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Is Self-Esteem a Cause or Consequence of Social Support? A 4-Year Longitudinal Study

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Considerable research has been devoted to examining the relations between self-esteem and social support. However, the exact nature and direction of these relations are not well understood. Measures of self-esteem, and social support quantity and quality were administered to 961 adolescents across five yearly time points (M_{age} = 13.41 years). Structural equation modeling (SEM) was utilized to test between a self-esteem antecedent model (self-esteem precedes changes in social support), self-esteem consequence model (social support precedes change in self-esteem), and a reciprocal influence model. Self-esteem reliably predicted increasing levels of social support quality and network size across time. In contrast, the consequence model was not supported. The implications of this for helping adolescents to develop higher quality social support structures are discussed.

A commonly held notion in our society is that what we believe about ourselves shapes our interactions with the world, including our social interactions with others. The incredible array of self-help books on self-esteem with alluring titles such as *Ten Days to Self-Esteem* (Burns, 1993) and *Loving Yourself Loving Another* (Cole, 2001) is testament to our fascination with the topic and the importance that we believe self-esteem holds for our lives. Indeed, self-esteem has long been held as an important concept worthy of scientific study with many thousands of related publications (Baumeister, Campbell, Krueger, & Vohs, 2003; Leary, 1999).

Self-esteem can be understood as the positive or negative evaluations that one holds toward oneself (Rosenberg, Schooler, Schoenbach, & Rosenberg, 1995). Neff (2011) describes self-esteem as an "evaluation of our worthiness as individuals, a judgement that we are good valuable people" (Neff, 2011, p. 1). For adolescents, popular psychology suggests self-esteem is seen as a critical factor in their development, yet, empirical research suggests a more complicated picture. In particular, Baumeister et al. (2003) and Baumeister, Campbell, Krueger, and Vohs (2005) suggest that self-esteem appears to be a consequence of other processes, rather than a driving force of positive outcomes for individuals.

This study therefore seeks to address the following question: To what extent is self-esteem an antecedent or consequence of social support in adolescence? Despite considerable lay interest, relatively little empirical research has addressed this question and thus the temporal ordering of these constructs remains unclear. An antecedent model suggests that positive self-concept leads adolescents to actively develop and maintain positive social support networks. That is, high-self-esteem adolescents believe they have social worth and consequently engage in behaviors that build social support. In contrast, people with low self-esteem may avoid social relationships to avoid rejection and thereby fail to build or maintain social support systems. A self-esteem consequence model, however, suggests that positive social support produces higher self-esteem, or greater sense of social worth. That is, self-esteem may be a mere reflection of being more socially connected or valued.

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What Is Self-Esteem Good for?

A vast literature has been devoted toward examining the positive consequences of self-esteem, as well as links between low self-esteem and poor mental health and problematic behavior (e.g., for reviews, see Baumeister et al., 2003). However, the majority of this literature has been cross-sectional, where evidence of temporal ordering is not possible. Some longitudinal studies exist, supporting associations between low self-esteem and poorer mental health outcomes. For example, the relation between low self-esteem as a predictor for depressive symptoms has been established in a number of large, multiwave longitudinal studies among adolescents and young adults. However, depression did not predict subsequent self-esteem over time (Orth, Robins, & Roberts, 2008; Orth, Robins, Trzesniewski, & Schmitt, 2009). Other longitudinal studies, for example, highlight the relation between low self-esteem and hopelessness in childhood and a later risk of suicidal ideation in early adulthood (McGee, Williams, & Nada-Raja, 2001). Orth, Robins, and Widaman (2012) cross-lagged analyses suggested that self-esteem was better modeled as a cause of various life outcomes, as opposed to a consequence. Specifically self-esteem had a moderate effect on lifetime trajectories of affect and depression, small to moderate effects on relationship and job satisfaction, and limited effects on health. Findings are not always consistent, with some authors reporting that self-esteem in adolescence is, at best, a weak predictor of outcomes in young adulthood, when controlling for other psychosocial factors (Boden, Fergusson, & Horwood, 2008).

More recently the concept of self-esteem has come under considerable debate (e.g., see Baumeister et al., 2003; Crocker & Park, 2004). As highlighted by "the question of causality goes to the heart of the debate about the self-esteem movement and interventions aimed at boosting self-esteem" (Baumeister et al., 2003, p. 9). Comparatively few studies use rigorous methods or longitudinal designs to better understand the direction of proposed relationships (Baumeister et al., 2003). In addition, there is a small but growing literature highlighting the darker side of self-esteem, including, for example, self-esteem being associated with narcissism and the need to feel superior to others (Crocker & Park, 2004). Other research suggests that the combination of aggression and high self-esteem in children can lead to rationalization of their conduct and devaluing of others (Menon et al., 2007). Thus, it is unclear to what extent self-esteem is beneficial for social well-being.

Social Support

Perceived social support can be defined as an individual's subjective judgement that their social network will provide effective help during times of need (Lakey & Scoboria, 2005) and can be distinguished from received support, which refers to the receipt of actual support usually provided within a specific time frame (Uchino, 2009). Research into social support originally stemmed from an interest in the effects of this variable on chronic illness and disease outcomes (e.g., for reviews, see Martire, Lustig, Schulz, Miller, & Helgeson, 2004). However, this literature has grown considerably to focus on nonclinical populations, including, for example, the impact of social support on the elderly (Kasser & Ryan, 1999; Pinquart & Sörensen, 2000), adolescents (Mackinnon, 2012; Parker, Lüdtke, Trautwein, & Roberts, 2012), and employees (Nahum-Shani, Bamberger, & Bacharach, 2011). The importance of positive social connections has been well established with respect to physical health and psychological well-being (Deiner & Seligman, 2002). Indeed, some researchers define positive relations with others as a specific component of well-being (Ryff & Singer, 2000).

Perceived support has been found to predict a range of beneficial outcomes among adolescents (e.g., Danielsen, Wiium, Wilhelmsen, & Wold, 2010; Sakiz, Pape, & Hoy, 2012), and likewise perceived low support has been associated with more problematic behaviors and emotional difficulties during childhood and adolescence (Demaray & Malecki, 2002). Cross-sectional research suggests that perceived support is more strongly related to self-esteem, when compared to received support (Goodwin, Costa, & Adonu, 2004).

Quality Versus Quantity of Social Support

Related research in this area has stressed the importance of the *quality* (i.e., quality of relatedness) of social relations over the *quantity* of social networks (i.e., the size of networks) regarding well-being outcomes (Kasser & Ryan, 1999; Pinquart & Sörensen, 2000; Ryan & Deci, 2001). Along similar lines, Denissen, Schmitt, Penke, and Van Aken (2008) in their study of social interactions and self-esteem found that having high-quality social interactions was the strongest and most consistent predictor of self-esteem, when compared to interaction quantity

(or duration of time spent with significant others). Dekovic and Meeus (1997) found that the positive quality of peer relations was associated with increased self-esteem, whereas quantity (defined as time spent in activities with peers) was negatively associated with self-esteem. However, existing research has not specifically examined social support and the relative importance of quality social support relationships over quantity in adolescence. Nonetheless, it seems plausible that as adolescents progress toward emerging adulthood, they may place increasing importance on the quality of their relationships, when compared to the size of their social networks. Adolescence marks an important time with marked changes to social relationships. In particular, the transition into high school is associated with both increasing independence from the family and the development of new social networks, with some authors suggesting that peer relationships take on increasing importance during early adolescence (Furman & Buhrmester, 1992). Other research has highlighted the importance of peer social support as a predictor for both positive and negative behavioral outcomes, stressing the importance of these networks from middle school to high school (Wang & Eccles, 2012).

Social Support and Self-Esteem in Adolescence: What Influences What?

There is relatively little longitudinal research that addresses the temporal ordering of self-esteem and social support. Cross-sectional research has led to hypotheses consistent with quite different temporal models with the majority of studies focusing on the broader concept of relationship quality, as opposed to social support. Most of this research suggests that the quality of social relationships (Dekovic & Meeus, 1997; Laible, Carlo, & Roesch, 2004; Ryan, Stiller, & Lynch, 1994) and perceived social support (Goodwin et al., 2004) are associated with higher self-esteem. Others have considered a reciprocal relation, with each variable influencing the other (Dekovic & Meeus, 1997; Kinnunen, Feldt, Kinnunen, & Pulkkinen, 2008). However, research that progresses beyond cross-sectional designs, examining directional influences between self-esteem and social interactions, are scarce.

