent experiences for majority and minority group members and there are likely stronger effects of contact on majority group members. There may also be developmental and context-based processes that moderate these effects.

Growing up in Northern Ireland

The current study will use an exploratory approach to examine developmental shifts in relations between quality and quantity contact and intergroup bias in adolescents in Belfast, Northern Ireland. Despite the signing of the Belfast/Good Friday Agreement in 1998, many areas of Belfast remain divided following the Troubles. The Troubles was a 30-year period between the late 1960s and the 1990s during which two main ethnopolitical groups were in conflict over the constitutional state of Northern Ireland (Cairns & Darby, 1998). These two groups are colloquially referred to as a Catholic or Protestant ‘community background’. Protestants, the historic majority group in terms of numbers and relative power, tend to want to preserve Northern Ireland’s place in the United Kingdom, and Catholics, the historic minority group in terms of numbers and relative power, tend to support a unification with the Republic of Ireland. For example, throughout the 1970’s, the government prevented Catholics from having the same access to housing, education, and thus wealth, compared to Protestants (Darby, 1976). Subsequent legislation was enacted to try to correct this historic exclusion, including the Fair Employment Acts of 1976 and 1989 and the Housing Executive responsible for allocation of social housing as previous local councils had discriminated against Catholics (Smith & Chambers, 1991).

In part due to Catholic communities organizing for civil and human rights in the 1960s, armed conflict escalated between state forces, paramilitary groups, and civilians resulting in 3,600 deaths, 20,000-30,000 imprisoned, and roughly 50,000 reported as injured (Cairns & Darby, 1998; Cairns, Wilson, Gallagher, & Trew, 1995; McEvoy & Shirlow, 2009). Like many other conflicts around the world, the signing of the peace agreement marked an increase in general security, but intergroup tension remains and spikes in violence occur periodically. For example, youth continue to be exposed to intergroup violence and participate in such acts (Taylor, Merrilees, Goeke-Morey, Shirlow, & Cummings, 2016).

In this post-accord period, daily life is largely segregated. For example, 95% of the youth in Northern Ireland were attending either Protestant or Catholic schools consistent with their ethno-political identities (Northern Ireland Council of Education, as cited in Stringer, et al., 2009). Although there has been progress, residential segregation also persists; that is, 90% of people in Northern Ireland live in an area that is homogenously Catholic or Protestant (Chartered Institute of Housing, 2015). Moreover, children are aware of Catholic and Protestant identities at least by age 5 (Taylor, Dautel, & Rylander, 2020). This demographic landscape shapes opportunities for intergroup contact among youth in Northern Ireland.

Drawing on previous literature suggesting the increasing awareness of and importance of contact in the early adolescence period, we expect that the relation between intergroup contact and intergroup bias to change with age in adolescence. Capitalizing on the exploratory approach to estimate the function of change in these constructs in continuous time, our models are not constrained to linear, quadratic, etc. change. To our knowledge, this is the first time a flexible change function has been applied in this area of research; therefore, we do not have a priori predictors of the shape or direction of change in intergroup contact (quality and frequency) and intergroup bias.

As the numbers of the two communities have become relatively even across the population of Northern Ireland (approximately 41% Catholic, 42% Protestant and 17% declaring no religion; Northern Ireland Statistics and Research Agency, 2011CITE), consistent with past research (Schulz & Taylor, 2018), the current study also examines patterns of change for youth from a Protestant (historic majority) and Catholic (historic minority) community background separately. Given the nature of intergroup relations in Belfast and drawing from previous literature in which the relation between contact and prejudice reduction is stronger for majority groups, we expect the relation between contact and intergroup bias to be stronger for Protestants compared to Catholics.

**Method**

**Participants**

 These data are drawn from the final two waves of a six wave longitudinal study of the effects of political violence on youth in Belfast. The waves were selected because they were the only measurement occasion in which these variables were assessed. In the current analyses, participants included 667 youth, aged 15.74 (*SD* = 1.97) and 16.82 (*SD* = 2.00) years old in each wave, evenly split by gender. Reflecting the demographics of Northern Ireland, all participants were White; there was a slight over-representation of the Protestant community (62%) compared to the Catholic community (38%). Roughly two-thirds of the participating families were headed by single females, consistent with the demographics of the larger area. Seventy-eight percent of the sample was retained between waves.

