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

Abstract

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 = 1972; 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 SEM 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 micro-contextual 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 behaviours (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, and 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 relates to optimism but is also distinguishable from it. Whilst 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). Further, there is empirical evidence for the distinctiveness of hope from constructs including optimism but also positive affect, self-esteem, and 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, 2010). 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; Mascaro & Rosen, 2005; Litalien, Lüdtke, Parker, & Trautwein, 2013). Hope has also been associated with better self-regulatory skills (Schmid et al., 2011) and meaning in life (Feldman & Snyder, 2005; Mascaro & Rosen, 2005). Further, hope has been shown to be an antecedent to the development of adolescent well-being (Ciarrochi, Heaven, & Davies, 2007).

In this paper we define subjective well-being as a multidimensional construct consisting of an individual's perceptions of their 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 relationship between hope and subjective well-being has occurred largely at the individual level. From a social ecology perspective (Bronfenbrenner, 1979), however, we would expect micro-contexts, 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 note that happiness "is not merely a function of individual experience and individual choice but is also a property of groups of people" (2008, 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 provide the primary source of support for young people even into adulthood (see Parker et al., 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 1996). 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 (Epstein, 1983; Chen et al., 2003; Cook, Deng, & Morgano, 2007), educational

expectations and choices (Cohen, 1983; Hallinan & Williams, 1990; Kiuru et al., 2007), 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 above, 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:

$$WellBeing = \beta_0 + \beta_1(hope) + e$$

$$\beta_0 = \gamma_{00} + \gamma_{01}(mean_{hope}) + u_0$$

Where β_0 is a random intercept and β_1 is the effect of individual hope on subjective well-being; γ_{01} representing the variation in β_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:

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

Methodology

Participants

Participants were students from Catholic secondary schools from the East coast of Australia (Queensland and New South Wales). Catholic schools account for almost a quarter 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 1000 (http://bit.ly/1mJK7KC). The schools in this sample had a similar average score of 1026 (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 = 1972) 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% community service,

with smaller numbers in trades, production, labour, or transport positions. For Fathers, 25% reporting that their parents had professional, technical, or managerial positions, 34% reported trades, production, labour, or transport positions, with smaller numbers in sales/clerical, community service, and pensioner/homemaker.

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

Instruments

Hope. The dispositional hope scale (Snyder et al., 1991; α = .90 current sample) consists of eight items, 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., 2001). 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 sub-factors 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, 2001), is distinctive from related constructs (Cairrochi, et al., 2007), and has evidenced criterion validity (Bailey et al., 2007; Ciarrochi et al., 2007).

Subjective well-being was measured with 12 items from the Child Development Supplement (CDS-II; Keyes, 2002, 2005). These items were designed to assess individuals across three different domains of wellbeing - emotional, psychological, and social. Emotional wellbeing 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 wellbeing consists of four items, e.g., "*How often did you feel good at managing the responsibilities of your daily life?"* Social wellbeing consisted of the five remaining items, e.g., "*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, & 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 analyse friendship nominations (Gabor & Nepusz, 2006). Thus, 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, 2009). 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 under estimation of groups (Lancichinetti & Fortunato, 2012; Rosvall, Axlesson, & Bergstrom, 2009; Rosvall & Bergstrom, 2009; see also Fortunato & Barthélemy, 2006; Good, 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, Axlesson, & Bergstrom, 2009; Rosvall & Bergstrom, 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 recipricated links) or at the core (many reciprocated links) of a cohesive group (Rosvall & Bergstrom, 2009).

Contextual Effects with Multilevel Structural Equation Modeling. The major hypothesis of this paper 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 and group levels variables are represented by latent variables controlling for measurement error (Marsh et al., 2009).

Contextual effects in a MSEM setting, given implicit group-mean centering, were considered statistically significant if the regression weight at the friendship group level were 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:

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

B is the contextual effect, σ_{pred} is the variance at the friendship group level of the predictor and σ_y is the individual level variance of the dependent variable (see Marsh et al., 2009; Parker et al., 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 the Appendix.

