

## Hope, Friends, and Subjective Well-Being: A Social Network Approach to Peer Group Contextual Effects

Philip D. Parker, Joseph Ciarrochi,  
Patrick Heaven, Sarah Marshall,  
and Baljinder Sahdra  
*Australian Catholic University*

Noona Kiuru  
*University of Jyväskylä*

Research on adolescence has previously shown that factors like depression and burnout are influenced by friendship groups. Little research, however, has considered whether similar effects are present for variables such as hope and subjective well-being. Furthermore, there is no research that considers whether the degree of hope of an adolescent's friends is associated with well-being over the individual's level of hope. Data were collected in 2012 from a sample of 15-year-olds ( $N = 1,972$ ; 62% Caucasian; 46% identified as Catholic; 25% had professional parents) from the East Coast of Australia. Findings suggest that individuals from the same friendship group were somewhat similar in hope and well-being. Multilevel structural equation modeling indicated that friendship group hope was significantly related to psychological and social well-being.

Bronfenbrenner (1979) and Elder (1998) have long noted the critical influences of microcontextual factors in adolescent development. Bronfenbrenner's (1979) model suggests that in addition to individual dispositions, family and friendship groups represent the most proximate influence on development. Indeed, adolescent peer contexts are known to have a range of effects on the development of risk-taking behaviors (e.g., DeLay, Laursen, Kiuru, Salmela-Aro, & Nurmi, 2013), academic self-beliefs (see Marsh, 2007, for a review), and future educational and occupational plans (see Dietrich, Parker, & Salmela-Aro, 2012, for a review). Thus, peer group characteristics can influence outcomes over and above individual characteristics. To date, limited research has considered the role of friendship group hope on adolescents' subjective well-being.

Individual differences in hope appear to be one key factor in the development of well-being (Ciarrochi, Heaven, & Davies, 2007). Hopeful adolescents have the will and determination to achieve goals, and have strategies at their disposal to reach their goals (Snyder, Irving, & Anderson, 1991). There is evidence that hope promotes higher well-being (Ciarrochi et al., 2007). What is unclear is the extent to which being surrounded by hopeful friends is associated with well-being. Members in hopeful

friendship groups may help each other to achieve goals, teach each other skills for goal achievement, and create a climate of goal striving, all of which would be expected to lead to subjective well-being. The present study utilized network analysis to identify friendship groups in a large sample to examine the extent to which friendship group hope contributed to individual well-being, over and above what could be explained by individual levels of hope.

### *Hope and Well-Being*

Hope helps to initiate and sustain action toward long-term goals, including flexible management of obstacles that might interfere with accomplishments. Hope thus provides an important pathway to increased subjective well-being (Snyder, 2000, 2002). Hope not only relates to optimism but is also distinguishable from it. While both constructs focus on the future, optimism refers to the belief that positive things are likely to occur in the future (Snyder, 2002), whereas hope encompasses the ability to generate and implement plans for the future (Bailey, Eng, Frisch, & Snyder, 2007). Furthermore, there is not only empirical evidence for the distinctiveness of hope from constructs including optimism but also positive effect, self-esteem, and

---

This article was partially funded by grants from the Australian Research Council (DP110100989, DP140103874, DE140100080).

Correspondence concerning this article should be addressed to Philip D. Parker, 25A Barker Road, Strathfield, NSW 2135, Australia. Electronic mail may be sent to [philip.parker@acu.edu.au](mailto:philip.parker@acu.edu.au).

© 2014 The Authors

Child Development © 2014 Society for Research in Child Development, Inc.  
All rights reserved. 0009-3920/2014/xxxx-xxxx  
DOI: 10.1111/cdev.12308

positive attribution style (Bryant & Vengros, 2004; Ciarrochi et al., 2007).

Research and theory has suggested hope to be a critical psychological strength relevant to the process of resilience (Cheavens, 2000; Snyder, 2000), where resilience is known to be significantly related to subjective well-being (e.g., Mak, Ng, & Wong, 2011). Indeed, it is known that goals and meaning are particularly important to well-being and people with high levels of hope implement goals and identify means of achieving them (Feldman & Snyder, 2005; Litalien, Lüdtke, Parker, & Trautwein, 2013; Mascaro & Rosen, 2005). Hope has also been associated with better self-regulatory skills (Schmid, Phelps, & Lerner, 2011) and meaning in life (Feldman & Snyder, 2005; Mascaro & Rosen, 2005). Furthermore, hope has been shown to be an antecedent to the development of adolescent well-being (Ciarrochi et al., 2007).

