# Shaping the Development of Prejudice: Latent Growth Modeling of the Influence of Social Dominance Orientation on Outgroup Affect in Youth

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Abstract

Social dominance orientation (SDO) has been theorized as a stable, early-emerging trait influencing outgroup evaluations, a view supported by evidence from cross-sectional and two-wave longitudinal research. Yet the limitations of identifying causal paths with cross-sectional and two-wave designs are increasingly being acknowledged. This paper presents the first use of multi-wave data to test the over-time relationship between SDO and outgroup affect among young people. We use cross-lagged and latent growth modeling of a three-wave dataset employing Norwegian adolescents (over 2 years, $N$ = 453) and a five-wave dataset with American university students (over 4 years, $N$ = 748). Overall, SDO exhibits high temporal rank-order stability and predicts changes in outgroup affect. This research represents the strongest test to date of SDO's role as a stable trait that influences the development of prejudice, while highlighting latent growth modeling as a valuable tool for social and political psychology.

*Keywords*: social dominance orientation, outgroup affect, prejudice, longitudinal studies, latent growth modeling.

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The idea that responses to social outgroups might be driven by an early-forming preference for group-based hierarchy continues to be counter-intuitive. As such, the role of social dominance orientation (Ho et al., 2015; Pratto, Sidanius, Stallworth, & Malle, 1994) as a stable, causal variable in the development of intergroup attitudes has attracted substantial attention and debate (Ekehammar, Akrami, Gylje, & Zakrisson, 2004; Kreindler, 2005; Kteily, Ho, & Sidanius, 2012; Kteily, Sidanius, & Levin, 2011; Lehmiller & Schmitt, 2007; Schmitt, Branscombe, & Kappen, 2003; Sibley & Duckitt, 2010; Sibley & Liu, 2010). Though several studies with longitudinal data have yielded results consistent with SDO's status as a stable predictor of intergroup attitudes (Asbrock, Sibley, & Duckitt, 2010; Kteily et al., 2011; Sibley & Duckitt, 2010; Sibley & Liu, 2010; Sibley, Wilson, & Duckitt, 2007a; Thomsen et al., 2010), these studies have been restricted to cross-lagged designs over two waves, with adult samples. The present paper reports, for the first time, studies of SDO and outgroup affect using multi-wave data collected from samples of young people in two different countries—a three-wave study of adolescents in Norway (Study 1) and a five-wave study of university students in the United States (Study 2). We used a combination of cross-lagged panel analysis and latent growth modeling to examine the development of SDO and outgroup affect over multiple years, and the ability of each variable to predict over-time changes in the other.

### The Nature of Social Dominance Orientation

Since its introduction, the concept of social dominance orientation has been theorized to be an enduring, general stance toward intergroup inequality. SDO is defined as "expressing the value that people place on non-egalitarian and hierarchically structured relationships among

social groups" (Sidanius & Pratto, 2001, p. 21), such that a person high in SDO will see a hierarchy of social groups as both natural and desirable (Pratto et al., 1994). Recent studies using factor analysis have indicated that SDO has a two-dimensional structure, and the literature now refers to intergroup dominance orientation and intergroup anti-egalitarianism as its correlated sub-dimensions (Ho et al., 2015; Ho et al., 2012; Jost & Thompson, 2000; Kugler, Cooper, & Nosek, 2010). Intergroup dominance orientation (SDO-D) is one's desire to see some groups actively dominate and oppress other groups, and is most strongly related to hostile attitudes such as old-fashioned racism, nationalism, support for the death penalty, militarism and support for war. Intergroup anti-egalitarianism (SDO-E) indexes a preference for inequality between groups, and is more related to subtle forms of racism, opposition to affirmative action, hierarchy-enhancing social ideologies and career choice (Ho et al., 2015; Ho et al., 2012). While apparently forming two sub-dimensions, SDO-D and SDO-E are strongly correlated, hanging together as a unified construct, and are analyzed as such in this paper.

The origins of SDO were theorized to include both dispositional and situational factors. As identified by both social identity theorists and social dominance theorists, being socialized into a dominant group or an environment that encourages group hierarchy will tend to result in a stronger social dominance orientation (Dambrun, Kamiejski, Haddadi, & Duarte, 2009; Fischer, Hanke, & Sibley, 2012; Lehmiller & Schmitt, 2007; Pratto, Sidanius, & Levin, 2006; Schmitt et al., 2003; Sidanius & Pratto, 1999, 2001; Sinclair, Sidanius, & Levin, 1998; Turner & Reynolds, 2003), and one's SDO increases even if one is temporarily associated with a high power position (Guimond, Dambrun, Michinov, & Duarte, 2003, Study 3).

Yet social dominance theory does not posit SDO as a mere reflection of socialization, existing intergroup relations and contextual variations. In fact, Sidanius and Pratto theorized that SDO is an early-emerging, stable trait with a status akin to personality, and with a causal impact on intergroup attitudes (Sidanius & Pratto, 1999, chapter 3). Positing an individual's "temperament" as a key source of social dominance orientation, social dominance theorists have argued that biological traits such as sex, and personality facets such as empathy, would be reliably linked to SDO (Pratto et al., 1994).

**Evidence for the Stability of SDO**

The first set of evidence in favor of SDO's stability comes from data suggesting links to underlying temperament. A recent meta-analysis showed that the sex difference in SDO, in which men report higher levels than women, is robust across 22 countries (I. Lee, Pratto, & Johnson, 2011). Furthermore, SDO has consistently been found to be negatively correlated with core personality traits, such as agreeableness (Sibley & Duckitt, 2008), openness to experience (Duriez & Soenens, 2006; Ekehammar et al., 2004), and the honesty/humility component of the HEXACO model (K. Lee, Ashton, Ogunfowora, Bourdage, & Shin, 2010; Sibley, Harding, Perry, Asbrock, & Duckitt, 2010). Indeed, there is even evidence implying that one personality facet—empathy—can be causally influenced by SDO (Sidanius et al., 2013), again supportive of the predictive, trait-like status of the latter.

Aside from demonstrating robust links to personality and sex, SDO has been theorized as having trait-like features such as high *rank-order stability* across time and contexts. The term rank-order stability does not imply that SDO levels never meaningfully change over different social contexts. Rather, social dominance theorists argue that individuals' *relative* SDO scores, if not their absolute scores, will be fairly stable over time and across social contexts (Levin, 1996; Pratto et al., 2006; Sidanius, Sinclair, & Pratto, 2006).

One source of evidence for SDO's rank-order stability across time is found in the high autocorrelations (or test-retest reliability coefficients) between SDO scores administered across waves of panel surveys, even where such waves are as long as four years apart (Kteily et al., 2011; Sibley & Duckitt, 2010; Sibley & Liu, 2010; Sidanius et al., 2013; Sidanius, Levin, van Laar, & Sears, 2010; Thomsen et al., 2010). Even more notable is the observation of rank-order stability in SDO scores across different intergroup contexts, as demonstrated in a study conducted with Jewish Israelis by Levin (1996; see Pratto et al., 2006; Sidanius & Pratto, 1999, ch.3). This study showed that when a randomly selected half of the SDO scale items were administered in the context of the conflict between the high status Ashkenazi and low status Mizrachi Jews in Israel, SDO was higher among the former group than among the latter. However, when the other half of the SDO scale was measured after the same sample was primed to think about Israeli Arab–Jewish relations, in which both groups have much higher status than a third group (i.e., Arabs), the SDO scores of both Ashkenazi and Mizrachi Jews were higher, and were more similar. Despite this situational shift in the mean level of SDO scores, the correlation between the SDO scores across contexts was nonetheless robust ($r$ = .56, or $r$ = .72 when the Spearman-Brown split-half formula was employed). This implies that among Israeli Jews, those with relatively high SDO scores in the Ashkenazi–Mizrachi ethnic context also had relatively high SDO scores in the Israeli Arab–Jewish national context (and the converse for those with relatively low SDO scores).

## SDO and the Development of Outgroup Attitudes

In addition to positing SDO as an enduring individual difference trait, social dominance theorists argue that it will influence the development of a range of traits, attitudes and behaviors within the intergroup domain (Sidanius, Pratto, & Mitchell, 1994). Indeed, two decades of research have shown that SDO has robust predictive power over a range of consequential intergroup attitudes and behaviors, encompassing both specific outgroups and

generalized prejudice. These include phenomena such as individual levels of prejudice, discriminatory behaviors, support for war, hostility toward immigrants, the aggressive persecution of terrorists, opposition to affirmative action and wealth redistribution, physiological fear response to outgroup faces, and choice of careers that have been defined as hierarchy-enhancing (e.g., the police) versus hierarchy-attenuating careers (e.g. social work) (for reviews, see Pratto et al., 2006; Sidanius, Cotterill, Sheehy-Skeffington, Kteily, & Carvacho, In press). It is through this long, robust and theoretically coherent array of relationships that SDO has been suggested to be one of the most important individual difference variables in the fields of political psychology and intergroup relations (e.g. Kandler, Bleidorn, & Riemann, 2012; McFarland, 2010; Sibley & Liu, 2010).

Prominent critiques from the social identity tradition, however, have argued against the interpretation of these correlations as indicative of the causal influence of SDO (Lehmiller & Schmitt, 2007; Schmitt et al., 2003; Turner & Reynolds, 2003). For instance, Schmitt and colleagues (2003) argued that correlations between scores on SDO and expressed outgroup attitudes in surveys result from the fact that the respondent is thinking about his/her attitude toward a particular outgroup when filling out the SDO questionnaire. In response to this critique, evidence assessing SDO's causal status comes, firstly, from cross-sectional studies which have investigated SDO's covariation with prejudice and discrimination even in the case of minimal groups or novel social categories and new social policies (Amiot & Bourhis, 2005; Ho, Sidanius, Cuddy, & Banaji, 2013; Ho et al., 2012, Sample 7; Krosch, Berntsen, Amodio, Jost, & Van Bavel, 2013; Pratto et al., 1994; Reynolds et al., 2007). Amiot and Bourhis (2005), for example, found that SDO was correlated with preferential allocation to the ingroup in a minimal group scenario, despite the fact that SDO was measured one month earlier. Thus, the correlation between SDO and intergroup discrimination could not have resulted from participants thinking of the minimal group

scenario as they completed the SDO scale. Although this does not rule out the potential for other forms of prejudice to affect SDO, it does support the claim that when new attitudes are being formed in a minimal group setting, SDO is an important input variable to those attitudes.

A more persuasive way of demonstrating SDO's causal power vis-à-vis intergroup attitudes is to analyze longitudinal data. This approach has been used by many recent studies of SDO and prejudice. These studies have analyzed responses to measures of SDO and outgroup attitudes obtained from the same sample twice, across time intervals varying from five months to four years (Asbrock et al., 2010; Dhont, Van Hiel, & Hewstone, 2013; Kteily et al., 2011; Sibley & Duckitt, 2010; Sibley, Wilson, & Duckitt, 2007b; Thomsen et al., 2010). Most of these studies converge on a picture of SDO as predicting prejudice and discrimination over time, occasionally supplemented by the reverse causal path. For example, Asbrock, Sibley, and Duckitt (2010) conducted a longitudinal analysis of attitudes of undergraduate students at two time points, six months apart. The authors found that SDO among undergraduates at the first administration predicted prejudice six months later toward "derogated" groups, (e.g. housewives and the unemployed) and "dissident" groups (e.g. protestors and feminists), controlling for the initial levels of the prejudice variables. Cross-lagged effects with SDO as a predictor have also been found in the case of hostile sexism (Sibley et al., 2007a), perceived ethnic victimization among Whites (Thomsen, Green, & Sidanius, 2008), outgroup friendships (Kteily et al., 2011), and support for ideologies that legitimize an unequal status quo (Sibley & Liu, 2010, Studies 2-4).

A recent paper by Dhont, van Hiel and Hewstone (2013, Study 2) yielded a different conclusion. The authors first demonstrated that experiences of intergroup contact on a short-term school trip were associated with a decrease in SDO levels compared to before the trip (Dhont et al., 2013, Study 1). In a subsequent study, Dhont et al. used a two-wave

longitudinal design with data collected over three months, and analyzed SDO and intergroup contact using structural equation modeling, testing cross-lagged effects. They also tested prejudice as a third variable. Using standardized estimates, they found that intergroup contact assessed at wave 1 exerted a moderate (*beta* = -.17) effect on SDO assessed at wave 2, whereas SDO had no effect on intergroup contact. When adding prejudice as a third variable, they found SDO to be affected primarily by prejudice (*beta* = .22) and to have only a minor (yet still statistically significant) downstream effect on prejudice (*beta* = .09). The conclusion from this research is that over short time periods, varying from one week to three months, SDO may be particularly malleable in response to intergroup experiences and related attitudes.

**Limitations of Previous Longitudinal Research**

Despite the important insights into SDO and outgroup evaluations gained from previous longitudinal research, it has some important limitations. First, the test-retest correlations used therein do not give decisive answers as to whether a psychological variable is trait-like, with rank-order stability across time and context. The issue is one of knowing how large a correlation should be to indicate rank-order stability. For example, a correlation of .50 may be high, but still shows a substantial proportion (75%) of non-common variance across measurements. A simple, non-statistical alternative might be to compare the rank order of all individuals at different time points. In other words, do some people change their position in the rank order? Nonetheless, this approach would result in a similar problem. A few people will probably change their positions, and because there is bound to be some fluctuation due simply to measurement error, it is not clear at what point there is too much "error" to reject the claim of rank-order stability. What is needed is a statistical test that does not rely on subjective judgments, but tells us whether there is a significant difference in "fit" between a model claiming trait-like rank order stability and a model claiming significant

changes across time. Second, the predominant use of only two waves limits analyses of longitudinal developments, both for tests of rank-order stability and for tests of relationships between variables. Changes in measured variables between two time points can be random, including representing a regression to the mean (Willett & Sayer, 1994). Consequently, one should use data from at least three measurement occasions, and a statistical analysis that integrates the repeated measurements into a single test of rank-order stability. Investigations into causality will also be strengthened by use of multiple measurement occasions, and integrating the repeated measurements into a single cross-lagged path representing the assumed causality. This is because the effect of SDO on outgroup attitudes will be a continuous process, one which is distorted by traditional cross-lagged panel analysis, relying as it does on paths between (usually only two) time-specific measurements (Rogosa, 1980). In addition, the time-specific measurements are often arbitrarily chosen, such that cross-lagged panel analysis may result in contradictory findings depending on the timing of observations (Oud, 2002). This is particularly an issue to the extent that the stability versus malleability of SDO and prejudice vary depending on the time intervals used (see above).

Longitudinal analysis with three or more waves, however, allows for more detailed and robust estimates of over-time developments. With three or more waves, cross-lagged panel analysis can be improved because it uses at least two cross-lagged paths for an assumed causal effect, the similarity in their effect sizes (or lack thereof) being informative. Nonetheless, because measurement points in cross-lagged designs are often arbitrary, the problem of reducing a continuous process to time-specific measurements remains. Thus, an even more important benefit of analyzing data from the same sample obtained at three or more waves is that one can use a more advanced statistical method, latent growth modeling, to investigate over-time trajectories (Curran & Hussong, 2003; Duncan, Duncan, & Strycker, 2006; Preacher, Wichman, MacCallum, & Briggs, 2008).

A further important limitation in most of the previous research on SDO, whether cross-sectional or longitudinal, is that it has been restricted to adult populations (including university students). Commentators on the debate about the causal status of SDO highlight the importance of obtaining developmental data among adolescents in order to gain a deeper understanding of SDO's role in the formation of prejudice and political attitudes (Wilson & Liu, 2003). Intergroup attitudes, as other politically relevant attitudes, are likely to be still in formation in the early teenage years, making the study of younger populations a particularly ripe opportunity to examine SDO's role in the formation and solidification of prejudice (Merelman, 1972; Sears, 1975, see also Torney-Purta 2004). Indeed, a recent meta-analysis of the development of prejudice throughout childhood and young adulthood points to a severe lack of longitudinal studies in youth, and in adolescence in particular (Raabe & Beelmann, 2011).

**Latent Growth Modeling in the Present Research**

This paper goes beyond previous research by using multi-wave longitudinal data and by introducing latent growth modeling (LGM) in the analysis of SDO and outgroup affect. In exploring developments in SDO and outgroup affect, and a potential causal relationship between these variables, we use both cross-lagged panel analysis and LGM. We analyze data from two longitudinal samples, one assessed at three time points and one assessed at five time points. We also expand the lens of analysis from commonly studied American and Australasian university student and adult samples to a European sample of middle-school students, aged between 13 and 15 years.

Latent growth modeling (Curran & Hussong, 2003; Duncan et al., 2006; Preacher et al., 2008), also known as "growth curve modeling", is an advanced multivariate technique that can test different aspects of over-time change in single constructs variables and associations between two longitudinally assessed constructs. Since LGM is a new approach in the analysis

of intergroup relations, we explain our use of this method before continuing with our specific research questions.[1]

Once provided with data on a variable measured more than twice over time, LGM can produce estimates of two factors for that variable: a latent intercept representing its initial level, and a latent growth factor, which represents its change over time. Each of these factors has a mean and a variance, the significance of which can be tested. In the top section of Figure 1, the variables and paths with thick lines depict a growth model for SDO, which allows us to assess its stability over time. If there is no growth (change) over time in SDO, then a model in which the factor loadings between the latent intercept for SDO and all of its time-specific measurements (labeled as $t_1$, $t_2$ and $t_3$) are fixed to 1 would be sufficient to explain the three waves of SDO scores. If, however, the data indicate that levels of SDO change over time, then a growth factor is required in order for the model to explain scores beyond the initial measurement. Thus, in Figure 1, measurements at $t_2$ and $t_3$ are explained both by the latent intercept and the growth factor, the growth factor representing change over time (separating change at $t_2$ and $t_3$ from the overall stability at all three measurement occasions).

A growth factor being necessary indicates either that there is an overall change over time in mean levels of SDO, or that there is significant variation between individuals in patterns of change over time. Whereas a significant mean for the growth factor indicates overall mean changes over time, a significant variance for the growth factor implies that SDO does not change in a uniform manner between individuals.

If both the latent intercept and the latent growth factor have significant variance (reflecting individual variations around the overall trends), then the covariance between the two factors is of interest. The covariance between the latent intercept and the latent growth factor may answer the question, for example, of whether individuals who originally have very

low scores in SDO catch up with others and develop similarly high scores in SDO. Zero covariance between the two factors would give a very clear indication of no changes in rank order, whereas a positive covariance would indicate that rank order is maintained, but that the differences in SDO scores increase over time. A small-to-moderate negative covariance between the latent intercept for SDO and the growth factor would suggest that those with initially lower scores of SDO increase their SDO scores relative to others. Rank order may still be maintained, but the data would indicate a tendency toward reduced differences between individuals in SDO. A strong negative covariance, however, would be inconsistent with the assumption of rank-order stability in SDO.

Following an analysis of the growth models of SDO and outgroup affect separately, the best-fitting growth models for SDO and outgroup affect are combined into a multivariate growth model. Figure 1 shows a potential outcome of this model development, using growth factors for both constructs. The multivariate growth model can distinguish between different components of the overall correlation between SDO and outgroup affect. Of particular interest are the cross-lagged paths between the intercept of one variable and the growth factor of another, which give an estimated effect from the initial state of one construct to over-time changes in the other construct. Notably, the cross-lagged paths modeled by multivariate growth modeling are not dependent on time-specific measurements, as they are in traditional cross-lagged panel analysis.

One cross-lagged path in Figure 1 represents estimated effects from outgroup affect to SDO (a causal path acknowledged both by social identity theorists and social dominance theorists and thus labeled “SIT (SDT)” in the figure). The other cross-lagged path goes from SDO to outgroup affect (not acknowledged by social identity theorists but central to social dominance theory and thus labeled “SDT”). If both constructs need a growth factor, then both cross-lagged paths in Figure 1 can be tested. If, however, the initial tests indicate that no

growth factor is required for one of the constructs, then neither the growth factor for this construct nor the causal paths toward it will be included in the model, as there would be no change in that construct to explain.

Another path of interest is the covariance between the two latent intercepts, which indicates the overall covariance between the constructs, and is derived from data at all measurement occasions. In addition, the analysis should test for covariances between the residuals for time-specific measurements of SDO and outgroup affect (in Figure 1, one of these two-headed paths is labeled "Time-specific covariance"). If the associations between SDO and outgroup affect are time-specific rather than representing a stable covariance (Schmitt et al., 2003), then covariances between time-specific measurements should be enough to explain the association between SDO and outgroup affect.

Finally, the model in Figure 1 includes the residual covariance between the two growth factors. If the growth factors have a high residual covariance (their disturbance/error variables have a strong covariance), then a reasonable interpretation would be that their common growth is not well explained by the initial scores for the two constructs, but rather, is dependent upon one or more variables not included in the model.

## Research Questions

This first application of latent growth modeling to the study of SDO, outgroup affect, and their interrelationship, enables us to ask two key research questions, each with related sub-questions:

1. What is the nature of changes or stability in social dominance orientation and feelings toward ethnic outgroups? Specifically, we can assess how growth in SDO and growth in outgroup affect compare, by testing alternative growth models for our two constructs separately. This also enables us to test the assumption of rank-order stability in SDO, which would be supported either if no growth factor is

required for SDO, or if the covariance between the growth factor and the intercept is positive or close to zero.

2. What is the nature of the interrelationships between social dominance orientation and feelings toward ethnic outgroups? In particular, we can test the claim by social dominance theorists that SDO explains over-time developments in outgroup affect, by conducting these tests of assumed causal paths with both latent growth modeling and cross-lagged panel analysis. LGM also allows us to examine whether the covariance between SDO and outgroup affect can be explained merely by time-specific associations, by seeing whether the covariances between the residuals for time-specific measurements are sufficient to explain the overall association between the two constructs. Support for the claim of the associations being merely time-specific would also require that both the cross-lagged paths and the covariance between intercepts are non-significant. Finally, LGM allows us to assess whether developments in SDO and outgroup affect are explained by these variables affecting each other, rather than by a third variable. A third causal variable is likely at play if the analysis suggests that both SDO and outgroup affect need a growth factor, and there is a substantial covariance between the two growth factors.

