12-2016

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## Original Publication Information

Pössel, Patrick, Christopher Rakes, Kathleen Moritz Rudasill, Michael G. Sawyer, Susan H. Spence and Jeanie Sheffield. "Associations Between Teacher-Reported School Climate and Depressive Symptoms in Australian Adolescents: A 5-Year Longitudinal Study" 2016. *School Mental Health* 8(4): 425-440.

# Associations between teacher-reported school climate and depressive symptoms in Australian adolescents: A 5-year longitudinal study

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**Abstract**

Adolescent depression is serious and common. As adolescents spend approximately 15,000 hours in school, this setting is a logical place to seek etiological factors. Research suggests there are negative associations between school climate and adolescent depressive symptoms. However, such studies typically use *student*-reports of both climate and depressive symptoms; this is problematic because common method variance results when the same individual provides information on all variables, contributing to overestimations of associations between depressive symptoms and school climate. Therefore, the purpose of this study is to examine the association between *teacher*-reported school climate and adolescent-reported depressive symptoms. Thus, 2545 Australian high school students participated in this 5-year longitudinal study. Students completed a measure of depressive symptoms annually; their teachers ($n$ = 882) completed a questionnaire to evaluate the quality of the school environment (i.e., safe/orderly & supportive relationships). Multi-group latent growth models revealed that more positive teacher-reported school climate was cross-sectionally associated with fewer student-reported depressive symptoms in both boys and girls, although this association was significantly stronger for girls. Longitudinally, positive school climate was associated with lower depressive symptoms but a higher rate of change of symptoms for both boys and girls. The overall findings are consistent with previous findings with *student*-reported school climate. However, the gender difference and the directionality of the longitudinal association between school climate and depressive symptoms over time demonstrate that additional studies of mechanisms by which school climate is connected to adolescents' depressive symptoms are needed.

*Keywords:* school climate; depressive symptoms; high school students; longitudinal study

Approximately 20% of individuals will develop depression before the end of adolescence (Costello, Foley, & Angold, 2006). In particular, adolescent girls are about twice as likely to develop depression than their male peers and show consistently more depressive symptoms (Ge, Conger, & Elder, 2001; Hankin, Mermelstein, & Roesch, 2007). Independent of gender, the consequences of early development of depression may persist for years after adolescence (Dunn & Goodyer, 2006). Individuals who experience depression once are more likely to experience depression in the future (Rutter, Caspi, & Moffitt, 2003), have academic problems, including lower rates of post-secondary degree attainment (Jonsson et al., 2010), and experience other psychopathologies in adulthood (Birmaher et al., 1996). Even depressive symptoms that are not severe enough for a diagnosis of depression have been identified as a risk factor for depression later in life (Georgiades, Lewinsohn, Monroe, & Seeley, 2006) and are risk factors for problems with homework completion, concentrating in class, interacting with peers, and attending class (Humensky et al., 2010).

Depressive symptoms and their consequences can be understood as ecological phenomena that develop as the result of complex interactions between intra- and inter-individual variables (Swearer & Espelage, 2004). Given that young people spend 15,000 hours in school (Rutter, Maughan, Mortimore, & Ouston, 1979) the potential importance of school and its influence on students' depressive symptoms becomes clear. One school-related variable associated with students' depressive symptoms is school climate (Brand, Felner, Seitsinger, Burns, & Bolton, 2008; Kuperminc, Leadbeater, & Blatt, 2001; Kuperminc, Leadbeater, Emmons, & Blatt, 1997; LaRusso, Romer, & Selman, 2008; Loukas & Murphy, 2007; Loukas & Robinson, 2004; Wang 2009; Way & Robinson,

2003). School climate has been consistently conceptualized as being comprised of (a) safety and order; and (b) teacher–student relationship quality (Brand, Felner, Shim, Seitsinger, & Dumas, 2003; Furlong et al., 2005; Wilson, 2004). A safer and more orderly environment should lead to a reduction of aggressive behavior including bullying and sexual harassment (Ormerod, Collinsworth, & Perry, 2008) both of which are associated with more depressive symptoms in victims (Espelage & Holt, 2007). With regard to teacher-student relationship quality, supportive relationships with parents, peers, and teachers are associated with a lower risk of developing depressive symptoms (Rudasill, Pössel, Winkeljohn Black, & Niehaus, 2014; Rueger, Malecki, & Demaray, 2010). Although there is evidence of a negative association between quality of school climate and the presence of depressive symptoms in students, most studies have relied on *student* reports of school climate (Kuperminc et al., 1997, 2001; LaRusso et al., 2008; Loukas & Murphy, 2007; Loukas & Robinson, 2004; Wang 2009; Way & Robinson, 2003). This is problematic because common method variance results when the same individual provides information on all variables (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003), contributing to overestimations of associations between depressive symptoms and school climate, especially when both are measured at the same time (Kuperminc et al., 1997; LaRusso et al., 2008; Loukas & Robinson, 2004). Thus, associations between depressive symptoms and school climate are likely to be lower, but more realistic, when school climate is reported by individuals other than students than between both variables reported by students.

Further, teachers serve a pivotal role in realizing a school's vision, especially in caring for their students' overall health and well-being and providing much-needed adult

mentoring in their students' lives (Gardinier, 2012; van der Heijden, Geldens, Beijaard, & Popeijus, 2015), making accurate teacher perceptions of school climate critical to improving school climate in a way that reduces student depressive symptoms. The correlation between student- and teacher-reported school climate is relatively low (supportive relationship: $r = .29$; safety: $r = .44$; Brand et al., 2008; Study 2), suggesting that studies relying on student-reported school climate may obtain a better picture of how students perceive school climate but miss the teacher perspective, which is key to making systemic improvements (Gardinier, 2012; Rothi, Leavey, & Best, 2008). In other words, student- and teacher-reports measure different perspectives of school climate, but students need teachers to be cognizant of their needs to facilitate continuous developmental support (Marland, 2001). Teachers are most effective at meeting the challenges inherent in their role when they are part of a school-wide effort (Watson, 2014). Therefore, the purpose of this study is to examine the associations between *teacher*-reported school climate and student-reported depressive symptoms; so far, such examinations are almost completely missing in the literature.

Improvements in *student*-reported school climate have been positively associated with students' academic, emotional, and behavioral outcomes over time (Roeser, Eccles, & Sameroff, 2000). However, research on associations between *teacher*-reported school climate and student-reported outcomes is limited, especially with reference to adolescent depression. In addition to already stated reasons, teacher-reported school climate may actually be more relevant than student-reported school climate because teachers' perceptions of school climate dictate their recognition of needed changes to improve students' experiences (Lukacs & Galluzzo, 2014; Ofsted, 2005), which are in turn related

to adolescent depression (Pössel, Rudasill, Adelson, Bjerg, Wooldridge, & Winkeljohn Black, 2013).

Brand, Felner, Seitsinger, Burns, and Bolton (2008) assessed teacher-reported school climate and adolescent depression cross-sectionally, and discovered that students in schools where teachers perceived the climate as higher in achievement orientation reported lower levels of depression. Although Brand et al.'s (2008) work begins to fill a substantial gap in the literature by including teacher reports of school climate, the cross-sectional design of the study and the focus on middle school students limit the conclusions that can be drawn. For example, it is currently unknown how teacher reports of school climate are longitudinally associated with depression in high school students (i.e., the ability of school climate to predict changes in depression in high school students over time). A focus on high school students is crucial as the increase in depressive symptoms might begin in middle school but continues throughout high school (Hankin, Abramson, Moffitt, McGee, Silva, & Angell, 1998). However, as the general association between school climate and risk of developing depressive symptoms is clear, it can be expected that teacher report of positive school climate is associated with lower levels of adolescents' depressive symptoms.