In this article we define subjective well-being as a multidimensional construct consisting of an individual's perceptions of his or her mental health in the key domains of emotional well-being (presence of positive emotional states), psychological well-being (sense of personal thriving, self-acceptance, growth, and autonomy), and social well-being (sense of acceptance, integration, and community; Keyes, 2002). Research on the relation between hope and subjective well-being has occurred largely at the individual level. From a social ecology perspective (Bronfenbrenner, 1979), however, we would expect microcontexts, such as immediate friendship groups, to have a significant influence on subjective well-being. Research examining happiness, for example, provides preliminary evidence that social networks have an important role to play (Fowler & Christakis, 2008; Van Workum, Scholte, Cillessen, Lodder, & Giletta, 2013). Fowler and Christakis (2008) note that happiness "is not merely a function of individual experience and individual choice but is also a property of groups of people" (p. 7). To date little research has considered whether hope and subjective well-being are also partially a property of peer groups, and has not explored the potential influence of group hope on adolescents' sense of well-being.

### *Peer Groups and Contextual Effects*

While family typically provides the primary source of support for young people even into adulthood (see Parker, Lüdtke, Trautwein, & Roberts, 2012), friendship groups become increasingly important during adolescence (Furman & Buhrmester, 1992; Oswald & Clark, 2003; Selfhout et al., 2010). A

lack of friends is associated with depression and other mental health problems (Kiuru, 2008; Schaefer, Kornienko, & Fox, 2011). In contrast, friendships have a considerably positive influence on subjective well-being (Bukowski, Newcomb, & Hartup, 1998). Given the central importance of peer groups, friendship maintenance is a pivotal developmental task (Fuligni & Eccles, 1993). Peer groups have been shown to be similar across a range of factors. For example, adolescents are similar to their friends on intrinsic motivation (Ryan, 2001), task value (Yli-Piipari, Kiuru, Jaakkola, Liukkonen, & Watt, 2011), academic achievement (Cook, Deng, & Morgano, 2007; Chen, Chang, & He, 2003; Epstein, 1981), educational expectations and choices (Cohen, 1977; Hallinan & Williams, 1990; Kiuru et al., 2008), school engagement (Kindermann, 2007; Li, Lynch, Kalvin, Liu, & Lerner, 2011), and burnout (Kiuru, Aunola, Nurmi, Leskinen, & Salmela-Aro, 2008). This similarity occurs via two sources—selection and influence (Cohen, 1977; Snijders, Van de Bunt, & Steglich, 2010). Selection occurs when adolescents who are similar are more likely to become friends (see Eisenberg, Golberstein, Whitlock, & Downs, 2013). Influence involves friendship groups becoming more similar over time.

Importantly, both processes highlight that adolescents are not in friendship groups randomly. Thus, individuals who have higher levels of hope are likely to congregate together and these similarities are likely to increase over time. As noted earlier, hope has well-known effects on a range of positive outcomes including subjective well-being. We therefore anticipate that peer group hope will be related to subjective well-being, over and above individual hope alone. Similar effects have been observed for peer groups where, for example, the average achievement levels of a friendship group were significantly associated with lower burnout, controlling for the student's own level of achievement (Kiuru et al., 2008).

In equation form, and using the terminology of Bryk and Raudenbush (1992), we will be evaluating the following model:

$$\text{Well-Being} = \beta_0 + \beta_1(\text{hope}) + e$$

$$\beta_0 = \gamma_{00} + \gamma_{01}(\text{mean}_{\text{hope}}) + u_0,$$

where  $\beta_0$  is a random intercept and  $\beta_1$  is the effect of individual hope on subjective well-being;  $\gamma_{01}$  represents the variation in  $\beta_0$  that is explained by the average hope in the individual's friendship group;  $e$  and  $u_0$  are residual terms.

On this basis we make two hypotheses:

Hypothesis 1. We expect that individuals from the same friendship groups will resemble each other in hope and subjective well-being.

Hypothesis 2 We expect that average levels of hope in friendship groups will be significantly associated with group members' subjective well-being over and above individual-level hope.

## Method

### Participants

Participants were students from Catholic secondary schools from the East Coast of Australia (Queensland and New South Wales). Catholic schools account for almost one fourth of all secondary school students in Australia and the demographic makeup of this sample broadly reflects that of the Australian population in terms of ethnicity, employment, and religious belief (Australian Bureau of Statistics [ABS], 2010). The Australian government provides a school socioeconomic index in which the average across Australia is 1,000 (<http://www.bit.ly/1mJK7KC>). The schools in this sample had a similar average score of 1,026 ( $SD = 43$ ). The students in the sample professed diverse religious views with 18% identifying as atheist, 43% as agnostic, and 39% holding theistic beliefs (though 46% identified as Catholic). Students from Grade 10 ( $M = 15.6$  years,  $SD = 0.43$ ) were sampled from 16 schools ( $N = 1,972$ ) and consisted of approximately even numbers of boys and girls. The majority of the sample self-identified as Western European/Caucasian with a number of other reported ethnicities including 2% Indigenous Australian and 3% Asian. Participants reported on their parents' occupation using the coding system based on the ABS (<http://www.abs.gov.au/ausstats/abs@.nsf/mf/1220.0>). For *mothers*, 25% reported professional, technical, or managerial positions; 19% reported sales/clerical occupations; 10% each reported homemaker or pensioner; 10% reported community service; with smaller numbers in trades, production, labor, or transport positions. For *fathers*, 25% reported that their parents had professional, technical, or managerial positions; 34% reported trades, production, labor, or transport positions; with smaller numbers in sales/clerical, community service, and pensioner/homemaker.