**Procedures**

 Participants were drawn from relatively homogenous neighborhoods based on Catholic/Protestant affiliation of residents, levels of conflict and violence experienced during and after the Troubles, and on socio-economic status. An expert demographer identified neighborhoods using data on historical politically-motivated death rates during the Troubles, as well as sectarian crime reports to the Police Service of Northern Ireland, (Shirlow & Murtagh, 2006). All study areas were working class and ranked in the lowest quarter of social deprivation (e.g. access to basic services, schools, education and housing). Community leaders and families were sent letters informing them of the study as an examination of political and community conflict, family relationships, and child development. Interviewers followed up through door-to-door visits to assess eligibility and interest. Families with a child in the target age range (10-17 years old) were recruited to participate (for greater detail about the sampling, see *Author Identifying Citation*). Interviewers from a local market research firm completed all interviews via face-to-face interview in the participants’ homes with youth interviews lasting approximately 45 minutes. The family received modest compensation at each time point. Procedures were approved by the Human Subjects Review Boards at all participating universities.

**Measures**

**Intergroup bias**. Youth responded to two “feeling thermometer” items used to create a score of intergroup attitudes (Cairns, Kenworthy, Campbell, & Hewstone, 2006). Participants rated how 0 (*unfavorable*) to 100 (*favorable*) they felt towards the Protestant and Catholic communities. A difference score was calculated, which we used as our measure of intergroup bias, such that the degree of intergroup bias reflects the difference between a favorable rating of the individual’s in-group compared to the out-group, ranging from -100 to 100. Higher scores indicate positive in-group bias. This approach to intergroup bias has been widely used in Northern Ireland (Cairns et al., 2006).

**Frequency of intergroup contact**. To assess contact frequency, adolescents responded to four items that asked “how often do you interact with people from the other community in each other’s homes / at school / in your neighborhood / through extra-curricular activities such as sports or community service.” Responses could range from 0 (*never*) to 4 (*very often*) and were summed for a composite score. Cronbach’s alphas were good (Time 1 α = .82, Time 2 α = .86).

**Quality of intergroup contact**. Participants rated the overall quality of intergroup contact with the other community using a five-item measure (Dixon et al., 2010). They rated the degree to which their contact experiences were friendly, cooperative, pleasant, and that the participants interacted as equals, and the contact was close and intimate using a 5-point Likert scale from 0 (*never*) to 4 (*always*). Responses were summed and higher scores indicated better quality of contact with excellent internal consistencies (Time 1 α = .99, Time 2 α = .99).

**Results**

**Descriptive Statistics**

Means, standard deviations and bi-variate correlations are presented in Table 1 by wave. Because age is measured in months (based on birth date and month interviewed) to capture continuous time, presenting the data by age is not possible.

**Time Varying Effects Models**

All analyses were modeled using the TVEM SAS Macro (Li et al., 2017). In order to model regression intercepts and coefficients as a smooth function of time, TVEM uses a spline-based approach to split a function of time into intervals that are based on a number of dividing points (knots). Polynomial terms are used to estimate the specific shape of change for each interval, as TVEM does not force a specific shape of change on intercepts or slopes (e.g., linear, quadratic). The only assumption made by TVEM is for the entire sample, change over time is continuous rather than discontinuous. This nonparametic approach is particularly useful in synthesizing nonlinear or complex patterns of change that are present in longitudinal data.

A curvilinear estimate of the slope function, with a 95% confidence interval, is created by TVEM (Tan et al., 2012). Relating to the specified age represented on the x-axis, any point on the curve signifies the relation between the predictor (e.g. quality or quantity of contact) and the outcome (e.g. intergroup bias). If the confidence interval does not include zero at a particular point in time, a significant relation is indicated; if the confidence intervals do not overlap over time, a significant slope is indicated (Lanza, Vasilenko, Liu, Li, & Piper, 2014). TVEM results are depicted in graphical form as tables of coefficients would be too large to incorporate.

For all models the P-spline (penalized truncated power spline) method was presented as P-spline utilizes information criteria to balance model fit with parsimony, thus automatically selecting the amount of knots to create the best model that does not overfit the data. B-spline (unpenalized truncated power spline) requires the researcher to, in an iterative manner, manually compare models with varying amounts of knots for every individual time-varying effect. The B-spline method with random effects was also explored, but the final model chosen by the fit statistics did not differ greatly to the patterns in the P-spline model, thus, the results of the P-spline models are presented here.

Figure 1 represents the changing value of the outcome variable, intergroup bias, which appears to increase from age 12 to about age 16 at which point it levels off or slightly decreases until age 19. The large tail on the confidence band around age 20 is likely the result of the smaller sample at these ages.

The line in Figure 2 represents the value of the regression coefficient between contact frequency and intergroup bias. Change over time seems to reflect a decrease across adolescence; that is, contact frequency goes from having a positive relation (more contact, more bias) to a negative relation (more contact, less bias) with intergroup bias around age 19. The 95% confidence band includes zero for the entire period measured, however, suggesting the value is not significantly different from zero.