As far as we are aware, this is the first instance of the application of latent growth modeling to the intergroup relations literature. This approach allows us to conduct rigorous tests of some of the key assumptions of social dominance theory–whether SDO exhibits trait-like stability, and whether it predicts the development of outgroup affect—in two samples of young people at a critical life stage.

## Study 1

### Sample

Data for Study 1 were collected in Drammen, a town with 63,000 inhabitants outside Oslo, Norway. About 25% of adolescents in Drammen have a non-Western immigrant background (the largest ethnic minority group being ethnic Turks, about 20% of the minority population, followed by ethnic Pakistanis). All of the town's students in grades 8 to 10 (and thus all of its six middle schools) were invited to participate in a longitudinal questionnaire study. The questionnaire assessed mental health and various aspects of intergroup relations, in addition to drug use. A measurement of SDO was introduced in 2008 and the present research used data from the cohort participating at all three waves between 2008 and 2010 (grades 8 to 10), with measurements conducted in November each year. Participation required active parental consent and was voluntary. The questionnaires were completed online on personal laptop computers (routinely provided by the school) under teacher supervision (teachers were instructed not to look at the students' answers). We used a prize lottery to motivate participation at all waves of the data collection.

Analyses were restricted to youth who self-categorized as being ethnic Norwegians, providing a sample size of 453 (54% girls). The overall response rate was 75% (for majority and minority students) and ethnic Norwegians had a higher response rate than minority youth (a common observation in this type of data collection, in particular when active consent from parents is required). There were no data available to compare responders to non-responders. Dropout was low: Sample size at $t_1$ (ethnic Norwegian students in grade 8) was 380; the dropout rate at $t_2$ was 19%, and the dropout rate from $t_2$ to $t_3$ was 24%. Seventy-three students joined the study after $t_1$.

**Measurements**

Following Sidanius, Levin, van Laar, & Sears (2010), social dominance orientation was assessed with four items: "It is a good thing that certain groups are at the top and other groups are at the bottom." "Sometimes other groups must be kept in their place." "We should do what we can to equalize conditions for groups." "We should do what we can to increase social equality". We used a Norwegian translation, displayed in the online appendix, Figure A1. Table 1 shows descriptive statistics and correlations for measured variables.

Outgroup Affect was assessed with a feeling thermometer scale (Alwin, 1997), using a drawing of a thermometer and temperatures ranging from 0 to 100 degrees, with 50 degrees being a neutral midpoint (see the online appendix, Figure A2). The adolescents were asked to indicate how coldly or warmly they felt toward girls and boys, respectively, from four ethnic outgroups: Turks, Pakistanis, Indians, and Iraqis (i.e., eight items in total for Outgroup Affect), all groups being represented among Drammen's minority population. Expressed Outgroup Affect toward the various ethnic outgroups had strong intercorrelations, resulting in very high Cronbach's alpha for the eight items (with values varying between .96 and .98 in the three school grades). We used an average of expressed Outgroup Affect toward girls and boys in each specific ethnic outgroup (which correlated at .81 to .84 in grade 8 and equally or more highly in the following two school grades) to feed into our factor analysis (yielding four indicators at each measurement occasion, with Cronbach's alpha values of .95 or .96). To simplify the presentation, we reversed the scale for Outgroup Affect, with high scores indicating less favorable affect.

Outgroup Affect and SDO were estimated as latent variables using confirmatory factor analysis. Model fit indicated that we needed to allow the residuals for either the SDO-D or SDO-E items to correlate. This was a decision that is in line with the bi-dimensional structure of SDO.[2] As it produced the more stable measurement model, we present results where residual variables for the two SDO-D items are correlated, thus defining SDO primarily by the two SDO-E items (due to the lower factor loadings for the SDO-D items produced by allowing their residuals to correlate).

**Analysis**

As described in the introduction, we used both cross-lagged panel analysis and latent growth modeling. By estimating time-specific measurements as latent variables, we applied a relatively advanced form of LGM: second-order latent growth modeling. Using second-order growth models enabled us to separate (1) measurement errors and (2) time-specific departure from the mean trajectory in the growth model. Measurement errors were modeled as residual variables for the indicators of time-specific measurements (similar to modeling measurement errors in ordinary confirmatory factor analysis). The time-specific departure from the mean trajectory was modeled as residual variances for the time-specific factors (see Preacher et al., 2008). This is shown in Figure 1, where the label "var1" refers to residual variances representing deviation from the mean trajectory for SDO, and "var2" refers to residual variances representing deviation from the mean trajectory for Outgroup Affect. We fixed the time-specific deviations for a specific construct to be invariant across measurements, consistent with recommendations in the literature (e.g., Preacher et al., 2008).

In addition, we tested measurement invariance across time. Since LGM incorporates not only covariances but also variable means, both factor loadings and intercepts of the indicators for SDO (or Outgroup Affect) should ideally be invariant across time. By having

invariant factor loadings and invariant indicator intercepts one achieves full scalar invariance (Vandenberg & Lance, 2000). Partial scalar invariance is seen as an adequate criterion to be satisfied (Byrne, Shavelson, & Muthén, 1989), meaning that very few factor loadings or indicator intercepts vary across measurements (this is also necessary for the second-order growth model to be mathematically identified). We tested models with invariant factor loadings and invariant indicator intercepts (using $p < .05$ in the scaled hierarchical Chi-square test as indicating statistically significant differences). If the scaled hierarchical Chi-square was significant, we freed single parameters on an exploratory basis, to allow variation across time until the Chi-square value was above .05, achieving a model with partial scalar invariance. All these models allowed residuals for measured variables to be correlated across time, such correlations reflecting systematic measurement error due to item wording.

The data supported full scalar invariance (time-invariant factor loadings and time-invariant indicator intercepts) for Outgroup Affect (the scaled Chi-square difference was non-significant, $p = .084$). For SDO, all factor loadings could be fixed to be time-invariant, and all but one indicator intercept (item 2 at $t_1$) could be fixed to be time-invariant ($p = .393$), thus achieving almost full scalar invariance.

**Estimation Methods**. We used maximum likelihood estimations with robust standard errors. Robust standard errors lowered the risk of false positives (Type 1 error) that can arise with artificially reduced standard errors when analyzing variables with skewed distributions. Using robust standard errors implied that nested models (e.g., testing time-invariant factor loadings and indicator intercepts) had to be compared with the scaled difference Chi-square test (Satorra & Bentler, 2001). All analyses with LGM used a sandwich estimator (Asparouhov, 2005) to account for students' clustering in school classes, again to reduce the risk of false positives. Analyses with cross-lagged panel analysis could not use the sandwich

estimator because the number of parameters was too high compared to the number of clusters.

**Model Fit**. We evaluated models with fit indices commonly used in structural equation modeling (SEM). While a non-significant Chi-square is preferable, we followed common recommendations for the use of SEM models (Mueller & Hancock, 2010) and accepted models with approximate fit, if these had better fit than alternative models. We used commonly recommended cut-off values for indices of approximate fit (e.g., Mueller & Hancock, 2010), specifically, the root mean square error of approximation (RMSEA, with a cut-off value at .05) along with its 90% confidence interval; the comparative fit index (CFI, with a cut-off value at .95), as well as the standardized root mean square residual (SRMR). We used two-tailed *p*-tests for individual parameters, but we also considered the one-tailed *p*-test if we had an a priori prediction about whether associations should be positive or negative (see Hurlbert & Lombardi, 2009).

Due to having partly missing data (nonresponse to single items or dropouts), we used full information maximum likelihood estimations (Arbuckle, 1996; Enders, 2010). Dropouts were thus unlikely to represent any bias effect. The analyses used Mplus 7.2 (Muthén & Muthén, 2012).

**Results**

**Cross-lagged panel analysis**. Cross-lagged panel analysis with latent variables and full (Outgroup Affect) or nearly full (SDO) scalar invariance across time ($\chi^2[241] = 331.197$, $p < 0.001$, RMSEA = 0.029, CFI = 0.977, SRMR = 0.082) gave no clear conclusion. Both SDO and Outgroup Affect had one cross-lagged path that suggested an effect (two-tailed $p$ = .064 for Outgroup Affect as a predictor and .048 for SDO as a predictor). Yet both SDO and Outgroup Affect also had one cross-lagged path that was clearly non-significant (see the online appendix, Table A1, for details).

**LGM of SDO and Outgroup Affect**. LGM tested whether SDO and Outgroup Affect had best fit with an intercept-only model, a linear growth model, or a model allowing for non-linear growth. The linear growth model pre-defined all factor loadings for the growth factor, with factor loadings fixed at 0 at $t_1$, at 1 at $t_2$, and at 2 at $t_3$. The non-linear growth model allowed one factor loading to be freely estimated by only fixing the first ($t_1$, fixed at 0) and the last factor loadings ($t_3$, fixed at 2).

For SDO, fit was best for the intercept-only model ($\chi^2[53] = 106.837$, $p < 0.001$, RMSEA = 0.048, CFI = 0.937, SRMR = 0.095). The linear growth model did not improve fit (e.g. RMSEA = 0.050) and its growth factor contained a non-significant mean and variance, corroborating the interpretation that the growth factor was redundant. The non-linear growth model failed to converge. Thus, the data indicated that SDO levels did not change over time.

The model of Outgroup Affect had best fit if it included a growth factor (linear or non-linear). We used the model with a linear growth factor ($\chi^2[53] = 49.150$, $p = .62$, RMSEA = 0.000, CFI = 1.000, SRMR = 0.040; the non-linear model did not improve fit significantly, $p = .13$). The growth factor had a significant and positive mean ($M = 0.32$, $p < .001$). Since higher scores on Outgroup Affect meant more negative evaluations, a positive mean implied a minor development toward less favorable Outgroup Affect. The variance of the growth factor was not statistically significant ($var = 0.23$, $p = .31$) and the latent intercept and the growth factor had no significant covariance. Thus, Outgroup Affect became more negative on average over time, the nature of this over-time change was not related to initial levels of Outgroup Affect, and the differences between individuals on their Outgroup Affect scores neither widened nor narrowed significantly.

We estimated a multivariate growth model of SDO and Outgroup Affect, using the two growth models that emerged, an intercept-only model for SDO and a linear growth model for Outgroup Affect with both an intercept and a growth factor. As shown in Figure 2

(see also Table A2 in the online appendix for further details), SDO predicted developments in Outgroup Affect: $b = 0.34$ [95% C.I. = 0.039 to 0.638]), a small, but statistically significant effect on the 11-point scale of Outgroup Affect. This effect and the path from the intercept for Outgroup Affect ($b = -0.13$, $p = .031$) were sufficient to explain the variance in the growth factor for Outgroup Affect: the residual variance for the growth factor for Outgroup Affect was minor and not statistically significant ($var = 0.15$, $p = .47$).

Time-specific covariances were not included because they did not improve model fit ($p = .10$). Even when (the redundant) time-specific covariances were included, the analysis indicated a cross-lagged effect from the SDO intercept to the growth factor for Outgroup Affect ($b = .30$, two-tailed $p = .070$, one-tailed $p = .035$). Also, the model in Figure 2 did not include a growth factor for SDO. We tried to add such a growth factor for SDO (at least theoretically allowing for a cross-lagged path from the intercept for Outgroup Affect), even though the previous test of growth models for SDO had shown that no such growth factor should be estimated. The multivariate growth model with growth factors for both Outgroup Affect and SDO (linear or non-linear for SDO) failed to converge. Finally, we omitted the (required) growth factor for Outgroup Affect and introduced a (redundant) growth factor for SDO. Even this model failed to indicate any effect from Outgroup Affect to SDO; the cross-lagged path from the Outgroup Affect intercept to the SDO growth factor was nonsignificant.

**Discussion of Study 1**

This first application of latent growth modeling to the study of prejudice supported predictions from social dominance theory. SDO was relatively constant across time (making a growth factor redundant); compatible with the view that SDO reflects enduring individual temperament, and supporting its rank-order stability. In contrast, latent growth modeling indicated that feelings toward ethnic outgroups became less favorable over the two years assessed, as reflected by its growth factor for Outgroup Affect.

Furthermore, latent growth modeling suggested a significant over-time influence of SDO on feelings toward ethnic outgroups. Though the cross-lagged panel analysis yielded inconclusive results, the more reliable estimates of latent growth modeling suggested a cross-lagged effect from the SDO intercept, apparently driving changes in Outgroup Affect over the two years studied. The LGM analysis further suggested that the association between SDO and Outgroup Affect was more than time-specific covariances, as adding time-specific covariances to the model did not improve fit, and did not weaken SDO's role as a predictor.

Finally, there being no observed development in SDO means that the results are not consistent with the joint development of SDO and Outgroup Affect being explained by a third variable.

## Study 2

### Sample

The data for Study 2 were taken from a five-wave panel study of undergraduates from the University of California at Los Angeles. The study began during freshman orientation in the summer of 1996 and ended the spring of 2000 (for a comprehensive description of the sample, see Sidanius et al., 2010). Only White students were used in our analyses, of which the total number was 748 (54% female), with 196 providing data across all five waves. The participants ranged in age from 17 to 20, with a mean age of 17.9 ($SD$ = 0.35). Total sample size at $t_1$ was 719. Dropout was moderate, 28% at $t_2$, increasing to 59% at $t_5$, the final measurement occasion. Twenty-nine students responded only after $t_1$.

### Measurements

SDO was measured by use of the same four English language SDO items described in Study 1. Outgroup Affect was assessed by asking the White students how positively they felt toward the three major minority groups in the United States: (1) Latinos/Hispanics, (2) Asians/Asian Americans and (3) African Americans/Blacks. All of these questions had a 7-

point response scale from "very negative" to "very positive". We reverse-scored the data for ease of presentation (high scores thus meaning less favorable Outgroup Affect).

Table 2 gives an overview of descriptive statistics and correlations for variables assessed at $t_1$, $t_3$, and $t_5$. Table A3 in the online appendix shows descriptive statistics for variables at all five measurement occasions, online Table A4 shows bivariate correlations for all five measurement occasions.

To determine the degree to which the students participating in all waves of the data collection differed from those who did not, extensive attrition analyses were conducted on study "persisters" (those present for all waves of the panel study) and study "dropouts" (those not present for all waves of the study, see Sidanius et al., 2010, Appendix C). Attrition analyses showed that the "persisters" did not significantly differ from the "dropouts" in either demographic or ideological factors of interest. We also note that the present study applies full information analyses, thus including dropouts in the analysis.

Confirmatory factor analysis of all four SDO items showed that these items did not load on a single factor. The factor model without correlated error variances did not fit the data (e.g., RMSEA = .395, CFI = .807 at $t_1$; RMSEA = .218, CFI = .902 at $t_5$). We therefore allowed residuals for the two SDO-D items to correlate, thereby primarily defining the factor by the SDO-E indicators.

**Analysis**

The analyses in Study 2 were identical to those used in Study 1, with two exceptions. First, Study 2 extended cross-lagged panel models and latent growth models to include five-wave data. Second, as Study 2 did not involve data clustered in classrooms, we did not apply

a sandwich estimator. We again used maximum likelihood estimations with robust standard errors because of skewed distributions in measured variables.

As with Study 1, Study 2 tested for measurement invariance across time prior to estimating growth and causal models. Three of the four SDO items (items 1 to 3) had their factor loadings fixed to be invariant across all five measurement occasions. Item 4 was fixed to be invariant at three measurement occasions, and to have a separate value at two measurement occasions ($t_3$ and $t_5$, with the same value at these two time points). The online appendix, Table A5, describes factor loadings in detail and also shows the partially invariant indicator intercepts. The restrictions introduced to achieve partial scalar invariance for SDO did not result in a statistically significant drop in model fit according to the conventional cut-off, estimated with the scaled Chi-square difference test ($p = .051$).

Outgroup Affect had one factor loading fixed to invariance across all measurement occasions (item 2, Outgroup Affect toward Asians, the loading for which we fixed to 1 in subsequent analyses to identify the factor). Simultaneously, partially invariant factor loadings were supported for the remaining two items, and all three indicator intercepts could be fixed to be invariant at all measurement occasions except for $t_1$. The online appendix, Table A5, describes invariance for factor loadings and indicator intercepts in detail. The partial measurement invariance introduced for Outgroup Affect did not result in a statistically significant drop in model fit ($p = .061$).

As in Study 1, Study 2 tested alternative single growth models before combining these into a multivariate latent growth model. The linear growth model used factor loadings increasing by 1 at each measurement occasion (from 0 at $t_1$ to 4 at $t_5$). The non-linear growth model used growth factors with the factor loading for $t_1$ fixed to 0 and the factor loading for $t_5$ fixed to 4, with the remaining factor loadings allowed to be estimated freely based on the data.[3]

## Results

**Cross-lagged Panel Analysis.** Our initial test of causal models applied cross-lagged panel analysis to the five-wave data for SDO and Outgroup Affect with latent variables, using the partial scalar invariance developed above.[4] Figure 3 shows standardized results with all five measurement occasions. Further details of this analysis can be found in the online appendix, Table A5. The five-wave analysis indicated a stronger effect of SDO on Outgroup Affect than of Outgroup Affect on SDO: Three of four cross-lagged paths from SDO were statistically significant, but only one of the four cross-lagged paths from Outgroup Affect; effect sizes for cross-lagged paths from SDO were also substantially higher than those from Outgroup Affect. Unstandardized estimates (see online Table A5) showed that residual covariances between SDO and Outgroup Affect were substantially reduced in the cross-lagged model (from an initial covariance of 0.39 at $t_1$ to a residual covariance of 0.11 at the last two measurement occasions). This is compatible with the assumption that the statistical association between SDO and Outgroup Affect was largely due to causal effects between these two variables.

**LGM of SDO and Outgroup Affect.** We used second-order latent growth modeling, i.e., growth models with latent indicators of growth factors (again using the partial scalar invariance developed above).[5] The five-wave data of SDO had the best fit with an intercept-only model ($\chi^2[155] = 369.663$, $p < 0.001$, RMSEA = 0.044, CFI = 0.923, SRMR = 0.099), indicating that SDO did not change over time. The linear growth model did not improve fit (e.g. RMSEA = 0.045) and its growth factor contained a non-significant mean ($M = -0.002$, $p = .96$) and variance ($M = 0.018$, $p = .14$). The non-linear growth model resulted in negative variance for the growth factor, and thus did not converge correctly. Moreover, even in this model the growth factor for SDO had a non-significant mean and non-significant variance,

further corroborating the conclusion that the intercept-only model had the best fit with the data.

Outgroup Affect, however, appeared to change over time. The model of Outgroup Affect had best fit when estimated as a non-linear growth model ($\chi^2[71] = 94.495$, $p = 0.033$, RMSEA = 0.021, CFI = 0.993, SRMR = 0.044), the intercept-only model giving lower fit (e.g. RMSEA = 0.045, with Chi-square-based $p < 0.0001$). The scaled Chi-square difference test also showed statistically significantly better fit for the non-linear growth model than for the linear growth model ($p < .0001$). While there appeared to be little overall growth in Outgroup Affect (the mean of the growth factor was non-significant; $M = -0.13$, $p = .16$), the variance of the growth factor was statistically significant (*var* = 0.05, $p < .001$) indicating that some individuals developed more favorable and some developed more negative Outgroup Affect over the five measurement occasions. Specifically, the data suggested a moderate tendency toward students with more negative Outgroup Affect becoming more positive relative to the other students over the five measurement occasions, as indicated by the negative covariance (*covar* = -.12, $p < .001$) between the latent intercept and the growth factor.

We tested a multivariate growth model of SDO and Outgroup Affect with latent indicators of growth factors and partial measurement invariance as developed above. This multivariate model used the growth models developed previously (intercept-only model for SDO, non-linear growth model for Outgroup Affect). Covariances between residuals for time-specific measurements improved model fit ($p < .001$) and were thus included (as shown in Figure 4). The multivariate growth model applying this solution indicated that the latent intercept for SDO predicted developments in general Outgroup Affect ($b = 0.08$ [95% C.I. = 0.053 to 0.100]; see Figure 4 and Table 3, with further details in online appendix Table A6). We also tested a model that included a latent linear growth factor for SDO (see beneath "With

SDO Growth Factor" in Table 3 and further details in online appendix Table A6). A model with a non-linear growth factor for SDO failed to converge. Adding a linear growth factor for SDO did not change the findings. No cross-lagged effect by Outgroup Affect was suggested ($b$ = 0.02 [-0.059 to 0.098], two-tailed $p$ = .63), but the model still resulted in a significant cross-lagged path from the SDO intercept to developing more negative Outgroup Affect ($b$ = 0.07 [0.041 to 0.097], two-tailed $p$ < .001).

**Discussion of Study 2**

Study 2 provided even stronger evidence than Study 1 compatible with the conceptualization of SDO as a stable orientation that causes changes in feelings toward outgroup members. This time using five-wave data, LGM again uncovered a growth factor for Outgroup Affect, indicating that it changed over time. Meanwhile, the redundancy of a growth factor for SDO again indicated that SDO exhibited not only rank-order stability, but also stability in mean levels, this time over the longer time period of four years. Improving on Study 1, in Study 2 both the cross-lagged panel analysis and the multivariate LGM were consistent in their depiction of significant cross-lagged paths from SDO to the development of Outgroup Affect over five measured time points. With the exception of one of four of the cross-lagged paths from Outgroup Affect, neither cross-lagged analysis nor LGM indicated an effect in the opposite direction. Though time-specific associations between the constructs played a role, they were not enough to explain the interrelation of the constructs, as the cross-lagged paths in both analyses remained significant. Finally, and again consistent with Study 1, there being no growth factor for SDO suggested that the joint development of SDO and Outgroup Affect was not caused by a third, unmeasured variable.

## General Discussion

As globalization and mass migration bring diverse populations into more contact than ever before, the pertinence of studying inter-ethnic prejudice will only continue to grow. At the

core of such prejudice is a set of negative emotional reactions to members of groups other than one's own: affective orientations that are thought to depend on upbringing, socialization, and inter-ethnic contact. Into this social psychological space, social dominance theory highlights that groups rarely come together on an equal footing, and thus that one's attitude toward intergroup *inequality* is key to understanding the development of one's attitude toward ethnic outgroups, particularly where the latter are lower in status. The present research stands as the most definitive test to date of the predictive power of the most widely used measure of attitudes toward intergroup inequality on the development of affect toward minority outgroups in youth.