Average number of students per school was 158 (range = 59–226). Missing data were small with covariance coverage over 95% for every cell in the estimated covariance matrix. To account for the small amount of missing data we utilized full information maximum likelihood estimation for all multilevel structural equation models.

### Instruments

#### Hope

The Dispositional Hope Scale (Snyder et al., 1991;  $\alpha = .90$ , current sample) consists of eight items, to which participants responded on a Likert scale with endpoints that ranged from 1 (*none of the time*) to 6 (*all of the time*). The scale items assess the agency aspects of hope (e.g., "I have been pretty successful in life") as well as pathways hope (e.g., "I can think of ways to get the things in life that are most important to me"; see Snyder et al., 1991). In the present research, we were primarily interested in the global aspect of hope (see also Brouwer et al., 2008). However, the items from the same subfactors are likely to have some covariance independent from the variance explained by the global components. This can lead to model misfit and potentially contribute to parameter estimate bias. Thus, we controlled for this potential misfit by utilizing a priori correlated residuals between the agency items and between the pathway items (see Marsh et al., 2013). The global hope measure has demonstrated validity (Snyder et al., 1991), is distinctive from related constructs (Ciarrochi et al., 2007) and has evidenced criterion validity (Bailey et al., 2007; Ciarrochi et al., 2007).

#### Subjective Well-Being

Subjective well-being was measured with 12 items from the Child Development Supplement-II (Keyes, 2002, 2005). These items were designed to assess individuals across three different domains of well-being—emotional, psychological, and social. Emotional well-being consisted of three items, which asked participants to indicate how much in the past month they have felt *happy*, *interested in life*, or *satisfied*. Psychological well-being consists of four items, for example, "How often did you feel good at managing the responsibilities of your daily life?" Social well-being consisted of the five remaining items, for example, "How often did you feel that people are basically good?" All items were scored using a 6-point Likert scale ranging from 1 (*never*) to 6 (*everyday*). Internal consistency estimates were

$\alpha = .90$  for emotional well-being,  $\alpha = .82$  for psychological well-being, and  $\alpha = .86$  for social well-being.

### Peer Group Nominations

We used a modified version of the procedure of Coie, Dodge, and Coppotelli (1982). Instead of asking participants to nominate friends across gender, we provided students with space to nominate five of their closest male and five closest female friends in the same year group at their school (see Rowsell, Ciarrochi, Heaven, & Deane, 2014). We utilized the R igraph package to analyze friendship nominations (Csardi & Nepusz, 2006). We focus on directed social networks (the fact that one individual cites another as a friend does not necessarily mean that the friendship is reciprocated).

Gender and socioeconomic status were used as covariates in this study. Socioeconomic status was based on the employment status of the child's parent. We used a classification scheme for father's and mother's occupation based on the eight-group structure used by the ABS (see above).

### Analysis

#### Social Network Analysis

Network adjacency matrices for each school were submitted to analysis in igraph with disjoint friendship groups identified via an infoMap community detection algorithm (Rosvall & Bergstrom, 2010). The aim of this algorithm is to identify underlying friendship group structures for each school. Community detection algorithms assign each participant to a single group. The aim of these algorithms is to find a structure, and placement of individuals within that structure, that best fits the data. Most community detection algorithms use modularity maximization to determine an optimal solution where modularity is the fraction of links within a group versus the number of links within a group that would be expected if the graph was randomly generated. However, this approach typically disregards directional links, and often results in an over- or underestimation of groups (Lancichinetti & Fortunato, 2012; Rosvall, Axelsson, & Bergstrom, 2009; Rosvall & Bergstrom, 2010; see also Fortunato & Barthelemy, 2007; Good, de Montjoye, & Clauset, 2010, for a review). In the context of friendship groups, direction of nomination is critically important for understanding the dynamics at play (e.g., Steglich, Snijders, & Pearson, 2010). In particular, whether Child A

nominates Child B, Child B nominates Child A, and both nominate each other provides important information on the structure of friendship groups. For example, three individuals who all nominate each other provide very different information from a case in which one child nominates two other children (who also nominate each other) but are themselves nominated by no one. Many community detection algorithms treat all forms of nomination as equivalent and thus the above set of relationships would be treated as the same, potentially leading to groups that do not reflect underlying friendship patterns.

Instead we use an infoMap algorithm (Rosvall & Bergstrom, 2010; Rosvall et al., 2009), which takes into account directional links and thus whether friendship nominations are reciprocal or whether a particular nomination comes from a student on the periphery (few reciprocated links) or at the core (many reciprocated links) of a cohesive group (Rosvall & Bergstrom, 2010).