Similarly, the line in Figure 3 represents the change in the relation between contact quality and intergroup bias through adolescence. As youth age through early adolescence, the relation between contact quality and intergroup bias is negative (higher quality contact, less bias) and gets stronger until about age 15, at which points it seems to get slightly weaker until age 19. Again, the large tail around ages 19-20 likely reflects the smaller sample and larger standard errors at these ages.

 We also examined changes in the values of the coefficients over age for Protestant (historic majority) and Catholic (historic minority) groups separately. The patterns for change in intergroup bias and contact *frequency* did not appear to differ from each other or from the full sample patterns so they are omitted for simplicity. The patterns of change for the relation between contact *quality* and intergroup bias, however, did appear to show potential differences between the Protestants and Catholics. Figure 4 shows the two graphs representing the change in coefficients by community background. For both groups, contact quality seems to be increasing in strength until around age 14, at which point Catholic youth level off. Protestant youth, on the other hand, seem to show a weakening of the relation between contact quality and intergroup bias until the end of the adolescence period. That is, for both groups the strength of the relation between contact quality and bias got stronger through early adolescence. In later adolescence, that effect stayed low and plateaued for the historic minority group; for the historic majority group, the effect of quality contact on bias weakened through middle adolescence.

**Discussion**

The current study examined how the relations between contact frequency and contact quality with intergroup bias change over adolescence using an exploratory approach that does not impose a parametric model to the data. In other words, we looked at age as a moderator that does not have to take a linear or quadratic form. Differing from recent parametric approaches that have examined the changes in contact and intergroup attitudes (Christ et al., 2014; Merrilees et al., 2018; Wolfer et al., 2016), the focus of the current paper is less on the environmental or neighborhood contextual effects, and more on estimating the nature of change in these constructs across an important developmental period. This approach provides a more nuanced and dynamic visualization for how these constructs change across adolescence, which may help refine theory or shape intervention timing.

The current results suggest that within these divided neighborhoods in Belfast, intergroup bias increases until middle adolescence, at which point it levels off. These results are consistent with social identity development theory (Nesdale, 2004), and the importance of context given the nature of segregation and division within these communities. The majority of youth in Belfast are living in segregated neighborhoods and attending schools with ingroup member. As they enter adolescence, norms about segregation and intergroup attitudes are likely to become increasingly important and incorporated into their attitudes about others (McKeown & Taylor, 2018).

The results for contact frequency suggest that there could be a trend such that more contact is related to less bias once youth are in middle adolescence, but the confidence bands include zero for all ages captured in this sample. The large confidence bands around this effect could indicate high levels of variability across youth that should be further explored. For example, it could be that opportunities for contact vary across neighborhood; future research with greater diversity across a larger number of areas could examine this possibility. Another possibility is that the effect that frequency of contact has depends on the quality of the contact or other variables moderating these associations. That is, the negative contact has been shown to have an enduring effect (Paolini, Harwood, & Rubin, 2010). Therefore, the impact of high frequency and high quality contact would likely have an opposite effect on prejudice compared to contact that is high frequency and low quality (Barlow et al., 2012).

The relation between quality of contact and bias appears to get stronger until middle adolescence at which point, around age 16, it starts to level off or get weaker (See Figure 3). This pattern of results is likely the product of both social cognitive processing changes in this age period coupled with changes in the school system. As predicted by theories suggesting the increasing importance of social contexts through adolescence (Abrams & Rutland, 2008; Nesdale, 2004), these shifts are likely due to both changes in context, such as leaving formal education at this age, and social cognitive changes associated with brain development. Significant changes in social-cognitive awareness are occurring through adolescence (Blakemore & Choudhury, 2006). For example, Foulkes, Leung, Fuhrmann, Knoll, & Blakemore (2018) found that children, young and middle adolescents (compared to later adolescents and emerging adults) were more likely to change their ratings of a social behavior based on how others rated the same event, suggesting the impact of social norms on youths’ attitudes through middle adolescence. These results demonstrate how more flexible estimates of how these constructs change with age may help to refine these social and developmental theories on intergroup relations.

There also appear to be differences in the relation between contact quality and intergroup bias for Catholics and Protestants over this age period. For both Catholic and Protestant youth, the relation between contact quality and bias gets stronger between 12 and 14. Around age 14 the impact of contact seems to get weaker for Protestant youth, but remains stable for Catholic youth. Given the previously documented weaker impacts of contact for minority group members (Tropp & Pettigrew, 2005), the current findings might suggest an age period at which youths’ awareness of their group status is particularly salient. In this case, the effect of contact quality is getting weaker for the historical majority group. Group status within Northern Ireland has been described as a “double majority” because Catholics are in the numeric majority on the island of Ireland, though Protestants maintain a slight majority within Northern Ireland (Mac Ginty, Muldoon, & Ferguson, 2007). Since the signing of the peace agreement, Catholics have been gaining in number as well as gaining cultural rights through the peace process. These gains could be felt by Protestants as threatening, heightening their perceptions of themselves as the relative minority (e.g. Goeke-Morey et al., 2015).