It is important to include gender in examinations of associations between school climate and adolescents' depressive symptoms. However, whether boys and girls benefit similarly from positive school climate is an open question. For example, research has shown that pubertal girls experience more stressful events, such as sexual harassment, in schools (Ormerod et al., 2008) and are more likely to develop depression than boys (Ge et al., 2001; Hankin, et al., 2007). Thus, regarding depressive symptoms, it is possible

that girls benefit more from a positive school climate than boys. On the other hand, although girls benefit more from a positive relationship with parents in middle adolescence (Kerr, Preuss, & King, 2006), boys benefit more in late adolescence (Ystgaard, Tambs, & Dalgard, 1999). If this pattern can be generalized to relationships with all adults, girls in late adolescence should benefit less from a positive school climate than boys. Nevertheless, most previous studies of associations between school climate and depressive symptoms have either not included tests for gender effects or have included gender only as a control variable (Brand et al., 2008; LaRusso et al., 2008; Loukas & Murphy, 2007; Pössel, Rudasill, Sawyer, Spence, & Bjerg, 2013). Of the five studies that tested for gender differences, two did not show gender differences in the strength of the associations between school climate and students' depressive symptoms (Jia et al., 2009; Kuperminc et al., 2001). In their cross-sectional study, Kuperminc et al. (1997) found that boys' perceptions of school climate accounted for significant variance in their internalizing problems, but this was not found for girls. In a longitudinal study with middle school students, Reddy et al. (2003) found that, although student-reported teacher–student relationships negatively predicted depressive symptoms in both boys and girls, the association was stronger for boys. Results from another longitudinal study showed that students' perceptions of teacher-student relationships negatively predicted depression only in boys (Rueger et al., 2010). Although results from these few studies are not completely congruent, collectively this research suggests that the association between teacher-student relationships and depression may be stronger for boys than girls.

Other factors that might influence the associations between school climate and adolescents' depressive symptoms include race/ethnicity, origin, and socio-economic

status (SES) of students and teachers. For example, there are school disciplinary (Gregory, Skiba, & Noguera, 2010; Shirley & Cornell, 2011), mental health (Miller & Taylor, 2012; Saluja et al., 2004; Sen, 2004) and socioeconomic (DeNavas-Walt & Proctor, 2014) disparities across different races/ethnicities in America. In the United States, African American, Latino, and Native American students are more often targets of a wide range of sanctions in schools including expulsion (KewelRamani, Gilbertson, Fox, & Provasnik, 2007), counselor referrals (Bryan, Day-Vines, Griffin, & Moore-Thomas, 2012), office discipline referrals (Skiba, Michael, Nardo, & Peterson, 2002), and suspension (Raffaele Mendez, Knoff, & Ferron, 2002; Raffaele Mendez & Knoff, 2003). Thus, positive school climate, which includes a safe school climate, might have a different meaning and different consequences for students with racial/ethnic minority and/or low SES background. In addition, in studies conducted in the United States, students from the racial/ethnic majority report more supportive teacher-student relationships than African American and Latino students (Noguera, 2003). Thus, in America it would be important to take into account racial/ethnic perspectives in a study such as the present.

Almost half of previous studies of associations between school climate and depressive symptoms have not included race/ethnicity, origin, and SES in analyses (Jia et al., 2009; Pössel, Rudasill, Sawyer et al., 2013; Reddy et al., 2003; Rueger et al., 2010). LaRusso et al. (2008) found differences by student race/ethnicity in the level of reported school climate, but did not test for differences in the associations between school climate and depressive symptoms. Of the remaining four studies, three did not show evidence that race/ethnicity and/or SES influences the associations between school climate and

depressive symptoms (Brand et al., 2008; Kuperminc et al., 2001; Loukas & Murphy, 2007) while one cross-sectional showed that race but not SES predicted the association between school climate and depressive symptoms in girls but not in boys (Kuperminc et al., 1997). Interestingly, this association could not be replicated in a longitudinal study using the same sample (Kuperminc et al., 2001). In summary, a potential influence of race/ethnicity, origin, and SES on the associations between school climate and adolescents' depressive symptoms seems unlikely, but cannot be excluded and should therefore be considered in the analyses.

As the data for the present study were collected in Australia, it is important to highlight that the demographic context in Australia differs from the demographic context of the United States. The vast majority of the population is of Caucasian origin (around 80%), with a very diverse range of ethnic groups making up the remainder (Australian Bureau of Statistics, 2013) and less than 3% of the population identifying as Indigenous. Data indicate, however, that individuals from Indigenous backgrounds in Australia are more likely to experience education, health, and social disadvantage (Biddle, 2011), although evidence is lacking about the nature of their school experience. Even though Indigenous Australians formed a very small proportion of the sample in the present study (less than 3%), we examined whether the overall results were generalizable to this population.

**Current Study**

The first purpose of the present study was to examine concurrent and longitudinal associations between teacher-reported school climate and student-reported depression during high school. We expected to find that teachers' ratings of school climate are

negatively associated with student ratings of concurrent and longitudinal depression in high school. In addition, we examined to what degree gender moderated these relationships. We expected that teachers' ratings of a positive school climate would be more strongly associated with student-rated depression for boys than for girls. Finally, we examined whether any associations also held up for youth who identified as Indigenous Australians.

## Methods

The present study is based on a secondary analysis of data collected from Australian students from grades 8 to 12 as part of the beyondblue research initiative, a large-scale depression prevention study conducted in Australian secondary schools (Sawyer et al., 2010). The beyondblue prevention program included a school climate improvement component.

### Beyondblue Prevention Program Design and Procedure

Schools with at least 100 students enrolled in grade 8 were contacted; 105 schools indicated their willingness to take part in the project (20 from Queensland, 23 from South Australia, and 62 from Victoria). To ensure that the participating schools would represent demographically diverse populations, the 105 schools were classified into one of six categories before constructing a stratified random sample: (a) urban public schools ranked in the top third in terms of socioeconomic status (SES), (b) urban public schools ranked in the middle third in terms of SES, (c) urban public schools ranked in the lower third in terms of SES, (d) non-urban public schools, (e) Catholic schools, and (f) independent schools. In each category, eight schools were randomly selected to participate. Thus, eight from each of

the three Australian states were included in the treatment group, and the same number was included in the control group.

Letters describing the study were sent to parents of all students in grade 8 of the participating schools. Sawyer et al. (2010) provided a detailed description of the eligibility criteria, the selection protocol, and the demographics of the participating schools. Parental consent was received for 63% of the students. Participating students were assessed during the school day each year from grade 8 to 12, which represents typical practice for secondary schools in Australia. Completion of the measures required approximately 30 minutes at each time point. Students absent during the scheduled assessments were followed to minimize missing data. Students, parents, and teachers were not paid for their participation. The researchers administered the questionnaires, and teachers assisted during instrument administration. Ethics approvals were obtained from the appropriate bodies in each state.

Australia's school year begins in February and ends in early December. Baseline data from grade 8 were collected during the second term (May and June, 2003) of the school year. All follow-up assessments occurred during the final term (October through early December) of grades 9 to 12.

**Participants**

To avoid the possibility that the beyondblue intervention might influence student depression and school climate (construct validity threats), only data from participants in control condition schools were analyzed for the present study. The 24 control condition schools consisted of 2,545 students (mean age: 13.11 years, SD = 0.56 years at year 1). The sample had rates of females (Year 1: 51.9%; Year 2: 52.2%; Year 3: 53.2%; Year 4: 54.0% Year 5: 56.9%) and Indigenous students (Year 1: 4.4%; Year 2: 3.9%; Year 3:

3.8%; Year 4: 2.6% Year 5: 2.8%) similar to the general Australian population (females: 2001-2011: 50.6% Indigenous: 2001: 1.9%; 2006: 2.3%; 2011: 2.5%; Australian Bureau of Statistics 2006, 2013). Australian born students (Year 1: 92.5%; Year 2: 93.0%; Year 3: 93.7%; Year 4: 94.2% Year 5: 92.3%) and with no more than one parent employed part time (Year 1: 11.2%; Year 2: 10.2%; Year 3: 9.6%; Year 4: 8.7% Year 5: 8.8%) were over-represented in the sample (Australian born: 2001: 72.6%; 2006: 70.9%; 2011: 69.8%; unemployed: 2001: 7.4%; 2006: 5.2%; 2011: 5.6%; Australian Bureau of Statistics 2006, 2013).