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 (median = 5; mode = 4). Reciprocity index, the fraction of nominations that were bi-lateral, ranged across schools from .39 to .63 (median = .48, mean = .49). This moderate level of reciprocation 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 (ICCs)

ICCs were calculated from the latent variables for hope and the three well-being factors. ICCs 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 zero means that knowing what group an individual comes from provides no information, while an ICC of one 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 to 30% of the variance in well-being and hope was explained by group membership, supporting Hypothesis 1 that friendship group membership would explain a non-trivial amount of the variance in hope and subjective well-being (see Appendix 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. (2010). This model provided an adequate fit to the data: χ^2 (320)= 1854, CFI = .91, TLI = .90, 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 level (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: χ^2 (560)= 2468, 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 well-being but not emotional well-being (see Table 1 for results).

Boys, compared to girls, had significantly higher hope (β = -.146, 95% CI [-.194 -.098]) and social well-being (β = -.078 [-.126 -.030]). More popular students, compared to their less popular counterparts, had higher psychological (β = .059 [.017 .101]) and social well-being (β = .052 [.008 .096]). Students who were more central in their high-school grades social network reported higher hope (β = .068 [.020 .116]) and emotional well-being (β = .049 [.013 .085]). Friendship groups consisting of more boys reported higher average levels of hope (β = -.170 [-.310 -.030]) and social well-being (β = -.150 [-.264 -.036]). The multi-category 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 individual 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 paper 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, Eng, Frisch, & Snyder, 2007) and the means to pursue them (Magaletta & Oliver, 1999; Snyder, Ilardi, Cheavens, Michael, Yamhure, & Sympson, 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 re-enforcement 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 modelling 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, Newcomb, & Hartup 1996). 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 behaviours in order to avoid rejection.

All these explanations point to the important role that friendships play in adolescence, and may have practical implications. Synder (2000) argues that hope is considered to be 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 friends 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, 2008). 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 relationship 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 relationship 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 modelling has been used in previous research, this is the first study, to 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, Axlesson, & Bergstrom, 2009; Rosvall & Bergstrom, 2009) and thus represents a useful tool for peer group research in the social sciences.

References

Australian Bureau of Statistics [ABS]. (2010). *Year book of Australia [2009-10*]. Canberra: Australian Bureau of Statistics

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

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.

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

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

Brouwer et al, (2008). On the Dimensionality of the Dispositional Hope Scale. *Psychological Assessment, 20, 310-315*

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). Academic Press.

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.

Cohen, J.M. (1977). Sources of peer group homogeneity. *Sociology of Education, 50,* 227-241.

Coie, J. D., Dodge, K. A., & Coppotelli, H. (1982). Dimensions and types of social status: A cross-age perspective. *Developmental psychology, 18*, 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.

Csardi, G. & Nepusz, T. (2006). The igraph package for complex network research. *Complex Systems*, *1695*, 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.

Dietrich, J., Parker, P., & Salmela-Aro, K. (2012). Phase-adequate engagement at the post-school transition. *Developmental psychology*, *48*, 1575-1593.

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.

Fruchterman, T.M.J. and Reingold, E.M. (1991). Graph Drawing by Force-directed Placement. *Software - Practice and Experience*, *21*, 1129-1164.

Fuligni, A. J., & Eccles, J. S. (1993). Perceived parent-child relationships and early adolescents' orientation toward peers. *Developmental psychology*, *29*, 622.

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

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.

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

Fortunato, S., & Barthelemy, M. (2007). Resolution limit in community detection. *Proceedings of the National Academy of Sciences, 104*, 36-41.

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.

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

Harker, R., & Tymms, P. (2004). The effects of student composition on school outcomes. *School effectiveness and school improvement, 15*, 177-199.

Harris, J.R. (1995). Where is the child's environment? A group socialization theory of development. *Psychological Review, 102,* 458-489.

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

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.

Kiuru, N. (2008). *The role of adolescents' peer group in the school context.* Academic 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.

Kiuru, N., Burk, W. J., Laursen, B., Nurmi, J.-E., & Salmela-Aro, K. (2012). Is depression contagious? A test of alternative peer socialization mechanisms of

depressive symptoms in adolescent peer networks. *Journal of Adolescent Health, 50,* 250-255.

Lancichinetti, A., & Fortunato, S. (2012). Consensus clustering in complex networks. *Scientific reports, 2*.

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.

Magaletta, 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.

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.

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.

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.

McGraw, K. O., & Wong, S. P. (1996). Forming inferences about some intraclass correlation coefficients. *Psychological methods*, *1*, 30-46.