A notable exception to this includes the work of Leary and colleagues with a number of experimental (e.g., Leary, Haupt, Strausser, & Chokel, 1998; Leary, Tambor, Terdal, & Downs, 1995; Thomaes et al., 2010) and longitudinal (e.g., Denissen et al., 2008) studies examining sociometer theory. Sociometer theory suggests that people are not motivated to maintain their self-esteem per se; rather, they are motivated to increase their value and acceptance in relation to others. Self-esteem therefore acts as an internal, subjective "gauge" of perceived relations, and when lowered, individuals are motivated to pursue establishment of social connections to increase their self-esteem (Leary, 2005). Hence, this theory suggests a self-esteem consequence model, with social interactions influencing self-esteem.

To date, research on the sociometer has largely focused on cross-lagged associations between social interactions and state self-esteem. Experimental studies have demonstrated support for sociometer theory and the consequence model, with self-esteem appearing to act as a "gauge" reflecting individual's perceptions of social relatedness, at least when examined within a laboratory setting (e.g., Leary et al., 1995, 1998, 2003). Regarding trait self-esteem, Leary et al. (1995, Study 5) found a negative correlation between trait self-esteem and perceived exclusion. Furthermore, Leary et al. (1998, Experiments 2 and 3) found that state self-esteem, but not trait self-esteem, moderated reactions to rejection–acceptance manipulations. However, research examining trait self-esteem and social interactions in naturalistic settings over an extended period (e.g., across adolescence) is limited.

Research in this area has been conducted by Denissen et al. (2008), who tested sociometer theory across three levels including cross-lagged analysis at the intraindividual level and cross-sectionally at the interindividual and international levels. Cross-lagged analyses supported associations between perceptions of relationship quality, but not quantity, and changes in state self-esteem (self-esteem as consequence). The finding was strongest for intimate relationships, but was also significant with respect to family and friends. In contrast, the alternative pathway from state self-esteem to social interactions did not generally approach significance (antecedent model). Social interaction also emerged as the strongest predictor of trait self-esteem in the second study, although of course conclusions about the directional nature of these findings would be strengthened by longitudinal analyses (Denissen et al., 2008). Research in this area, however, has focused almost exclusively on state self-esteem and it is thus not clear if the same pattern of relations hold for more stable conceptions of self-esteem.

Longitudinal studies that examine cross-lagged associations between trait self-esteem and social interactions, as well as social support more specifically, are limited. An exception to this includes the

work of Kinnunen et al. (2008) who examined cross-lagged associations between self-esteem and social support among adults at two time points. They found evidence for a reciprocal relation with high self-esteem predicting high social support at age 42, and to a lesser extent, high social support at age 36 predicted high self-esteem at age 42. One notable limitation was the exclusive focus on network size as a predictor and failure to include ratings of perceived quality of support networks. In another related study, Stinson et al. (2008) examined the relation between social bonds, self-esteem, and health outcomes among university students using a longitudinal design, with six time waves over a 10-week period. In brief, they found evidence for reciprocal relations. Lower self-esteem predicted poorer quality social bonds and poorer quality social bonds predicted acute drops in self-esteem over the 10-week period.

Asendorpf and Van Aken (2003) examined cross-lagged associations between relationship quality and self-esteem among 230 adolescents assessed at 12 years and again at 17 years. Relationship quality was a single index score based on perceptions of instrumental help, intimacy, esteem enhancement, and reliability. Relationship quality at age 12 predicted global self-esteem at age 17 (after controlling for personality traits), but not vice versa, supporting the self-esteem as consequence model. More specifically self-esteem was influenced by perceived support from fathers (not mothers or friends). Limitations included the limited assessment schedule with two time waves, separated by an extended time period and different measures of self-esteem utilized at the two time points which may have compromised the findings.

In a related study, Caldwell, Rudolph, Troop-Gordon, and Do-Yeong (2004) examined reciprocal influence models between early adolescents' relational self-views (i.e., their social self-worth), peer engagement, and peer stress (M = 11.7 years). Reciprocal processes were supported within this three-wave longitudinal design covering a 1-year period. That is, negative views of social worth predicted social disengagement among peers, which in turn predicted peer stress. In addition, peer stress contributed to disengagement from peers and more negative views with respect to social self-worth. It is of interest to examine whether such findings hold when examining more time waves over an extended period in adolescence and specifically with respect to directional influence between global self-esteem and social support, not limited to peers.

Current Research

In recognition of previous research limitations, the aim of this study was to examine the longitudinal relations between self-esteem and perceived social support network size and social support quality utilizing a five-wave, 4-year design among Australian adolescents. More specifically, we aimed to examine (a) antecedent effects of self-esteem on change in social support and (b) consequence effects of social support on change in self-esteem. A third possibility was that both models held. That is, a reciprocal relation existed between self-esteem and social support. Given that many data points across a considerable time frame were used, we also considered whether there was a consistent trend over the time period in these relations, or whether the relations between self-esteem and social support varied as participants progressed through adolescence. The potential moderating effect of gender was also considered.

We did not predict a priori that the antecedent, consequence, or reciprocal model would be more strongly supported, as limited prior evidence was available to support such claims. However, it was anticipated that social support quality would most strongly predict self-esteem and, likewise, that self-esteem would most strongly predict social support quality, when compared to social support network size as suggested by previous research (e.g., Dekovic & Meeus, 1997; Denissen et al., 2008; Pinquart & Sörensen, 2000).

Method

Participants

During the course of 5 years a total of 961 adolescents participated in at least one wave of the study and were surveyed midyear during Grades 8–12. The sample consisted of participants from the Wollongong Youth Study who attended five Catholic high schools in a diocese in New South Wales, Australia. In Australia, nearly two thirds of non-government schools are Catholic, accounting for 21.5% of secondary schools (Australian Bureau of Statistics, 2012). The Diocese is concentrated on the city of Wollongong, but also includes schools within southwestern metropolitan Sydney, thereby ensuring a diverse socioeconomic and cultural mix of participants. The mean age of participants at Time 1 was 13.41 years (SD = 0.53). Gender was evenly distributed among the 961 adolescents, consisting of 51.2% males and 48.8% females.

Occupations for fathers included 35.2% professionals, 21.1% trades, 22.9% laborer/transport/production, 8.5% community service, and 10.5% in sales or clerical roles. Reported occupations for mothers comprised 30.4% professionals, 0.9% trades, 4.6% laborer/transport/production, 9.5% community service, and 33% in sales or clerical roles. In addition 1.8% of fathers and 21.6% of mothers were reported as homemaker or pensioner. Parent's marital status was reported as 84.5% married or in a cohabiting relationship, 13.3% separated or divorced, 1.9% reported that a parent was deceased, and 0.3% unknown.

Instruments

Self-Esteem

Global trait self-esteem was measured using the 10-item Rosenberg self-Esteem scale (RSE; Rosenberg, 1979). Participants were asked to indicate their agreement with statements such as, "Generally I feel satisfied with myself" and "I think that I am a failure." A binary forced response scale ("yes" or "no") was utilized. This scale has been validated in previous research (Heaven, Ciarrochi, & Hurrell, 2010). The mean Cronbach's alpha for the 10-item scale across the five time waves was $\alpha = .83$.

Item parcels were created for latent variable analysis. Due to the large number of items in the RSE, three-item parcels were created each consisting of randomly selected items (two parcels containing three items and one parcel containing four items). For models where items measure a single construct, parcels can be created through random assignment of items to individual parcels (Coffman & MacCallum, 2005). Numerous authors (e.g., Coffman & MacCallum, 2005) have noted the advantages of using item parcels as they are more normally distributed, reliable, and less influenced by unique characteristics of individual items and require the estimation of fewer parameters.

Social Support

Perceived social support network size and quality were measured using a revised four-item version of the Social Support Questionnaire (SSQ; Ciarrochi, Chan, & Bajgar, 2001; Sarason, Sarason, & Shearin, 1986). For each item, participants listed the persons perceived to be available for support and then rated how satisfied they were with these supports using a 6-point rating scale (1 = *very dissatisfied* to 6 = *very satisfied*). Participants are further asked to provide their relationship with the participant (e.g., friend, mother, brother, teacher). The four key areas of social support include: (a) Who do you feel really appreciates you as a person? (b) Who can you count on to help you out in a crisis situation, even though they would have to go out of their way to do so? (c) Whose lives do you feel you are an important part of? and (d) Who can you really count on for help? The revised SSQ has been validated in previous research with adolescents (Ciarrochi, Scott, Deane, & Heaven, 2003). The response scale ranged from 1 to 6 (*very dissatisfied* to *very satisfied*). The mean Cronbach's alpha for the four social support quality ratings across the five waves was $\alpha = .86$ ($SD = 0.03$). The Cronbach's alpha for the four social support network size totals across the five waves was $\alpha = .89$ ($SD = 0.02$).