All teachers at the participating schools were invited to participate. At year 1, 882 teachers rated the climate at their schools. Of these teachers, 40.5% were male, 5.9% worked for less than 1 year in schools, 6.3% worked for 1-2 years in schools, 10.7% worked for 3-5 years in schools, 15.9% worked for 6-10 years in schools, 13.0% worked for 11-15 years in schools, 12.6% worked for 16-20 years in schools, and 34.9% worked for more than 20 years in schools. Of year1 responders, 64% completed the year 2 assessments, 52.7% did so in year 3, 40% in year 4, and 36.4% in year 5. Teachers in Australia are largely homogeneous in terms of race (approximately 1% Indigenous) and origin (approximately 80% Australian born). In addition to the 80% Australian born, another 7% of teachers were born in other mostly Caucasian countries within the Commonwealth (e.g., Canada, New Zealand, United Kingdom; McKenzie, Weldon, Rowley, Murphy, & McMillan, 2014). Given the official emphasis on multi-culturalism in Australian society, the Australian government and state departments are very sensitive about inquiries concerning racial background. Therefore, race and origin of teachers were not collected in the beyondblue study, placing an examination of how teachers' race may

have influenced their perceptions of school climate outside the scope of the present study. The teachers that left these schools were replaced by new teachers who participated in the study. The teachers participating in year 1 assessments were not significantly different than those participating in the year 5 in terms of gender [$\chi^2(1) = 1.72$, $p = .189$]; however, teachers participating at year 1 were more experienced than teachers participating in the year 5 assessments [$\chi^2(6) = 441.84$, $p < .001$].

**Measures**

**Depressive symptoms.** The 20 items Center for Epidemiological Studies Depression Scale (CES-D; Radloff, 1991) was used to assess students' depressive symptoms at each time point (e.g., "I could not get 'going.'"). To complete the measure, respondents rate the frequency of each symptom in the past week on a four-point scale. Summed scores can range from 0 to 60, with higher scores indicating more depressive symptoms in the past week. The CES-D has demonstrated strong reliability and construct validity in adolescents (Garrison, Schluchter, Schoenbach, & Kaplan, 1989) and was previously used in samples of Australian adolescents (Lin, Yung, Wigman, Killackey, Baksheev, & Wardenaar, 2014; Pössel, Rudasill, Sawyer et al., 2013). For the present study, the five time points for the CES-D had an acceptable internal consistency, $\alpha = 0.81$. Stability of the CES-D across the five years of the study was moderate: Correlations ranged from .35 to .57 ($p < .001$).

**Teacher-reported school climate.** Teachers' perceptions of school climate were assessed using a 12-item scale developed for the present study to assess school climate from the perspective of teachers. Teacher data were aggregated at the school level. Items were taken from the Organizational Health Inventory for Middle Schools (Hoy & Sabo,

1997), the Manitoba School Improvement Questionnaire (Earl & Lee, 1998), and the Comer Scale (Aguilera, Crane, Hamer, Morrison, & Serrano, 1998). Confirmatory factor analysis identified two factors congruent with two consistently identified components of school climate: Safe/Orderly Environment (order and safety) and Supportive Relationships (teacher-student relationship), Comparative Fit Index (CFI) = .88, Root Mean-Square Residual (RMR) = .04, and Root Mean Square Error of Approximation (RMSEA) = .066. All item loadings on the proposed factors were statistically significant ($p < .001$) with loadings greater than .40. Safe/Orderly Environment included 7 items such as "school is a safe place" and "there is good discipline in this school." Supportive Relationships included 5 items such as "at this school, staff pays attention to students' feelings" and "some students are unfairly treated by teachers (reverse coded)." A significant correlation was identified between Safe/Orderly and Supportive Relationships ($r = .62$, $p < .001$). Because the present analyses focused on the association between school climate and depression, the scores of the two scales were averaged to form a single *school climate* score. This score across the five time points had a high internal consistency, $\alpha = .97$, and stability across the five years of the study was also strong: Correlations ranged from .74 to .93 ($p < .001$).

**Data Analysis**

Data in this sample were not missing at random, with attrition rates consistently increasing in each year of the study for overall estimates. Therefore we included a time variable for both student and teacher variables to account for these missing patterns. The missing values analysis also revealed four student variables whose response rates consistently decreased in each year of the study: *age, Australian born, indigenous*

*origins*, and *parent employment*. These variables were therefore included in the model as auxiliary variables as recommended by Graham (2003) and Enders (2006).

We used latent growth modeling (LGM), a structural equation modeling approach, to measure change over time because LGMs can be used to describe individual behaviors in terms of initial amounts and change over time while simultaneously estimating variances, covariances, and means (Hancock & Lawrence, 2006). In the LGM, latent factors represented the depression and school climate slopes and intercepts after taking change over time into account. These latent factors were estimated using full information maximum likelihood, which produces valid parameter estimates and standard errors for data with missing values (Davey & Savla, 2010). The *depression* variable for all five years was non-normally distributed: Wilks' Lambda (df = 1186) ranged from 0.857 to 0.905, $p < .001$. We therefore used the maximum likelihood estimator with robust standard errors (MLR estimator) to compute all fit indices and model parameters because it is known to be robust to non-normality (Byrne, 2012). By using the MLR estimator to account for non-normality and including auxiliary variables (*age*, *Australian born*, *indigenous origins*, and *parent employment*) to account for missing data patterns, the analytic methods maximizing the validity of estimates of *depression* and *school climate* relationships over time. All models were computed with MPlus Version 7.2 (Múthen & Múthen, 2013).

We considered modeling *depression* as nested within schools; however, the intra-class correlations for *depression* ranged from .013 to .027 and were not considered sufficiently large to justify a multilevel structural equation model analysis for which the intra-class correlations needed to be at least .10 (Byrne, 2012).

Because the second purpose of this study was to examine if and to what degree gender moderates associations between *school climate* and *depression*, we conducted LGM and multi-group structural equation modeling (MG-SEM), using boys and girls as the two groups being compared. Thus, we proceeded as follows:

- Step 1: Develop the baseline LGM models for boys and girls. The baseline model is the best fitting model for boys, produced independently from girls, and vice-versa.
- Step 2: Develop a configural LGM model. This model includes the boys' and girls' baseline models together, and no parameters are constrained to be equivalent.
- Step 3: Test equivalence of all freely-estimated parameters that are present in both girls and boys models.

A wide array of fit indices were used to maximize statistical conclusion validity: $\chi^2$ (Hu & Bentler, 1995), Akaike's Information Criterion (AIC; Akaike, 1974), Comparative Fit Index (CFI; Hu & Bentler, 1995), Root Mean Square Error of Approximation (RMSEA; Steiger, 1998), Standardized Root Mean Residual (SRMR; Kline, 2011), and Expected Cross-Validation Index (ECVI; Brown & Cudeck, 1989). Significant differences between nested models were determined by use of the MLR-Adjusted $\chi^2$ difference test (Satorra, 2000). All models were compared based on AIC, CFI, ECVI, RMSEA, and SRMR values.