In two multi-wave longitudinal studies conducted with young people in two different national contexts, we applied the statistical tool of latent growth modeling (LGM) to the study of the development of social dominance orientation (SDO) and Outgroup Affect over time, and tested causal paths between these constructs. LGM allowed us to avoid some of the limitations of the widely used two-wave cross-lagged panel analysis, and to assess the evolution of each variable over time, as opposed to merely comparing mean levels at one time with those at another. LGM and multi-wave cross-lag results from samples of adolescents in Norway assessed over three time points (spanning two years), and of undergraduates in the United States assessed over five time points (spanning four years) were broadly consistent, and in line with predictions from social dominance theory.

The first research question addressed was whether and how responses on measures of SDO and Outgroup Affect changed over the time periods assessed. By testing alternative growth models, we could investigate whether and how mean levels in either of our constructs changed over time, and also the nature of this change. It could have been, for example, that

everyone increased in their SDO levels, but also (or instead), that there was a change in the *size of the difference* between individuals' SDO levels, or indeed, a shift in individuals' *rank ordering* on SDO. In fact, no such changes in mean levels, differentiation, or rank ordering, were observed for SDO in either study. That is, the data were clear that SDO levels across the three (Study 1) and five (Study 2) time periods measured were best explained by a growth model that contained just an intercept (indicating initial SDO level), and not a growth factor (indicating any kind of change over time). This finding provides further empirical evidence supporting conceptualization of social dominance orientation as an enduring trait[6], implying that it has remarkable stability at least over the 3 and 5 year periods assessed, in these youth samples.

Not only did SDO exhibit mean-level and rank-order stability; it was also more stable than Outgroup Affect. In contrast to the data on SDO, the data on Outgroup Affect in both studies were best explained by models that included a growth factor. In the Norwegian sample of adolescents, mean levels of Outgroup Affect became slightly more negative over time, and did so in roughly equal measure for teenagers of high versus low levels of outgroup liking. This finding qualifies the conclusion of Raabe and Beelmann (2011) from a meta-analysis of primarily cross-sectional studies of the development of prejudice, which was that unlike in childhood, prejudice does not change systematically in the adolescent years. Our finding is also concerning, given the high levels of contact our Norwegian participants had with ethnic outgroup students in their schools. Intergroup contact (though usually of the more involved kind than mere school attendance together) has been found to attenuate the growth of prejudice in children (Raabe & Beelmann, 2011). Previous research on older teenagers and young adults indicates that prejudice decreases with exposure to university (Dhont, Roets, & Van Hiel, 2011; Dhont et al., 2013; Sidanius, Pratto, Martin, & Stallworth, 1991; Wodtke, 2012), a trend that is only somewhat corroborated by our data. Specifically, scores on

Outgroup Affect from our American university sample did not decrease on average over time, though those initially more prejudiced became less prejudiced over time, in relation to other participants. By illuminating details such as changes in variance over multiple time points, this application of latent growth modeling to the study of the development of Outgroup Affect thus challenges existing assumptions regarding the developmental trajectory of a key social psychological construct (see Dyck & Pearson-Merkowitz, 2014).

The second broad question addressed by this research concerns the nature of the interrelationship between SDO and Outgroup Affect. The now widely observed association between social dominance orientation and intergroup prejudice has been dismissed by some critics of social dominance theory as a mere product of the fact that one has a particular group context in mind when completing the SDO scale (Schmitt et al., 2003). Though this possibility is rendered less likely by evidence for SDO's generality found in cross-sectional samples (see Kteily et al., 2012) and its over-time predictive power in two-wave longitudinal samples (e.g., Kteily et al., 2011; Sibley & Duckitt, 2010), it has hitherto been impossible to test directly the explanatory power of the posited time-specific associations. Latent growth modeling is able to separate two origins of the time-specific correlations observed in cross-lagged panel analysis: the overall correlation between SDO and Outgroup Affect across time, and the time-specific deviations from the overall trend. Specifically, we were able to examine the impact on model fit of including covariances among the residuals of SDO and Outgroup Affect at each time point, and found them either to have no role in the model (Study 1), or to be small enough to have no impact on SDO's predictive power vis-à-vis the development in Outgroup Affect (Study 2). Thus, these results tend to cast doubt on the plausibility of the interpretation by Schmitt and colleagues of the connection between SDO and negative Outgroup Affect.

Rather than being explained by time-specific covariances, any similarities in the development of SDO and Outgroup Affect could instead be spurious, caused by their joint relationship with some third, unmeasured variable. LGM can test for this possibility by analyzing whether the residual variables for the two growth factors were correlated (a possibility that would indicate the existence of such a third variable). As our analyses consistently yielded no evidence for changes in SDO, there was no growth factor with which the residuals of the growth in Outgroup Affect could be correlated, and thus there was no evidence for a third variable causing joint developments in SDO and Outgroup Affect.

In fact, the results were compatible with the idea that the relationship between SDO and Outgroup Affect is one of over-time causation of Outgroup Affect by SDO. This conclusion can be drawn, firstly, based on the results of the multi-wave cross-lagged panel analyses, which, though unclear in the first study, were clear in the more informative second study, in suggesting SDO's predictive power regarding later levels of Outgroup Affect. This application of cross-lagged panel analysis is more robust than previous published uses of cross-lagged analysis with SDO (e.g., Kteily et al., 2011), as it is based on more than two waves (and thus multiple sampling of cross-lag paths), and involves more robust estimations. Even more informative than the multi-wave cross-lagged analysis, however, was the multivariate LGM analysis of SDO and Outgroup Affect. Here, both studies were consistent in indicating a cross-lagged effect from initial levels of SDO to changes in Outgroup Affect over the time periods studied. This effect, however, seems moderate. Unstandardized coefficients for the suggestive prediction of the growth in Outgroup Affect by the SDO intercept were fairly small (one third of a point on an 11-point scale in Study 1, and one eighth on a 7-point scale in Study 2). Thus, these estimates reflect the limited change in Outgroup Affect.

The consistency in SDO's predictive power as observed across two national contexts and educational stages, in such a uniquely robust analysis, which is simultaneously supported by cross-lagged panel analysis with five waves, is an important finding for the field of intergroup relations. It supports the conclusion that in the critical age periods of adolescence and young adulthood (13 to 20 years), social dominance orientation appears to influence the development of attitudes about ethnic outgroup members. As SDO is a general orientation shown to predict evaluations of many outgroups, one implication of these results might be that efforts to reduce prejudice should focus less on specific outgroups than on the more basic and psychologically upstream phenomenon of orientation toward intergroup hierarchy. Educating young people concerning general principles such as egalitarianism and universal rights might thus be more effective than educating them about racism specifically, especially given that explicit manifestations of the latter can more and more easily be hidden as children age (Banaji, Baron, Dunham, & Olson, 2008).

That said, caution should be exercised in inferring insights about prejudice in general from a study of just one component of it. The psychological distinction between "ingroup love" and "outgroup hate" (Brewer, 1999), for example, implies that evaluations of ingroup members, and intergroup bias in evaluations, may not follow the same pattern as do evaluations of outgroup members—an interesting question for follow-up studies.

We intend that the lessons to be taken from this research go beyond the theoretical and applied, to the methodological. Indeed, we hope that this first demonstration of the use of multi-wave cross-lagged panel analysis and latent growth modeling in intergroup relations research might inspire fellow researchers to apply advanced and robust analytic techniques in collecting and analyzing their data. We have demonstrated how LGM goes further than existing methods in assessing change in a psychological construct over time. This is because it can explicitly test for violation of rank-order stability. LGM can also convey the extent to

which changes in test scores on a construct are driven primarily by people who had relatively low or high scores on the construct in the first place. Even more alluringly, LGM improves analyses of assumed causalities in longitudinal data, through its ability to distinguish between the different origins of overall correlations between two or more variables, and between overall trajectories versus individual variations around these trajectories.

**Methodological Caveats**

Highlighting the benefits of the advanced statistical approaches used here should not come without acknowledging the limitations of the particular use we made of them in this research. One issue concerns the SDO scale used, which, in four-item form, was not as psychometrically sound as it would have been had we been able to use the latest version of the 16-item scale (see Ho et al., 2015). Using the full $SDO_7$ scale would also enable us to analyze the role of intergroup dominance orientation and intergroup anti-egalitarianism separately, as opposed to privileging one sub-dimension, as we do here.

One shortcoming of all correlational analyses, including the current longitudinal analyses, is that they cannot speak to the issue of causality as well as can experimental research. Though discovery of the successful experimental manipulation of SDO levels would be intriguing, thus far, the literature shows relatively little evidence that the general component of SDO can be meaningfully shifted, even if its group-specific components have been found to be malleable (see, e.g., Guimond et al., 2003; Schmitt et al., 2003). This is consistent with the recent suggestion (Bergh, Akrami, Sidanius, & Sibley, In press), that besides tracking reactions to specific groups within specific contexts, SDO will be sensitive to low-status groups in general and across a variety of social contexts.

One recurrent issue regarding causality that this set of correlational data can address, however, is the third variable problem. By searching for and failing to find a correlation between the residuals of the two growth factors (in our case, because SDO had no growth

factor), we were able to gain confidence that the link between changes in the variables over measurements was unlikely to be a spurious one.

Finally, a more general constraint on the conclusions to be drawn from this paper is the, as-yet, unknown generalizability of the results beyond the specific age groups, countries and cultures studied here. Indeed, part of our enthusiasm in suggesting the use of advanced data analytic techniques for multi-wave data to the intergroup relations literature is that this paper be followed by many more attempts to investigate the evolution of critical social attitudes across a range of temperaments, ages, nations, cultures and intergroup contexts.

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Footnotes

1 An alternative to LGM is multilevel modeling (e.g., Raudenbush & Bryk, 2002), with time-specific measurements being data at level 1 and the individual representing level 2, the clustering level. However, due to its origin in structural equation modeling, LGM has advantages over MLM for analyzing longitudinal data (e.g., see Preacher et al., 2008, for details). LGM can estimate the time-specific measurements as latent variables, providing improved time-specific measurements. Furthermore, LGM estimates intercepts and growth as latent variables, which can act as predictors of other variables in the analysed system. Both these advantages in LGM over MLM are decisive in the present research.

2 A model without correlated errors had poor fit (e.g., RMSEA = .32 in grade 8, RMSEA = .36 in grade 10). Adding a correlation between error variables for SDO/E items or between error variables for SDO/D items gave perfect fit, with a non-significant Chi-square.

3. With five waves, it would also be possible to estimate a second, quadratic growth factor. We did not use this approach, partly because it rests on an untested assumption of non-linear growth being quadratic (see Preacher et al., 2008), which we also see no theoretical reason to assume for SDO. Using two growth factors would also complicate investigations of causal paths.

4. We also performed a cross-lagged panel analysis with data only from measurement occasions 1 and 5, that is, an analyses of two-wave data. This analysis was similar to an analysis conducted by Kteily et al. (2011, Figure 1, *p*. 212) and used the same data. However, we modified parts of the model consistent with the guidelines described in the methods section (using full information maximum likelihood to include dropouts, using partial measurement invariance, allowing residual variables for a specific item to be correlated across time, and using robust standard errors). Model fit was improved ($\chi^2(65) = 83.604$, $p$ =

0.06, RMSEA = 0.020, CFI=0.993, SRMR = 0.047) compared to model fit reported by Kteily *et al.* The most notable difference in the result was that only the cross-lagged path from SDO to Outgroup Affect was statistically significant ($p < .001$), the cross-lagged path from Outgroup Affect to SDO was not ($p = .114$).

5. Residual covariances across time were not included for SDO item 4 in growth models of SDO/E. If estimated, these error covariances were negative rather than positive and prevented the model from converging correctly (but they had little effect on other parameters or overall fit estimates).

6. Without engaging in the dispute as to whether or SDO is or is not a personality construct, we are nonetheless on non-controversial grounds in suggesting that SDO can be reasonably regarded as a "trait", where a trait is simply defined as "a distinguishing quality or characteristic, typically one belonging to a person." (See Oxford Dictionary, http://www.oxforddictionaries.com/us/definition/american_english/trait)

Table 1

*Variable descriptive statistics and intercorrelations from all 3 waves in Study 1*

| | M | SD | % missing | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *SDO* | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $t_1$ | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 Item 1 | 2.74 | 1.65 | 20.3 | 1.00 | | | | | | | | | | | | | | | | | | | | | | |
| 2 Item 2 | 2.82 | 1.73 | 20.5 | .63* | 1.00 | | | | | | | | | | | | | | | | | | | | | |
| 3 Item 3 | 2.66 | 1.74 | 20.7 | .16* | .19* | 1.00 | | | | | | | | | | | | | | | | | | | | |
| 4 Item 4 | 3.54 | 1.88 | 21.4 | -.01 | .03 | .43* | 1.00 | | | | | | | | | | | | | | | | | | | |
| $t_2$ | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 Item 1 | 2.80 | 1.58 | 21.6 | .23* | .23* | .12* | .00 | 1.00 | | | | | | | | | | | | | | | | | | |
| 6 Item 2 | 2.63 | 1.57 | 21.6 | .21* | .31* | .23* | .14* | .55* | 1.00 | | | | | | | | | | | | | | | | | |
| 7 Item 3 | 2.78 | 1.68 | 21.6 | .03 | .13* | .23* | .26* | .25* | .32* | 1.00 | | | | | | | | | | | | | | | | |
| 8 Item 4 | 3.61 | 1.90 | 23.8 | .06 | .17* | .08 | .24* | .19* | .19* | .57* | 1.00 | | | | | | | | | | | | | | | |
| $t_3$ | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 Item 1 | 3.00 | 1.80 | 30.0 | .20* | .20* | .05 | .03 | .32* | .25* | .20* | .25* | 1.00 | | | | | | | | | | | | | | |
| 10 Item 2 | 2.68 | 1.73 | 30.6 | .21* | .28* | .15* | .07 | .27* | .34* | .30* | .27* | .70* | 1.00 | | | | | | | | | | | | | |
| 11 Item 3 | 2.70 | 1.75 | 30.0 | .09 | .11 | .20* | .11 | .18* | .24* | .25* | .16* | .25* | .39* | 1.00 | | | | | | | | | | | | |
| 12 Item 4 | 3.43 | 1.84 | 30.6 | .00 | .08 | .11 | .11 | .14* | .17* | .24* | .24* | .24* | .27* | .54* | 1.00 | | | | | | | | | | | |
| *Outgroup Affect* | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $t_1$ | | | | | | | | | | | | | | | | | | | | | | | | | | |

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 13 | Turks | 5.17 | 2.97 | 26.0 | .12* | .16* | .10 | .07 | .09 | .10 | .10 | .05 | .07 | .11 | .14* | -.04 | 1.00 | | | | | | | | | | | |
| 14 | Pakistanis | 5.43 | 2.97 | 27.8 | .12* | .21* | .09 | .06 | .10 | .14* | .10 | .06 | .07 | .08 | .17* | -.05 | .82* | 1.00 | | | | | | | | | | |
| 15 | Indians | 5.01 | 3.05 | 27.3 | .07 | .15* | .08 | .03 | .10 | .14* | .11 | .00 | .01 | .06 | .15* | -.04 | .79* | .84* | 1.00 | | | | | | | | | |
| 16 | Iraqis | 5.49 | 3.06 | 29.7 | .11 | .20* | .13* | .12* | .12 | .16* | .13* | .08 | .06 | .09 | .16* | .00 | .80* | .85* | .83* | 1.00 | | | | | | | | |
| | $t_2$ | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 17 | Turks | 4.43 | 2.97 | 23.4 | .20* | .31* | .05 | .03 | .21* | .23* | .24* | .21* | .20* | .25* | .18* | .17* | .42* | .39* | .36* | .36* | 1.00 | | | | | | | |
| 18 | Pakistanis | 4.80 | 3.03 | 25.8 | .16* | .29* | .05 | .04 | .20* | .26* | .20* | .22* | .22* | .23* | .18* | .17* | .39* | .44* | .37* | .37* | .87* | 1.00 | | | | | | |
| 19 | Indians | 4.27 | 2.98 | 25.3 | .11 | .26* | .10 | .10 | .21* | .28* | .25* | .20* | .20* | .26* | .18* | .17* | .34* | .42* | .42* | .42* | .79* | .82* | 1.00 | | | | | |
| 20 | Iraqis | 5.04 | 3.17 | 26.4 | .15* | .25* | .08 | .09 | .18* | .29* | .26* | .24* | .19* | .26* | .19* | .20* | .40* | .44* | .40* | .45* | .84* | .89* | .84* | 1.00 | | | | |
| | $t_3$ | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 21 | Turks | 4.46 | 2.80 | 29.7 | .03 | .19* | -.01 | .00 | .14* | .12 | .15* | .22* | .21* | .27* | .23* | .19* | .36* | .39* | .27* | .33* | .48* | .45* | .36* | .42* | 1.00 | | | |
| 22 | Pakistanis | 4.70 | 2.91 | 30.8 | .02 | .17* | -.04 | -.03 | .15* | .17* | .16* | .20* | .18* | .28* | .23* | .16* | .33* | .41* | .30* | .34* | .43* | .47* | .36* | .43* | .86* | 1.00 | | |
| 23 | Indians | 4.21 | 2.81 | 31.3 | .00 | .16* | .03 | -.01 | .14* | .16* | .17* | .20* | .22* | .35* | .20* | .18* | .24* | .31* | .30* | .31* | .39* | .40* | .46* | .43* | .80* | .85* | 1.00 | |
| 24 | Iraqis | 4.86 | 2.95 | 30.4 | .00 | .11 | -.01 | .03 | .13* | .14* | .20* | .24* | .20* | .31* | .26* | .19* | .30* | .36* | .27* | .34* | .44* | .45* | .39* | .48* | .82* | .89* | .83* | |

Table 2

*Variable descriptive statistics and intercorrelations from 3 of 5 waves in Study 2*

| | | M | S.D. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *SDO* | | | | | | | | | | | | | | | | | | | | | | | |
| | $t_1$ | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Item 1 | 2.13 | 1.45 | 1.00 | | | | | | | | | | | | | | | | | | | |
| 2 | Item 2 | 1.62 | 1.13 | .60* | 1.00 | | | | | | | | | | | | | | | | | | |
| 3 | Item 3 | 2.86 | 1.60 | .32* | .31* | 1.00 | | | | | | | | | | | | | | | | | |
| 4 | Item 4 | 2.53 | 1.44 | .38* | .35* | .80* | 1.00 | | | | | | | | | | | | | | | | |
| | $t_3$ | | | | | | | | | | | | | | | | | | | | | | |
| 5 | Item 1 | 1.93 | 1.26 | .36* | .18* | .06 | .10* | 1.00 | | | | | | | | | | | | | | | |
| 6 | Item 2 | 1.50 | .96 | .22* | .20* | .14* | .08 | .48* | 1.00 | | | | | | | | | | | | | | |
| 7 | Item 3 | 2.73 | 1.59 | .18* | .13* | .40* | .40* | .30* | .26* | 1.00 | | | | | | | | | | | | | |
| 8 | Item 4 | 2.19 | 1.30 | .14* | .12* | .38* | .39* | .27* | .28* | .74* | 1.00 | | | | | | | | | | | | |
| | $t_5$ | | | | | | | | | | | | | | | | | | | | | | |
| 9 | Item 1 | 1.81 | 1.16 | .26* | .13* | .06 | .09 | .55* | .25* | .21* | .26* | 1.00 | | | | | | | | | | | |
| 10 | Item 2 | 1.38 | .80 | .21* | .28* | .12 | .13* | .28* | .50* | .23* | .25* | .38* | 1.00 | | | | | | | | | | |
| 11 | Item 3 | 2.48 | 1.45 | .11 | .24* | .46* | .44* | .22* | .20* | .67* | .55* | .29* | .25* | 1.00 | | | | | | | | | |
| 12 | Item 4 | 2.04 | 1.27 | .12* | .20* | .43* | .39* | .23* | .34* | .57* | .57* | .26* | .27* | .71* | 1.00 | | | | | | | | |
| *Outgroup affect* | | | | | | | | | | | | | | | | | | | | | | | |
| | $t_1$ | | | | | | | | | | | | | | | | | | | | | | |
| 13 | Latinos | 2.51 | 1.32 | .18* | .22* | .19* | .24* | .08 | .03 | .15* | .10 | .06 | .09 | .20* | .18* | 1.00 | | | | | | | |
| 14 | Asians | 2.32 | 1.23 | .10* | .13* | .14* | .20* | .03 | .00 | .09 | .10* | .07 | .08 | .10 | .08 | .81* | 1.00 | | | | | | |
| 15 | African | 2.42 | 1.31 | .17* | .18* | .20* | .24* | .05 | -.01 | .16* | .11* | .02 | .06 | .16* | .17* | .87* | .79* | 1.00 | | | | | |
| | $t_3$ | | | | | | | | | | | | | | | | | | | | | | |
| 16 | Latinos | 2.09 | 1.07 | .16* | .17* | .19* | .18* | .26* | .23* | .32* | .33* | .17* | .21* | .25* | .33* | .30* | .22* | .20* | **1.00** | | | | |
| 17 | Asian | 2.19 | 1.20 | .15* | .16* | .16* | .12* | .25* | .22* | .22* | .22* | .22* | .15* | .15* | .29* | .23* | .22* | .16* | .78* | 1.00 | | | |

| | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 18 | African $t_5$ | 2.08 | 1.03 | .17* | .15* | .17* | .16* | .30* | .22* | .34* | .31* | .20* | .22* | .27* | .31* | .28* | .21* | .23* | .88* | .74* | 1.00 | |
| 19 | Latinos | 1.97 | 1.13 | .14* | .17* | .24* | .20* | .16* | .29* | .23* | .19* | .19* | .23* | .32* | .38* | .22* | .11 | .21* | .51* | .48* | .50* | 1.00 | |
| 20 | Asians | 2.07 | 1.21 | .14* | .20* | .21* | .17* | .21* | .30* | .23* | .21* | .24* | .20* | .29* | .34* | .12 | .13* | .10 | .43* | .60* | .44* | .76* | 1.00 |
| 21 | African | 2.03 | 1.08 | .10 | .12* | .27* | .21* | .13* | .23* | .25* | .25* | .18* | .19* | .32* | .38* | .17* | .12* | .21* | .50* | .47* | .52* | .89* | .76* |

Table 3

*Second-order growth model of SDO and outgroup affect in Study 2. Unstandardized estimates*

| | No SDO growth factor | | With SDO growth factor | |
|---|---|---|---|---|
| | Estimate | *p* | Estimate | *p* |
| *Causal paths (Intercept → Growth)* | | | | |
| Outgroup Affect → Outgroup Affect | -0.18 | < 0.001 | -0.18 | < 0.001 |
| SDO → Outgroup Affect | 0.08 | < 0.001 | 0.07 | < 0.001 |
| SDO → SDO | — | | -0.02 | 0.511 |
| Outgroup Affect → SDO | — | | 0.02 | 0.629 |
| *Growth factors* | | | | |
| SDO | | | | |
| $t_2$ | — | | 1.00 | |
| $t_3$ | — | | 2.00 | |
| $t_4$ | — | | 3.00 | |
| $t_5$ | — | | 4.00 | |
| Outgroup Affect | | | | |
| $t_2$ | 3.23 | < 0.001 | 3.19 | < 0.001 |
| $t_3$ | 3.75 | < 0.001 | 3.73 | < 0.001 |
| $t_4$ | 3.60 | < 0.001 | 3.60 | < 0.001 |
| $t_5$ | 4.00 | | 4.00 | |
| *Model fit* | | | | |
| $\chi^2$ | 864.539 | | 860.174 | |
| df | 519 | | 514 | |
| p | < .0001 | | < .0001 | |
| RMSEA | 0.030 | | 0.030 | |
| CI RMSEA | 0.027, 0.034 | | 0.027, 0.034 | |
| CFI | 0.957 | | 0.957 | |
| SRMR | 0.079 | | 0.077 | |

*Note.* See table A5 in the online appendix for complete results. Latent intercepts were estimated with all factor loadings fixed to 1 (not shown in the table). Underlined parameters were fixed to the value shown. Both models included time-specific covariances between residuals for growth indicators; the scalar Chi-square test showed a significant ($p = .003$) drop in model fit if these covariances were omitted.