#### Contextual Effects With Multilevel Structural Equation Modeling

The major hypothesis of this article was that levels of hope in an individual's friendship group would be significantly related to their subjective well-being over and above their own level of hope. Such contextual effects are common in educational psychology and typically estimated via multilevel models (see Harker & Tymms, 2004, for an overview). Unfortunately, the presence of measurement error can result in "phantom" contextual effects. That is, because contextual variables consist of the aggregation of many individuals' scores, they are typically more reliable than the individual scores themselves. This has lead to a number of potentially spurious findings in the literature (see Harker & Tymms, 2004). We dealt with this issue by using Mplus 7 to estimate the required multilevel models in a structural equation model framework (MSEM) in which both individual-level and group-level variables are represented by latent variables controlling for measurement error (Marsh et al., 2009).

Contextual effects in an MSEM setting, given implicit group-mean centering, were considered statistically significant if the regression weight at the friendship group level was significantly different from the regression weight at the individual level (Marsh et al., 2009). This difference is a direct estimate of the contextual effect with effect size estimates for these contextual effects using the formula:

$$\frac{\beta = B \times \sigma_{\text{pred}}}{\sigma_y},$$

where  $B$  is the contextual effect,  $\sigma_{\text{pred}}$  is the variance at the friendship group level of the predictor, and  $\sigma_y$  is the individual-level variance of the dependent variable (see Marsh et al., 2009; Parker, Marsh, Lüdtke, & Trautwein, 2013). Note that MSEM requires a large number of cases per level. As such, while a three-level model accounting for both peer group and school would have been interesting, it was not feasible given the relatively small number of schools in this sample. However, manifest three-level models were run and are summarized in Appendix S1 in the online Supporting Information.

## Results

### Preliminary Analysis

The initial step in the analysis was to form friendship groupings using the infoMap algorithm. This resulted in 211 friendship groups with an average of 13.18 groups per school (range = 3–22), and an average size of 10.08 students per group (school range = 6.65–14.36). Indegree or popularity (the number of times a given student was nominated by a peer) was also estimated and ranged from 0 to 24 nominations with a mean of 5.21 nominations ( $Mdn = 5$ , mode = 4). Reciprocity index, the fraction of nominations that were bilateral, ranged across schools from .39 to .63 ( $Mdn = .48$ ,  $M = .49$ ). This moderate level of reciprocity indicated the importance of taking into account direction of friendship nomination when forming friendship groups. We also estimated each individual's centrality, which is the number of pathways in a social network that an individual is on, that links one classmate to another. Individuals with high centrality have a position of relative political power as information (e.g., gossip) tends to flow through them and they provide a link between different friendship groups.

### Intraclass Correlations

Intraclass correlations (ICCs) were calculated from the latent variables for hope and the three well-being factors. Intraclass correlations provide a measure of the proportion of variance in a given construct that is explained by a grouping variable (McGraw & Wong, 1996). However, given the ICC is the expected correlation of individuals' scores within the same group, they provide a measure of

the relative similarity or resemblance of individuals in the same group (e.g., peer groups) on a variable of interest (e.g., subjective well-being and hope; Gelman & Hill, 2006; McGraw & Wong, 1996; Shrout & Fleiss, 1979). An ICC of 0 means that knowing what group an individual comes from provides no information, while an ICC of 1 means that all individuals in a group are the same (Gelman & Hill, 2006). ICCs do not, however, indicate whether similarity is due to selection or socialization processes (see Discussion).

The results were surprisingly strong, with ICCs of .241 for hope, .287 for emotional well-being, .293 for psychological well-being, and .264 for social well-being. This suggests that approximately 25%–30% of the variance in well-being and hope was explained by group membership, supporting Hypothesis 1 that friendship group membership would explain a nontrivial amount of the variance in hope and subjective well-being (see Appendix S1 in the online Supporting Information for school-level ICCs).

### Contextual Effects Models

Contextual effects models were run with the measurement properties (i.e., the item loadings) constrained to be equal across student and peer group levels as per Marsh et al. (2009). This model provided an adequate fit to the data,  $\chi^2(320) = 1,854$ , comparative fit index (CFI) = .91, Tucker Lewis indexn (TLI) = .90, root mean square error of approximation (RMSEA) = .05. Individual hope was significantly related to emotional, psychological, and social well-being (see Table 1 for results). Consistent with our hypotheses, while the average hope levels of friendship groups was not associated with emotional well-being, they were related to both psychological and social well-being, over and above individual-level hope.

Indegree (student popularity), centrality (degree to which the student holds a position in the social network that links many individuals), socioeconomic status, and gender are important potential confounds. We also controlled for gender and popularity at both the friendship group levels (i.e., the percentage of the group that is male and the average popularity of the group). This model also provided an adequate fit to the data,  $\chi^2(560) = 2,468$ , CFI = .92, TLI = .89, RMSEA = .04. Controlling for these effects, individual-level hope was still significantly and positively associated with all three well-being factors and friendship level hope was still significantly related to both psychological and social