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

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.

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.

Rose, A. J. (2002). Co–rumination in the friendships of girls and boys. *Child development*, *73*, 1830-1843.

Rosvall, M., & Bergstrom, C. T. (2010). Mapping change in large networks.*PloS one*, *5*, e8694.

Rosvall, M., Axelsson, D., & Bergstrom, C. T. (2009). The map equation. *The European Physical Journal Special Topics*, *178*, 13-23.

Rowsell, 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.

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

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.

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.

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.

Shrout, P. E., & Fleiss, J. L. (1979). Intraclass correlations: uses in assessing rater reliability. *Psychological bulletin, 86*, 420-428.

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.

Snyder, C. R. (2000). The past and possible futures of hope. *Journal of Social and Clinical Psychology, 19*, 11-28.

Snyder, C. R. (2002). Hope theory: Rainbows in the mind. *Psychological Inquiry, 13*(4), 249-275.

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.

Steglich, C., Snijders, T. A., & Pearson, M. (2010). Dynamic networks and behavior: Separating selection from influence. *Sociological Methodology, 40*, 329-393.

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.

Table 1
Results from MSEM Models

	2-Level MSEM			2-Level MSEM with Covariates		
Well-being	Beta	CI-95%	CI+95%	Beta	CI-95%	CI+95%
			Student Level: Hope as Predictor			
Emotional	.592	.548	.63	.588	.542	.634
Psychological	.697	.657	.737	.694	.652	.736
Social	.597	.547	.647	.584	.534	.634
			School Level Contextual Effects: Hope as Predictor			
Emotional	.140	-.072	.352	.132	-.066	.330
Psychological	.208	.008	.408	.185	.003	.367
Social	.179	.005	.353	.181	.017	.345
			Student Level Variance			
Emotional		.839			.839	
Psychological		.897			.897	
Social		1.259			1.259	
			Student Level Residual Variance: Hope as Predictor			
Emotional		.546			.542	
Psychological		.462			.450	
Social		.810			.800	

Notes. Variances and residual variances are provided for the outcomes of interest, namely student level well-being. MSEM = Multilevel structural equation models.

Appendix: 3-Level Models

In the current research, student had three levels of nesting (students within friendship groups within schools). There were far too few schools (n = 16) to perform Latent MSEM (the models would not converge). Indeed, we could only explore Latent ICCs on factor at a time for the three levels and could only run multilevel models at the manifest level. As we note in the paper this is less than ideal as it ignores the complex structure of hope and does not account for measurement error at any level and thus parameter estimates are likely to be noticeably attenuated. For completeness we provide the three-level results here but given the small number of schools and lack of latent variables suggest readers should exercise caution in interpreting these results. We thus note that analysis of this sort with much larger numbers of schools is required.

The ICCs for friendship group remained largely unchanged dropping slightly to .232 for hope, .253, .255, .260 for psychological, social, and emotional well-being respectively when controlling for school. ICCs at the school level were very small, accounting for between 1-3% of the variance or less for hope and the three well-being factors. These results suggest that the friendship group level, and not the school level, was important for predicting hope and well-being. Manifest 3-level models (students nested within friendship groups nested within school) were also run. School aggregated hope was associated with small regression estimates with wide confidence intervals for all aspect of well-being. The introduction of school average hope did not considerably diminish the size of the friendship hope on psychological and social well-being; noting the likely attenuation of results given the lack of latent variables (see Table A1 for results).

Table A1.

3-Level Manifest Multilevel Models

Well-being Factors	Beta	CI-95%	CI+95%	Variance	Residual Variances
Student Level: Hope as Predictor					
Emotional	.594	.552	.642	1.294	.892
Psychological	.616	.573	.860	1.074	.693
Social	.609	.559	.661	1.467	1.058
Friendship level Contextual Effects: Hope as Predictor					
Emotional	.123	-.026	.263	-	-
Psychological	.098	-.025	.224	-	-
Social	.145	.004	.299	-	-
School level Contextual Effects: Hope as Predictor					
Emotional	.303	-.143	.800	-	-
Psychological	.081	-.264	.223	-	-
Social	.152	-.323	.638	-	-

Notes. As well-being at the student level was the outcome of interest, variances and residual variances are only available at that level.