Covariates

A number of adolescent and parental characteristics were included as covariates in the structural analyses. This included participant gender, non-English-speaking background, participant's country of birth, parental country of birth, socioeconomic status (SES), and IQ. Proxy for SES was taken from adolescent's reports of their mother's and father's occupation status. Participants completed standardized numerical and verbal assessments, which were included as a proxy for IQ in the structural analyses in keeping with past publications (Ciarrochi, Heaven, & Davies, 2007). Although these tests are strictly classified as aptitude or ability tests as opposed to IQ tests, they do assess learning that has occurred up to the time of administration. Tests are curriculum based, administered by the NSW Department of Education, and consist specifically of six numerical (numeracy, number, measurement, space, data, and numeracy problem solving) and three verbal (writing, reading, and language achievement) subtests. Scores on subtests were summed to provide a total verbal and total numeracy score for inclusion as covariates.

Procedure

Participation in the study was voluntary and required school, parental, and student consent to administer the questionnaires at each time wave (i.e., consent was renewed for each year of the study). The study was approved by the university ethics committee as well as the Catholic Diocese

Schools Authority. Information sheets invited participants to take part in a study relevant to "youth issues." Questionnaires were completed anonymously within class under exam style conditions, in the presence of a school teacher as well as a study author.

Statistical Analysis

We used Mplus 6.1 (Muthen & Muthen, Los Angeles, CA) to estimate a series of structural equation models representing the relations between adolescents' self-esteem, social support network size, and perceptions of social support quality across the 5 years of the study. All analyses were conducted with latent variables for self-esteem and social support. A latent variables approach in SEM is advantageous as it enables measurement error to be estimated (Weston & Gore, 2006). To control for measurement error in the current research, self-esteem, social support network size, and social support quality were estimated by the use of latent variables. Specifically, we used a parceling procedure in accordance with Little, Cunningham, and Shahar (2002). Robust maximum likelihood estimation was used such that standard errors and a chi-square test statistic were robust to non-normality. The data for this study had a nested structure with student's nested within schools. Our research hypotheses were not focused on multilevel hypotheses (e.g., interest in both student and school). However, even when interest is at a single level, failure to account for the nested structure can result in underestimated standard errors and too liberal tests of statistical significance (see Hox, 2010, for a general introduction). To control for this we used a sandwich estimator in Mplus via the TYPE=COMPLEX command. This sandwich estimator adjusts standard errors for the effects of clustered data and provides more appropriate tests of statistical significance. Models were considered to fit the data well if (a) the solution was well defined, (b) parameter estimates were consistent with the theory proposed, and (c) the fit indices were acceptable, giving emphasis to fit indices which are appropriate for larger sample sizes (McDonald & Marsh, 1990). Specifically we provide three additional fit indices in addition to chi-square, considering its sensitivity to sample size. The Tucker–Lewis index (TLI) and comparative fix index (CFI) $\geq .90$ and root mean square error of approximation (RMSEA) $< .08$ were considered to provide evidence of model fit in accordance with commonly accepted criteria.

Tests of Invariance for Time and Gender

Multiple-group SEM tests of invariance were used to test the generalizability of the results based on analyses of separate covariance matrices for males and females (measurement invariance across gender), as well as across the five waves (longitudinal measurement invariance). More specifically, measurement invariance across gender refers to the degree to which a test measures the same construct across varied groups, whereas longitudinal measurement invariance refers to whether a test reflects the same constructs in the same group but tested on different occasions (Widaman, Ferrer, & Conger, 2010). For the purposes of these analyses, we began with separate CFA models for the three factors (self-esteem, social support network size, and social support quality) across the five measurement occasions and gender. We first tested invariance separately for gender and time for the three constructs. Following this we tested measurement across gender and time simultaneously for all three constructs. This last approach is akin to testing invariance across the interaction between gender and time and is thus the more conservative approach.

Tests of invariance commenced with the least restrictive configural model where all model parameters are freely estimated across time and between genders (or time and genders independently). If the hypothesis of configural invariance is not rejected, stronger forms of measurement invariance can be utilized.

In the second model, termed *weak factor invariance*, factor loadings of each indicator were constrained to be equal across time and for both boys and girls. If this hypothesis is retained it means that the constructs have the same meaning in each group. Weak factorial invariance is an assumption of covariance-based models such as cross-lagged models preformed here (Nagengast et al., 2011). Finally, in the third model, termed *strong factorial invariance*, both the factor loadings and the intercepts were held to be constant across groups. Strong factorial invariance is an assumption of analyses that compare or utilize latent means. If this hypothesis is retained it indicates that any changes in the mean levels of the indicators are adequately captured as changes in the underlying means of the latent construct (Little, Preacher, Selig, & Card, 2007).

Evidence of invariance comes from comparing a well-fitting baseline model to alternate nested models. Invariance sensitivity to sample size of the chi-square that underlies the widespread use of fit

indices (e.g., RMSEA, CFI, and TLI) does not merely relate to model fit but additionally log-likelihood ratio tests that are often used to conduct such model comparisons. Therefore, in this study we used the criteria by Cheung and Rensvold (2002) who suggest invariance between nested models if ΔCFI is ≤ .01 (we utilized the same criteria for the TLI), and the criteria described by Chen (2007), who suggests invariance between nested models if ΔRMSEA is ≤ .015.

Missing Data

As with most longitudinal data that cover a long time period, attrition was a concern (see Graham, 2012). From the 961 participants, a total of 281 had data from all five waves (53% female), 246 had data from four waves (50.4% female), 219 had data from three waves (46.6% female), 129 had data from two waves (44.5% female), and 86 had data from only one wave (41.9% female). With respect to each time wave the gender ratio was as follows at Time 1 (N = 793, 49.1% female), Time 2 (N = 786, 48.6% female), Time 3 (N = 778, 49.7% female), Time 4 (N = 565, 52.5% female), and Time 5 (N = 468, 51.9% female).

Typically, attrition leads to data that are not missing completely at random and thus parameter estimates may be biased particularly when traditional methods such as listwise deletion are used (see Enders, 2010). Of particular concern are selectivity effects where individuals with certain characteristics are more likely to remain within the sample across time waves. We compared those participants who completed all five waves of data with those who completed less than five time waves on the key variables of self-esteem, social support quality, and network size for each time wave (see Table 1). As can be viewed from Table 1, the only significant difference between completers and noncompleters was for social support network size for Grade 9 (p = .05). Moreover, effect sizes were small for all comparisons (d = ≤ .20). Completers and noncompleters did not differ by gender for Grades 8 (phi = .05), 9 (phi = .04), or 10 (phi = .06), but were more likely to be female at Grades 11 (phi = .10) and 12 (phi = .08). Although selectivity effects were present, the differences were typically small. This was not surprising given that the unit of selection was school and thus random factors like absenteeism on the day of testing or participants changing schools accounted for much of the attrition. Nevertheless, to deal with these missing data we used full information maximum likelihood estimation (FIML) in contrast to traditional listwise deletion

Table 1
Comparisons on Key Variables for Completers and Noncompleters by Grade

	Self-esteem						Social support quality						Social support network size					
	Completers		Non-completers				Completers		Non-completers				Completers		Non-completers			
Grade	*M*	*SD*	*M*	*SD*	*p*	*d*[a]	*M*	*SD*	*M*	*SD*	*p*	*d*[a]	*M*	*SD*	*M*	*SD*	*p*	*d*[a]
8	0.82	0.21	0.81	0.22	.40	.05	5.36	0.79	5.35	0.75	.90	.01	5.57	2.36	5.40	2.32	.34	.07
9	0.78	0.26	0.77	0.25	.54	.04	5.30	0.67	5.35	0.69	.29	.07	6.08	2.27	5.74	2.23	.05	.15
10	0.78	0.24	0.77	0.26	.43	.04	5.33	0.69	5.38	0.74	.34	.07	6.27	2.18	6.20	2.41	.70	.03
11	0.82	0.24	0.81	0.22	.49	.04	5.45	0.63	5.44	0.70	.84	.02	6.40	2.08	6.34	2.25	.77	.03
12	0.80	0.24	0.75	0.26	.08	.20	5.40	0.72	5.40	0.77	.95	.00	6.22	2.26	6.04	2.30	.39	.08

[a]Effect size Cohen's *d*.

approaches. FIML uses all the available information for parameter estimation (Enders, 2010).