Table 1  
Results From MSEM Models

Well-being	$\beta$	Two-level MSEM		Two-level MSEM with covariates		
		CI -95%	CI +95%	$\beta$	CI -95%	CI +95%
<b>Student level: Hope as predictor</b>						
Emotional	.592	.548	.630	.588	.542	.634
Psychological	.697	.657	.737	.694	.652	.736
Social	.597	.547	.647	.584	.534	.634
<b>School-level contextual effects: Hope as predictor</b>						
Emotional	.140	-.072	.352	.132	-.066	.330
Psychological	.208	.008	.408	.185	.003	.367
Social	.179	.005	.353	.181	.017	.345
<b>Student-level variance</b>						
Emotional	.839			.839		
Psychological	.897			.897		
Social	1.259			1.259		
<b>Student-level residual variance: Hope as predictor</b>						
Emotional	.546			.542		
Psychological	.462			.450		
Social	.810			.800		

Note. Variances and residual variances are provided for the outcomes of interest, namely student level well-being. MSEM = multilevel structural equation models; CI = confidence interval.

well-being but not emotional well-being (see Table 1 for results).

Boys, compared to girls, had significantly higher hope ( $\beta = -.146$ , 95% CI  $[-.194, -.098]$ ) and social well-being ( $\beta = -.078$ , 95% CI  $[-.126, -.030]$ ). More popular students, compared to their less popular counterparts, had higher psychological ( $\beta = .059$ , 95% CI  $[.017, .101]$ ) and social ( $\beta = .052$ , 95% CI  $[.008, .096]$ ) well-being. Students who were more central in their high school grades social network reported higher hope ( $\beta = .068$ , 95% CI  $[.020, .116]$ ) and emotional well-being ( $\beta = .049$ , 95% CI  $[.013, .085]$ ). Friendship groups consisting of more boys reported higher average levels of hope ( $\beta = -.170$ , 95% CI  $[-.310, -.030]$ ) and social well-being ( $\beta = -.150$ , 95% CI  $[-.264, -.036]$ ). The multicategory socioeconomic status variable was only marginally significant associated with hope in one case.

## Discussion

The current research suggests that there is moderate similarity in friendship groups in adolescents in subjective well-being and hope. Indeed, the sizes of the ICCs were larger than other intrapsychic factors found in previous research (e.g., burnout; Kiuru et al., 2008) and considerably larger than those at the school level. Furthermore, the current research used a contextual effects model to show that indi-

vidual subjective well-being in psychological and social well-being was associated with group hope beyond what would be expected based on individual level of hope alone. Several significant covariates effects were observed but did not significantly diminish the size of the contextual effects. While these were not the focus of this article the covariate findings are of potential interest to future research. In particular, the juxtaposition between popularity, which was associated with psychological and social well-being, and centrality, which was related to hope and emotional well-being, in social networks and their differential predictive effect is an important area for future research. This is particularly the case given that popularity and centrality were only moderately correlated ( $r = .32$ ). However, the effects for all covariates were small in size.

Given the focus of hope on the development of goals (Bailey et al., 2007) and the means to pursue them (Magaletta & Oliver, 1999; Snyder et al., 2000), there are several potential mechanisms by which friendship group hope may influence subjective well-being via group socialization (see Kiuru, 2008, for a review). First, groups may act as a resource. Hopeful groups may tend to generate better solutions and provide more positive reinforcement when young people are faced with barriers to goal attainment (Kiuru, 2008). Indeed, adolescence marks a developmental period in which individuals increasingly turn to friends for

support and advice (Fuligni & Eccles, 1993). Second, the group may act as a "teacher," with friendship groups modeling hope-based strategies and improving the skills of individuals (see Bandura, 1977, 1986). Indeed, friends are known to become increasingly similar to each other on a wide range of psychological variables (Bukowski et al., 1998). Third, the group may exert influence through its norms and values. Harris (1995) suggests that individuals who do not conform to the norms of their friendship group may modify their behaviors in order to avoid rejection.

All these explanations point to the important role that friendships play in adolescence, and may have practical implications. Snyder (2000) argues that hope is considered a common factor of many clinical and social and emotional learning interventions. The present research suggests that targeting an individual's hope may have cascading effects in that person's friend circles. Put simply, interventions that raise hope in one individual have the possibility of positively influencing their friends. Future research is needed to evaluate this possibility.

The current research was cross-sectional and thus cannot provide evidence of the extent to which socialization explains the link between group hope and individual well-being. Our findings may reflect friendship group selection and common background rather than socialization processes (Eisenberg et al., 2013). However, contextual effects examine the effect of group hope on well-being, after controlling for individual hope, suggesting similarities in well-being may not merely be selection effects. A strength of the present study is that we used latent variables, making it less likely that these findings were merely phantom effects (Harker & Tymms, 2004). Finally, we note that our research took place in Catholic schools. Although Catholic schools students come from a broad range of backgrounds and are fairly similar to the general Australian population, it is possible that the nature of Catholic schooling may explain some of the results here. Further research in this area should include broader student populations.