## Results

### Descriptive Statistics

Means and standard deviations for *school climate* and *depression* as well as the correlations between these variables are shown in Table 1. As expected, the depression scores at different time points were moderately to highly correlated for both girls and

boys, as were school climate scores ($p < .01$).

**Step 1: Development of Baseline Models for Boys and Girls**

Separate baseline models for boys and girls were developed to determine which parameters had the potential to be equivalent for boys and girls. The initial baseline models for boys and girls included the LGM models for *depression* and *school climate* along with the auxiliary variables (age, Australian born, indigenous ethnicity, & parent employment). Modification indices suggested the addition of a few error covariances between time point measurements, and because each time point represented the same construct, we considered the covariances to be theoretically viable relationships. Although any of the relationships between time points could be represented by a freely-estimated error covariance, we looked to the modification indices to indicate stronger-than-usual relationships and only retained error covariances that improved the model fit significantly (Table 2). Model 5 for girls and Model 6 for boys from Table 2 became the final baseline models and were combined for the next step, the configural model. The auxiliary variables age, Australian born, and indigenous were significant predictors of depressive intercept and slop in both models. Model 5 for girls included two parameters not included in Model 6 for boys: covariances between year 2 and 3 depression scores and between year 3 and 4 climate scores (thin dashed arrows in Figure 1). Model 6 for boys included three parameters not included in Model 5 for girls: covariances between climate scores for years 1 and 5, years 2 and 4, and years 2 and 5 (thin dashed arrows in Figure 1).

**Step 2: Development of Configural LGM Model**

The configural model consisted of the boys' and girls' final baseline models

(Models 5 and 6 from Table 2) analyzed simultaneously with none of the common parameters were held equal across genders ("unconstrained"). All parameters that were freely estimated in the final baseline models continued to be freely estimated in the configural model. The fit indices suggested that the configural model had a good fit overall, RMSEA = .05, SRMR = .07, and CFI = .98 (see Model 0 in Table 3). The configural model is an important intermediary step between the baseline models and testing hypotheses about equivalent parameters between boys and girls. The configural model was used as the initial model for Step 3, in which the equivalence of parameters across gender groups was tested.

**Step 3: Test for Parameter Invariance**

Freely-estimated parameters were tested as equivalent between genders ("invariant") first in the measurement model (associations between depression and climate scores for particular years), then the structural model (associations between depression slope and intercept with school climate slope and intercept), as recommended by Byrne (2012). The measurement model included only error variances and co-variances (Models 16 and 17 in Table 3) because the factor loadings were fixed as part of the LGM model. The structural model parameters consisted of factor variances and covariances (Models 3 to 7 in Table 3), auxiliary variable factor loadings (Models 8 to 14 in Table 3), and latent means (Models 1 and 18 in Table 3). Table 3, Models 3 and 5-14 were retained due to a non-significant adjusted $\chi^2$ change with an increase in degrees of freedom, along with values for RMSEA, SRMR, CFI, and ECVI that were as strong as for the previous model. Models 1, 2, 4, and 15 to 17 in Table 3 were rejected due to combinations of significantly higher adjusted $\chi^2$ values, higher RMSEA, AIC, ECVI, or SRMR values, or

lower CFI values. Model 14 in Table 3 was the final model and is depicted in Figure 1. Three parameters were statistically significantly different for boys and girls (thick dashed arrows in Figure 1): (1) association between depression and school climate intercept factors (i.e., associations between initial depression and school climate scores differed for boys and girls); (2) association between school climate intercept and slope factors (i.e., associations between initial school climate score and average school climate growth over time differed for boys and girls); and, (3) factor loading for depression slope factor on *one or both parents employed full time or both part time* variable (i.e., parent employment had a different effect on depression growth over time for boys and girls).

Parameter values for the final model, Model 14 in Table 3, are shown in Table 4. An inspection of these parameter values revealed that, independent of gender, *school climate* at year 1 (grade 8) was significantly and negatively associated with *depression* at year 1. However, the multi-group analysis also revealed that this association is significantly stronger in girls than in boys. Further, *school climate* at year 1 was significantly and positively associated with the slope of *depression* for both boys and girls. Thus, more positive teacher-reported school climate is associated with more increase in student-rated depressive symptoms in both genders. Independent of gender, neither the association between *school climate* slope and *depression* at year 1 nor the association between *school climate* slope and *depression* slope were significant. These results suggest that, independent of student gender, changes in teacher-reported school climate over time were not associated with student depression or with changes in student depression over time.

## Discussion

The present study extends previous empirical work (Brand et al., 2008; Kuperminc et al., 1997; 2001; LaRusso et al., 2008; Loukas & Murphy, 2007; Loukas & Robinson, 2004; Wang 2009; Way & Robinson, 2003) and demonstrates that *teacher*-reported school climate is concurrently and longitudinally associated with student-reported depressive symptoms in girls and boys. A close inspection of the associations between teacher-rated school climate and concurrent student-reported depressive symptoms revealed two unexpected findings.

First, while the fact that more positive teacher-reported school climate (safe/orderly environment and supportive relationships) was associated with fewer student-reported depressive symptoms is consistent with previous work (Brand et al., 2008; Kuperminc et al., 1997; 2001; LaRusso et al., 2008; Loukas & Murphy, 2007; Loukas & Robinson, 2004; Wang 2009; Way & Robinson, 2003), the fact that more positive school climate (*school climate* intercept in Figure 1) was associated with an *increase* in depressive symptoms over time (*depression* slope in Figure 1) was unexpected (see parameter $Slope_{depression}$ *with* $Intercept_{SchoolClimate}$ in Table 4). However, there is some theoretical grounding to explain this finding. One component of school climate is teacher–student relationship quality (Brand et al., 2003; Furlong et al., 2005; Wilson, 2004) which is conceptualized as being influenced by socio-emotional teaching behavior. Pössel et al. (2013) found in a sample of high school students that more socio-emotional teaching behavior was associated with greater reported negative affect (a component of depression; Clark & Watson, 1991). Pössel et al.'s (2013) interpretation was that a positive climate created by socio-emotional teaching behavior may allow students to express their negative affect and be encouraged to express feelings and

emotions. In other words, positive school climate may not actually be associated with an increase in depressive symptoms over time, but with an increase in the ability and willingness to express depressive symptoms. This interpretation is also consistent with the finding that more positive school climate was associated with *fewer* concurrent depressive symptoms but with more depressive symptoms over time. Testing this possible explanation in a study measuring adolescents' depressive symptoms, not only by student-report but also by parent-report, teacher-report, or clinical interview, is necessary.

Another possible explanation for the finding that more positive school climate was associated with an *increase* in depressive symptoms over time could be based on the safe/orderly environment component of the school climate variable. It is possible that the teachers' perception of the school being a safe environment could reflect a strongly disciplinarian system within the school which may adversely impact some students (Gregory et al., 2010). Testing this possible explanation would require more specific assessment of factors associated with safe school environment, including disciplinarian climate, when analyzing the associations between school climate and depressive symptoms.

Second, it was expected that the associations would be stronger for boys than girls, but the findings demonstrate that the concurrent association was stronger for girls and there was no gender difference in the longitudinal association. The fact that adolescent girls are about twice as likely to develop depression than their male peers and show consistently more depressive symptoms (Ge et al., 2001; Hankin et al., 2007) could be one possible explanation for this finding. However, if the difference in depression prevalence between boys and girls would be the reason for girls benefitting more from a

positive school climate in the present study, one could expect to find a similar pattern in all previous studies of school climate and students' depressive symptoms. However, two studies did not show gender differences in the strength of associations between school climate and students' depressive symptoms (Jia et al., 2009; Kuperminc et al., 2001) and three found boys to benefit more (Kuperminc et al., 1997; Reddy et al., 2003; Rueger et al., 2010). Thus, other explanations seem more likely.