Results

Measurement Invariance Across Time and Gender

Table 2 reports the measurement invariance for time and gender tested separately as well as simultaneously. When testing gender and time separately, Models 1–3 showed a good fit to the data. As testing gender and time simultaneously is the most stringent test for measurement invariance, we will focus on this invariance test. The configural invariance model for gender and time showed a good fit to the data. Subsequently, the fit for the weak factorial model was similar and within the criteria specified by Chen (2007) and Cheung and Rensvold (2002), indicating that the latent constructs had the same meaning for males and females and the same meaning over time (ΔRMSEA = .01, ΔCFI = .01, ΔTLI = .00). Weak factorial invariance is an assumption of covariance-based models (e.g., autoregressive cross-lag models). Finally, the strong factorial model for gender and time held, indicating that any changes in the mean levels of the indicators for males and females were adequately captured in the mean levels for the latent constructs, and further changes in the mean level of indicators over time were adequately captured in the mean levels of the latent constructs (ΔRMSEA = .01, ΔCFI = .00, ΔTLI = .01). As the strong factorial model held when testing time and gender simultaneously, these constraints were used in subsequent analyses.

Table 2
Gender and Longitudinal Invariance Statistics

Model	χ^2	*df*	RMSEA	CFI	TLI
Gender invariance					
M1—Configural	3,935	2,558	.033	.928	.916
M2—Weak factorial	3,957	2,566	.034	.927	.916
M3—Strong factorial	4,013	2,574	.034	.925	.913
Longitudinal invariance					
M1—Configural	1,800	1,215	.022	.966	.959
M2—Weak factorial	1,829	1,247	.022	.967	.960
M3—Strong factorial	1,906	1,279	.023	.964	.958
Longitudinal and gender invariance					
M1—Configural	3,911	2,494	.034	.926	.912
M2—Weak factorial	3,928	2,539	.034	.927	.915
M3—Strong factorial	4,007	2,571	.034	.925	.913

Note. RMSEA = root mean square of approximation; CFI = comparative fit index; TLI = Tucker–Lewis index.

Changes in Constructs Over Time and by Gender

Table 3 provides the means and standard deviation for all key variables—self-esteem, social support network size, and social support quality—across the five waves. Self-esteem dropped in Grade 9, stayed relatively stable in Grade 10, increased slightly in Grade 11, before dropping again in Grade 12. Social support network size increased most dramatically during Grades 9 and 10, and less so from Grades 10 and 11, before decreasing somewhat in Grade 12. Finally, social support quality stayed relatively stable during Grades 9 and 10, increased somewhat during Grade 11, and remained fairly stable during Grade 12.

Network Size and Support Type

Social network size reported across time by gender and support type (i.e., parental, peer, sibling, extended family, other support) is available in Table 4. A small number of adolescents reported receiving support from "no one" in Grades 8–12 (M = 2.8, SD = 1.72). This included six students in Grade 8 (five of whom were male), one male student in Grade 9, two students in Grade 10 (one male, one female), three male students in Grade 11, and two male students in Grade 12.

Evaluation of Structural Models

In this study we tested a series of increasingly restrictive structural equation models to identify the most parsimonious model concerning the longitudinal relations among self-esteem, social network size, and social network quality (see Figure 1 for a conceptual illustration). The autoregressive paths, or latent factors, predicting themselves at later time points, provide information about relative stability of constructs, with higher values indicating higher

Table 3
Descriptives for Key Variables Reported by Grade

	Self-esteem		Social support quality		Social support network size	
Grade	*M*	*SD*	*M*	*SD*	*M*	*SD*
8	0.81	0.22	5.34	0.76	5.38	2.35
9	0.76	0.26	5.32	0.68	5.81	2.27
10	0.76	0.25	5.35	0.73	6.19	2.34
11	0.81	0.23	5.43	0.69	6.26	2.22
12	0.77	0.25	5.41	0.75	6.07	2.31

Table 4
Social Support Network Size Reported by Support Type and Gender

Grade	Parental support				Peer support				Sibling support				Extended family				Other support			
	Girls	*SD*	Boys	*SD*	Girls	*SD*	Boys	*SD*	Girls	*SD*	Boys	*SD*	Girls	*SD*	Boys	*SD*	Girls	*SD*	Boys	*SD*
8	1.55	0.59	1.58	0.61	2.34	0.53	1.36	1.46	0.89	0.87	0.74	0.75	0.92	1.20	0.82	1.16	0.08	0.24	0.12	0.32
9	1.41	0.32	1.47	0.66	3.29	1.34	2.23	1.84	0.82	0.78	0.70	0.73	0.76	1.88	0.62	0.97	0.12	0.68	1.15	0.61
10	1.40	0.65	1.43	0.72	3.25	2.04	2.32	2.15	0.81	0.80	0.65	0.73	0.71	0.99	0.65	0.98	0.21	0.41	0.15	0.35
11	1.48	0.64	1.46	0.73	2.98	1.80	2.24	1.98	0.82	0.75	0.69	0.74	0.67	0.90	0.61	0.96	0.33	0.49	0.22	0.52
12	1.44	0.62	1.37	0.76	2.96	1.83	2.05	1.84	0.90	0.83	0.65	0.80	0.60	0.81	0.57	0.96	0.30	0.49	0.22	0.43

stability. Conversely, the paths measured across latent variables provide information about the effect of one variable on change in another variable over time.

With data spanning more than two time periods, a number of models are possible, including autoregression and cross-lag paths spanning more than a single time lag. The aim of the current research was not to establish the best fitting model, but rather to identify the most parsimonious model that adequately represented the data. More specifically, this is achieved by comparing Model 1 (baseline model) with subsequent models and observing whether the fit for each subsequent model (which is a product of constraining parameters) is not significantly worsened based on specified cutoff values.

We tested a series of four models in which successive nested models were increasingly parsimonious (see Figure 1). Model 1 tested a fully forward model in which latent factors at Time 1 predicted all latent variables at each subsequent time point (and similarly for Time 2, Time 3, and Time 4). This model is equivalent in degrees of freedom and fit to a CFA model in which all latent factors are correlated. Model 2 maintained all autoregression paths, but constrained the cross-lag effects to single year spans (e.g., from Time 1 to Time 2 but not Time 1 to Time 3). Model 3 constrained both autoregression and cross-lag to a single year span. Finally, Model 4 constrained all autoregression and cross-lag effects from Model 3 to be consistent across time. This model was thus a test of whether the relation between self-esteem and the social network and social support quality constructs had consistent developmental effects across time and was the most parsimonious solution. Model 1 was used as a baseline model from which all subsequent models were compared using the invariance criteria specified earlier. The aim of this approach was to identify the most parsimonious model that still provided an appropriate account of the data.

As can be seen from Table 5 all models provided an adequate fit to the data. Model 1 as determined by necessity (greater number of parameters and the least constraints) provided the best fit, with fit statistics decreasing somewhat for each subsequent model (see chi-square values in Table 5). Utilizing criteria specified by Cheung and Rensvold (2002) and Chen (2007), when exploring ΔCFI, ΔTLI, and ΔRMSEA, evidence for invariance was present up to and including Model 4. Model 4, the most parsimonious model, had satisfactory fit that changed little from the baseline fully forward model. This strongly suggests that the relation between self-esteem and