# Figures

*Figure 1*. An example of a multivariate growth model of SDO and outgroup affect

*Figure 2*. Multivariate growth model of SDO and outgroup affect in Study 1. Unstandardized estimates

*Figure Note*. SDO was defined primarily by SDO-E items (by correlating residual variances for SDO-D items). Numbers in bold were fixed prior to estimation. The path with a broken line (residual variable for growth in outgroup affect) was not statistically significant. Time-specific factor models ($t_1$ to $t_3$) used fixed indicator intercepts (N = 453, $\chi^2[249] = 334.312$, $p < 0.001$, RMSEA = 0.028 [0.019, 0.035], CFI=0.979, SRMR = 0.089). Details of the model estimated are shown in the online appendix, Table A2.

*Figure 3*. Cross-lagged panel analysis of five-wave data of SDO and Outgroup Affect in Study 2. Standardized estimates

*Figure note*. SDO was primarily defined by SDO-E items (by correlating residual variances for SDO-D items). N = 736, $\chi^2(480) = 815.65$, $p < 0.001$, RMSEA = 0.031, CFI=0.959, SRMR = 0.083. Details of the analysis are given in the online appendix, Table A3.

*Figure 4*. Multivariate growth model of SDO and outgroup affect from Study 2. Unstandardized estimates.

*Figure note.* SDO was defined primarily by SDO-E items (by correlating residual variances for SDO-D items). Numbers in bold were fixed prior to estimation. Paths drawn with broken lines were not statistically significant. Time-specific factor models ($t_1$ to $t_5$) used fixed indicator intercepts (N = 736, $\chi^2[519] = 864.539$, $p < 0.001$, RMSEA = 0.030 [0.027, 0.034], CFI=0.957, SRMR = 0.079). We

also tested a model that included a growth factor for SDO (though initial analyses indicated that it should be omitted), see Table 2 for results. Details of the analysis are given in the online appendix, Table A4.

Figure 1

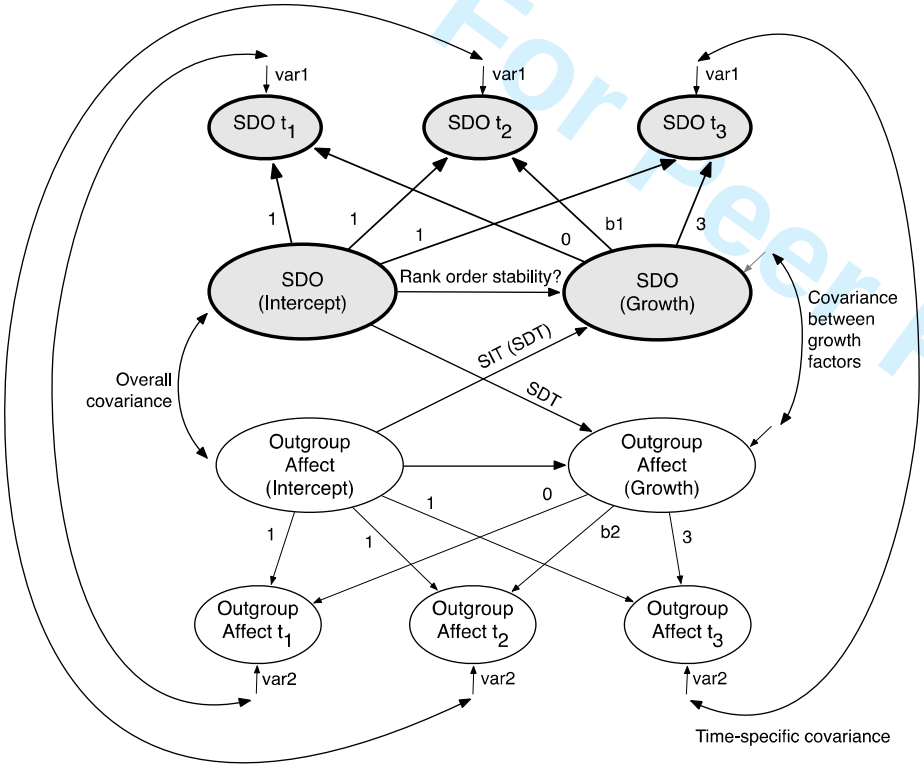


Figure 2

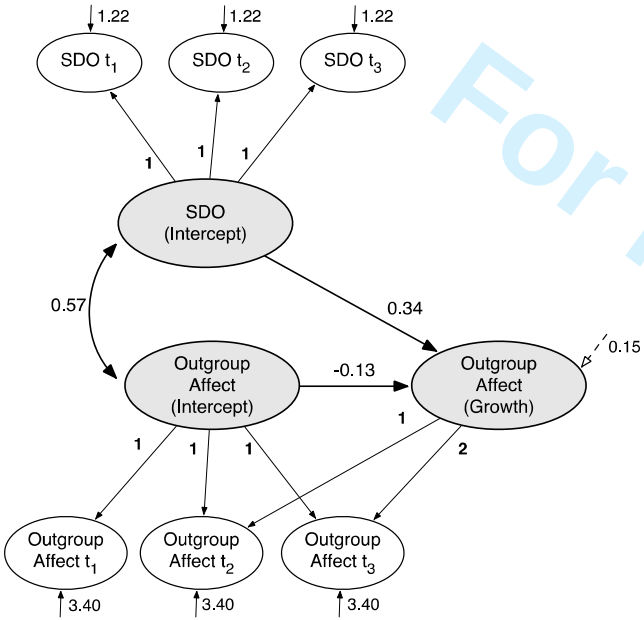


Figure 3

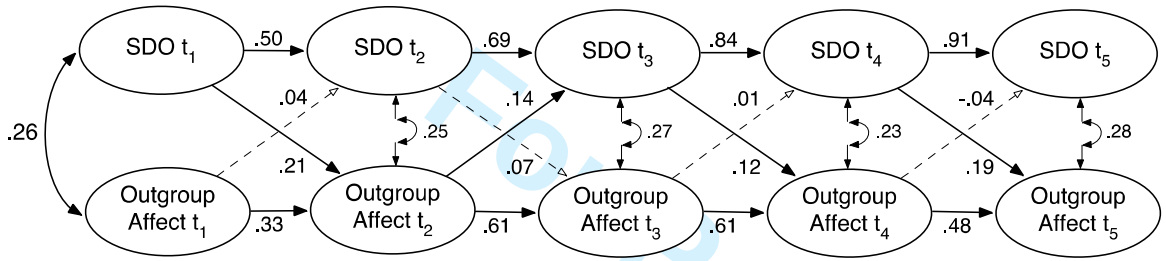
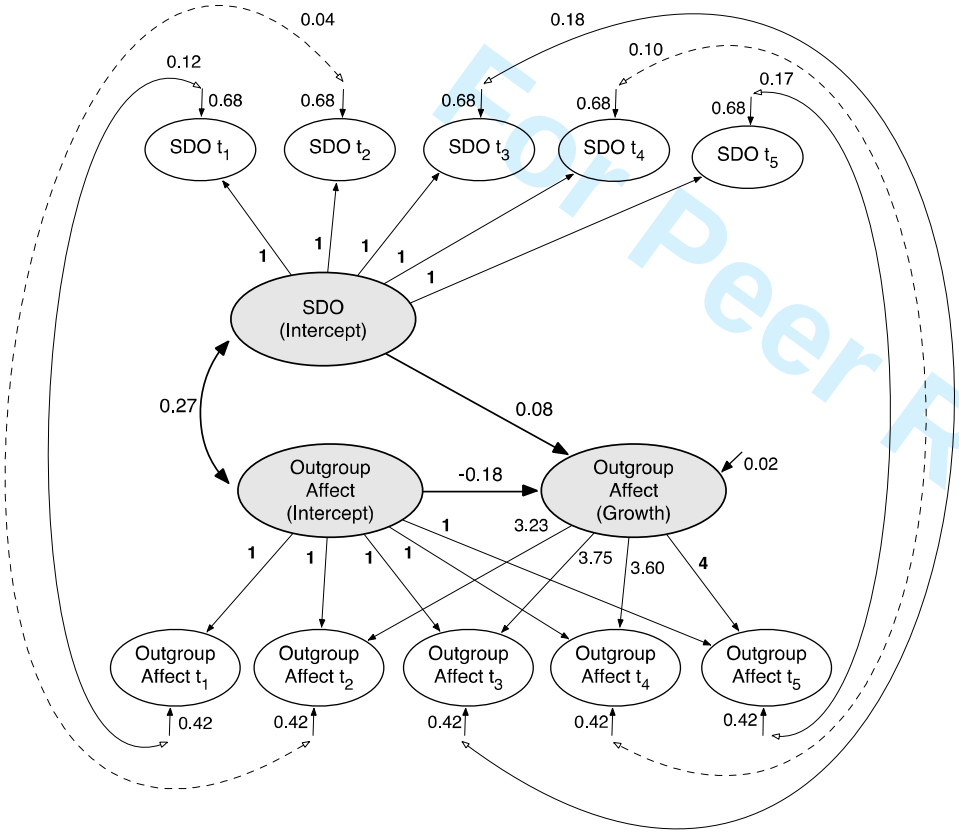


Figure 4



# Online Appendix

**for**

**"Shaping the Development of Prejudice: A Latent Growth Curve Analysis of the Influence of Social Dominance Orientation on Outgroup Affect in Youth"**



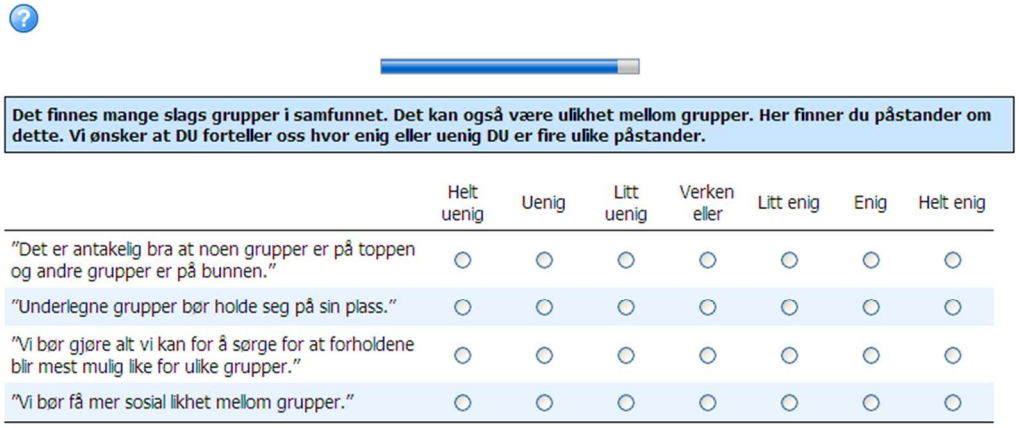
## Study 1

### Measurements

The measurement of SDO in Study 1 used four SDO items, translated into Norwegian. Figure A1 below shows the Norwegian translation and the questionnaire format used for SDO items in Study 1. Figure A2 shows how attitudes to ethnic groups were assessed with a feeling thermometer.

We used expressed emotions toward outgroups rather than computing difference scores as an estimate of ingroup bias. Difference scores have been shown to have reduced validity (e.g., Johns, 1981) and, in the case of ingroup bias, run the risk of conflating ingroup love and outgroup hate (see Brewer, 1999).

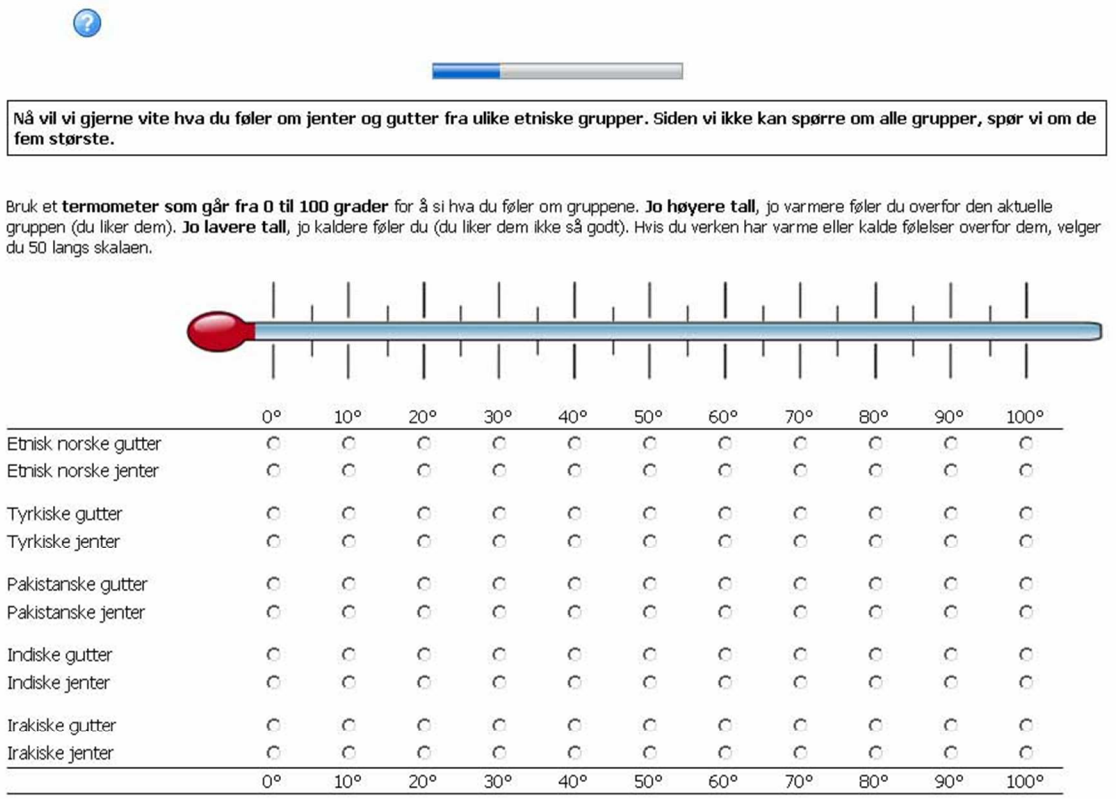
Figure A1. *Measurement of social dominance orientation (in Norwegian) in Study 1*



**Det finnes mange slags grupper i samfunnet. Det kan også være ulikhet mellom grupper. Her finner du påstander om dette. Vi ønsker at DU forteller oss hvor enig eller uenig DU er fire ulike påstander.**

| | Helt uenig | Uenig | Litt uenig | Verken eller | Litt enig | Enig | Helt enig |
|---|---|---|---|---|---|---|---|
| "Det er antakelig bra at noen grupper er på toppen og andre grupper er på bunnen." | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| "Underlegne grupper bør holde seg på sin plass." | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| "Vi bør gjøre alt vi kan for å sørge for at forholdene blir mest mulig like for ulike grupper." | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| "Vi bør få mer sosial likhet mellom grupper." | ○ | ○ | ○ | ○ | ○ | ○ | ○ |

Figure A2. *Measurement of outgroup affect using a feeling thermometer (in Norwegian) in Study 1*



**Nå vil vi gjerne vite hva du føler om jenter og gutter fra ulike etniske grupper. Siden vi ikke kan spørre om alle grupper, spør vi om de fem største.**

Bruk et **termometer som går fra 0 til 100 grader** for å si hva du føler om gruppene. **Jo høyere tall**, jo varmere føler du overfor den aktuelle gruppen (du liker dem). **Jo lavere tall**, jo kaldere føler du (du liker dem ikke så godt). Hvis du verken har varme eller kalde følelser overfor dem, velger du 50 langs skalaen.

| | 0° | 10° | 20° | 30° | 40° | 50° | 60° | 70° | 80° | 90° | 100° |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Etnisk norske gutter | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Etnisk norske jenter | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Tyrkiske gutter | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Tyrkiske jenter | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Pakistanske gutter | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Pakistanske jenter | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Indiske gutter | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Indiske jenter | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Irakiske gutter | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Irakiske jenter | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | 0° | 10° | 20° | 30° | 40° | 50° | 60° | 70° | 80° | 90° | 100° |

Table A1 below shows details of the analyses with cross-lagged panel analysis in Study 1, Table A2 shows details of the analysis with multivariate growth modelling.