One such possible explanation might be the already above mentioned association between school safety and punitive punishment, as boys are more often punished than girls (Bryan et al., 2012; Raffaele Mendez & Knoff, 2003). One might speculate that such punitive punishment by the school may actually trigger the development of depressive symptoms. As boys are more often punished, they may be more likely than girls to develop depressive symptoms in schools with safe/orderly environments.

Another possible explanation for the finding that girls benefitted more than boys from a positive school climate can be found by examining differences between previous empirical studies and the present study. For example, the predicted gender difference was based solely on studies with middle school students (Jia et al., 2009; Kuperminc et al., 1997; 2001; Reddy et al., 2003; Rueger et al., 2010) whereas the present study included high school students. Further, to our knowledge, the present study is the first to use teacher-reported, instead of student-reported, school climate when examining gender differences in associations between school climate and adolescents' depressive symptoms. To summarize, more work is needed, both examining gender as a moderator of relationships between school climate and depression in high school students, and with school climate reported by teachers.

A final possible explanation for the finding that girls benefitted more than boys from a positive school climate may be found in the literature on sexual harassment. Research has shown that girls experience more sexual harassment in schools than boys (Ormerod et al., 2008). Further, sexual harassment is associated with more depressive symptoms in victims (Espelage & Holt, 2007) and the rates of violence (including sexual harassment) are lower in safe schools (Morrison, Redding, Fisher, & Peterson, 2006). Because one of the components of school climate is safety and order (Brand et al., 2003; Furlong et al., 2005 Wilson, 2004), it is possible that the unexpected direction of the gender difference was a result of the safe/orderly component of school climate. Further the school climate scale also includes items related to general student behavior toward one another (e.g., "Students here fight a lot." reverse coded) and behavior between students might also reflect peer social networks which are known to reduce the risk of depression, especially for girls (Nolen-Hoeksema & Girgus, 1994). Associations of the different components of teacher-reported school climate with student-rated depressive symptoms should be separately examined in future studies. Additional variables, such as sexual harassment and peer social networks, should be included in future studies to get a clearer understanding of the mechanisms underlying the associations between school climate and adolescents' depressive symptoms in high school students. However, the gender difference in the concurrent association between teacher-rated school climate and student-reported depressive symptoms should not be overestimated, as no gender difference was found in the longitudinal association between these two variables.

**Strengths and Limitations**

Strengths of the present study include the representativeness of the sample, large sample size, and 5-wave longitudinal design. Using teacher report to measure school climate is also a strength of this study as it reduces a common method bias (Podsakoff et al., 2003), and, thus, an overestimation of the associations between school climate and depressive symptoms. A final strength is the usage of MG LGM as it overcomes some of the limitations of more traditional methods (see Hancock & Lawrence, 2006).

However, this study has several potential limitations that should be noted. Depressive symptoms were assessed using a self-report questionnaire instead of other-report. Further, only teacher-report of school climate was measured. The inclusion of both teacher- and student-reported school climate would have allowed us to compare their associations with students' depressive symptoms. In addition, evidence on the validity of the instrument to measure teacher-reported school climate is lacking. While the CFA provides some evidence for construct validity, this evidence is particularly limited because the reported analyses and the CFA used the same beyondblue sample.

The non-random and high rate of attrition (42.95%) drop out rate limits the generalizability of the presented findings. Students that left the participating schools were more likely to be boys, older, of Indigenous descent, born outside of Australia, have a higher frequency of depressive symptoms, and have parents who were under- or unemployed, compared with the students staying in the participating schools. In Australia, students interested in a vocational career leave the general high school after grade 10 to go to a vocational high school. This may explain the drop in participation rate by almost 20% from grade 10 grade 11. Further, male students and students of Indigenous decent transfer more often into vocational schools or drop out of schools

entirely (Rothman & Australian Council for Educational Research, 2008). Similarly, students with depressive symptoms (Fortin, Marcotte, Potvin, Royer, & Joly, 2006) are more likely to switch schools and drop out than other adolescents. Nevertheless, it cannot be excluded that the above discussed racial (Bryan et al., 2012; KewelRamani et al., 2007; Raffaele Mendez et al., 2002; Raffaele Mendez & Knoff, 2003; Skiba et al., 2002) and gender inequality in punishment found among youth in the United States (Bryan et al., 2012; Raffaele Mendez & Knoff, 2003) might also occur among Australian male students and those of Indigenous descent, and may be at least partially responsible for more male students and students of Indigenous descent leaving the participating schools. Thus, future research should separate the dimensions of school climate to examine safe/orderly environment and disciplinary practices as predictors of drop out.

Finally, while it is likely that the teacher sample is homogeneous regarding race and origin (McKenzie et al., 2014), the lack of teacher demographic information is a limitation. Just as demographic data for the student sample were included as control variables, information about teachers' race and origin could have been used similarly. Future studies should attempt to collect and use such data from teachers.

In terms of generalizability, it is important to consider the cultural context in which the beyondblue study took place. As opposed to the United States, Australian society is largely homogeneous in terms of race (only 2-3% Indigenous) but diverse regarding origin (approximately 30% non-Australian born; Australian Bureau of Statistics 2013). In addition, the Indigenous population is not uniformly distributed across the country. Thus, Australian society is more similar to many western European societies and focuses more on culture than on race. In addition, Australia has a strong focus on

multi-culturalism that discourages discussion of race. Therefore, government departments and individuals (e.g., teachers) are very sensitive about information regarding race or origin. Thus, the Australian context regarding race and culture might limit the generalizability to the United States, but may make findings more applicable to other parts of the world (i.e., western Europe).

**Directions for Future Research**

As indicated earlier, future studies should include both teacher- and student-reported school climate to allow for comparisons of their associations with students' depressive symptoms. Further, future research should separate the dimensions of school climate to examine safe/orderly environment and disciplinary practices as independent predictors, particularly of student drop out. We also suggest that future research should include investigations of the impact of teachers' and students' cultural and racial background to determine whether these are associated with school climate. This is particularly important given rise in globalization and the concomitant increase in immigration into Australia from non-European countries. We also need to better understand the perspectives of Indigenous Australians (Dandy & Pe-Pua, 2010). Without knowing more about the demographics of teachers we cannot examine whether the higher school drop out rates in students from Indigenous and non-European backgrounds could be associated with different attitudes and behavior of school personnel towards them. Finally, considering the high comorbidities between depression and other mental (e.g., substance misuse; Patel, Flisher, Hetrick, & McGorry, 2007) and physical health outcomes (Pössel, Adams, & Valentine, 2012; Pössel, Mitchell, Ronkainen, Kaplan, Kauhanen, & Valtonen, 2015) future studies should include measures of multiple

comorbidities to be able to examine their impact on students' depressive symptoms and the extent to which comorbidity might influence the associations between school climate and depressive symptoms in adolescents.

In summary, teacher-reported school climate was concurrently and longitudinally associated with depressive symptoms in high-school girls and boys. This finding is largely consistent with previous findings with student-reported school climate. However, while a more positive teacher-reported school climate was concurrently associated with less student-reported depressive symptoms, a more positive school climate was associated with an increase in depressive symptoms over time. Further, concurrently girls benefited more from a positive school climate than boys but longitudinally no gender difference were found. Thus, longitudinal studies to explore the mechanisms by which school climate is connected to adolescents' depressive symptoms are needed. Nevertheless, clearly schools, and the teachers and other staff who work within them, have a significant influence in the life of students. School climate appears to have an important influence upon educational and mental health outcomes. The policy implications should be regarded as tentative at the present time, while research is conducted to clarify the explanation for the increase in depression trajectories in those schools with more positive school climates. The cross-sectional association between lower student depression symptoms and positive teacher-rated school climate suggests that there may be benefits to be gained from inclusion of curriculum content relating to the development of supportive school climate in the training of teachers and particularly in ongoing professional development for school leaders. Indeed, the data also support the case for routine assessment of school climate from the perspective of students and

teachers, in order to inform school policies and practices. It is insufficient for school management procedures to have policies regarding safe schools and supportive school climate if these are not enacted. We suggest that implementation of such policies is likely to be enhanced by clear guidelines about what is intended and expected, and training, mentoring and support of all staff in the implementation process.