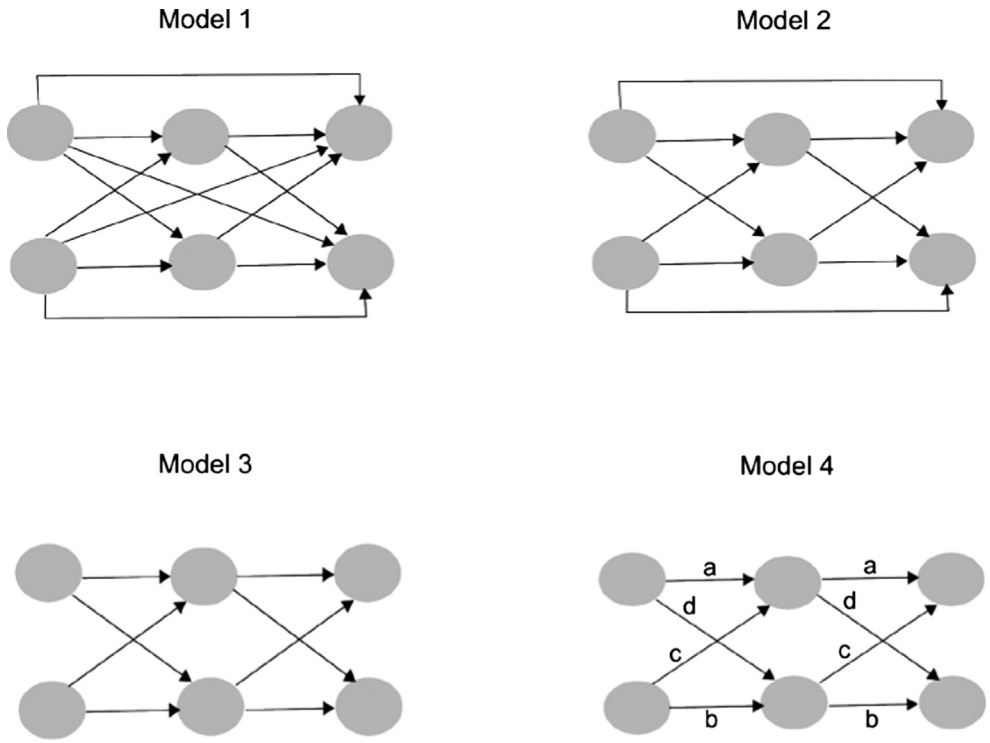

Figure 1. Conceptual diagram Models 1–4. This illustration is provided to facilitate understanding of structural models; hence, all latent variables and time waves are not displayed. Model 1: All latent factors at Time 1 predicted all latent factors at Times 2–5 (similarly, all latent factors at Times 2, 3, and 4 predicted all latent factors at later waves). Model 2: All autoregression paths maintained but constrained cross-lag effects to single year span. Model 3: Constrained autoregression and cross-lag effects from Model 3 to be consistent across time. Model 4: Paths with the same letter were constrained to be equal.

Table 5
Models 1–4 for Self-Esteem, Social Support Network Size, and Social Support Quality

Model	χ^2	*df*	RMSEA	CFI	TLI
M1 Fully forward model	2,652	1,959	.02	.96	.96
M2 Single-year span cross-lags only	2,712	1,998	.02	.96	.96
M3 Single-year span structural paths only	2,820	2,013	.02	.96	.95
M4 Constrained structural paths	2,904	2,040	.02	.96	.95

Note. RMSEA = root mean square of approximation; CFI = comparative fit index; TLI = Tucker–Lewis index.

social network size and quality had consistent developmental effects across time. The coefficients for Model 4 are reported in Figure 2.

Antecedent and Consequence Effects for Self-Esteem

All three constructs (self-esteem, social support quality, and social support network size) over five time periods were fitted within the same model (see Figure 1 for conceptual diagram). Figure 2 displays key findings from Model 4, which was the most parsimonious solution. Standardized coefficients are reported for all cross-lags and autoregressive paths. For the results from Model 4 we provide two standardized estimates. Beta 1 (β_1) is an effect size based on pooled standard errors from across all time lags taken from averaging the parameter-specific standardization coefficients obtained from Mplus. We also report effect size ranges or Beta 2 (β_2) based on time lag-specific standard errors.

In brief, the effect of self-esteem on change in both social support network size and social support quality had significant and consistent developmental effects across time. Most notably, self-esteem predicted increasing levels of social support quality across time ($\beta_1 = .13$; β_2 range = .12–.13, $p < .001$). In addition, self-esteem emerged as a significant predictor of social network size across time ($\beta_1 = .10$; β_2 range = .10–.11, $p < .001$). In contrast, the consequence model, or effect of social support network size on change in self-esteem, was not supported

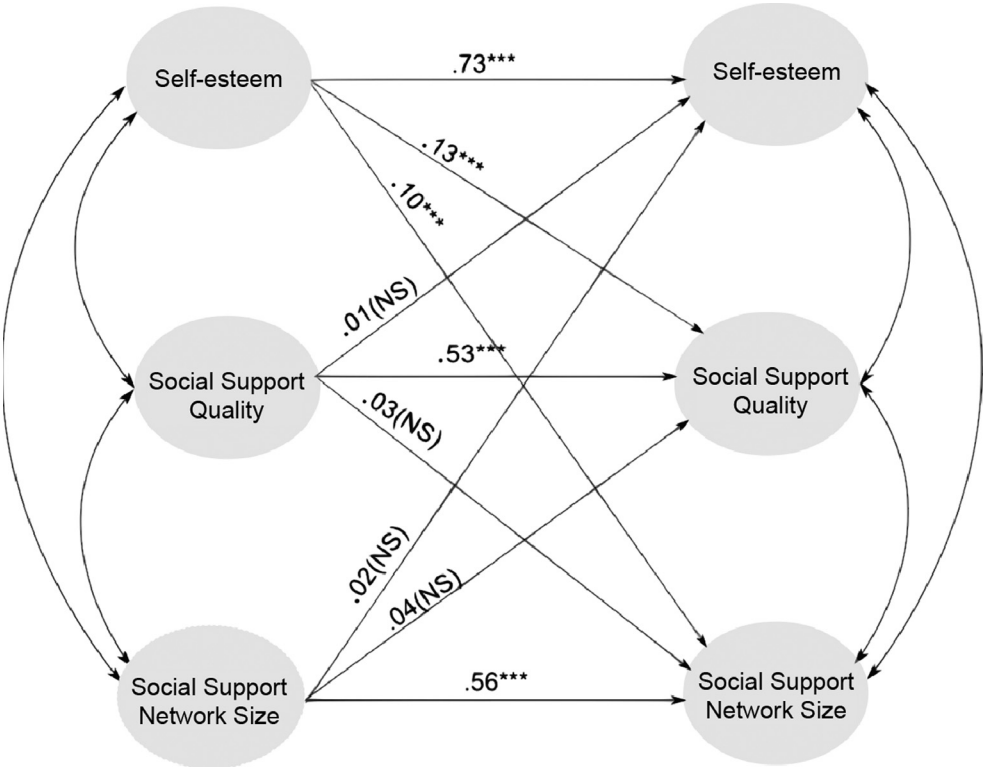

Figure 2. Model 4—Constrained structural model displaying standardized coefficients. In Model 4 the unstandardized coefficients for the cross-lag paths were set equal. To provide a common effect size for this estimate we provide a single standardized coefficient that utilizes a pooled standard error taken from averaging the parameter-specific standardization coefficients obtained from Mplus. NS = nonsignificant.
***$p < .001$.

across time ($\beta_1 = .02$; β_2 range = .02–.03, $p = ns$). Similarly, the effect of social support quality on change in self-esteem was not supported across time ($\beta_1 = .01$; β_2 range = .01–.01, *ns*).

We compared Model 4 for girls and boys to examine whether autoregression and cross-lag effects were the same across gender. Using the delta method to compare these structural paths for boys and girls, gender generally did not moderate the relation between self-esteem and social network size or quality. The single exception to this was for social support satisfaction predicting social support network size where there was a small but significant difference, in which this relation was significant for males but not for females. The delta method is a means of approximating standard errors for a transformation of a set of parameter where the variance–covariance matrix of the parameters is known (Oehlert, 1992). In the current case the transformation of interest was the difference between two cross-lagged paths ($\beta_1 - \beta_2 = \text{Diff}_{\beta1,\beta1}$) where standard errors were required to test whether this difference was significantly different from zero (i.e., testing the hypothesis that the parameter estimates were of different magnitudes).

Sensitivity Analysis Findings for Participants With Two or More Waves of Data Only

It is considered appropriate to include data from all participants when utilizing FIML, such as used here (Enders, 2010; Graham, 2012). Nonetheless, as an additional precaution and to ensure the robustness of our findings we reran the analyses including only those participants who had data for two or more waves ($N = 875$). The findings of this sensitivity analysis with the reduced subset of participants indicated that changes to coefficients were minimal in all instances and were in keeping with findings reported earlier and in Figure 2. Indeed, averaged coefficients for the cross-lags were identical in almost all instances. Self-esteem predicted increasing levels of social support quality ($\beta = .12$, $p < .001$) and social network size across time ($\beta = .10$, $p < .001$). In contrast, social support quality and network size were not found to predict

changes in self-esteem across time (β = .01, *ns*, and β = .02, *ns*, respectively.)

Discussion

This study employed a longitudinal 4-year, five-wave design that aimed to clarify the directional nature of the relations between adolescents' self-esteem and their perceptions regarding social support. The broad findings suggest that how adolescents feel about themselves influences both their perceptions of social support quality and their social support network size, albeit to a lesser degree.