Table A1: *Cross-lagged panel analysis of SDO and Outgroup Affect in Study 1*

| | | Unstandardized | | | Standardized | |
|---|---|---|---|---|---|---|
| | | Estimate | 95% C.I. | *p* | Estimate | $R^2$ |
| *Autoregressive and cross-lagged paths* | | | | | | |
| Affect $t_1$ → Affect $t_2$ | | 0.45 | [ 0.333, 0.575] | .000 | 0.45 | |
| SDO $t_1$ → Affect $t_2$ | | 0.21 | [-0.116, 0.544] | .204 | 0.10 | |
| Affect $t_2$ → Affect $t_3$ | | 0.46 | [ 0.348, 0.578] | .000 | 0.48 | |
| SDO $t_2$ → Affect $t_3$ | | 0.21 | [ 0.002, 0.419] | .048 | 0.12 | |
| SDO $t_1$ → SDO $t_2$ | | 0.52 | [ 0.268, 0.772] | .000 | 0.45 | |
| Affect $t_1$ → SDO $t_2$ | | 0.01 | [-0.069, 0.091] | .786 | 0.02 | |
| SDO $t_2$ → SDO $t_3$ | | 0.45 | [ 0.237, 0.655] | .000 | 0.44 | |
| Affect $t_2$ → SDO $t_3$ | | 0.08 | [-0.005, 0.162] | .064 | 0.15 | |
| *Factor loadings for SDO* | | | | | | |
| SDO $t_1$ | Item 1 | 0.35[a] | [ 0.200, 0.492] | .000 | 0.25 | |
| | Item 2 | 0.46[b] | [ 0.298, 0.617] | .000 | 0.32 | |
| | Item 3 | 1.00[c] | [ 1.000, 1.000] | | 0.71 | |
| | Item 4 | 0.85[d] | [ 0.704, 1.003] | .000 | 0.56 | |
| SDO $t_2$ | Item 1 | 0.35[a] | [ 0.200, 0.492] | .000 | 0.31 | |
| | Item 2 | 0.46[b] | [ 0.298, 0.617] | .000 | 0.41 | |
| | Item 3 | 1.00[c] | [ 1.000, 1.000] | | 0.84 | |
| | Item 4 | 0.85[d] | [ 0.704, 1.003] | .000 | 0.64 | |
| SDO $t_3$ | Item 1 | 0.35[a] | [ 0.200, 0.492] | .000 | 0.28 | |
| | Item 2 | 0.46[b] | [ 0.298, 0.617] | .000 | 0.40 | |
| | Item 3 | 1.00[c] | [ 1.000, 1.000] | | 0.82 | |
| | Item 4 | 0.85[d] | [ 0.704, 1.003] | .000 | 0.66 | |
| *Factor loadings for outgroup affect* | | | | | | |
| Affect $t_1$ | Turks | 1.00[a] | [ 1.000, 1.000] | | 0.87 | |
| | Pakistanis | 1.08[e] | [ 1.035, 1.128] | .000 | 0.94 | |
| | Indian | 1.03[f] | [ 0.973, 1.082] | .000 | 0.90 | |
| | Iraqi | 1.09[g] | [ 1.036, 1.136] | .000 | 0.92 | |
| Affect $t_2$ | Turks | 1.00[a] | [ 1.000, 1.000] | | 0.90 | |
| | Pakistanis | 1.08[e] | [ 1.035, 1.128] | .000 | 0.95 | |
| | Indian | 1.03[f] | [ 0.973, 1.082] | .000 | 0.89 | |
| | Iraqi | 1.09[g] | [ 1.036, 1.136] | .000 | 0.93 | |
| Affect $t_3$ | Turks | 1.00[a] | [ 1.000, 1.000] | | 0.90 | |
| | Pakistanis | 1.08[e] | [ 1.035, 1.128] | .000 | 0.96 | |
| | Indian | 1.03[f] | [ 0.973, 1.082] | .000 | 0.90 | |
| | Iraqi | 1.09[g] | [ 1.036, 1.136] | .000 | 0.93 | |
| *Indicator intercepts* | | | | | | |
| SDO $t_1$ | Item 1 | 2.85[h] | [ 2.730, 2.965] | .000 | 1.71 | |
| | Item 2 | 2.91 | [ 2.741, 3.069] | .000 | 1.66 | |
| | Item 3 | 2.77[j] | [ 2.644, 2.894] | .000 | 1.61 | |
| | Item 4 | 3.57[k] | [ 3.439, 3.695] | .000 | 1.91 | |
| SDO $t_2$ | Item 1 | 2.85[h] | [ 2.730, 2.965] | .000 | 1.83 | |
| | Item 2 | 2.63[i] | [ 2.500, 2.760] | .000 | 1.68 | |
| | Item 3 | 2.77[j] | [ 2.644, 2.894] | .000 | 1.65 | |
| | Item 4 | 3.57[k] | [ 3.439, 3.695] | .000 | 1.89 | |
| SDO $t_3$ | Item 1 | 2.85[h] | [ 2.730, 2.965] | .000 | 1.61 | |
| | Item 2 | 2.63[i] | [ 2.500, 2.760] | .000 | 1.58 | |
| | Item 3 | 2.77[j] | [ 2.644, 2.894] | .000 | 1.57 | |
| | Item 4 | 3.57[k] | [ 3.439, 3.695] | .000 | 1.91 | |
| Affect $t_1$ | Turks | 5.69[l] | [ 5.453, 5.918] | .000 | 1.89 | |
| | Pakistanis | 5.99[m] | [ 5.749, 6.226] | .000 | 1.98 | |
| | Indian | 5.54[n] | [ 5.313, 5.774] | .000 | 1.85 | |
| | Iraqi | 6.15[o] | [ 5.909, 6.390] | .000 | 1.98 | |
| Affect $t_2$ | Turks | 5.69[l] | [ 5.453, 5.918] | .000 | 1.92 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Pakistanis | 5.99[m] | [ 5.749, 6.226] | .000 | 1.97 | |
| | Indian | 5.54[n] | [ 5.313, 5.774] | .000 | 1.80 | |
| | Iraqi | 6.15[o] | [ 5.909, 6.390] | .000 | 1.98 | |
| Affect $t_3$ | Turks | 5.69[l] | [ 5.453, 5.918] | .000 | 2.00 | |
| | Pakistanis | 5.99[m] | [ 5.749, 6.226] | .000 | 2.07 | |
| | Indian | 5.54[n] | [ 5.313, 5.774] | .000 | 1.90 | |
| | Iraqi | 6.15[o] | [ 5.909, 6.390] | .000 | 2.06 | |
| *Covariances* | | | | | | |
| *Initial covariance* | | | | | | |
| SDO $t_1$ and Affect $t_1$ | | 0.42 | [-0.032, 0.870] | .068 | 0.13 | |
| *Residual covariances* | | | | | | |
| SDO $t_2$ and Affect $t_2$ | | 0.96 | [ 0.525, 1.445] | .000 | 0.33 | |
| SDO $t_3$ and Affect $t_3$ | | 0.53 | [ 0.076, 0.984] | .022 | 0.20 | |
| *Indicator-level residual covariances* | | | | | | |
| SDO1 $t_1$ and SDO2 $t_1$ | | 1.60 | [ 1.226, 1.974] | .000 | .60 | |
| SDO1 $t_1$ and SDO1 $t_2$ | | 0.18 | [-0.038, 0.392] | .107 | .07 | |
| SDO1 $t_1$ and SDO1 $t_3$ | | 0.07 | [-0.187, 0.327] | .592 | .03 | |
| SDO1 $t_2$ and SDO2 $t_2$ | | 0.99 | [ 0.695, 1.286] | .000 | .47 | |
| SDO1 $t_2$ and SDO1 $t_3$ | | 0.30 | [ 0.030, 0.568] | .030 | .12 | |
| SDO1 $t_3$ and SDO2 $t_3$ | | 1.64 | [ 1.189, 2.084] | .000 | .63 | |
| SDO2 $t_1$ and SDO2 $t_2$ | | 0.19 | [-0.033, 0.420] | .094 | .08 | |
| SDO2 $t_1$ and SDO2 $t_3$ | | 0.21 | [ 0.006, 0.422] | .044 | .09 | |
| SDO3 $t_1$ and SDO3 $t_2$ | | -0.03 | [-0.368, 0.310] | .866 | -.03 | |
| SDO3 $t_1$ and SDO3 $t_3$ | | 0.21 | [-0.064, 0.489] | .133 | .17 | |
| SDO4 $t_1$ and SDO4 $t_2$ | | 0.31 | [ 0.006, 0.617] | .046 | .14 | |
| SDO4 $t_1$ and SDO4 $t_3$ | | 0.08 | [-0.238, 0.401] | .616 | .04 | |
| SDO2 $t_2$ and SDO2 $t_3$ | | 0.16 | [-0.073, 0.382] | .182 | .07 | |
| SDO3 $t_2$ and SDO3 $t_3$ | | -0.07 | [-0.355, 0.224] | .657 | -.07 | |
| SDO4 $t_2$ and SDO4 $t_3$ | | 0.23 | [-0.122, 0.587] | .198 | .12 | |
| Turks $t_1$ and Turks $t_2$ | | 0.51 | [ 0.174, 0.845] | .003 | .27 | |
| Turks $t_1$ and Turks $t_3$ | | 0.29 | [ 0.049, 0.534] | .018 | .16 | |
| Pakistani $t_1$ and Pakistani $t_2$ | | 0.35 | [ 0.049, 0.654] | .023 | .34 | |
| Pakistani $t_1$ and Pakistani $t_3$ | | 0.20 | [-0.031, 0.436] | .089 | .22 | |
| Indian $t_1$ and Indian $t_2$ | | 0.23 | [-0.351, 0.810] | .439 | .12 | |
| Indian $t_1$ and Indian $t_3$ | | 0.45 | [ 0.047, 0.843] | .028 | .26 | |
| Iraqi $t_1$ and Iraqi $t_2$ | | 0.30 | [-0.090, 0.690] | .132 | .21 | |
| Iraqi $t_1$ and Iraqi $t_3$ | | 0.21 | [-0.194, 0.608] | .312 | .15 | |
| Turks $t_2$ and Turks $t_3$ | | 0.57 | [ 0.186, 0.944] | .003 | .35 | |
| Pakistani $t_2$ and Pakistani $t_3$ | | 0.21 | [ 0.021, 0.401] | .030 | .25 | |
| Indian $t_2$ and Indian $t_3$ | | 0.95 | [ 0.364, 1.527] | .001 | .52 | |
| Iraqi $t_2$ and Iraqi $t_3$ | | 0.38 | [ 0.056, 0.707] | .022 | .31 | |
| *Variances* | | | | | | |
| SDO $t_1$ | | 1.50 | [ 0.946, 2.056] | .005 | 1.00 | |
| Affect $t_1$ | | 6.87 | [ 5.856, 7.881] | .000 | 1.00 | |
| *Residual Variances* | | | | | | |
| SDO $t_1$ | Item 1 | 2.59 | [ 2.202, 2.978] | .000 | 0.94 | 0.07 |
| | Item 2 | 2.75 | [ 2.313, 3.181] | .000 | 0.90 | 0.10 |
| | Item 3 | 1.46 | [ 0.914, 2.006] | .000 | 0.49 | 0.51 |
| | Item 4 | 2.41 | [ 1.907, 2.919] | .000 | 0.69 | 0.31 |
| SDO $t_2$ | Item 1 | 2.19 | [ 1.870, 2.519] | .000 | 0.90 | 0.10 |
| | Item 2 | 2.04 | [ 1.645, 2.431] | .000 | 0.83 | 0.17 |
| | Item 3 | 0.82 | [ 0.429, 1.211] | .000 | 0.29 | 0.71 |
| | Item 4 | 2.10 | [ 1.602, 2.601] | .000 | 0.59 | 0.41 |
| SDO $t_3$ | Item 1 | 2.87 | [ 2.424, 3.311] | .000 | 0.92 | 0.08 |
| | Item 2 | 2.32 | [ 1.836, 2.804] | .000 | 0.84 | 0.16 |
| | Item 3 | 1.02 | [ 0.519, 1.519] | .000 | 0.33 | 0.67 |
| | Item 4 | 1.94 | [ 1.388, 2.501] | .000 | 0.56 | 0.44 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Affect $t_1$ | Turks | 2.14 | [ 1.394, 2.887] | .000 | 0.24 | 0.76 |
| | Pakistanis | 1.14 | [ 0.448, 1.834] | .001 | 0.12 | 0.88 |
| | Indian | 1.78 | [ 1.190, 2.368] | .000 | 0.20 | 0.80 |
| | Iraqi | 1.58 | [ 0.777, 2.388] | .000 | 0.16 | 0.84 |
| Affect $t_2$ | Turks | 1.67 | [ 1.104, 2.230] | .000 | 0.19 | 0.81 |
| | Pakistanis | 0.95 | [ 0.497, 1.404] | .000 | 0.10 | 0.90 |
| | Indian | 2.02 | [ 1.155, 2.891] | .000 | 0.21 | 0.79 |
| | Iraqi | 1.27 | [ 0.755, 1.776] | .000 | 0.13 | 0.87 |
| Affect $t_3$ | Turks | 1.60 | [ 0.866, 2.326] | .000 | 0.20 | 0.80 |
| | Pakistanis | 0.73 | [ 0.339, 1.111] | .000 | 0.09 | 0.91 |
| | Indian | 1.62 | [ 0.973, 2.266] | .000 | 0.19 | 0.81 |
| | Iraqi | 1.20 | [ 0.635, 1.770] | .000 | 0.14 | 0.87 |
| SDO $t_2$ | | 1.59 | [ 1.002, 2.176] | .000 | 0.79 | 0.21 |
| SDO $t_3$ | | 1.57 | [ 0.951, 2.193] | .000 | 0.75 | 0.25 |
| Affect $t_2$ | | 5.55 | [ 4.516, 6.580] | .000 | 0.78 | 0.22 |
| Affect $t_3$ | | 4.65 | [ 3.809, 5.487] | .000 | 0.71 | 0.29 |

*Note*. N = 453, $\chi^2(241) = 331.197$, $p < 0.001$, RMSEA = 0.029 [C.I. RMSEA = .021, .036] , CFI=0.977, SRMR = 0.083. The model used time-invariant indicator loadings and indicator intercepts to the extent that these were supported by the scaled Chi-square difference test. Identical superscript letters in the table mark parameters fixed for invariance. Parameters at 1 with no confidence interval were fixed to 1 prior to estimation.

Table A2. *Second-order growth model of SDO and outgroup affect in Study 1. Unstandardized estimates.*

| | Estimate | 95% C.I. | *p* |
|---|---|---|---|
| *Causal paths (Intercept → Growth)* | | | |
| Outgroup Affect → Outgroup Affect | -0.13 | [-0.249, -0.012] | 0.031 |
| SDO → Outgroup Affect | 0.34 | [0.039, 0.638] | 0.027 |
| *Growth factor* | | | |
| Outgroup Affect | | | |
| $t_2$ | 1.00 | [1.000, 1.000] | |
| $t_3$ | 2.00 | [2.000, 2.000] | |
| *Time-invariant factor loadings* | | | |
| SDO ($t_1$ to $t_3$) | | | |
| Item 1 | 0.32 | [0.182, 0.451] | < 0.001 |
| Item 2 | 0.42 | [0.292, 0.551] | < 0.001 |
| Item 3 | 1.00 | [1.000, 1.000] | |
| Item 4 | 0.80 | [0.617, 0.991] | < 0.001 |
| Outgroup Affect ($t_1$ to $t_3$) | | | |
| Turks | 1.00 | [1.000, 1.000] | |
| Pakistanis | 1.08 | [1.047, 1.120] | < 0.001 |
| Indians | 1.03 | [0.979, 1.076] | < 0.001 |
| Iraqis | 1.09 | [1.050, 1.121] | < 0.001 |
| *Covariances* | | | |
| Intercepts | 0.57 | [0.185, 0.963] | 0.001 |
| Error covariances item 1 & item 2 | | | |
| $t_1$ | 1.60 | [1.293, 1.915] | < 0.001 |
| $t_2$ | 1.02 | [0.676, 1.363] | < 0.001 |
| $t_3$ | 1.67 | [1.134, 2.215] | < 0.001 |
| *Residual Variances* | | | |
| SDO $t_1$ | 1.22 | [0.718, 1.716] | 0.000 |
| SDO $t_2$ | 1.22 | [0.718, 1.716] | 0.000 |
| SDO $t_3$ | 1.22 | [0.718, 1.716] | 0.000 |
| Outgroup affect $t_1$ | 3.40 | [2.789, 4.001] | 0.000 |
| Outgroup affect $t_2$ | 3.40 | [2.789, 4.001] | 0.000 |
| Outgroup affect $t_3$ | 3.40 | [2.789, 4.001] | 0.000 |
| Growth Outgroup affect | 0.15 | [-0.261, 0.562] | 0.474 |

*Note*. N = 453, $\chi^2(249) = 334.312$, $p < 0.001$, RMSEA = 0.028 [C.I. RMSEA = .019, .035] , CFI=0.979, SRMR = 0.089. The growth factor for outgroup affect used fixed factor loadings (with loadings fixed at 0 [$t_1$], 1 [$t_2$], and 2[$t_3$].) Underlined parameters were also fixed prior to estimation. Indicators of SDO and outgroup affect were the same as in Table A1 and used the same partial measurement invariance.

Table A3 shows the Mplus input for the cross-sectional model, Table A4 shows the input for the multivariate latent growth model in Study 1.

Table A3. *Mplus input for cross-lagged panel analysis in Study 1.*

```
DATA:
  FILE = mplusin.dat;

VARIABLE:
  NAMES = sdo1_8 sdo2_8 sdo3_8 sdo4_8 sdo1_9 sdo2_9 sdo3_9 sdo4_9 sdo1_0
  sdo2_0 sdo3_0 sdo4_0 att_tu1 att_pa1 att_in1 att_ir1 att_tu2
  att_pa2 att_in2 att_ir2 att_tu3 att_pa3 att_in3 att_ir3;
  MISSING ARE ALL (-9999);

ANALYSIS:
  ESTIMATOR = mlr;   !Uses robust standard errors

MODEL:
  sdo8 BY sdo1_8* (sa1);   !Measurement model for SDO, school grade 8
  sdo8 BY sdo2_8 (sb1);  !sdo1_8 is first item, sdo2_8 is second item
  sdo8 BY sdo3_8@1 (sc1);  !Factor loading fixed at 1
  sdo8 BY sdo4_8 (sd1);
  sdo1_8 WITH sdo2_8;    !Residuals for SDO-D items are correlated

  sdo9 BY sdo1_9* (sa1);   !Measurement model for SDO, school grade 9
  sdo9 BY sdo2_9 (sb1);
  sdo9 BY sdo3_9@1 (sc1);
  sdo9 BY sdo4_9 (sd1);
  sdo1_9 WITH sdo2_9;

  sdo0 BY sdo1_0* (sa1);   !Measurement model for SDO, school grade 10
  sdo0 BY sdo2_0 (sb1);
  sdo0 BY sdo3_0@1 (sc1);
  sdo0 BY sdo4_0 (sd1);
  sdo1_0 WITH sdo2_0;

  !Residuals for specific SDO items are correlated across time
  sdo1_8 sdo2_8 sdo3_8 sdo4_8 PWITH sdo1_9 sdo2_9 sdo3_9 sdo4_9;
  sdo1_8 sdo2_8 sdo3_8 sdo4_8 PWITH sdo1_0 sdo2_0 sdo3_0 sdo4_0;
  sdo1_9 sdo2_9 sdo3_9 sdo4_9 PWITH sdo1_0 sdo2_0 sdo3_0 sdo4_0;

  [sdo1_8] (e1); !Intercepts for indicators, invariant when using the same label
  [sdo1_9] (e1);
  [sdo1_0] (e1);
  [sdo2_8] (f1);
  [sdo2_9] (f2);
  [sdo2_0] (f2);
  [sdo3_8] (g1);
  [sdo3_9] (g1);
  [sdo3_0] (g1);
  [sdo4_8] (h1);
  [sdo4_9] (h1);
  [sdo4_0] (h1);

  att8 BY att_tu1 (a1); !Measurement model for Outgroup affect, school grade 8
  att8 BY att_pa1 (b1); !Factor loadings invariant if using the same label
  att8 BY att_in1 (c1); !tu = Turks, pa = Pakistanis, in = Indians, ir = Iraqis
  att8 BY att_ir1 (d1); !First factor loading (a1) automatically fixed at 1

  att9 BY att_tu2 (a1); !Measurement model for Outgroup affect, school grade 9
  att9 BY att_pa2 (b1);
  att9 BY att_in2 (c1);
  att9 BY att_ir2 (d1);

  att0 BY att_tu3 (a1); !Measurement model for Outgroup affect, school grade 10
  att0 BY att_pa3 (b1);
  att0 BY att_in3 (c1);
  att0 BY att_ir3 (d1);
```

```
  !Residuals for attitudes toward specific outgroup is correlated across time
  att_tu1 att_pa1 att_in1 att_ir1 PWITH att_tu2 att_pa2 att_in2 att_ir2;
  att_tu1 att_pa1 att_in1 att_ir1 PWITH att_tu3 att_pa3 att_in3 att_ir3;
  att_tu2 att_pa2 att_in2 att_ir2 PWITH att_tu3 att_pa3 att_in3 att_ir3;

  [att_tu1] (tu1); !Intercepts for indicators, invariant when using the same label
  [att_tu2] (tu1);
  [att_tu3] (tu1);
  [att_pa1] (pa1);
  [att_pa2] (pa1);
  [att_pa3] (pa1);
  [att_in1] (in1);
  [att_in2] (in1);
  [att_in3] (in1);
  [att_ir1] (ir1);
  [att_ir2] (ir1);
  [att_ir3] (ir1);

  sdo0 sdo9 sdo8 PWITH att0 att9 att8; !Time-specific residual covariances

  sdo0 ON sdo9; !SDO scores regressed on previous SDO score
  sdo9 ON sdo8;
  att0 ON att9; !Outgroup affect score regressed on previous Outgroup affect score
  att9 ON att8;
  sdo0 ON att9; !Cross-lagged paths
  sdo9 ON att8;
  att0 ON sdo9;
  att9 ON sdo8;

OUTPUT: cinterval; stdyx; !Asks for confidence intervals and standardized estimates
```

Table A4. *Mplus input for the multivariate growth model in Study 1.*

```
DATA:
    FILE = mplusin.dat;
VARIABLE:
    NAMES =
    s_class sdo1_8 sdo2_8 sdo3_8 sdo4_8 sdo1_9 sdo2_9 sdo3_9 sdo4_9
    sdo1_0 sdo2_0 sdo3_0 sdo4_0 att_tu1 att_pa1 att_in1 att_ir1
    att_tu2 att_pa2 att_in2 att_ir2 att_tu3 att_pa3 att_in3 att_ir3;
    MISSING ARE ALL (-9999);
    CLUSTER = s_class;      !Clustering in school classes

ANALYSIS:
    TYPE = complex;         !Robust sandwich estimator for clustering

MODEL:
    sdo8 BY sdo1_8* (sa1);  !Measurement models of SDO (as in Table A3)
    sdo8 BY sdo2_8 (sb1);
    sdo8 BY sdo3_8@1 (sc1);
    sdo8 BY sdo4_8 (sd1);
    sdo1_8 WITH sdo2_8;

    sdo9 BY sdo1_9* (sa1);
    sdo9 BY sdo2_9 (sb1);
    sdo9 BY sdo3_9@1 (sc1);
    sdo9 BY sdo4_9 (sd1);
    sdo1_9 WITH sdo2_9;

    sdo0 BY sdo1_0* (sa1);
    sdo0 BY sdo2_0 (sb1);
    sdo0 BY sdo3_0@1 (sc1);
    sdo0 BY sdo4_0 (sd1);
    sdo1_0 WITH sdo2_0;
```

```
    sdo1_8 sdo2_8 sdo3_8 sdo4_8 PWITH sdo1_9 sdo2_9 sdo3_9 sdo4_9;
    sdo1_8 sdo2_8 sdo3_8 sdo4_8 PWITH sdo1_0 sdo2_0 sdo3_0 sdo4_0;
    sdo1_9 sdo2_9 sdo3_9 sdo4_9 PWITH sdo1_0 sdo2_0 sdo3_0 sdo4_0;

    [sdo1_8] (e1);
    [sdo1_9] (e1);
    [sdo1_0] (e1);
    [sdo2_8] (f1);
    [sdo2_9] (f2);
    [sdo2_0] (f2);
    [sdo3_8] (g1);
    [sdo3_9] (g1);
    [sdo3_0] (g1);
    [sdo4_8] (h1);
    [sdo4_9] (h1);
    [sdo4_0] (h1);

    att8 BY att_tu1 (a1);  !Measurement models of Outgroup affect
    att8 BY att_pa1 (b1);
    att8 BY att_in1 (c1);
    att8 BY att_ir1 (d1);

    att9 BY att_tu2 (a1);
    att9 BY att_pa2 (b1);
    att9 BY att_in2 (c1);
    att9 BY att_ir2 (d1);

    att0 BY att_tu3 (a1);
    att0 BY att_pa3 (b1);
    att0 BY att_in3 (c1);
    att0 BY att_ir3 (d1);

    att_tu1 att_pa1 att_in1 att_ir1 PWITH att_tu2 att_pa2 att_in2 att_ir2;
    att_tu1 att_pa1 att_in1 att_ir1 PWITH att_tu3 att_pa3 att_in3 att_ir3;
    att_tu2 att_pa2 att_in2 att_ir2 PWITH att_tu3 att_pa3 att_in3 att_ir3;

    [att_tu1] (tu1);
    [att_tu2] (tu1);
    [att_tu3] (tu1);
    [att_pa1] (pa1);
    [att_pa2] (pa1);
    [att_pa3] (pa1);
    [att_in1] (in1);
    [att_in2] (in1);
    [att_in3] (in1);
    [att_ir1] (ir1);
    [att_ir2] (ir1);
    [att_ir3] (ir1);

    sdo8 sdo9 sdo0 (r1);       !Residual variance of growth indicators equal across time
    att8 att9 att0 (r2);

    i_sdo | sdo8 sdo9 sdo0;             !Intercept-only growth model
    i_att s_att | att8@0 att9@1 att0@2; !Linear growth model

    s_att ON i_att i_sdo;      !Outgroup affect growth regressed on the two intercepts

OUTPUT: cinterval;
```

## Study 2

Measurements of *SDO* and outgroup affect are described in the main document. Tables below show means and standard deviations (Table A3) and bivariate correlations between measured variables (Table A4) at all five measurement occasions. Table A5 shows detailed results from cross-lagged panel analysis, Table A6 shows detailed results from second-order multivariate growth modeling.