## Compliance with Ethical Standards

Funding: This study was funded by beyondblue and the National Health and Medical Research Council, Australia.

Conflict of Interest: Author A declares that he has no conflict of interest. Author B declares that he has no conflict of interest. Author C declares that she has no conflict of interest. Author D declares that he has no conflict of interest. Author E declares that she has no conflict of interest. Author F declares that he has no conflict of interest.

Ethical approval: All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent: Informed consent was obtained from all individual participants included in the study.

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*Table 1: Means, Standard Deviations, and Pearson Correlations for School Climate (Teacher-Reported; N = 882) and Depression Variables (Student-Reported; Overall: N = 1,439; Girls: N = 823; Boys: N = 616)*

| Variable | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Overall | | | | | |
| 1 aveclim1 | — | .93** | .83** | .73** | .74** | -.11** | -.03 | -.06* | -.02 | -.03 |
| 2 aveclim2 | — | — | .92** | .88** | .83** | -.12** | -.05 | -.07* | -.03 | -.04 |
| 3 aveclim3 | — | — | — | .91** | .90** | -.12** | -.04 | -.08** | -.04 | -.07* |
| 4 aveclim4 | — | — | — | — | .92** | -.13** | -.04 | -.08** | -.05 | -.06* |
| 5 aveclim5 | — | — | — | — | — | -.10** | -.019 | -.06* | -.032 | -.06* |
| 6 dptot1 | — | — | — | — | — | — | .53** | .41** | .38** | .34** |
| 7 dptot2 | — | — | — | — | — | — | — | .56** | .46** | .43** |
| 8 dptot3 | — | — | — | — | — | — | — | — | .53** | .50** |
| 9 dptot4 | — | — | — | — | — | — | — | — | — | .57** |
| 10 dptot5 | — | — | — | — | — | — | — | — | — | — |
| mean | 22.15 | 22.19 | 22.20 | 22.35 | 22.12 | 12.70 | 13.05 | 13.53 | 13.57 | 13.25 |
| SD | 1.47 | 1.43 | 1.37 | 1.41 | 1.46 | 10.50 | 10.97 | 11.47 | 10.74 | 10.84 |
| | | | | | Girls (Upper Diagonal) and Boys (Lower Diagonal) | | | | | |
| 1 aveclim1 | — | .95** | .88** | .78** | .80** | -.14** | -.09* | -.15** | -.12** | -.10** |
| 2 aveclim2 | .89** | — | .94** | .90** | .85** | -.16** | -.11** | -.18** | -.14** | -.10** |
| 3 aveclim3 | .69** | .86** | — | .92** | .91** | -.16** | -.11** | -.19** | -.15** | -.11** |
| 4 aveclim4 | .60** | .82** | .88** | — | .93** | -.16** | -.11** | -.18** | -.18** | -.11** |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 5 aveclim5 | .60** | .77** | .86** | .90** | — | -.13** | -.09* | -.16** | -.15** | -.11** |
| 6 dptot1 | -.07 | -.09 | -.09* | -.11* | -.08 | — | .53** | .45** | .43** | .35** |
| 7 dptot2 | -.00 | -.01 | .01 | -.02 | .03 | .52** | — | .60** | .53** | .45** |
| 8 dptot3 | .07 | .07 | .04 | .04 | .05 | .33** | .47** | — | .58** | .52** |
| 9 dptot4 | .09* | .11* | .09 | .11* | .10* | .30** | .33** | .44** | — | .58** |
| 10 dptot5 | .06 | .03 | -.04 | -.04 | -.03 | .31** | .38** | .44** | .54** | — |
| mean (girls) | | | | | | 12.97 | 14.36 | 14.50 | 14.55 | 13.87 |
| SD (girls) | | | | | | 10.78 | 11.91 | 11.99 | 11.08 | 11.50 |
| mean (boys) | | | | | | 12.29 | 11.29 | 12.26 | 12.29 | 12.44 |
| SD (boys) | | | | | | 9.96 | 9.33 | 10.66 | 10.15 | 9.86 |

*Note.* Overall $N = 1439$. Boys $N = 616$. Girls $N = 823$. Correlations computed using listwise deletion. *dptot* = CES-D scale; *aveclim* = average for Safe/Orderly Environment and Supportive Relationships scores; 1 = grade 8; 2 = grade 9; 3 = grade 10; 4 = grade 11; 5 = grade 12; *$p < .05$. **$p < .01$.

*Table 2: Goodness of Fit Indices for Baseline Models*

| Baseline Model | Description of Parameter Tested | RMSEA | SRMR | CFI | AIC | AIC Reduction | ECVI | MLR $\chi^2$ | DF | Adjusted $\chi^2$ Reduction |
|---|---|---|---|---|---|---|---|---|---|---|
| Girls | | | | | | | | | | |
| 1 | Depression and School Climate LGM Models with Intercept and Slope Factors Covarying | .11 | .09 | .91 | 51833.4 | --- | 40.31 | 1174.4 | 67 | --- |
| 2 | Covariance between aveclim4 and aveclim1 | .08 | .09 | .95 | 51260.1 | 573.3 | 39.86 | 654.6 | 66 | 257.6**** |
| 3 | Covariance between aveclim3 and aveclim1 | .06 | .09 | .97 | 50971.2 | 288.9 | 39.64 | 379.8 | 65 | 446.7**** |
| 4 | Covariance between aveclim4 and aveclim3 | .05 | .08 | .98 | 50893.6 | 77.6 | 39.58 | 304.6 | 64 | 95.8**** |
| **5** | **Covariance between dptot3 and dptot2** | **.05** | **.08** | **.98** | **50845.4** | **48.2** | **39.54** | **260.4** | **63** | **16.1**** |
| Boys | | | | | | | | | | |
| 1 | Depression and School Climate LGM Models with Intercept and Slope Factors Covarying | .10 | .22 | .91 | 43768.4 | --- | 37.03 | 878.1 | 67 | --- |
| 2 | Covariance between aveclim4 and aveclim1 | .08 | .20 | .95 | 43447.0 | 321.4 | 36.76 | 566.9 | 66 | 373.5**** |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 3 | Covariance between aveclim3 and aveclim1 | .07 | .15 | .96 | 43280.9 | 166.1 | 36.62 | 408.9 | 65 | 258.1**** |
| 4 | Covariance between aveclim5 and aveclim1 | .06 | .14 | .97 | 43215.0 | 65.9 | 36.56 | 341.4 | 64 | 50.2**** |
| 5 | Covariance between aveclim4 and aveclim2 | .06 | .13 | .97 | 43188.8 | 26.2 | 36.54 | 315.5 | 63 | 22.7**** |
| **6** | **Covariance between aveclim5 and aveclim2** | **.05** | **.05** | **.98** | **43132.9** | **55.9** | **36.49** | **260.1** | **62** | **53.6**** |

*Note.* Bold rows represent the final baseline models. *dptot* = CES-D scale; *aveclim* = average for Safe/Orderly Environment and Supportive Relationships scores; 1 = grade 8; 2 = grade 9; 3 = grade 10; 4 = grade 11; 5 = grade 12. Adjusted $\chi^2$ computed using formulas from Satorra (2000).