Specifically, self-esteem reliably predicted increasing levels of social support quality and social support network size. Importantly, a model in which this effect was consistent over time provided an adequate account of the data, indicating consistency over the five time periods. As anticipated, this finding was most reliable for the relation between self-esteem and perceived quality of support, when compared to individuals' perceptions of the size of their support network.

In contrast, the consequence model for self-esteem was not supported. That is, the effect was not significant in the case of social support quality and social network size. This is somewhat surprising considering the growing literature supporting sociometer theory and established relations between individuals' social relations and state fluctuations in self-esteem (e.g., Denissen et al., 2008; Leary et al., 1995; Leary et al., 1998). Unlike many previous studies, ours focused on trait self-esteem and perceptions of social support, as one aspect of interpersonal functioning within a longitudinal five-wave design during adolescence.

Existing research on sociometer theory has been directed toward examining the quality of social relations in general and, in particular, experiences of inclusion and exclusion in interpersonal interactions. Commonly, this has been within experimental designs focused on adult populations with state-based measures of self-esteem (e.g., Leary et al., 1995; Leary et al., 2003). Cross-lagged analyses have not focused on the relations between trait self-esteem and social interactions. Our findings in support of the antecedent model are inconsistent with sociometer theory, which proposes that "self-esteem has no more causal influence on behavior than the fuel gauge has on the operation of a car" (Leary, 2003, p. 273). Indeed, our findings suggest that global perceptions of self-worth *do* influence adolescents' support networks, including both perceived quality and network size, in a manner that is consistent across high school. Of course, this does not imply that self-esteem does not develop over time, within a social context, and in response to an individual's social context.

With respect to existing longitudinal studies in this area, our findings are partially consistent with the work of Kinnunen et al. (2008) who found that self-esteem at age 36 predicted social support at age 42. However, these authors also found that, to a lesser degree, social support predicted self-esteem. It is possible that these differences could be attributed to a number of factors such as the age of the participants, as well as methodological differences such as the limited time waves and exclusive focus on network size. Our research builds on this former work by demonstrating the importance of self-esteem for perceived social support quality, relative to support network size.

Our findings diverge from those of Asendorpf and Van Aken (2003), in one of the only known cross-lag studies examining relationship quality and self-esteem among adolescents. This particular study supported a consequence model with relationship quality predicting self-esteem. However, there were a number of methodological differences with respect to the design and analysis that may, in part, account for our divergent findings. For example, the former study had a different assessment of social support, a younger starting time period (12 years), smaller sample, and only two assessments across 5 years. The strength of our study is the use of SEM and five assessments across 5 years.

The finding that self-esteem emerged as the stronger predictor of social support quality may in part reflect the increasing importance placed on emotional closeness during this developmental period, when compared to the early adolescent years (Buhrmester, 1990). For example, it is possible that holding more positive self-beliefs in later adolescence may lead to a greater confidence in managing relationships, resulting in a greater tendency toward developing desired intimate and close connections, in turn leading to increases in perceived social support quality. It should be noted that these suggestions are tentative and were not directly examined in this study. Concerning gender there was no difference in the relation between self-esteem and social support when examined by gender. This is important as it suggests that the self-beliefs of both males and females predict the perceived quality of their social supports, as well as the size of their social networks across adolescence. Consequently,

practical implications discussed in the following section are equally relevant to both males and females, although of course future research is needed, to both confirm and build on our findings.

Practical Implications

Baumeister et al. (2003) argue that the emphasis on "self-esteem boosting" interventions is not empirically supported and, specifically, that self-esteem has not been shown to predict quality or quantity of social interactions. In contrast, Swann, Chang-Schneider, and McClarty (2007) contend that "self-views do matter," and consequently empirical research should be devoted toward the development of interventions to promote self-esteem. This study is consistent with the latter argument; that is, self-esteem appears to be generally beneficial. However, what our study and previous longitudinal studies do not address is the best way to raise self-esteem. Baumeister et al. (2003) criticized self-esteem interventions that seek to increase self-esteem in a noncontingent way (e.g., telling everybody they are special regardless of what they do). However, we would suggest that these criticisms of certain kinds of self-esteem intervention should not be taken as evidence that self-esteem, as a construct, has no utility. There are ways to influence self-esteem that do not require the practitioner to "build" self-esteem in noncontingent ways. Specifically, a new wave of mindfulness-based interventions seeks to alter one's relation with self-relevant thoughts rather than altering content.

For example, acceptance and commitment therapy (ACT) teaches people to create distance from, and to let go of, unhelpful negative self-concepts (Ciarrochi & Bailey, 2008). These negative self-concepts then have less of an influence on future behavior (Forman et al., 2007; Gutiérrez, Luciano, Rodrőguez, & Fink, 2004). Similarly, self-compassion interventions seek to help people to accept their flaws and treat themselves kindly when they are experiencing self-criticism (Neff, 2011). ACT and self-compassion interventions seek to alter one's relation with thoughts, so that those thoughts occur but no longer have power over behavior. These interventions are quite different from "content" interventions that seek to increase the positivity of thoughts. Baumeister et al. (2003) are premature in their conclusions that self-esteem does not predict the quality or quantity of social interactions. Our research suggests that self-esteem may be a worthy target of intervention to influence social support networks; moreover, our data suggest that intervening at any stage during the high school years may be of benefit.

Limitations and Future Directions

A major limitation was that it was not possible to disentangle state versus trait effects in this study as time periods were a year apart. Considering our findings within the context of existing research (e.g., the work of Leary et al. 1995; Leary et al. 1998; Leary et al., 2003, on the sociometer), future longitudinal studies should seek to examine cross-lagged associations between both state and trait self-esteem, across shorter time periods. Further to this, although this study provides valuable information regarding the antecedent and consequence model (i.e., whether self-esteem or social support is likely to precede the other), our study still has a limitation common to practically all real-world, nonexperimental research, that is, the possible presence of third-variable explanations for the observed effects (Morgan & Winship, 2007).

A limitation of the RSE is that a dichotomous response format was used in this study, rather than the 4-point Likert scale typically associated with this instrument. A potential advantage of Likert scales over the dichotomous response format is that an increase in points allows for greater variance. Some research suggests that although dichotomous scales may rate highly on ease of use, they are likely to be rated low with regard to facilitating adequate expression of feelings and reliability. Improvements in reliability may be most evident when moving from 2- to 6- or 7-point scales (Preston & Colman, 2000). Of course practicalities such as time demands and ease of use must also be considered. In addition, social support quality was not reported separately for individuals nominated within a particular participant's social network, but rather as an average indicator of quality across all nominated persons within that network. Considering our finding that self-esteem most reliably predicted social support quality, future research would benefit from obtaining further detail with regard to the nature of that support (e.g., peer, parents, etc.). This would allow, for example, analysis of self-esteem and social support quality separately by support type to ascertain whether perceived quality for parental and peer support contributes differentially to outcomes. Existing research in this area is limited. However, one cross-sectional study demonstrated that both parental and peer attachment contribute uniquely to adolescents self-esteem (Laible et al., 2004). In the broader domain of school engagement, the combination and degree of support from peers, teachers, and parents has been found to contribute differentially to outcomes. Considering school outcomes, for example,

adolescents most at risk have been found to be those with limited parental and teacher support paired with strong peer support (Wang & Eccles, 2012).

This study focused specifically on perceived social support, and future research would benefit from examining other aspects of social relations such as belongingness and social inclusion and directional relations with trait self-esteem within multiwave, longitudinal designs. Such a focus would also coincide more closely with sociometer theory. Future research may also benefit from attempts to include more objective ratings of received social support; for example, from significant others including parents, teachers, and peers. Consistent with O'Mara, Marsh, Craven, and Debus (2006), we also recommend that future researchers consider utilizing measures of both domain-specific and global self-esteem.

While acknowledging the limitations of the current research, this study has a number of notable strengths. First, the study involved a longitudinal 4-year, five-wave design with more time waves and a notably larger sample than existing studies in this area. Second, we employed rigorous statistical procedures, involving SEM, which allowed us to partial out measurement error and examine directional influences between self-esteem and perceptions of social support quality as well as social support network size.

Conclusions

Our research suggests that how adolescents view themselves predicts the perceived quality of their social support as well as the size of that support network, albeit to a lesser degree across the high school years. In contrast, our findings do not support a consequence model. Further longitudinal research is clearly needed both to confirm and build on the research presented here, including examination of directional influences. Intervention research is needed to establish whether experimentally increasing self-esteem leads to subsequent increases in social support.