Table A5. *Means, standard deviations, and missingness of measured variables in Study 2*

| Variable | M | SD |
|---|---|---|
| SDO1_1 | 2.128 | 1.451 |
| SDO1_2 | 1.624 | 1.129 |
| SDO1_3 | 2.856 | 1.603 |
| SDO1_4 | 2.528 | 1.445 |
| SDO2_1 | 1.957 | 1.229 |
| SDO2_2 | 1.513 | 0.990 |
| SDO2_3 | 2.634 | 1.562 |
| SDO2_4 | 2.208 | 1.342 |
| SDO3_1 | 1.932 | 1.257 |
| SDO3_2 | 1.499 | 0.959 |
| SDO3_3 | 2.729 | 1.591 |
| SDO3_4 | 2.188 | 1.299 |
| SDO4_1 | 2.085 | 1.325 |
| SDO4_2 | 1.551 | 0.998 |
| SDO4_3 | 2.839 | 1.602 |
| SDO4_4 | 2.282 | 1.343 |
| SDO5_1 | 1.807 | 1.161 |
| SDO5_2 | 1.381 | 0.801 |
| SDO5_3 | 2.477 | 1.449 |
| SDO5_4 | 2.036 | 1.265 |
| Att1_1 | 2.513 | 1.325 |
| Att1_2 | 2.318 | 1.232 |
| Att1_3 | 2.416 | 1.305 |
| Att2_1 | 2.174 | 1.103 |
| Att2_2 | 2.226 | 1.148 |
| Att2_3 | 2.157 | 1.054 |
| Att3_1 | 2.088 | 1.069 |
| Att3_2 | 2.187 | 1.198 |
| Att3_3 | 2.078 | 1.033 |
| Att4_1 | 2.160 | 1.098 |
| Att4_2 | 2.187 | 1.238 |
| Att4_3 | 2.172 | 1.102 |
| Att5_1 | 1.967 | 1.126 |
| Att5_2 | 2.074 | 1.210 |
| Att5_3 | 2.030 | 1.082 |

*Note*. The label SDO1_1 refers to measurement occasion $t_1$ and item 1 for SDO, Att5_3 refers to measurement occasion $t_5$ and item 3 for outgroup affect.

Table A6. *Correlations in five-wave data of four SDO items and three items for outgroup Affect in Study 2*

| | SDO1_1 | SDO1_2 | SDO1_3 | SDO1_4 | SDO2_1 | SDO2_2 | SDO2_3 |
|---|---|---|---|---|---|---|---|
| SDO1_1 | 1.0000 | | | | | | |
| SDO1_2 | 0.5963* | 1.0000 | | | | | |
| SDO1_3 | 0.3244* | 0.3084* | 1.0000 | | | | |
| SDO1_4 | 0.3843* | 0.3502* | 0.7986* | 1.0000 | | | |
| SDO2_1 | 0.3712* | 0.2094* | 0.0886* | 0.1740* | 1.0000 | | |
| SDO2_2 | 0.1732* | 0.2032* | 0.0744 | 0.1003* | 0.4453* | 1.0000 | |
| SDO2_3 | 0.1376* | 0.1536* | 0.4007* | 0.3459* | 0.2256* | 0.1929* | 1.0000 |
| SDO2_4 | 0.1840* | 0.2185* | 0.3654* | 0.3615* | 0.3099* | 0.2949* | 0.7387* |
| SDO3_1 | 0.3640* | 0.1764* | 0.0604 | 0.1019* | 0.5183* | 0.2791* | 0.2416* |
| SDO3_2 | 0.2213* | 0.2035* | 0.1387* | 0.0807 | 0.3548* | 0.3115* | 0.2048* |
| SDO3_3 | 0.1808* | 0.1310* | 0.4027* | 0.3997* | 0.2497* | 0.1181* | 0.5381* |
| SDO3_4 | 0.1369* | 0.1189* | 0.3757* | 0.3902* | 0.2751* | 0.1980* | 0.4924* |
| SDO4_1 | 0.3552* | 0.2930* | 0.1073 | 0.1876* | 0.4595* | 0.2641* | 0.1681* |
| SDO4_2 | 0.1968* | 0.2279* | 0.0925 | 0.1596* | 0.3627* | 0.2708* | 0.1359* |
| SDO4_3 | 0.1579* | 0.0946 | 0.3735* | 0.3696* | 0.2442* | 0.1682* | 0.4774* |
| SDO4_4 | 0.1017 | 0.0747 | 0.3630* | 0.3771* | 0.2127* | 0.1780* | 0.3699* |
| SDO5_1 | 0.2573* | 0.1269* | 0.0589 | 0.0889 | 0.4438* | 0.2001* | 0.2408* |
| SDO5_2 | 0.2090* | 0.2761* | 0.1167 | 0.1349* | 0.4046* | 0.4115* | 0.2056* |
| SDO5_3 | 0.1141 | 0.2386* | 0.4616* | 0.4398* | 0.1981* | 0.2027* | 0.5851* |
| SDO5_4 | 0.1194* | 0.2000* | 0.4333* | 0.3859* | 0.2124* | 0.2245* | 0.4661* |
| Att1_1 | 0.1764* | 0.2245* | 0.1883* | 0.2366* | 0.0530 | -0.0451 | 0.1709* |
| Att1_2 | 0.1022* | 0.1325* | 0.1441* | 0.1970* | 0.0556 | -0.0574 | 0.1028* |
| Att1_3 | 0.1692* | 0.1780* | 0.1968* | 0.2391* | 0.0410 | -0.0606 | 0.1989* |
| Att2_1 | 0.2098* | 0.2324* | 0.1809* | 0.2604* | 0.2121* | 0.1436* | 0.2574* |
| Att2_2 | 0.1914* | 0.2112* | 0.1154* | 0.1767* | 0.2070* | 0.1361* | 0.1946* |
| Att2_3 | 0.2219* | 0.2286* | 0.1662* | 0.2635* | 0.2421* | 0.1716* | 0.2345* |
| Att3_1 | 0.1648* | 0.1703* | 0.1940* | 0.1829* | 0.2717* | 0.1501* | 0.2377* |
| Att3_2 | 0.1518* | 0.1556* | 0.1625* | 0.1166* | 0.1956* | 0.0844 | 0.1514* |
| Att3_3 | 0.1728* | 0.1459* | 0.1711* | 0.1565* | 0.2510* | 0.1306* | 0.2532* |
| Att4_1 | 0.1488* | 0.1569* | 0.1700* | 0.1904* | 0.1935* | 0.0904 | 0.1807* |
| Att4_2 | 0.1296* | 0.1742* | 0.1304* | 0.1242* | 0.2063* | 0.0892 | 0.1538* |
| Att4_3 | 0.1502* | 0.1413* | 0.1469* | 0.1629* | 0.2384* | 0.0817 | 0.1753* |
| Att5_1 | 0.1387* | 0.1727* | 0.2383* | 0.2023* | 0.1763* | 0.0976 | 0.2199* |
| Att5_2 | 0.1411* | 0.2001* | 0.2065* | 0.1684* | 0.1470* | 0.1452* | 0.2012* |
| Att5_3 | 0.0962 | 0.1181* | 0.2714* | 0.2110* | 0.1574* | 0.0975 | 0.2245* |

| | SDO2_4 | SDO3_1 | SDO3_2 | SDO3_3 | SDO3_4 | SDO4_1 | SDO4_2 |
|---|---|---|---|---|---|---|---|
| SDO2_4 | 1.0000 | | | | | | |
| SDO3_1 | 0.2618* | 1.0000 | | | | | |
| SDO3_2 | 0.2752* | 0.4842* | 1.0000 | | | | |
| SDO3_3 | 0.5061* | 0.2984* | 0.2623* | 1.0000 | | | |
| SDO3_4 | 0.5466* | 0.2673* | 0.2831* | 0.7356* | 1.0000 | | |
| SDO4_1 | 0.2216* | 0.6002* | 0.3761* | 0.2428* | 0.2728* | 1.0000 | |
| SDO4_2 | 0.1834* | 0.3621* | 0.3750* | 0.2047* | 0.2893* | 0.5587* | 1.0000 |
| SDO4_3 | 0.4523* | 0.2256* | 0.2851* | 0.6548* | 0.5382* | 0.2103* | 0.1626* |
| SDO4_4 | 0.4456* | 0.2116* | 0.2633* | 0.5737* | 0.6229* | 0.2742* | 0.2000* |
| SDO5_1 | 0.2559* | 0.5490* | 0.2543* | 0.2111* | 0.2573* | 0.5580* | 0.3352* |
| SDO5_2 | 0.2803* | 0.2793* | 0.5046* | 0.2324* | 0.2541* | 0.2450* | 0.3776* |
| SDO5_3 | 0.5595* | 0.2231* | 0.2049* | 0.6668* | 0.5541* | 0.1835* | 0.2023* |
| SDO5_4 | 0.4486* | 0.2282* | 0.3379* | 0.5736* | 0.5698* | 0.1668* | 0.1206 |
| Att1_1 | 0.1007* | 0.0835 | 0.0299 | 0.1505* | 0.0974 | 0.1210* | 0.1137* |
| Att1_2 | 0.0553 | 0.0331 | 0.0026 | 0.0856 | 0.1039* | 0.1059 | 0.0747 |
| Att1_3 | 0.1151* | 0.0541 | -0.0106 | 0.1633* | 0.1117* | 0.1340* | 0.0991 |
| Att2_1 | 0.2957* | 0.1760* | 0.0848 | 0.2592* | 0.2923* | 0.2332* | 0.1200* |
| Att2_2 | 0.2266* | 0.1610* | 0.0461 | 0.1414* | 0.1867* | 0.2174* | 0.1075* |
| Att2_3 | 0.2865* | 0.1873* | 0.1067* | 0.2730* | 0.2931* | 0.2701* | 0.1716* |
| Att3_1 | 0.2323* | 0.2635* | 0.2347* | 0.3243* | 0.3342* | 0.2435* | 0.2302* |
| Att3_2 | 0.1175* | 0.2475* | 0.2231* | 0.2208* | 0.2221* | 0.2531* | 0.2226* |
| Att3_3 | 0.2341* | 0.3005* | 0.2183* | 0.3445* | 0.3073* | 0.2754* | 0.2378* |
| Att4_1 | 0.2061* | 0.2316* | 0.2884* | 0.3066* | 0.2249* | 0.2575* | 0.2002* |
| Att4_2 | 0.1382* | 0.2652* | 0.2508* | 0.2508* | 0.2166* | 0.2926* | 0.2088* |
| Att4_3 | 0.2364* | 0.2495* | 0.3101* | 0.3465* | 0.2730* | 0.2396* | 0.1855* |
| Att5_1 | 0.2456* | 0.1642* | 0.2857* | 0.2254* | 0.1919* | 0.1962* | 0.1646* |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Att5_2 | 0.1986* | 0.2102* | 0.3011* | 0.2260* | 0.2108* | 0.2587* | 0.1413* |
| Att5_3 | 0.2612* | 0.1326* | 0.2300* | 0.2450* | 0.2464* | 0.1672* | 0.1119 |

| | SDO4_3 | SDO4_4 | SDO5_1 | SDO5_2 | SDO5_3 | SDO5_4 | Att1_1 |
|---|---|---|---|---|---|---|---|
| SDO4_3 | 1.0000 | | | | | | |
| SDO4_4 | 0.7132* | 1.0000 | | | | | |
| SDO5_1 | 0.2613* | 0.2629* | 1.0000 | | | | |
| SDO5_2 | 0.2269* | 0.2524* | 0.3813* | 1.0000 | | | |
| SDO5_3 | 0.6534* | 0.6133* | 0.2942* | 0.2459* | 1.0000 | | |
| SDO5_4 | 0.5914* | 0.6021* | 0.2624* | 0.2705* | 0.7097* | 1.0000 | |
| Att1_1 | 0.2049* | 0.1011 | 0.0615 | 0.0925 | 0.2010* | 0.1821* | 1.0000 |
| Att1_2 | 0.1231* | 0.0367 | 0.0689 | 0.0842 | 0.1036 | 0.0835 | 0.8087* |
| Att1_3 | 0.2006* | 0.0852 | 0.0220 | 0.0597 | 0.1570* | 0.1651* | 0.8709* |
| Att2_1 | 0.3043* | 0.2837* | 0.1340* | 0.1066 | 0.2951* | 0.2978* | 0.3627* |
| Att2_2 | 0.2224* | 0.2228* | 0.1905* | 0.1198* | 0.3084* | 0.2953* | 0.2600* |
| Att2_3 | 0.3048* | 0.2726* | 0.1445* | 0.1038 | 0.2928* | 0.3048* | 0.3559* |
| Att3_1 | 0.3097* | 0.2175* | 0.1700* | 0.2121* | 0.2493* | 0.3335* | 0.2964* |
| Att3_2 | 0.2451* | 0.2268* | 0.2167* | 0.1493* | 0.1495* | 0.2917* | 0.2344* |
| Att3_3 | 0.3168* | 0.2309* | 0.1959* | 0.2167* | 0.2664* | 0.3100* | 0.2827* |
| Att4_1 | 0.3203* | 0.2873* | 0.1363* | 0.2330* | 0.2097* | 0.2997* | 0.3216* |
| Att4_2 | 0.2713* | 0.2791* | 0.2047* | 0.2013* | 0.1604* | 0.2878* | 0.2512* |
| Att4_3 | 0.3086* | 0.2902* | 0.1483* | 0.2082* | 0.2050* | 0.2928* | 0.2583* |
| Att5_1 | 0.2681* | 0.2928* | 0.1869* | 0.2299* | 0.3196* | 0.3819* | 0.2212* |
| Att5_2 | 0.2695* | 0.3333* | 0.2351* | 0.1977* | 0.2880* | 0.3352* | 0.1157 |
| Att5_3 | 0.2642* | 0.3170* | 0.1850* | 0.1905* | 0.3241* | 0.3786* | 0.1740* |

| | Att1_2 | Att1_3 | Att2_1 | Att2_2 | Att2_3 | Att3_1 | Att3_2 |
|---|---|---|---|---|---|---|---|
| Att1_2 | 1.0000 | | | | | | |
| Att1_3 | 0.7878* | 1.0000 | | | | | |
| Att2_1 | 0.2650* | 0.3117* | 1.0000 | | | | |
| Att2_2 | 0.2717* | 0.1840* | 0.7929* | 1.0000 | | | |
| Att2_3 | 0.2816* | 0.3566* | 0.8963* | 0.7439* | 1.0000 | | |
| Att3_1 | 0.2227* | 0.2023* | 0.5937* | 0.4702* | 0.5276* | 1.0000 | |
| Att3_2 | 0.2229* | 0.1620* | 0.4549* | 0.5610* | 0.4228* | 0.7791* | 1.0000 |
| Att3_3 | 0.2141* | 0.2333* | 0.5458* | 0.4350* | 0.5633* | 0.8814* | 0.7449* |
| Att4_1 | 0.2569* | 0.2966* | 0.4952* | 0.3673* | 0.4719* | 0.5741* | 0.5471* |
| Att4_2 | 0.2961* | 0.2386* | 0.4102* | 0.4558* | 0.3936* | 0.5119* | 0.6435* |
| Att4_3 | 0.2332* | 0.2677* | 0.4590* | 0.3322* | 0.4913* | 0.5421* | 0.4871* |
| Att5_1 | 0.1132 | 0.2118* | 0.4245* | 0.3544* | 0.4060* | 0.5086* | 0.4808* |
| Att5_2 | 0.1333* | 0.1020 | 0.3251* | 0.3762* | 0.2851* | 0.4336* | 0.6011* |
| Att5_3 | 0.1217* | 0.2066* | 0.4063* | 0.3159* | 0.4145* | 0.5032* | 0.4734* |

| | Att3_3 | Att4_1 | Att4_2 | Att4_3 | Att5_1 | Att5_2 | Att5_3 |
|---|---|---|---|---|---|---|---|
| Att3_3 | 1.0000 | | | | | | |
| Att4_1 | 0.5535* | 1.0000 | | | | | |
| Att4_2 | 0.4879* | 0.8204* | 1.0000 | | | | |
| Att4_3 | 0.5899* | 0.8796* | 0.7942* | 1.0000 | | | |
| Att5_1 | 0.5001* | 0.5023* | 0.3867* | 0.4402* | 1.0000 | | |
| Att5_2 | 0.4422* | 0.4252* | 0.5271* | 0.3849* | 0.7605* | 1.0000 | |
| Att5_3 | 0.5165* | 0.4549* | 0.4009* | 0.4846* | 0.8909* | 0.7571* | 1.0000 |

*Note*. The label SDO1_1 refers to measurement occasion $t_1$ and item 1 for SDO, Att5_3 refers to measurement occasion $t_5$ and item 3 for outgroup affect.
* $p < .05$

Table A7. *Cross-lagged panel analysis of five-wave data of SDO (primarily defined by SDO-E items) and Outgroup Affect in Study 2. Unstandardized and standardized estimates*

| | | Unstandardized | | | Standardized | |
|---|---|---|---|---|---|---|
| | | Estimate | 95% C.I. | *p* | Estimate | $R^2$ |
| *Autoregressive and cross-lagged paths* | | | | | | |
| Affect $t_1$ → Affect $t_2$ | | 0.297 | [0.210, 0.384] | .000 | 0.33 | |
| SDO $t_1$ → Affect $t_2$ | | 0.145 | [0.082, 0.209] | .000 | 0.21 | |
| Affect $t_2$ → Affect $t_3$ | | 0.599 | [0.498, 0.701] | .000 | 0.61 | |
| SDO $t_2$ → Affect $t_3$ | | 0.056 | [-0.022, 0.135] | .159 | 0.07 | |
| Affect $t_3$ → Affect $t_4$ | | 0.650 | [0.541, 0.760] | .000 | 0.61 | |
| SDO $t_3$ → Affect $t_4$ | | 0.100 | [0.008, 0.191] | .032 | 0.12 | |
| Affect $t_4$ → Affect $t_5$ | | 0.454 | [0.301, 0.607] | .000 | 0.48 | |
| SDO $t_4$ → Affect $t_5$ | | 0.150 | [0.031, 0.268] | .013 | 0.19 | |
| SDO $t_1$ → SDO $t_2$ | | 0.446 | [0.350, 0.542] | .000 | 0.50 | |
| Affect $t_1$ → SDO $t_2$ | | 0.039 | [-0.073, 0.152] | .494 | 0.04 | |
| SDO $t_2$ → SDO $t_3$ | | 0.708 | [0.591, 0.824] | .000 | 0.69 | |
| Affect $t_2$ → SDO $t_3$ | | 0.181 | [0.057, 0.304] | .004 | 0.14 | |
| SDO $t_3$ → SDO $t_4$ | | 0.798 | [0.680, 0.917] | .000 | 0.84 | |
| Affect $t_3$ → SDO $t_4$ | | 0.007 | [-0.145, 0.160] | .925 | 0.01 | |
| SDO $t_4$ → SDO $t_5$ | | 0.876 | [0.716, 1.036] | .000 | 0.91 | |
| Affect $t_4$ → SDO $t_5$ | | -0.048 | [-0.201, 0.105] | .535 | -0.04 | |
| *Factor loadings for SDO* | | | | | | |
| SDO $t_1$ | Item 1 | 0.358[b] | [0.287, 0.430] | .000 | 0.35 | |
| | Item 2 | 0.250[c] | [0.189, 0.310] | .000 | 0.31 | |
| | Item 3 | 1.000[a] | [1.000, 1.000] | | 0.85 | |
| | Item 4 | 0.993[d] | [0.922, 1.064] | .000 | 0.95 | |
| SDO $t_2$ | Item 1 | 0.358[b] | [0.287, 0.430] | .000 | 0.37 | |
| | Item 2 | 0.250[c] | [0.189, 0.310] | .000 | 0.32 | |
| | Item 3 | 1.000[a] | [1.000, 1.000] | | 0.79 | |
| | Item 4 | 0.993[d] | [0.922, 1.064] | .000 | 0.92 | |
| SDO $t_3$ | Item 1 | 0.358[b] | [0.287, 0.430] | .000 | 0.37 | |
| | Item 2 | 0.250[c] | [0.189, 0.310] | .000 | 0.34 | |
| | Item 3 | 1.000[a] | [1.000, 1.000] | | 0.81 | |
| | Item 4 | 0.898[e] | [0.807, 0.989] | .000 | 0.88 | |
| SDO $t_4$ | Item 1 | 0.358[b] | [0.287, 0.430] | .000 | 0.34 | |
| | Item 2 | 0.250[c] | [0.189, 0.310] | .000 | 0.31 | |
| | Item 3 | 1.000[a] | [1.000, 1.000] | | 0.78 | |
| | Item 4 | 0.993[d] | [0.922, 1.064] | .000 | 0.87 | |
| SDO $t_5$ | Item 1 | 0.358[b] | [0.287, 0.430] | .000 | 0.36 | |
| | Item 2 | 0.250[c] | [0.189, 0.310] | .000 | 0.36 | |
| | Item 3 | 1.000[a] | [1.000, 1.000] | | 0.82 | |
| | Item 4 | 0.897[e] | [0.807, 0.989] | .000 | 0.84 | |
| *Factor loadings for outgroup affect* | | | | | | |
| Affect $t_1$ | Latinos | 1.125[f] | [1.071, 1.179] | .000 | 0.94 | |
| | Asians | 1.000[a] | [1.000, 1.000] | | 0.86 | |
| | African-Americans | 1.096[i] | [1.027, 1.165] | .000 | 0.92 | |
| Affect $t_2$ | Latinos | 1.101[g] | [1.036, 1.167] | .000 | 0.97 | |
| | Asians | 1.000[a] | [1.000, 1.000] | | 0.83 | |
| | African-Americans | 1.019[j] | [0.969, 1.069] | .000 | 0.93 | |
| Affect $t_3$ | Latinos | 1.101[g] | [1.036, 1.167] | .000 | 0.96 | |
| | Asians | 1.000[a] | [1.000, 1.000] | | 0.81 | |
| | African-Americans | 1.019[j] | [0.969, 1.069] | .000 | 0.92 | |
| Affect $t_4$ | Latinos | 1.030[h] | [0.961, 1.099] | .000 | 0.95 | |
| | Asians | 1.000[a] | [1.000, 1.000] | | 0.84 | |