*Table 3: Goodness of Fit Indices for Configural and Invariance Models*

| Model | Parameter(s) Tested for Invariance | RMSEA | SRMR | CFI | AIC | AIC Reduction | ECVI | MLR $\chi^2$ | DF | Adjusted $\chi^2$ Reduction |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | Final Baseline Models for Boys and Girls Estimated Simultaneously | .05 | .07 | .98 | 94029.0 | --- | 38.10 | 580.6 | 131 | --- |
| *1* | *Constraint of Depression Intercept and Slope: Boys Means = 0; Variances = 1; Girls Means and Variances Freely Estimated* | *.19* | *1.65* | *.70* | *100327.0* | *-6298.0* | *40.65* | *6646.2* | *143* | --- |
| *2* | *Covariance between School Climate Intercept and Slope* | *.05* | *.08* | *.98* | *94043.7* | *-14.7* | *38.11* | *598.2* | *132* | *-25.9* |
| 3 | Covariance between Depression Intercept and Slope | .05 | .07 | .98 | 94027.1 | 2.0 | 38.10 | 578.4 | 132 | 0.0 |
| *4* | *Covariance between Depression and School Climate Intercepts* | *.05* | *.08* | *.98* | *94036.0* | *-9.0* | *38.10* | *589.2* | *133* | *-11.6**** |
| 5 | Covariance between School Climate Slope and Depression Intercept | .05 | .07 | .98 | 94026.0 | 1.0 | 38.10 | 579.3 | 133 | -0.9 |
| 6 | Covariance between School Climate Intercept and Depression Slope | .05 | .07 | .98 | 94025.0 | 1.0 | 38.10 | 580.4 | 134 | -1.0 |
| 7 | Covariance between School Climate and Depression Slopes | .05 | .07 | .98 | 94023.1 | 1.9 | 38.10 | 580.4 | 135 | -0.1 |
| 8 | Regression of Depression Intercept on Age | .05 | .07 | .98 | 94021.1 | 2.0 | 38.10 | 580.4 | 136 | 0.0 |
| 9 | Regression of Depression Intercept on | .05 | .07 | .98 | 94022.4 | -1.3 | 38.10 | 584.1 | 137 | -3.6 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Australian born | | | | | | | | | |
| 10 | Regression of Depression Intercept on Indigenous | .05 | .07 | .98 | 94020.8 | 1.6 | 38.10 | 583.9 | 138 | -0.4 |
| 11 | Regression of Depression Intercept on Parent Employment | .05 | .07 | .98 | 94019.4 | 1.4 | 38.10 | 584.6 | 139 | -0.5 |
| 12 | Regression of Depression Slope on Age | .05 | .07 | .98 | 94017.4 | 2.0 | 38.09 | 585.4 | 140 | 0.0 |
| 13 | Regression of Depression Slope on Australian born | .05 | .07 | .98 | 94015.8 | 1.6 | 38.09 | 586.3 | 141 | -0.4 |
| **14** | **Regression of Depression Slope on Indigenous** | **.05** | **.07** | **.98** | **94015.3** | **0.5** | **38.09** | **587.7** | **142** | **-1.5** |
| *15* | *Regression of Depression Slope on Parent Employment* | *.05* | *.07* | *.98* | *94021.4* | *-6.1* | *38.10* | *595.1* | *143* | *-7.2*** |
| *16* | *Covariance between aveclim4 and aveclim1* | *.05* | *.09* | *.98* | *94052.6* | *-37.3* | *38.11* | *626.0* | *143* | *-48.5**** |
| *17* | *Covariance between aveclim3 and aveclim1* | *.05* | *.07* | *.98* | *94027.7* | *-12.4* | *38.10* | *602.9* | *143* | *-21.1**** |

*Note.* Bold row indicates the final model. Italicized rows indicate models that were rejected. aveclim = average for Safe/Orderly Environment and Supportive Relationships scores; 1 = grade 8; 2 = grade 9; 3 = grade 10; 4 = grade 11; 5 = grade 12; ** $p < .01$. *** $p < .001$. **** $p < .0001$. Adjusted $\chi^2$ computed using formulas from Satorra (2000). Negative reductions indicate increase in unexplained variance. Statistically significant negative reductions indicate worse fitting models. Parent Employment: 1 = At least one parent employed full time or both parents employed part time, 0 = No more than one parent employed part time.

*Table 4: Parameter Estimates for Final Model (Model 14 from Table 4)*

| Parameter | Girls | | | Boys | | |
|---|---|---|---|---|---|---|
| | Estimate | SE | Estimate/SE | Estimate | SE | Estimate/SE |
| Structural Model | | | | | | |
| *Intercept$_{Depression}$ on Age* | *0.70* | *0.38* | *1.82* | *0.70* | *0.38* | *1.82* |
| *Intercept$_{Depression}$ on Australian born* | *-0.23* | *0.77* | *-0.30* | *-0.23* | *0.77* | *-0.30* |
| *Intercept$_{Depression}$ on Indigenous* | *2.61* | *1.06* | *2.45** | *2.61* | *1.06* | *2.45** |
| *Intercept$_{Depression}$ on Parent Employment* | *-1.17* | *0.69* | *-1.69* | *-1.17* | *0.69* | *-1.69* |
| *Slope$_{Depression}$ on Age* | *0.01* | *0.13* | *0.05* | *0.01* | *0.13* | *0.05* |
| *Slope$_{Depression}$ on Australian born* | *0.02* | *0.30* | *0.08* | *0.02* | *0.30* | *0.08* |
| *Slope$_{Depression}$ on Indigenous* | *-0.24* | *0.42* | *-0.56* | *-0.24* | *0.42* | *-0.56* |
| **Slope$_{Depression}$ on Parent Employment** | **-0.96** | **0.39** | **-2.48*** | **0.29** | **0.35** | **0.83** |
| **Intercept$_{SchoolClimate}$ with Slope$_{SchoolClimate}$** | **-0.09** | **0.01** | **-13.21*** | **-0.19** | **0.02** | **-10.63*** |
| *Intercept$_{Depression}$ with Slope$_{Depression}$* | *-5.91* | *1.24* | *-4.77** | *-5.91* | *1.24* | *-4.77** |
| **Intercept$_{Depression}$ with Intercept$_{SchoolClimate}$** | **-2.23** | **0.41** | **-5.42*** | **-0.49** | **0.28** | **-1.75*** |
| *Intercept$_{Depression}$ with Slope$_{SchoolClimate}$* | *-0.07* | *0.05* | *-1.31* | *-0.07* | *0.05* | *-1.31* |
| *Slope$_{Depression}$ with Intercept$_{SchoolClimate}$* | *0.25* | *0.09* | *2.67** | *0.25* | *0.09* | *2.67** |
| *Slope$_{Depression}$ with Slope$_{SchoolClimate}$* | *-0.03* | *0.02* | *-1.45* | *-0.03* | *0.02* | *-1.45* |
| Means | | | | | | |
| **Intercept$_{Climate}$** | **0.63** | **0.05** | **11.87*** | **0.00** | **0.00** | --- |
| **Slope$_{Climate}$** | **-0.03** | **0.01** | **-3.19*** | **0.00** | **0.00** | --- |
| **Intercept$_{Depression}$** | **3.44** | **0.42** | **8.18*** | **0.00** | **0.00** | --- |