Our research suggests that there is a relation between individual subjective well-being and the hope of the friendship group. The present research justifies further research aimed at identifying the nature of the relation between these constructs and the processes involved. In addition, research with larger samples from a greater number of schools will allow researchers to compare the contextual effects of friendship groups versus wider institution

contexts. Finally, while contextual effects modeling has been used in previous research, this is the first study, to the best of our knowledge, to make use of new and evolving methods of identifying communities of individuals from social network data. The infoMap algorithm used in this research is both efficient and tractable for sample sizes as large and considerably larger than those used here (Rosvall & Bergstrom, 2010; Rosvall et al., 2009) and thus represents a useful tool for peer group research in the social sciences.

## References

Australian Bureau of Statistics. (2010). *Year book of Australia [2009–10]*. Canberra, Australia: Author.

Bailey, T. C., Eng, W., Frisch, M. B., & Snyder, C. R. (2007). Hope and optimism as related to life satisfaction. *Journal of Positive Psychology*, 2, 168–175. doi:10.1080/17439760701409546

Bandura, A. (1977). *Social learning theory*. Englewood Cliffs, NJ: Prentice Hall.

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice Hall.

Bronfenbrenner, U. (1979). *The ecology of human development*. Cambridge, MA: Harvard University Press.

Brouwer, D., Meijer, R. R., Weekers, A. M., & Baneke, J. J. (2008). On the dimensionality of the Dispositional Hope Scale. *Psychological Assessment*, 20, 310–315. doi:10.1037/1040-3590.20.3.310

Bryant, F., & Vengros, J. (2004). Distinguishing hope and optimism: Two sides of the same coin, or two separate coins? *Journal of Social and Clinical Psychology*, 23, 273–302. doi:10.1521/jscp.23.2.273.31018

Bryk, A. S., & Raudenbush, S. W. (1992). Hierarchical linear models: Applications and data analysis methods. Thousand Oaks, CA: Sage.

Bukowski, W. M., Newcomb, A. F., & Hartup, W. W. (Eds.). (1998). *The company they keep: Friendships in childhood and adolescence*. Cambridge, UK: Cambridge University Press.

Cheavens, J. (2000). Hope and depression: Light through the shadows. In C. R. Snyder (Ed.), *Handbook of hope: Theory, measures, and applications* (pp. 321–340). San Diego, CA: Academic Press.

Chen, X., Chang, L., & He, Y. (2003). The peer group as a context: Mediating and moderating effects on relations between academic achievement and social functioning in Chinese children. *Child Development*, 74, 710–727. doi:10.1111/1467-8624.00564

Ciarrochi, J., Heaven, P. C., & 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

Cohen, J. M. (1977). Sources of peer group homogeneity. *Sociology of Education*, 50, 227–241. doi:10.2307/2112497

Coie, J. D., Dodge, K. A., & Coppotelli, H. (1982). Dimensions and types of social status: A cross-age perspective. *Developmental Psychology, 18*, 557–570. doi:10.1037/0012-1649.18.4.557

Cook, T. D., Deng, Y., & Morgano, E. (2007). Friendship influences during early adolescence: The special role of friends' grade point average. *Journal of Research on Adolescence, 17*, 325–356. doi:10.1111/j.1532-7795.2007.00525.x

Csardi, G., & Nepusz, T. (2006). The igraph package for complex network research. *Complex Systems, 16*(5).

DeLay, D., Laursen, B., Kiuru, N., Salmela-Aro, K., & Nurmi, J. E. (2013). Selecting and retaining friends on the basis of cigarette smoking similarity. *Journal of Research on Adolescence, 23*, 464–473. doi:10.1111/jora.12017

Dietrich, J., Parker, P., & Salmela-Aro, K. (2012). Phase-adequate engagement at the post-school transition. *Developmental Psychology, 48*, 1575–1593. doi:10.1111/jora.12017

Eisenberg, D., Golberstein, E., Whitlock, J. L., & Downs, M. F. (2013). Social contagion of mental health: Evidence from college roommates. *Health Economics, 22*, 965–986. doi:10.1002/hec.2873

Elder, G. H. (1998). The life course as developmental theory. *Child Development, 69*, 1–12. doi:10.2307/1132065

Epstein, J. L. (1981). *The quality of school life*, Washington, DC: Lexington Books.

Feldman, D. B., & Snyder, C. R. (2005). Hope and the meaningful life: Theoretical and empirical associations between goal-directed thinking and life meaning. *Journal of Social and Clinical Psychology, 24*, 401–421. doi:10.1521/jscp.24.3.401.65616

Fortunato, S., & Barthelemy, M. (2007). Resolution limit in community detection. *Proceedings of the National Academy of Sciences of the United States of America, 104*, 36–41. doi:10.1073/pnas.0605965104

Fowler, J. H., & Christakis, N. A. (2008). Dynamic spread of happiness in a large social network: Longitudinal analysis over 20 years in the Framingham Heart Study. *British Medical Journal, 337*, 1–9. doi:10.1136/bmj.a2338

Fuligni, A. J., & Eccles, J. S. (1993). Perceived parent-child relationships and early adolescents' orientation toward peers. *Developmental Psychology, 29*, 622–632. doi:10.1037/0012-1649.29.4.622

Furman, W., & Buhrmester, D. (1992). Age and sex differences in perceptions of networks of personal relationships. *Child Development, 63*, 103–115. doi:10.2307/1130905

Gelman, A., & Hill, J. (2006). *Data analysis using regression and multilevel/hierarchical models*. Cambridge, UK: Cambridge University Press.