| | | | | | |
|---|---|---|---|---|---|
| | African-Americans | 1.019[j] | [0.969, 1.069] | .000 | 0.93 |
| Affect $t_5$ | Latinos | 1.125[f] | [1.071, 1.179] | .000 | 0.95 |
| | Asians | 1.000[a] | [1.000, 1.000] | | 0.81 |
| | African-Americans | 1.019[j] | [0.969, 1.069] | .000 | 0.94 |
| *Indicator intercepts* | | | | | |
| SDO $t_1$ | Item 1 | 2.090[k] | [1.999, 2.182] | .000 | 1.49 |
| | Item 2 | 1.609 | [1.527, 1.690] | .000 | 1.46 |
| | Item 3 | 2.850 | [2.728, 2.971] | .000 | 1.75 |
| | Item 4 | 2.521 | [2.414, 2.629] | .000 | 1.75 |
| SDO $t_2$ | Item 1 | 1.943[l] | [1.852, 2.034] | .000 | 1.60 |
| | Item 2 | 1.512[m] | [1.448, 1.575] | .000 | 1.55 |
| | Item 3 | 2.652[n] | [2.536, 2.768] | .000 | 1.69 |
| | Item 4 | 2.200[o] | [2.100, 2.299] | .000 | 1.64 |
| SDO $t_3$ | Item 1 | 1.943[l] | [1.852, 2.034] | .000 | 1.58 |
| | Item 2 | 1.512[m] | [1.448, 1.575] | .000 | 1.61 |
| | Item 3 | 2.652[n] | [2.536, 2.768] | .000 | 1.68 |
| | Item 4 | 2.154 | [2.044, 2.264] | .000 | 1.64 |
| SDO $t_4$ | Item 1 | 2.090[k] | [1.999, 2.182] | .000 | 1.66 |
| | Item 2 | 1.512[m] | [1.448, 1.575] | .000 | 1.52 |
| | Item 3 | 2.738 | [2.592, 2.885] | .000 | 1.76 |
| | Item 4 | 2.200[o] | [2.100, 2.299] | .000 | 1.59 |
| SDO $t_5$ | Item 1 | 1.836 | [1.713, 1.958] | .000 | 1.60 |
| | Item 2 | 1.403 | [1.312, 1.495] | .000 | 1.73 |
| | Item 3 | 2.465 | [2.324, 2.606] | .000 | 1.73 |
| | Item 4 | 2.031 | [1.904, 2.157] | .000 | 1.63 |
| Affect $t_1$ | Latinos | 2.495 | [2.398, 2.591] | .000 | 1.91 |
| | Asians | 2.311 | [2.220, 2.403] | .000 | 1.83 |
| | African-Americans | 2.397 | [2.302, 2.492] | .000 | 1.85 |
| Affect $t_2$ | Latinos | 2.105[p] | [2.026, 2.184] | .000 | 1.90 |
| | Asians | 2.174[q] | [2.090, 2.258] | .000 | 1.84 |
| | African-Americans | 2.108[r] | [2.032, 2.183] | .000 | 1.96 |
| Affect $t_3$ | Latinos | 2.105[p] | [2.026, 2.184] | .000 | 1.91 |
| | Asians | 2.174[q] | [2.090, 2.258] | .000 | 1.83 |
| | African-Americans | 2.108[r] | [2.032, 2.183] | .000 | 1.98 |
| Affect $t_4$ | Latinos | 2.105[p] | [2.026, 2.184] | .000 | 1.88 |
| | Asians | 2.174[q] | [2.090, 2.258] | .000 | 1.78 |
| | African-Americans | 2.108[r] | [2.032, 2.183] | .000 | 1.87 |
| Affect $t_5$ | Latinos | 2.105[p] | [2.026, 2.184] | .000 | 1.82 |
| | Asians | 2.174[q] | [2.090, 2.258] | .000 | 1.81 |
| | African-Americans | 2.108[r] | [2.032, 2.183] | .000 | 1.98 |
| *Covariances* | | | | | |
| *Initial covariance* | | | | | |
| | SDO $t_1$ and Affect $t_1$ | 0.385 | [0.246, 0.524] | .000 | 0.26 |
| *Residual covariances* | | | | | |
| | SDO $t_2$ and Affect $t_2$ | 0.236 | [0.132, 0.341] | .000 | 0.25 |
| | SDO $t_3$ and Affect $t_3$ | 0.173 | [0.080, 0.267] | .000 | 0.27 |
| | SDO $t_4$ and Affect $t_4$ | 0.113 | [0.020, 0.206] | .017 | 0.23 |
| | SDO $t_5$ and Affect $t_5$ | 0.115 | [0.039, 0.192] | .003 | 0.28 |
| *Indicator-level residual covariances* | | | | | |
| | SDO $t_1$ 1 and SDO $t_1$ 2 | 0.661 | [0.485, 0.837] | .000 | 0.48 |
| | SDO $t_2$ 1 and SDO $t_2$ 2 | 0.242 | [0.119, 0.365] | .000 | 0.23 |
| | SDO $t_3$ 1 and SDO $t_3$ 2 | 0.205 | [0.069, 0.342] | .003 | 0.20 |
| | SDO $t_4$ 1 and SDO $t_4$ 2 | 0.384 | [0.109, 0.658] | .006 | 0.34 |
| | SDO $t_5$ 1 and SDO $t_5$ 2 | 0.086 | [-0.016, 0.188] | .099 | 0.11 |
| | SDO $t_1$ 1 and SDO $t_2$ 1 | 0.448 | [0.295, 0.602] | .000 | 0.30 |
| | SDO $t_1$ 1 and SDO $t_3$ 1 | 0.443 | [0.278, 0.608] | .000 | 0.30 |
| | SDO $t_1$ 1 and SDO $t_4$ 1 | 0.324 | [0.160, 0.488] | .000 | 0.21 |

| | | | | |
|---|---|---|---|---|
| SDO $t_1$ 1 and SDO $t_5$ 1 | 0.314 | [0.162, 0.467] | .000 | 0.22 |
| SDO $t_2$ 1 and SDO $t_3$ 1 | 0.513 | [0.334, 0.693] | .000 | 0.40 |
| SDO $t_2$ 1 and SDO $t_4$ 1 | 0.386 | [0.226, 0.546] | .000 | 0.29 |
| SDO $t_2$ 1 and SDO $t_5$ 1 | 0.431 | [0.243, 0.620] | .000 | 0.36 |
| SDO $t_3$ 1 and SDO $t_4$ 1 | 0.605 | [0.383, 0.827] | .000 | 0.45 |
| SDO $t_3$ 1 and SDO $t_5$ 1 | 0.568 | [0.372, 0.764] | .000 | 0.47 |
| SDO $t_4$ 1 and SDO $t_5$ 1 | 0.554 | [0.325, 0.784] | .000 | 0.44 |
| SDO $t_1$ 2 and SDO $t_2$ 2 | 0.104 | [0.022, 0.186] | .013 | 0.11 |
| SDO $t_1$ 2 and SDO $t_3$ 2 | 0.120 | [0.031, 0.208] | .008 | 0.13 |
| SDO $t_1$ 2 and SDO $t_4$ 2 | 0.113 | [0.015, 0.211] | .024 | 0.11 |
| SDO $t_1$ 2 and SDO $t_5$ 2 | 0.150 | [0.043, 0.258] | .006 | 0.19 |
| SDO $t_2$ 2 and SDO $t_3$ 2 | 0.144 | [0.011, 0.277] | .034 | 0.18 |
| SDO $t_2$ 2 and SDO $t_4$ 2 | 0.115 | [0.006, 0.225] | .039 | 0.13 |
| SDO $t_2$ 2 and SDO $t_5$ 2 | 0.204 | [0.057, 0.351] | .006 | 0.29 |
| SDO $t_3$ 2 and SDO $t_4$ 2 | 0.142 | [0.001, 0.283] | .048 | 0.17 |
| SDO $t_3$ 2 and SDO $t_5$ 2 | 0.269 | [0.098, 0.439] | .002 | 0.40 |
| SDO $t_4$ 2 and SDO $t_5$ 2 | 0.248 | [0.047, 0.448] | .015 | 0.35 |
| SDO $t_1$ 3 and SDO $t_2$ 3 | 0.208 | [0.066, 0.350] | .004 | 0.25 |
| SDO $t_1$ 3 and SDO $t_3$ 3 | 0.064 | [-0.075, 0.203] | .365 | 0.08 |
| SDO $t_1$ 3 and SDO $t_4$ 3 | 0.098 | [-0.036, 0.232] | .151 | 0.12 |
| SDO $t_1$ 3 and SDO $t_5$ 3 | 0.037 | [-0.114, 0.188] | .631 | 0.05 |
| SDO $t_2$ 3 and SDO $t_3$ 3 | 0.215 | [0.065, 0.364] | .005 | 0.25 |
| SDO $t_2$ 3 and SDO $t_4$ 3 | 0.249 | [0.072, 0.426] | .006 | 0.27 |
| SDO $t_2$ 3 and SDO $t_5$ 3 | 0.276 | [0.108, 0.444] | .001 | 0.35 |
| SDO $t_3$ 3 and SDO $t_4$ 3 | 0.286 | [0.096, 0.477] | .003 | 0.32 |
| SDO $t_3$ 3 and SDO $t_5$ 3 | 0.318 | [0.129, 0.506] | .001 | 0.43 |
| SDO $t_4$ 3 and SDO $t_5$ 3 | 0.137 | [-0.073, 0.347] | .202 | 0.17 |
| SDO $t_1$ 4 and SDO $t_2$ 4 | -0.115 | [-0.217, -0.013] | .028 | -0.47 |
| SDO $t_1$ 4 and SDO $t_3$ 4 | 0.004 | [-0.096, 0.105] | .935 | 0.01 |
| SDO $t_1$ 4 and SDO $t_4$ 4 | -0.008 | [-0.132, 0.117] | .904 | -0.02 |
| SDO $t_1$ 4 and SDO $t_5$ 4 | -0.055 | [-0.162, 0.051] | .308 | -0.18 |
| SDO $t_2$ 4 and SDO $t_3$ 4 | -0.047 | [-0.159, 0.065] | .409 | -0.14 |
| SDO $t_2$ 4 and SDO $t_4$ 4 | -0.050 | [-0.167, 0.068] | .407 | -0.14 |
| SDO $t_2$ 4 and SDO $t_5$ 4 | -0.173 | [-0.292, -0.055] | .004 | -0.49 |
| SDO $t_3$ 4 and SDO $t_4$ 4 | 0.036 | [-0.109, 0.180] | .630 | 0.08 |
| SDO $t_3$ 4 and SDO $t_5$ 4 | -0.004 | [-0.128, 0.120] | .948 | -0.01 |
| SDO $t_4$ 4 and SDO $t_5$ 4 | -0.105 | [-0.245, 0.035] | .143 | -0.23 |
| Affect $t_1$ 1 and Affect $t_2$ 1 | 0.012 | [-0.027, 0.051] | .547 | 0.10 |
| Affect $t_1$ 1 and Affect $t_3$ 1 | 0.023 | [-0.025, 0.071] | .354 | 0.17 |
| Affect $t_1$ 1 and Affect $t_4$ 1 | 0.037 | [-0.011, 0.085] | .134 | 0.23 |
| Affect $t_1$ 1 and Affect $t_5$ 1 | 0.026 | [-0.029, 0.082] | .354 | 0.16 |
| Affect $t_2$ 1 and Affect $t_3$ 1 | 0.030 | [-0.008, 0.068] | .124 | 0.38 |
| Affect $t_2$ 1 and Affect $t_4$ 1 | 0.013 | [-0.027, 0.053] | .520 | 0.14 |
| Affect $t_2$ 1 and Affect $t_5$ 1 | -0.012 | [-0.051, 0.028] | .569 | -0.12 |
| Affect $t_3$ 1 and Affect $t_4$ 1 | 0.012 | [-0.038, 0.062] | .628 | 0.12 |
| Affect $t_3$ 1 and Affect $t_5$ 1 | 0.010 | [-0.034, 0.055] | .647 | 0.10 |
| Affect $t_4$ 1 and Affect $t_5$ 1 | 0.072 | [0.002, 0.141] | .042 | 0.57 |
| Affect $t_1$ 2 and Affect $t_2$ 2 | 0.136 | [0.062, 0.210] | .000 | 0.32 |
| Affect $t_1$ 2 and Affect $t_3$ 2 | 0.058 | [-0.008, 0.124] | .083 | 0.13 |
| Affect $t_1$ 2 and Affect $t_4$ 2 | 0.142 | [0.050, 0.233] | .002 | 0.34 |
| Affect $t_1$ 2 and Affect $t_5$ 2 | 0.141 | [0.036, 0.246] | .009 | 0.32 |
| Affect $t_2$ 2 and Affect $t_3$ 2 | 0.229 | [0.131, 0.327] | .000 | 0.50 |
| Affect $t_2$ 2 and Affect $t_4$ 2 | 0.230 | [0.136, 0.324] | .000 | 0.53 |
| Affect $t_2$ 2 and Affect $t_5$ 2 | 0.140 | [0.049, 0.231] | .003 | 0.30 |
| Affect $t_3$ 2 and Affect $t_4$ 2 | 0.279 | [0.167, 0.391] | .000 | 0.62 |
| Affect $t_3$ 2 and Affect $t_5$ 2 | 0.227 | [0.124, 0.329] | .000 | 0.47 |
| Affect $t_4$ 2 and Affect $t_5$ 2 | 0.238 | [0.123, 0.353] | .000 | 0.52 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Affect $t_1$ 3 and Affect $t_2$ 3 | 0.052 | [0.006, 0.099] | .028 | 0.26 | |
| | Affect $t_1$ 3 and Affect $t_3$ 3 | 0.025 | [-0.007, 0.058] | .122 | 0.13 | |
| | Affect $t_1$ 3 and Affect $t_4$ 3 | 0.011 | [-0.035, 0.057] | .642 | 0.05 | |
| | Affect $t_1$ 3 and Affect $t_5$ 3 | 0.039 | [-0.007, 0.084] | .096 | 0.21 | |
| | Affect $t_2$ 3 and Affect $t_3$ 3 | 0.052 | [0.014, 0.091] | .007 | 0.32 | |
| | Affect $t_2$ 3 and Affect $t_4$ 3 | 0.055 | [0.014, 0.095] | .008 | 0.33 | |
| | Affect $t_2$ 3 and Affect $t_5$ 3 | 0.042 | [0.001, 0.083] | .046 | 0.28 | |
| | Affect $t_3$ 3 and Affect $t_4$ 3 | 0.070 | [0.022, 0.117] | .004 | 0.42 | |
| | Affect $t_3$ 3 and Affect $t_5$ 3 | 0.008 | [-0.055, 0.071] | .804 | 0.05 | |
| | Affect $t_4$ 3 and Affect $t_5$ 3 | 0.036 | [-0.002, 0.074] | .066 | 0.23 | |
| *Variances* | | | | | | |
| | SDO $t_1$ | 1.902 | [1.646, 2.158] | .000 | 1.00 | |
| | Affect $t_1$ | 1.195 | [1.063, 1.326] | .000 | 1.00 | |
| *Residual Variances* | | | | | | |
| SDO $t_1$ | Item 1 | 1.725 | [1.498, 1.952] | .000 | 0.88 | 0.12 |
| | Item 2 | 1.098 | [0.893, 1.304] | .000 | 0.90 | 0.10 |
| | Item 3 | 0.740 | [0.540, 0.940] | .000 | 0.28 | 0.72 |
| | Item 4 | 0.210 | [0.054, 0.367] | .008 | 0.10 | 0.90 |
| SDO $t_2$ | Item 1 | 1.287 | [1.054, 1.520] | .000 | 0.87 | 0.13 |
| | Item 2 | 0.859 | [0.598, 1.120] | .000 | 0.90 | 0.10 |
| | Item 3 | 0.912 | [0.679, 1.146] | .000 | 0.37 | 0.63 |
| | Item 4 | 0.280 | [0.131, 0.428] | .000 | 0.16 | 0.84 |
| SDO $t_3$ | Item 1 | 1.299 | [1.046, 1.552] | .000 | 0.86 | 0.14 |
| | Item 2 | 0.776 | [0.509, 1.042] | .000 | 0.88 | 0.12 |
| | Item 3 | 0.840 | [0.570, 1.111] | .000 | 0.34 | 0.66 |
| | Item 4 | 0.404 | [0.242, 0.565] | .000 | 0.23 | 0.77 |
| SDO $t_4$ | Item 1 | 1.405 | [1.106, 1.703] | .000 | 0.88 | 0.12 |
| | Item 2 | 0.897 | [0.567, 1.227] | .000 | 0.91 | 0.09 |
| | Item 3 | 0.960 | [0.650, 1.270] | .000 | 0.40 | 0.61 |
| | Item 4 | 0.454 | [0.241, 0.668] | .000 | 0.24 | 0.76 |
| SDO $t_5$ | Item 1 | 1.148 | [0.877, 1.418] | .000 | 0.87 | 0.13 |
| | Item 2 | 0.570 | [0.297, 0.843] | .000 | 0.87 | 0.13 |
| | Item 3 | 0.665 | [0.400, 0.930] | .000 | 0.33 | 0.67 |
| | Item 4 | 0.453 | [0.252, 0.654] | .000 | 0.29 | 0.71 |
| Affect $t_1$ | Latinos (1) | 0.203 | [0.127, 0.279] | .000 | 0.12 | 0.88 |
| | Asians (2) | 0.408 | [0.299, 0.518] | .000 | 0.26 | 0.75 |
| | African-Americans (3) | 0.246 | [0.154, 0.338] | .000 | 0.15 | 0.85 |
| Affect $t_2$ | Latinos | 0.072 | [0.020, 0.124] | .006 | 0.06 | 0.94 |
| | Asians | 0.441 | [0.323, 0.559] | .000 | 0.32 | 0.68 |
| | African-Americans | 0.161 | [0.103, 0.220] | .000 | 0.14 | 0.86 |
| Affect $t_3$ | Latinos | 0.088 | [0.015, 0.160] | .017 | 0.07 | 0.93 |
| | Asians | 0.482 | [0.298, 0.666] | .000 | 0.34 | 0.66 |
| | African-Americans | 0.166 | [0.097, 0.236] | .000 | 0.15 | 0.85 |
| Affect $t_4$ | Latinos | 0.123 | [0.033, 0.214] | .008 | 0.10 | 0.90 |
| | Asians | 0.428 | [0.289, 0.567] | .000 | 0.29 | 0.71 |
| | African-Americans | 0.166 | [0.097, 0.235] | .000 | 0.13 | 0.87 |
| Affect $t_5$ | Latinos | 0.129 | [0.047, 0.210] | .002 | 0.10 | 0.90 |
| | Asians | 0.493 | [0.357, 0.628] | .000 | 0.34 | 0.66 |
| | African-Americans | 0.141 | [0.063, 0.218] | .000 | 0.13 | 0.88 |
| SDO $t_2$ | | 1.148 | [0.912, 1.384] | .000 | 0.75 | 0.26 |
| SDO $t_3$ | | 0.728 | [0.528, 0.928] | .000 | 0.44 | 0.56 |
| SDO $t_4$ | | 0.421 | [0.240, 0.602] | .000 | 0.29 | 0.71 |
| SDO $t_5$ | | 0.276 | [0.069, 0.484] | .009 | 0.20 | 0.80 |
| Affect $t_2$ | | 0.777 | [0.662, 0.891] | .000 | 0.81 | 0.19 |
| Affect $t_3$ | | 0.553 | [0.447, 0.659] | .000 | 0.59 | 0.41 |
| Affect $t_4$ | | 0.584 | [0.440, 0.728] | .000 | 0.55 | 0.45 |
| Affect $t_5$ | | 0.630 | [0.465, 0.794] | .000 | 0.66 | 0.34 |

*Note*. N = 736, $\chi^2(495) = 833.73$, $p < 0.001$, RMSEA = 0.030, CFI = 0.958, SRMR = 0.083. The model used time-invariant indicator loadings and indicator intercepts to the extent that these were supported by the scaled Chi-square difference test. Identical superscript letters in the table mark parameters fixed for invariance.

[a] Parameter fixed at 1.