References

Asendorpf, J. B., & Van Aken, M. A. G. (2003). Personality-relationship transaction in adolescence: Core versus surface personality characteristics. *Journal of Personality*, *71*, 629–666. doi:10.1111/1467-6494.7104005

Australian Bureau of Statistics. (2012). *Yearbook Australia: Primary and secondary education schooling structures* (Document 1301.0). Canberra, Australia: Government Printer.

Baumeister, R. F., Campbell, J. D., Krueger, J. I., & Vohs, K. D. (2003). Does high self-esteem cause better performance, interpersonal success, happiness, or healthier lifestyles? *Psychological Science in the Public Interest*, *40*, 1–44. doi:10.1111/1529-1006.01431

Baumeister, R. F., Campbell, J. D., Krueger, J. I., & Vohs, K. D. (2005). Exploding the self-esteem myth. *Scientific American*, *292*, 84–91. doi:10.1038/scientificamericanmind1205-50

Boden, J. M., Fergusson, D. M., & Horwood, L. J. (2008). Does adolescent self-esteem predict later life outcomes? A test of the causal role of self-esteem. *Development and Psychopathology*, *20*, 319–339. doi:10.1017/S0954579408000151

Buhrmester, D. (1990). Intimacy of friendship, interpersonal competence, and adjustment during preadolescence and adolescence. *Child Development*, *61*, 1101–1111. doi:10.1111/j.1467-8624.1990.tb02844.x

Burns, D. (1993). *Ten days to self-esteem*. New York, NY: Morrow.

Caldwell, M. S., Rudolph, K. D., Troop-Gordon, W., & Do-Yeong, K. (2004). Reciprocal influences among relational self-views, social disengagement, and peer stress during early adolesence. *Child Development*, *75*, 1140–1154. doi:10.1111/j.1467-8624.2004.00730.x

Chen, F. F. (2007). Sensitivity of goodness of fit indexes to lack of measurement invariance. *Structural Equation Modeling*, *14*, 464–504. doi:10.1080/10705510701301834

Cheung, G. W., & Rensvold, R. B. (2002). Evaluating the goodness-of-fit indexes for testing measurement invariance. *Structural Equation Modeling*, *9*, 233–255. doi:10.1207/S15328007SEM0902_5

Ciarrochi, J., & Bailey, A. (2008). *A CBT-practitioner's guide to ACT: How to bridge the gap between cognitive behavioral therapy and acceptance and commitment therapy*. Oakland, CA: New Harbinger.

Ciarrochi, J., Chan, A. Y. C., & Bajgar, J. (2001). Measuring emotional intelligence in adolescents. *Personality and Individual Differences*, *31*, 1105–1119. doi:10.1016/S0191-8869(00)00207-5

Ciarrochi, J., Heaven, P. C. L., & Davies, F. (2007). The impact of hope, self-esteem, and attributional style on adolescents' school grades and emotional well-being: A longitudinal study. *Journal of Research in Personality*, *41*, 1161–1178. doi:10.1016/j.jrp.2007.02.001

Ciarrochi, J., Scott, G., Deane, F. P., & Heaven, P. C. L. (2003). Relations between social and emotional competence and mental health: A construct validation study. *Personality and Individual Differences*, *35*, 1947–1963. doi:10.1016/S0191-8869(03)00043-6

Coffman, D. L., & MacCallum, R. C. (2005). Using parcels to convert path analysis models into latent variable models. *Multivariate Behavioral Research*, *40*, 235–259. doi:10.1207/s15327906mbr4002_4

Cole, J. (2001). *Loving yourself loving another: The importance of self esteem for successful relationships*. London, UK: Vremilion.

Crocker, J., & Park, L. E. (2004). The costly pursuit of self-esteem. *Psychological Bulletin*, *130*, 392–414. doi:10.1037/0033-2909.130.3.392

Danielsen, A. G., Wiium, N. W., Wilhelmsen, B. V., & Wold, B. (2010). Perceived support provided by teachers and classmates and students' self reported academic initiative. *Journal of School Psychology*, *48*, 247–267. doi:10.1016/j.jsp.2010.02.002

Deiner, E., & Seligman, M. E. P. (2002). Very happy people. *Psychological Science*, *13*, 81–84. doi:10.1111/1467-9280.00415

Dekovic, M., & Meeus, W. (1997). Peer relations in adolescence: Effects of parenting and adolescents' self-concept. *Journal of Adolescence*, *20*, 163–176. doi:10.1006/jado.1996.0074

Demaray, M. K., & Malecki, C. R. M. (2002). Critical levels of perceived social support associated with student adjustment. *School Psychology Quarterly*, *17*, 213–241. doi:10.1521/scpq.17.3.213.20883

Denissen, J. A., Schmitt, D. P., Penke, L. P., & Van Aken, M. A. G. (2008). Self-esteem reactions to social interactions: Evidence for sociometer mechanisms across days, people and nations. *Journal of Personality and Social Psychology*, *95*, 181–196. doi:10.1037/0022-3514.95.1.181

Enders, C. (2010). *Applied missing data analysis*. New York, NY: Guilford Press.

Forman, E. M., Hoffman, K. L., McGrath, K. B., Herbert, J. D., Brandsma, L. L., & Lowe, M. R. (2007). A comparison of acceptance and control-based strategies for coping with food cravings: An analog study. *Behavior Research and Therapy*, *45*, 2372–2386. doi:10.1016/j.brat.2007.04.004

Furman, W., & Buhrmester, D. (1992). Age and sex differences in perceptions of networks of personal relationships. *Child Development*, *63*, 103–115. doi:10.1111/j.1467-8624.1992.tb03599.x

Goodwin, R., Costa, P., & Adonu, J. (2004). Social support and its consequences: "Positive" and "deficiency" values and their implications for support and self-esteem. *British Journal of Social Psychology*, *43*, 465–474. doi:10.1348/0144666042038006

Graham, J. (2012). *Missing data: Analysis and design*. New York, NY: Springer.

Gutiérrez, O., Luciano, C., Rodrőguez, M., & Fink, B. C. (2004). Comparison between an acceptance-based and a cognitive control-based protocol for coping with pain. *Behavior Therapy*, *35*, 767–784. doi:10.1016/S0005-7894(04)80019-4

Heaven, P. C. L., Ciarrochi, J., & Hurrell, K. (2010). The distinctiveness and utility of a brief measure of alexithymia for adolescents. *Personality and Individual Differences*, *49*, 222–227.

Hox, J. J. (2010). *Multilevel analysis: Techniques and applications* (2nd ed.). Hove, UK: Routledge.

Kasser, V. G., & Ryan, R. M. (1999). The relation of psychological needs for autonomy and relatedness to vitality, well-being, and mortality in a nursing home. *Journal of Applied Social Psychology*, *29*, 935–954. doi:10.1111/j.1559-1816.1999.tb00133.x

Kinnunen, M. L., Feldt, T., Kinnunen, U., & Pulkkinen, L. (2008). Self-esteem: An antecedent or a consequence of social support and psychosomatic symptoms? Cross-lagged associations in adulthood. *Journal of Research in Personality*, *42*, 333–347. doi:10.1016/j.jrp.2007.06.004

Laible, D. J., Carlo, G., & Roesch, S. C. (2004). Pathways to self-esteem in late adolesence: The role of parent and peer attachment, empathy, and social behaviours. *Journal of Adolescence*, *27*, 703–716. doi:10.1016/j.adolescence.2004.05.005

Lakey, B., & Scoboria, A. (2005). The relative contribution of trait and social influences to the links among perceived social support, affect, and self-esteem. *Journal of Personality*, *73*, 361–388. doi:10.1111/j.1467-6494.2005.00312.x

Leary, M. R. (1999). Making sense of self-esteem. *Current Directions in Psychological Science*, *8*, 32–35. doi:10.1111/1467-8721.00008

Leary, M. R. (2003). Commentary on self-esteem as an interpersonal monitor: The sociometer hypothesis (1995). *Psychological Inquiry*, *14*, 270–274. doi:10.1080/1047840X.2003.9682891

Leary, M. R. (2005). Sociometer theory and the pursuit of relational value: Getting to the root of self-esteem. *European Review of Social Psychology*, *16*, 75–111. doi:10.1080/10463280540000007

Leary, M. R., Gallagher, B., Fors, E., Buttermore, N., Baldwin, E., Kennedy, K., & Mills, A. (2003). The invalidity of disclaimers about the effects of social feedback on self-esteem. *Personality and Social Psychology Bulletin*, *29*, 623–636. doi:10.1177/0146167203029005007