Good, B. H., de Montjoye, Y. A., & Clauset, A. (2010). Performance of modularity maximization in practical contexts. *Physical Review E, 81*, 046106. doi:PhysRevE.81.046106

Hallinan, M. T., & Williams, R. A. (1990). Students' characteristics and the peer-influence process. *Sociology of Education, 63*, 122–132. doi:10.2307/2112858

Harker, R., & Tymms, P. (2004). The effects of student composition on school outcomes. *School Effectiveness and School Improvement, 15*, 177–199. doi:10.1076/seis.15.2.177.30432

Harris, J. R. (1995). Where is the child's environment? A group socialization theory of development. *Psychological Review, 102*, 458–489. doi:10.1037/0033-295X.102.3.458

Keyes, C. L. M. (2002). The mental health continuum: From languishing to flourishing in life. *Journal of Health and Social Behavior, 43*, 207–222. doi:10.2307/3090197

Keyes, C. L. (2005). Mental illness and/or mental health? Investigating axioms of the complete state model of health. *Journal of Consulting and Clinical Psychology, 73*, 539–548. doi:10.1037/0022-006X.73.3.539

Kindermann, T. A. (2007). Effects of naturally existing peer groups on changes in academic engagement of sixth graders. *Child Development, 78*, 1186–1203. doi:10.1111/j.1467-8624.2007.01060.x

Kiuru, N. (2008). *The role of adolescents' peer group in the school context*. (Dissertation). University of Jyväskylä, Finland.

Kiuru, N., Aunola, K., Nurmi, J. E., Leskinen, E., & Salmela-Aro, K. (2008). Peer group influence and selection in adolescents' school burnout: A longitudinal study. *Merrill-Palmer Quarterly, 54*, 23–55. doi:10.1353/mpq.2008.0008

Lancichinetti, A., & Fortunato, S. (2012). Consensus clustering in complex networks. *Scientific Reports, 2* (336). doi:10.1038/srep00336

Li, Y., Lynch, A. D., Kalvin, C., Liu, J., & Lerner, R. M. (2011). Peer relationships as a context for the development of school engagement during early adolescence. *International Journal of Behavioral Development, 35*, 329–342. doi:10.1177/0165025411402578

Litalien, D., Lüdtke, O., Parker, P., & Trautwein, U. (2013). Different pathways, same effects: Autonomous goal regulation is associated with subjective well-being during the post-school transition. *Motivation and Emotion, 37*, 444–456. doi:10.1007/s11031-012-9328-z

Magalhaes, P. R., & Oliver, J. M. (1999). The hope construct, will, and ways: Their relations with self-efficacy, optimism, and general well-being. *Journal of Clinical Psychology, 55*, 539–551. doi:10.1002/(SICI)1097-4679(199905)55:5<539::AID-JCLP2>3.0.CO;2-G

Mak, W. W., Ng, I. S., & Wong, C. C. (2011). Resilience: Enhancing well-being through the positive cognitive triad. *Journal of Counseling Psychology, 58*, 610–617. doi:10.1037/a0025195

Marsh, H. W. (2007). *Self-concept theory, measurement and research into practice: The role of self-concept in educational psychology*, Leicester, UK: British Psychological Society.

Marsh, H. W., Abduljabbar, A. S., Abu-Hilal, M. M., Morin, A. J., Abdelfattah, F., Leung, K. C. . . . Parker, P. (2013). Factorial, convergent, and discriminant validity of timss math and science motivation measures: A com-

parison of Arab and Anglo-Saxon countries. *Journal of Educational Psychology*, 105, 108–128. doi:10.1037/a0029907

Marsh, H. W., Lüdtke, O., Robitzsch, A., Trautwein, U., Asparouhov, T., Muthén, B., & Nagengast, B. (2009). Doubly-latent models of school contextual effects: Integrating multilevel and structural equation approaches to control measurement and sampling error. *Multivariate Behavioral Research*, 44, 764–802. doi:10.1080/0027317090333665

Mascaro, N., & Rosen, D. H. (2005). Existential meaning's role in the enhancement of hope and prevention of depressive symptoms. *Journal of Personality*, 73, 985–1014. doi:10.1111/j.1467-6494.2005.00336.x

McGraw, K. O., & Wong, S. P. (1996). Forming inferences about some intraclass correlation coefficients. *Psychological Methods*, 1, 30–46. doi:10.1037/1082-989X.1.1.30

Muthén, L. K., & Muthén, B. O. (1998-2014). *Mplus user's guide*. (7th ed.) Los Angeles, CA: Author.