Table A8. *Second-order growth model of SDO and outgroup affect in Study 2. Unstandardized values*

| | No SDO growth factor | | | With SDO growth factor | | |
|---|---|---|---|---|---|---|
| | Estimate | | *p* | Estimate | | *p* |
| *Causal paths (Intercept → Growth)* | | | | | | |
| Outgroup Affect → Outgroup Affect | -0.18 | [-0.214, -0.143] | < 0.001 | -0.18 | [-0.213, -0.137] | < 0.001 |
| SDO → Outgroup Affect | 0.08 | [ 0.053, 0.100] | < 0.001 | 0.07 | [ 0.041, 0.097] | < 0.001 |
| SDO → SDO | — | | — | -0.02 | [-0.073, 0.036] | 0.511 |
| Outgroup Affect → SDO | — | | — | 0.02 | [-0.059, 0.098] | 0.629 |
| *Growth factors* | | | | | | |
| SDO | | | | | | |
| $t_2$ | — | | — | 1.00 | [ 1.000, 1.000] | |
| $t_3$ | — | | — | 2.00 | [ 2.000, 2.000] | |
| $t_4$ | — | | — | 3.00 | [ 3.000, 3.000] | |
| $t_5$ | — | | — | 4.00 | [ 4.000, 4.000] | |
| Outgroup Affect | | | | | | |
| $t_2$ | 3.23 | [ 2.542, 3.915] | < 0.001 | 3.19 | [ 2.503, 3.934] | < 0.001 |
| $t_3$ | 3.75 | [ 3.301, 4.193] | < 0.001 | 3.73 | [ 3.278, 4.188] | < 0.001 |
| $t_4$ | 3.60 | [ 3.015, 4.182] | < 0.001 | 3.60 | [ 3.021, 4.175] | < 0.001 |
| $t_5$ | 4.00 | [ 4.000, 4.000] | | 4.00 | [ 4.000, 4.000] | |
| *Time-specific factors* | | | | | | |
| SDO $t_1$ | | | | | | |
| Item 1 | 0.33[a] | [ 0.261, 0.397] | < 0.001 | 0.33[a] | [ 0.262, 0.399] | < 0.001 |
| Item 2 | 0.23[b] | [ 0.171, 0.282] | < 0.001 | 0.23[b] | [ 0.171, 0.282] | < 0.001 |
| Item 3 | 1.00 | [ 1.000, 1.000] | | 1.00 | [ 1.000, 1.000] | |
| Item 4 | 0.94[c] | [ 0.885, 1.003] | < 0.001 | 0.95[c] | [ 0.888, 1.009] | < 0.001 |
| SDO $t_2$ | | | | | | |
| Item 1 | 0.33[a] | [ 0.261, 0.397] | < 0.001 | 0.33[a] | [ 0.262, 0.399] | < 0.001 |
| Item 2 | 0.23[b] | [ 0.171, 0.282] | < 0.001 | 0.23[b] | [ 0.171, 0.282] | < 0.001 |
| Item 3 | 1.00 | [ 1.000, 1.000] | | 1.00 | [ 1.000, 1.000] | |
| Item 4 | 0.94[c] | [ 0.885, 1.003] | < 0.001 | 0.95[c] | [ 0.888, 1.009] | < 0.001 |
| SDO $t_3$ | | | | | | |
| Item 1 | 0.33[a] | [ 0.261, 0.397] | < 0.001 | 0.33[a] | [ 0.262, 0.399] | < 0.001 |
| Item 2 | 0.23[b] | [ 0.171, 0.282] | < 0.001 | 0.23[b] | [ 0.171, 0.282] | < 0.001 |
| Item 3 | 1.00 | [ 1.000, 1.000] | | 1.00 | [ 1.000, 1.000] | |
| Item 4 | 0.83[d] | [ 0.753, 0.914] | < 0.001 | 0.83[d] | [ 0.753, 0.910] | < 0.001 |
| SDO $t_4$ | | | | | | |
| Item 1 | 0.33[a] | [ 0.261, 0.397] | < 0.001 | 0.33[a] | [ 0.262, 0.399] | < 0.001 |
| Item 2 | 0.23[b] | [ 0.171, 0.282] | < 0.001 | 0.23[b] | [ 0.171, 0.282] | < 0.001 |
| Item 3 | 1.00 | [ 1.000, 1.000] | | 1.00 | [ 1.000, 1.000] | |
| Item 4 | 0.94[c] | [ 0.885, 1.003] | < 0.001 | 0.95[c] | [ 0.888, 1.009] | < 0.001 |

| | | | | | | |
|---|---|---|---|---|---|---|
| SDO $t_5$ | | | | | | |
| Item 1 | 0.33[a] | [ 0.261, 0.397] | < 0.001 | 0.33[a] | [ 0.262, 0.399] | < 0.001 |
| Item 2 | 0.23[b] | [ 0.171, 0.282] | < 0.001 | 0.23[b] | [ 0.171, 0.282] | < 0.001 |
| Item 3 | 1.00 | [ 1.000, 1.000] | | 1.00 | [ 1.000, 1.000] | |
| Item 4 | 0.83[d] | [ 0.753, 0.914] | < 0.001 | 0.83[d] | [ 0.753, 0.910] | < 0.001 |
| Outgroup Affect $t_1$ | | | | | | |
| Latinos | 1.13 | [ 1.080, 1.177] | < 0.001 | 1.13 | [ 1.081, 1.177] | < 0.001 |
| Asians | 1.00 | [ 1.000, 1.000] | | 1.00 | [ 1.000, 1.000] | |
| African-Americans | 1.10 | [ 1.029, 1.163] | < 0.001 | 1.10 | [ 1.030, 1.164] | < 0.001 |
| Outgroup Affect $t_2$ | | | | | | |
| Latinos | 1.09[e] | [ 1.033, 1.140] | < 0.001 | 1.09[e] | [ 1.032, 1.139] | < 0.001 |
| Asians | 1.00 | [ 1.000, 1.000] | | 1.00 | [ 1.000, 1.000] | |
| African-Americans | 1.02[f] | [ 0.968, 1.063] | < 0.001 | 1.02[f] | [ 0.968, 1.063] | < 0.001 |
| Outgroup Affect $t_3$ | | | | | | |
| Latinos | 1.09[e] | [ 1.033, 1.140] | < 0.001 | 1.09[e] | [ 1.032, 1.139] | < 0.001 |
| Asians | 1.00 | [ 1.000, 1.000] | | 1.00 | [ 1.000, 1.000] | |
| African-Americans | 1.02[f] | [ 0.968, 1.063] | < 0.001 | 1.02[f] | [ 0.968, 1.063] | < 0.001 |
| Outgroup Affect $t_4$ | | | | | | |
| Latinos | 1.05[e] | [ 0.986, 1.114] | < 0.001 | 1.05[e] | [ 0.985, 1.114] | < 0.001 |
| Asians | 1.00 | [ 1.000, 1.000] | | 1.00 | [ 1.000, 1.000] | |
| African-Americans | 1.02[f] | [ 0.968, 1.063] | < 0.001 | 1.02[f] | [ 0.968, 1.063] | < 0.001 |
| Outgroup Affect $t_5$ | | | | | | |
| Latinos | 1.13[e] | [ 1.080, 1.177] | < 0.001 | 1.13[e] | [ 1.081, 1.177] | < 0.001 |
| Asians | 1.00 | [ 1.000, 1.000] | | 1.00 | [ 1.000, 1.000] | |
| African-Americans | 1.02[f] | [ 0.968, 1.063] | < 0.001 | 1.02[f] | [ 0.968, 1.063] | < 0.001 |
| *Covariances* | | | | | | |
| Intercepts | 0.27 | [ 0.149, 0.390] | < 0.001 | 0.25 | [ 0.077, 0.426] | 0.005 |
| Growth factors | — | | — | 0.01 | [-0.004, 0.016] | 0.252 |
| Time-specific | | | | | | |
| $t_1$ | 0.12 | [ 0.024, 0.208] | 0.013 | 0.12 | [-0.027, 0.267] | 0.110 |
| $t_2$ | 0.04 | [-0.044, 0.131] | 0.322 | 0.04 | [-0.045, 0.128] | 0.348 |
| $t_3$ | 0.18 | [ 0.081, 0.284] | 0.000 | 0.17 | [ 0.069, 0.268] | 0.001 |
| $t_4$ | 0.10 | [-0.010, 0.209] | 0.057 | 0.09 | [-0.021, 0.191] | 0.116 |
| $t_5$ | 0.17 | [ 0.057, 0.272] | 0.002 | 0.17 | [ 0.048, 0.283] | 0.006 |
| Error covariance SDO item 1 & item 2 | | | | | | |
| $t_1$ | 0.67 | [ 0.496, 0.851] | < 0.001 | 0.67 | [ 0.496, 0.851] | < 0.001 |
| $t_2$ | 0.24 | [ 0.119, 0.369] | < 0.001 | 0.24 | [ 0.119, 0.369] | < 0.001 |
| $t_3$ | 0.22 | [ 0.074, 0.365] | 0.003 | 0.22 | [ 0.073, 0.364] | 0.003 |
| $t_4$ | 0.40 | [ 0.125, 0.673] | 0.004 | 0.40 | [ 0.125, 0.672] | 0.004 |
| $t_5$ | 0.09 | [-0.009, 0.194] | 0.076 | 0.09 | [-0.010, 0.194] | 0.075 |
| *Residual variances* | | | | | | |
| SDO (invariant $t_1$ to $t_5$) | 0.68 | [ 0.580, 0.777] | | 0.64 | [ 0.527, 0.751] | < 0.001 |

| | | | | | |
|---|---|---|---|---|---|
| Outgroup Affect (invariant $t_1$ to $t_5$) | 0.42 | [ 0.347, 0,486] | 0.42 | [ 0.346, 0.484] | < 0.001 |
| *Model fit* | | | | | |
| $\chi^2$ | | 864.539 | | 860.174 | |
| df | | 519 | | 514 | |
| p | | < .0001 | | < .0001 | |
| RMSEA | | 0.030 | | 0.030 | |
| CI RMSEA | | 0.027, 0.034 | | 0.027, 0.034 | |
| CFI | | 0.957 | | 0.957 | |
| SRMR | | 0.079 | | 0.077 | |

*Note.* Latent intercepts were estimated with all factor loadings fixed to 1 (not shown in the table). Underlined parameters were fixed to the value shown. Parameters with the same superscript letter were fixed to invariance across time. Both models included time-specific covariances between growth indicators; the scaled Chi-square difference test showed a significant ($p$ = .003) drop in model fit if these covariances were omitted. The table does not show indicator intercepts; see the online appendix, Table A3, for details on how indicator intercepts were fixed to partial invariance across time. Parameters with no confidence interval were fixed prior to estimation. The models also used correlated residuals for items used repeatedly across the five measurement occasions.

Table A9. *Mplus input for cross-lagged panel analysis in Study 2.*

```
DATA:
       FILE = mplusin.dat;
VARIABLE:
       NAMES =
       sdo1_1 sdo1_2 sdo1_3 sdo1_4 sdo2_1 sdo2_2 sdo2_3 sdo2_4 sdo3_1
       sdo3_2 sdo3_3 sdo3_4 sdo4_1 sdo4_2 sdo4_3 sdo4_4 sdo5_1 sdo5_2
       sdo5_3 sdo5_4 att1_1 att1_2 att1_3 att2_1 att2_2 att2_3 att3_1
       att3_2 att3_3 att4_1 att4_2 att4_3 att5_1 att5_2 att5_3;
       MISSING ARE ALL (-9999);

ANALYSIS:
       ESTIMATOR = mlr;              !Robust standard errors

MODEL:
       sdo1 BY sdo1_1* (sa1);        !Measurement model SDO
       sdo1 BY sdo1_2 (sb1);         !sdo1 is SDO at t1
       sdo1 BY sdo1_3@1;
       sdo1 BY sdo1_4 (sd1);
       sdo1_1 WITH sdo1_2;           !Residuals for SDO-E items are correlated

       sdo2 BY sdo2_1* (sa1);        !sdo2 is SDO at t2
       sdo2 BY sdo2_2 (sb1);
       sdo2 BY sdo2_3@1;
       sdo2 BY sdo2_4 (sd1);
       sdo2_1 WITH sdo2_2;

       sdo3 BY sdo3_1* (sa1);
       sdo3 BY sdo3_2 (sb1);
       sdo3 BY sdo3_3@1;
       sdo3 BY sdo3_4 (sd3);
       sdo3_1 WITH sdo3_2;

       sdo4 BY sdo4_1* (sa1);
       sdo4 BY sdo4_2 (sb1);
```

```
        sdo4 BY sdo4_3@1;
        sdo4 BY sdo4_4 (sd1);
        sdo4_1 WITH sdo4_2;

        sdo5 BY sdo5_1* (sa1);
        sdo5 BY sdo5_2 (sb1);
        sdo5 BY sdo5_3@1;
        sdo5 BY sdo5_4 (sd3);
        sdo5_1 WITH sdo5_2;

        sdo1_1 WITH sdo2_1 sdo3_1 sdo4_1 sdo5_1;  !Residuals for a SDO item correlated
across time
        sdo2_1 WITH sdo3_1 sdo4_1 sdo5_1;
        sdo3_1 WITH sdo4_1 sdo5_1;
        sdo4_1 WITH sdo5_1;
        sdo1_2 WITH sdo2_2 sdo3_2 sdo4_2 sdo5_2;
        sdo2_2 WITH sdo3_2 sdo4_2 sdo5_2;
        sdo3_2 WITH sdo4_2 sdo5_2;
        sdo4_2 WITH sdo5_2;
        sdo1_3 WITH sdo2_3 sdo3_3 sdo4_3 sdo5_3;
        sdo2_3 WITH sdo3_3 sdo4_3 sdo5_3;
        sdo3_3 WITH sdo4_3 sdo5_3;
        sdo4_3 WITH sdo5_3;
        sdo1_4 WITH sdo2_4 sdo3_4 sdo4_4 sdo5_4;
        sdo2_4 WITH sdo3_4 sdo4_4 sdo5_4;
        sdo3_4 WITH sdo4_4 sdo5_4;
        sdo4_4 WITH sdo5_4;

        att1 BY att1_1* (a1);      !Measurement model for Outgroup affect
        att1 BY att1_2@1 ;
        att1 BY att1_3 (c1);

        att2 BY att2_1* (a2);
        att2 BY att2_2@1 ;
        att2 BY att2_3 (c2);

        att3 BY att3_1* (a2);
        att3 BY att3_2@1 ;
        att3 BY att3_3 (c2);

        att4 BY att4_1* (a4);
        att4 BY att4_2@1 ;
        att4 BY att4_3 (c2);

        att5 BY att5_1* (a1);
        att5 BY att5_2@1 ;
        att5 BY att5_3 (c2);

        att1_1 WITH att2_1 att3_1 att4_1 att5_1;  !Residuals for attitude to specific
group...
        att2_1 WITH att3_1 att4_1 att5_1;         !... are correlated across time
        att3_1 WITH att4_1 att5_1;
        att4_1 WITH att5_1;

        att1_2 WITH att2_2 att3_2 att4_2 att5_2;
        att2_2 WITH att3_2 att4_2 att5_2;
        att3_2 WITH att4_2 att5_2;
        att4_2 WITH att5_2;

        att1_3 WITH att2_3 att3_3 att4_3 att5_3;
        att2_3 WITH att3_3 att4_3 att5_3;
        att3_3 WITH att4_3 att5_3;
        att4_3 WITH att5_3;

        sdo5 ON sdo4;          !Regression paths
        sdo4 ON sdo3;
        sdo3 ON sdo2;
        sdo2 ON sdo1;
        att5 ON att4;
        att4 ON att3;
        att3 ON att2;
```

```
        att2 ON att1;
        sdo5 ON att4;
        sdo4 ON att3;
        sdo3 ON att2;
        sdo2 ON att1;
        att5 ON sdo4;
        att4 ON sdo3;
        att3 ON sdo2;
        att2 ON sdo1;

        sdo1 sdo2 sdo3 sdo4 sdo5 PWITH att1 att2 att3 att4 att5;

        [sdo1_1] (e1);         !Indicator intercepts (with invariance)
        [sdo2_1] (e2);
        [sdo3_1] (e2);
        [sdo4_1] (e1);
        [sdo5_1] (e5);
        [sdo1_2] (f1);
        [sdo2_2] (f2);
        [sdo3_2] (f2);
        [sdo4_2] (f2);
        [sdo5_2] (f5);
        [sdo1_3] (g1);
        [sdo2_3] (g2);
        [sdo3_3] (g2);
        [sdo4_3] (g4);
        [sdo5_3] (g5);
        [sdo1_4] (h1);
        [sdo2_4] (h2);
        [sdo3_4] (h3);
        [sdo4_4] (h2);
        [sdo5_4] (h5);
        [att1_1] (i1);
        [att2_1] (i2);
        [att3_1] (i2);
        [att4_1] (i2);
        [att5_1] (i2);
        [att1_2] (j1);
        [att2_2] (j2);
        [att3_2] (j2);
        [att4_2] (j2);
        [att5_2] (j2);
        [att1_3] (k1);
        [att2_3] (k2);
        [att3_3] (k2);
        [att4_3] (k2);
        [att5_3] (k2);


OUTPUT: cinterval; stdyx;
```

Table A10. *Mplus input for multivariate growth model (with growth factor for SDO) in Study 2.*

```
DATA:
        FILE = mplusin.dat;
VARIABLE:
        NAMES =
        sdo1_1 sdo1_2 sdo1_3 sdo1_4 sdo2_1 sdo2_2 sdo2_3 sdo2_4 sdo3_1
        sdo3_2 sdo3_3 sdo3_4 sdo4_1 sdo4_2 sdo4_3 sdo4_4 sdo5_1 sdo5_2
        sdo5_3 sdo5_4 att1_1 att1_2 att1_3 att2_1 att2_2 att2_3 att3_1
        att3_2 att3_3 att4_1 att4_2 att4_3 att5_1 att5_2 att5_3;
        MISSING ARE ALL (-9999);
ANALYSIS:
        ESTIMATOR = mlr;

MODEL:
        sdo1 BY sdo1_1* (sa1); !Measurement models SDO
        sdo1 BY sdo1_2 (sb1);
        sdo1 BY sdo1_3@1;
        sdo1 BY sdo1_4 (sd1);
        sdo1_1 WITH sdo1_2;

        sdo2 BY sdo2_1* (sa1);
        sdo2 BY sdo2_2 (sb1);
        sdo2 BY sdo2_3@1;
        sdo2 BY sdo2_4 (sd1);
        sdo2_1 WITH sdo2_2;

        sdo3 BY sdo3_1* (sa1);
        sdo3 BY sdo3_2 (sb1);
        sdo3 BY sdo3_3@1;
        sdo3 BY sdo3_4 (sd3);
        sdo3_1 WITH sdo3_2;

        sdo4 BY sdo4_1* (sa1);
        sdo4 BY sdo4_2 (sb1);
        sdo4 BY sdo4_3@1;
        sdo4 BY sdo4_4 (sd1);
        sdo4_1 WITH sdo4_2;

        sdo5 BY sdo5_1* (sa1);
        sdo5 BY sdo5_2 (sb1);
        sdo5 BY sdo5_3@1;
        sdo5 BY sdo5_4 (sd3);
        sdo5_1 WITH sdo5_2;

        sdo1_1 WITH sdo2_1 sdo3_1 sdo4_1 sdo5_1;
        sdo2_1 WITH sdo3_1 sdo4_1 sdo5_1;
        sdo3_1 WITH sdo4_1 sdo5_1;
        sdo4_1 WITH sdo5_1;
        sdo1_2 WITH sdo2_2 sdo3_2 sdo4_2 sdo5_2;
        sdo2_2 WITH sdo3_2 sdo4_2 sdo5_2;
        sdo3_2 WITH sdo4_2 sdo5_2;
        sdo4_2 WITH sdo5_2;
        sdo1_3 WITH sdo2_3 sdo3_3 sdo4_3 sdo5_3;
        sdo2_3 WITH sdo3_3 sdo4_3 sdo5_3;
        sdo3_3 WITH sdo4_3 sdo5_3;
        sdo4_3 WITH sdo5_3;

        [sdo1_1] (e1);
        [sdo2_1] (e2);
        [sdo3_1] (e2);
        [sdo4_1] (e1);
        [sdo5_1] (e5);
        [sdo1_2] (f1);
        [sdo2_2] (f2);
        [sdo3_2] (f2);
        [sdo4_2] (f2);
        [sdo5_2] (f5);
        [sdo1_3] (g1);
```

```
        [sdo2_3] (g2);
        [sdo3_3] (g2);
        [sdo4_3] (g4);
        [sdo5_3] (g5);
        [sdo1_4] (h1);
        [sdo2_4] (h2);
        [sdo3_4] (h3);
        [sdo4_4] (h2);
        [sdo5_4] (h5);

        !Growth model for SDO includes (a redundant) growth factor
        i_sdo s_sdo | sdo1@0 sdo2@1 sdo3@2 sdo4@3 sdo5@4;
        sdo1 sdo2 sdo3 sdo4 sdo5 (r1);

        att1 BY att1_1* (a1);
        att1 BY att1_2@1 ;
        att1 BY att1_3 (c1);
        att2 BY att2_1* (a2);
        att2 BY att2_2@1 ;
        att2 BY att2_3 (c2);
        att3 BY att3_1* (a2);
        att3 BY att3_2@1 ;
        att3 BY att3_3 (c2);
        att4 BY att4_1* (a4);
        att4 BY att4_2@1 ;
        att4 BY att4_3 (c2);
        att5 BY att5_1* (a1);
        att5 BY att5_2@1 ;
        att5 BY att5_3 (c2);

        att1_1 WITH att2_1 att3_1 att4_1 att5_1;
        att2_1 WITH att3_1 att4_1 att5_1;
        att3_1 WITH att4_1 att5_1;
        att4_1 WITH att5_1;
        att1_2 WITH att2_2 att3_2 att4_2 att5_2;
        att2_2 WITH att3_2 att4_2 att5_2;
        att3_2 WITH att4_2 att5_2;
        att4_2 WITH att5_2;
        att1_3 WITH att2_3 att3_3 att4_3 att5_3;
        att2_3 WITH att3_3 att4_3 att5_3;
        att3_3 WITH att4_3 att5_3;
        att4_3 WITH att5_3;

        [att1_1] (i1);
        [att2_1] (i2);
        [att3_1] (i2);
        [att4_1] (i2);
        [att5_1] (i2);
        [att1_2] (j1);
        [att2_2] (j2);
        [att3_2] (j2);
        [att4_2] (j2);
        [att5_2] (j2);
        [att1_3] (k1);
        [att2_3] (k2);
        [att3_3] (k2);
        [att4_3] (k2);
        [att5_3] (k2);

        i_att s_att | att1@0 att2 att3 att4 att5@4;
        att1 att2 att3 att4 att5 (r2);

        s_att s_sdo ON i_att i_sdo;                  !Reciprocal cross-lagged paths

        !Time-specific covariances between residuals for growth indicators
        sdo1 sdo2 sdo3 sdo4 sdo5 PWITH att1 att2 att3 att4 att5;

OUTPUT: cinterval;
```

## References

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