| Parameter | Girls | | | Boys | | |
|---|---|---|---|---|---|---|
| | Estimate | SE | Estimate/SE | Estimate | SE | Estimate/SE |
| **$Slope_{Depression}$** | **1.22** | **0.47** | **2.60*** | **0.00** | **0.00** | --- |
| Variances | | | | | | |
| **$Intercept_{Climate}$** | **2.20** | **0.05** | **40.72*** | **1.67** | **0.06** | **28.30*** |
| **$Slope_{Climate}$** | **0.04** | **0.00** | **16.66*** | **0.10** | **0.01** | **12.20*** |
| **$Intercept_{Depression}$** | **79.41** | **5.18** | **15.32*** | **55.44** | **4.85** | **11.43*** |
| **$Slope_{Depression}$** | **4.55** | **0.63** | **7.21*** | **3.56** | **0.54** | **6.59*** |
| Observed Variable Intercepts | | | | | | |
| *aveclim1* | *21.81* | *0.04* | *620.40** | *21.81* | *0.04* | *620.40** |
| *aveclim2* | *21.87* | *0.03* | *644.63** | *21.87* | *0.03* | *644.63** |
| *aveclim3* | *21.90* | *0.03* | *682.85** | *21.90* | *0.03* | *682.85** |
| *aveclim4* | *22.07* | *0.04* | *623.96** | *22.07* | *0.04* | *623.96** |
| *aveclim5* | *21.85* | *0.04* | *591.54** | *21.85* | *0.04* | *591.54** |
| *dptot1* | *4.32* | *5.13* | *0.84* | *4.32* | *5.13* | *0.84* |
| *dptot2* | *4.20* | *4.42* | *0.95* | *4.20* | *4.42* | *0.95* |
| *dptot3* | *4.22* | *4.28* | *0.99* | *4.22* | *4.28* | *0.99* |
| *dptot4* | *3.86* | *4.76* | *0.81* | *3.86* | *4.76* | *0.81* |
| *dptot5* | *3.14* | *5.69* | *0.55* | *3.14* | *5.69* | *0.55* |
| Observed Variable Variances/Covariances | | | | | | |
| **aveclim1** | **0.11** | **0.01** | **8.88*** | **0.01** | **0.02** | **0.67** |
| **aveclim2** | **0.14** | **0.01** | **24.40*** | **0.20** | **0.01** | **17.70*** |

| Parameter | Girls | | | Boys | | |
|---|---|---|---|---|---|---|
| | Estimate | SE | Estimate/SE | Estimate | SE | Estimate/SE |
| **aveclim3** | **0.10** | **0.01** | **11.92*** | **0.01** | **0.02** | **0.64** |
| **aveclim4** | **0.10** | **0.01** | **13.45*** | **0.23** | **0.01** | **18.51*** |
| **aveclim5** | **0.18** | **0.02** | **9.99*** | **-0.01** | **0.02** | **-0.29*** |
| **dptot1** | **66.70** | **5.62** | **11.88*** | **45.97** | **4.75** | **9.68*** |
| **dptot2** | **85.38** | **6.01** | **14.21*** | **46.30** | **3.77** | **12.28*** |
| **dptot3** | **86.79** | **5.88** | **14.75*** | **64.11** | **7.12** | **9.01*** |
| **dptot4** | **55.43** | **5.24** | **10.58*** | **59.94** | **5.38** | **11.14*** |
| **dptot5** | **46.89** | **6.59** | **7.11*** | **38.07** | **5.64** | **6.75*** |
| **aveclim4 with aveclim1** | **-0.20** | **0.01** | **-26.84*** | **0.04** | **0.03** | **1.26** |
| **aveclim3 with aveclim1** | **-0.12** | **0.01** | **-13.46*** | **-0.17** | **0.01** | **-18.80*** |

*Note.* Bold rows represent parameters that were statistically significantly different for boys and girls. Italicized rows represent not statistically significantly different parameters. *dptot* = CES-D scale; *aveclim* = average for Safe/Orderly Environment and Supportive Relationships scores; 1 = grade 8; 2 = grade 9; 3 = grade 10; 4 = grade 11; 5 = grade 12; *$p < .05$.

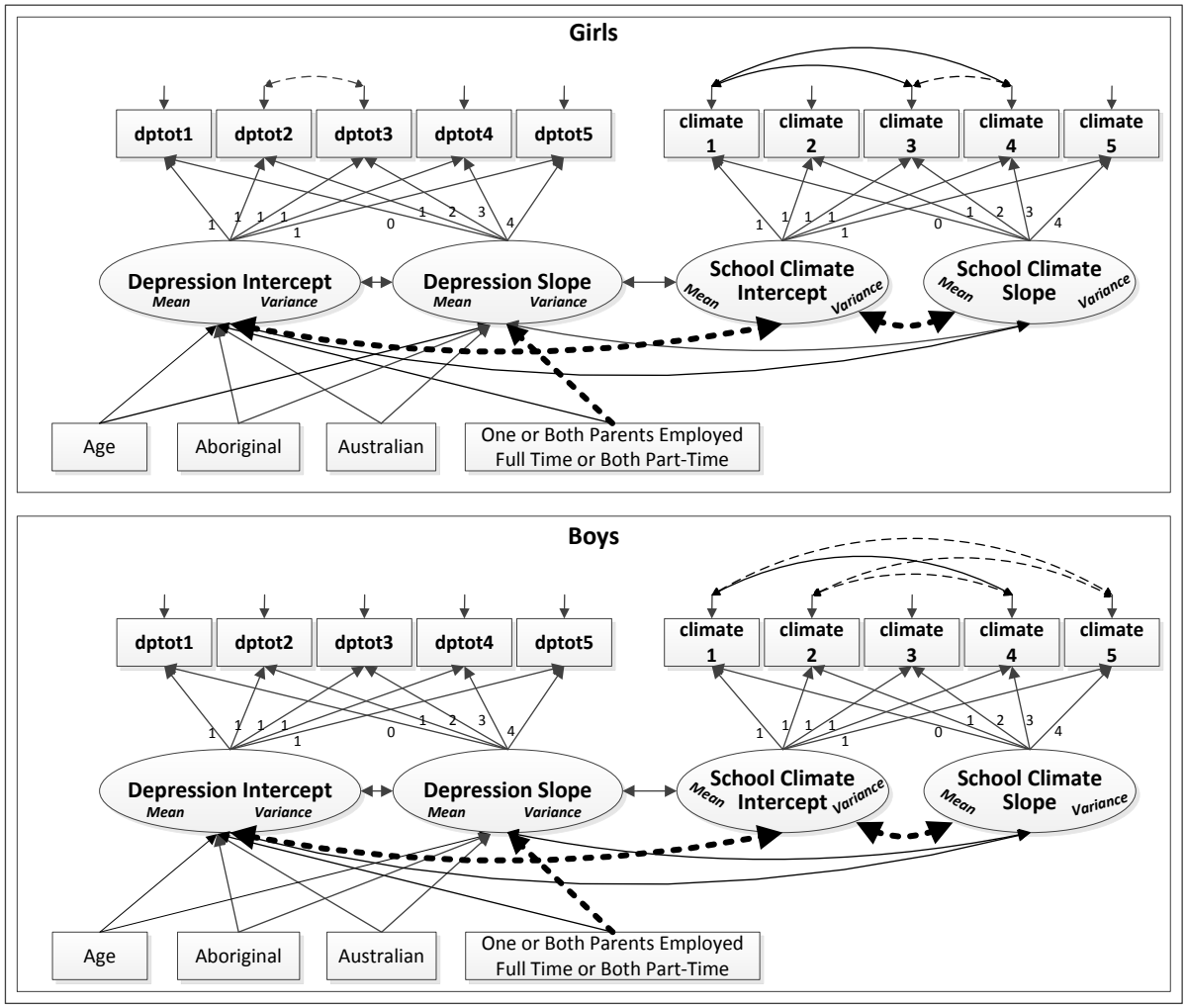


*Figure 1*. Pictorial representation of final model (Model 14 in Table 4; parameters shown in Table 5). Bold variable/factor names and thick dashed arrows represent freely-estimated parameters that operated differently for boys and girls (i.e., statistically significant differences between boys and girls). Thin dashed arrows represent parameters that were only present in the boys' or girls' model but not both. Thin solid arrows represent parameters that were present in both the boys' and girls' model and operated equivalently in both models (i.e., not statistically significantly different between boys and girls).