Oswald, D. L., & Clark, E. M. (2003). Best friends forever? High school best friendships and the transition to college. *Personal Relationships*, 10, 187–196. doi:10.1111/1475-6811.00045

Parker, P. D., Lüdtke, O., Trautwein, U., & Roberts, B. W. (2012). Personality and relationship quality during the transition from high school to early adulthood. *Journal of Personality*, 80, 1061–1089. doi:10.1111/j.1467-6494.2012.00766.x

Parker, P. D., Marsh, H. W., Lüdtke, O., & Trautwein, U. (2013). Differential school contextual effects for math and English: Integrating the big-fish-little-pond effect and the internal/external frame of reference. *Learning and Instruction*, 23, 78–89. doi:10.1016/j.learninstruc.2012.07.001

Rosvall, M., Axelsson, D., & Bergstrom, C. T. (2009). The map equation. *European Physical Journal Special Topics*, 178, 13–23. doi:10.1140/epjst/e2010-01179-1

Rosvall, M., & Bergstrom, C. T. (2010). Mapping change in large networks. *PLoS One*, 5, e8694. doi:10.1371/journal.pone.0008694

Rowse, H. C., Ciarrochi, J., Heaven, P. C., & Deane, F. P. (2014). The role of emotion identification skill in the formation of male and female friendships: A longitudinal study. *Journal of Adolescence*, 37, 103–111. doi:10.1016/j.adolescence.2013.11.005

Ryan, A. (2001). The peer group as a context for the development of young adolescent motivation and achievement. *Child Development*, 72, 1135–1150. doi:10.1111/1467-8624.00338

Schaefer, D. R., Kornienko, O., & Fox, A. M. (2011). Misery does not love company network selection mechanisms and depression homophily. *American Sociological Review*, 76, 764–785. doi:10.1177/0003122411420813

Schmid, K. L., Phelps, E., & Lerner, R. M. (2011). Constructing positive futures: Modeling the relationship between adolescents' hopeful future expectations and intentional self regulation in predicting positive youth development. *Journal of Adolescence*, 34, 1127–1135. doi:10.1016/j.adolescence.2011.07.009

Selfhout, M., Burk, W., Branje, S., Denissen, J., van Aken, M., & Meeus, W. (2010). Emerging late adolescent friendship networks and Big Five personality traits: A social network approach. *Journal of Personality*, 78, 509–538. doi:10.1111/j.1467-6494.2010.00625.x

Shrout, P. E., & Fleiss, J. L. (1979). Intraclass correlations: Uses in assessing rater reliability. *Psychological Bulletin*, 86, 420–428. doi:10.1037/0033-2909.86.2.420

Snijders, T. A., Van de Bunt, G. G., & Steglich, C. E. (2010). Introduction to stochastic actor-based models for network dynamics. *Social Networks*, 32, 44–60. doi:10.1016/j.socnet.2009.02.004

Snyder, C. R. (2000). The past and possible futures of hope. *Journal of Social and Clinical Psychology*, 19, 11–28. doi:10.1521/jscp.2000.19.1.11

Snyder, C. R. (2002). Hope theory: Rainbows in the mind. *Psychological Inquiry*, 13, 249–275. doi:10.1207/S15327965PLI1304\_01

Snyder, C. R., Harris, C., Anderson, J. R., Holleran, S. A., Irving, L. M., Sigmon, S. T., & . . . Harney, P. (1991). The will and the ways: development and validation of an individual-differences measure of hope. *Journal of Personality and Social Psychology*, 60, 570–585. doi:10.1037/0022-3514.60.4.570

Snyder, C. R., Ilardi, S. S., Cheavens, J., Michael, S. T., Yamhure, L., & Sympson, S. (2000). The role of hope in cognitive-behavior therapies. *Cognitive Therapy and Research*, 24, 747–762. doi:10.1023/A:1005547730153

Snyder, C. R., Irving, L. M., & Anderson, J. R. (1991). In C. R. Snyder & D. R. Forsyth (Eds.) *Handbook of social and clinical psychology: The health perspective* (pp. 285–305). Elmsford, NY: Pergamon Press.

Steglich, C., Snijders, T. A., & Pearson, M. (2010). Dynamic networks and behavior: Separating selection from influence. *Sociological Methodology*, 40, 329–393. doi:10.1111/j.1467-9531.2010.01225.x

Van Workum, N., Scholte, R. H. J., Cillessen, A. H. N., Lodder, G. M. A., & Giletta, M. (2013). Selection, deselection, and socialization processes of happiness in adolescent friendship networks. *Journal of Research on Adolescence*, 23, 563–573. doi:10.1111/jora.12035

Yli-Piipari, S., Kiuru, N., Jaakkola, T., Liukkonen, J., & Watt, A. (2011). The role of peer groups in male and female adolescents' task values and physical activity. *Psychological Reports*, 108, 75–93. doi:10.2466/05.10.11.17.PR0.108.1.75-93

## Supporting Information

Additional supporting information may be found in the online version of this article at the publisher's website:

**Appendix S1.** Three-Level Models

**Table S1.** Three-Level Manifest Multilevel Models