Leary, M. R., Haupt, A. L., Strausser, K. S., & Chokel, J. T. (1998). Calibrating the sociometer: The relationship between interpersonal appraisals and state self esteem. *Journal of Personality and Social Psychology*, *74*, 1290–1299. doi:10.1037/0022-3514.74.5.1290

Leary, M. R., Tambor, E. S., Terdal, S. K., & Downs, D. L. (1995). Self-esteem as an interpersonal monitor: The sociometer hypothesis. *Journal of Personality and Social Psychology*, *68*, 518–530. doi:10.1037/0022-3514.68.3.518

Little, T. D., Cunningham, W. A., & Shahar, G. (2002). To parcel or not to parcel: Exploring the question, weighing the merits. *Structural Equation Modeling*, *9*, 151–173. doi:10.1207/S15328007SEM0902_1

Little, T. D., Preacher, K. J., Selig, J. P., & Card, N. A. (2007). New developments in latent variable panel analyses of longitudinal data. *International Journal of Behavioral Development*, *31*, 357–365. doi:10.1177/0165025407077757

Mackinnon, S. P. (2012). Perceived social support and academic achievement: Cross-lagged panel and bivariate growth curve analyses. *Journal of Youth Adolescence*, *41*, 474–485. doi:10.1007/s10964-011-9691-1

Martire, L. M., Lustig, A. P., Schulz, R., Miller, G. E., & Helgeson, V. S. (2004). Is it beneficial to involve a

family member? A meta-analysis of psychosocial interventions for chronic illness. *Health Psychology*, *23*, 599–611. doi:10.1037/0278-6133.23.6.599

McDonald, R. P., & Marsh, H. W. (1990). Choosing a multivariate model: Noncentrality and goodness of fit. *Psychological Bulletin*, *107*, 247–255. doi:10.1037/0033-2909.107.2.247

McGee, R., Williams, S., & Nada-Raja, S. (2001). Low self-esteem and hopelessness in childhood and suicidal ideation in early adulthood. *Journal of Abnormal Child Psychology*, *29*, 281–291.

Menon, M., Tobin, D. D., Corby, B. C., Menon, M., Hodges, E. V. E., & Perry, D. G. (2007). The developmental costs of high self-esteem for antisocial children. *Child Development*, *78*, 1627–1639. doi:10.1111/j.1467-8624.2007.01089.x

Morgan, S. L., & Winship, C. (2007). *Counterfactuals and causal inference: Methods and principles for social research*. Cambridge, UK: Cambridge University Press.

Nagengast, B., Marsh, H. W., Scalas, L. F., Xu, M. K., Hau, K. T., & Trautwein, U. (2011). Who took the "×" out of expectancy-value theory? A psychological mystery, a substantive-methodological synergy, and a cross-national generalization. *Psychological Science*, *22*, 1058–1066. doi:10.1177/0956797611415540

Nahum-Shani, I., Bamberger, P. A., & Bacharach, S. B. (2011). Social support and employee well-being: The conditioning effect of perceived patterns of supportive exchange. *Journal of Health and Social Behavior*, *52*, 123–139. doi:10.1177/0022146510395024

Neff, K. D. (2011). Self-compassion, self-esteem, and well-being. *Social and Personality Psychological Compass*, *5*, 1–12. doi:10.1111/j.1751-9004.2010.00330.x

Oehlert, G. W. (1992). A note on the delta method. *American Statistician*, *46*, 27–29.

O'Mara, A. J., Marsh, H. W., Craven, R. G., & Debus, R. L. (2006). Do self-concept interventions make a difference? A synergistic blend of construct validation and meta-analysis. *Educational Psychologist*, *41*, 37–41. doi:10.1207/s15326985ep4103_4

Orth, U., Robins, R. W., & Roberts, B. W. (2008). Low self-esteem prospectively predicts depression in adolescence and young adulthood. *Journal of Personality and Social Psychology*, *95*, 695–708. doi:10.1037/0022-3514.95.3.695

Orth, U., Robins, R. W., Trzesniewski, K. H., & Schmitt, M. (2009). Low self-esteem is a risk factor for depressive symptoms from young adulthood to old age. *Journal of Abnormal Psychology*, *118*, 472–478. doi:10.1037/a0015922

Orth, U., Robins, R. W., & Widaman, K. F. (2012). Life-span development of self-esteem and its effects on important life outcomes. *Journal of Personality and Social Psychology*, *102*, 1271–1288. doi:10.1037/a0025558

Parker, P. D., Lüdtke, O., Trautwein, U., & Roberts, B. (2012). Personality and relationship quality during the transition from high school to early adulthood. *Journal of Personality*, *80*, 1061–1081. doi:10.1111/j.1467-6494.2012.00766.x

Pinquart, M., & Sörensen, S. (2000). Influences of socioeconomic status, social network, and competence on subjective well-being in later life: A meta analysis. *Psychology and Aging*, *15*, 187–224. doi:10.1037//0882-7974.15.2.187

Preston, C. C., & Colman, A. M. (2000). Optimal number of response categories in rating scales: Reliability, validity, discriminating power, and respondent preferences. *Acta Psychologica*, *104*, 1–15.

Rosenberg, M. (1979). *Conceiving the self*. New York, NY: Basic Books.

Rosenberg, M., Schooler, C., Schoenbach, C., & Rosenberg, F. (1995). Global self-esteem and specific self-esteem: Different concepts, different outcomes. *American Psychological Review*, *60*, 141–156. doi:10.2307/2096350

Ryan, R. M., & Deci, E. L. (2001). On happiness and human potentials: A review of research on hedonic and eudaimonic well-being. *Annual Review of Psychology*, *52*, 141–166. doi:10.1146/annurev.psych.52.1.141

Ryan, R. M., Stiller, J. D., & Lynch, J. H. (1994). Representations of relationships to teachers, parents, and friends as predictors of academic motivation and self-esteem. *Journal of Early Adolescence*, *14*, 226–249. doi:10.1177/027243169401400207

Ryff, C. D., & Singer, B. (2000). Interpersonal flourishing: A positive health agenda for the new millennium. *Personality and Social Psychology Review*, *4*, 30–44. doi:10.1207/S15327957PSPR0401_4

Sakiz, G., Pape, S. J., & Hoy, A. W. (2012). Does perceived teacher affective support matter for middle school students in mathematics classrooms? *Journal of School Psychology*, *50*, 235–255. doi:10.1016/j.jsp.2011.10.005

Sarason, I. G., Sarason, B. R., & Shearin, E. N. (1986). Social support as an individual difference variable: Its stability, origins, and relational aspects. *Journal of Personality and Social Psychology*, *50*, 845–855. doi:10.1037/0022-3514.50.4.845

Stinson, D. A., Logel, C., Zanna, M. P., Holmes, J. G., Cameron, J. J., Wood, J. V., & Spencer, S. J. (2008). The cost of lower self-esteem: Testing a self and social-bonds model of health. *Journal of Personality and Social Psychology*, *94*, 412–428. doi:10.1037/0022-3514.94.3.412

Swann, W. B., Chang-Schneider, C., & McClarty, K. L. (2007). Do people's self-views matter? Self-concept and self-esteem in everyday life. *American Psychologist*, *62*, 84–94. doi:10.1037/0003-066X.62.2.84

Thomaes, S., Reijntjes, A., de Castro, B. O., Bushman, B. J., Poorthuis, A., & Telch, M. J. (2010). I like me if you like me: On the interpersonal modulation and regulation of preadolescents state self-esteem. *Child Development*, *81*, 811–825. doi:10.1111/j.1467-8624.2010.01435.x

Uchino, B. N. (2009). Understanding the links between social support and physical health. *Perspectives on Psychological Science*, *4*, 236–255. doi:10.1111/j.1745-6924.2009.01122.x

Wang, M. T., & Eccles, J. S. (2012). Social support matters: Longitudinal effects of social support on three

dimensions of school engagement from middle to high school. *Child Development*, *83*, 877–895. doi:10.1111/j.1467-8624.2012.01745.x

Weston, R., & Gore, P. A. (2006). A brief guide to structural equation modeling. *Counseling Psychologist*, *34*, 719–751. doi:10.1177/0011000006286345

Widaman, K. F., Ferrer, E., & Conger, R. D. (2010). Factorial invariance within longitudinal structural equation models: Measuring the same construct across time. *Child Development Perspectives*, *4*, 10–18. doi:10.1111/j.1750-8606.2009.00110.x