The findings of the current study must be considered keeping in mind the limitations of the sample and methodology. Although not a limitation, per se, it should be noted that the results presented here are exploratory in nature and should be replicated with different samples. The correlational data limits any conclusions regarding cause and directionality; more robust measures of constructs, such as intergroup bias or negative contact, might also be employed in future research. Although the analyses presented here include two waves in which contact was assessed, the presentation of the figures represents changes that are across participants in the sample. Future research including assessment of these changes with more waves of data could help tease apart within- and between-person changes.

This research has practice implications as contact strategies are commonly used to bring youth together in historically divided societies such as in the Middle East, the Former Yugoslavia, and Northern Ireland (McKeown & Cairns, 2012). Highlighting the changing relations between contact and intergroup attitudes could provide valuable information regarding the best time to implement such programs. The current study provides initial evidence that there are developmental changes in how intergroup contact relates to intergroup bias from early through late adolescence and that there may be differences in these changes based on group status. For example, the current results suggest that focusing contact programming between the ages of 12 and 14 could be particularly important, whereas contact occurring after age 14 may not be as impactful. Importantly, this paper demonstrates that these patterns might not follow the linear patterns that are often assessed through approaches that impose such models to the data.

These findings, and the general approach to assessing contact and intergroup attitudes, could help inform the timing of contact-based interventions that are common in communities working toward peace promotion in divided communities. Given the exploratory nature of this method of analysis, future studies should consider applying time-varying effects modeling to other contexts of intergroup contact to build a larger base of knowledge regarding potential developmental shifts in the impact of contact through adolescence.

The findings offer unique insight into the developmental changes in contact and bias; through advanced exploratory modelling, greater insight and precision of age-related changes emerges. Future research utilizing exploratory models that do not impose preconceived models to the data, but instead allow for the change in relationships between variables to emerge in dynamic patterns, may highlight both similarities and differences across various contexts of intergroup divide. These findings will have important implications for the timing of interventions for the nearly one-fifth of children worldwide growing up amid conflict (Save the Children, 2019).

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| --- |
| **Table 1** |
| *Means, Standard Deviations, and Bivariate Correlations* |
|  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Wave 5 |
|  1. Age | - |  |  |  |  |  |  |  |  |  |
|  2. Contact Frequency | -0.03 | - |  |  |  |  |  |  |  |  |
|  3. Contact Quality | -0.02 | 0.74\*\*\* | - |  |  |  |  |  |  |  |
|  4. Bias | 0.03 | -0.32\*\*\* | -0.48\*\*\* | - |  |  |  |  |  |  |
| Wave 6 |
|  5. Age | 0.95\*\*\* | -0.06 | 0.00 | 0.03 | - |  |  |  |  |  |
|  6. Contact Frequency | -0.07 | 0.48\*\*\* | 0.47\*\*\* | -0.35\*\*\* | -0.05 | - |  |  |  |  |
|  7. Contact Quality | -0.05 | 0.47\*\*\* | 0.68\*\*\* | -0.49\*\*\* | -0.02 | 0.74\*\*\* | - |  |  |  |
|  8. Bias | 0.06 | -0.29\*\*\* | -0.49\*\*\* | 0.79\*\*\* | 0.06 | -0.39\*\*\* | -0.58\*\*\* | - |  |  |
|  9. Gender | -0.00 | 0.10\* | 0.13\*\* | -0.13\*\* | -0.00 | 0.16\*\*\* | 0.14\*\* | -0.16\*\*\* | - |  |
|  10. Ethnicity | -0.01 | 0.30\*\*\* | 0.52\*\*\* | -0.22\*\*\* | -0.01 | 0.25\*\*\* | 0.44\*\*\* | -0.15\*\* | 0.03 | - |
| Mean (SD) | 16.39 (2.04) | 2.23 (3.27) | 6.16(7.54) | 34.23(30.35) | 17.26(2.04) | 2.07(3.12) | 6.16(6.97) | 34.27(31.58) | 0.50(0.50) | 0.35(0.48) |
| Range | 10.83-20.67 | 0-16 | 0-20 | -35 - 100 | 11.33-21.17 | 0-13 | 0-20 | -30-100 |  |  |

*Note. \*p <.05. \*\*p < .01. \*\*\*p < .001*



*Figure 1*. Changes in intergroup bias through adolescence.



*Figure 2*. Changes in the relation between contact frequency and intergroup bias through adolescence.



*Figure 3*. Changes in the relation between contact quality and intergroup bias through adolescence.



*Figure 4*. Changes in relations between contact quality and bias for Protestant (left) and Catholic (right) adolescents.