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A 32-year longitudinal study of child and adolescent pathways to well-being in adulthood.

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Abstract

The purpose of the study was to investigate the relative importance of child and adolescent social and academic pathways to well-being in adulthood (32-years) indicated by a sense of meaning, competence, social engagement and prosocial values. Data were drawn from a 15 wave (32-year) longitudinal study of the health and development of around 1000 New Zealanders (Dunedin Multidisciplinary Health and Development Study, New Zealand). Moderate continuity in social connectedness (0.38) and high continuity in intellectual and academic ability (0.90) was observed across childhood and adolescence. Adolescent social connectedness was a better predictor of adult positive development than academic achievement (0.61 vs. 0.13). There was evidence of an indirect pathway from adolescent academic achievement to adult well-being through social connectedness (0.24). Indicators of well-being in adulthood appear to be better explained by social connection rather than intellectual and academic competence pathways. Implications for promoting longer term well-being during the school years are discussed.

Key Words. Childhood, Adolescence, Language, Social Connectedness, Well-being, Adulthood.

There is an important transition occurring in the mental health literature from a focus on disorder and symptom management (treatment) to a focus on psychological strengths, positive development and capacity building (prevention). One consequence has been increasing interest in the construct of *well-being*; however, what is meant by *well-being* has been controversial and implications for practice and policy have so far been unclear. This is not a new problem. The nature of ‘the good life’ was a major point of philosophical divide in Ancient Greece millennia ago. There were two broad perspectives, one that equated ‘the good life’ with happiness or pleasure (hedonism), the other with virtue and meaning (eudaimonism). This philosophical tension remains in Western culture. Arguably the dominant perspective on ‘the good life’ is hedonic, expressed as *utilitarianism*

in philosophy (Bentham, 1789) and *enlightened self-interest* in many cognitive-behaviour therapies (Walen, DiGiuseppe, & Dryden, 1992). However, the eudaimonic perspective also has a strong tradition in Western Culture, expressed as *virtue ethics* in philosophy (Irwin, 1994; Waterman, 2004) and *self-actualisation* in modern humanistic psychology (Erikson, 1968; Feather, 1995; Rogers, 1961; Sheldon, Arndt, & Hauser-Marko, 2003).

Within psychology, there has been increasing interest in enriching definitions of well-being beyond *feeling happy* to broader concepts of human growth and flourishing. One example of this is Ryff's theory of *Personal Well-Being (PWB)* which defines well-being with respect to six domains of human growth: autonomy, personal growth, self-acceptance, life purpose, mastery and positive relatedness (Ryff, 1989). Another example is *Salutogenic Theory* which equates well-being with *sense of coherence (SoC)* indicated by perceptions of the meaningfulness, comprehensibility and manageability of life (Antonovsky, 1993). *SoC* has been related to self-reported good health, fewer health complaints, and mental health indicators such as resilience, self-esteem and optimism (Eriksson & Lindstrom, 2005; Simonelli, Guerreiro, Simonelli, & di Pasquale, 2010).

Other attempts have been more explicitly aligned to *eudaimonic theory* in that they equate well-being with ontological development around values such as honesty, kindness, justice, courage, and generosity (Aristotle, 2004; Tiberius, 2006). *Self-Determination Theory* (Ryan & Deci, 2001) and *Positive Psychology* (Seligman & Csikszentmihalyi, 2000) are the most recent extensions of these ideas. Both frameworks emphasise ontological development. *Positive Psychology* focuses on the identification and development of character strengths, assessed within six major domains: wisdom and knowledge, courage, humanity, justice, temperance and transcendence. In contrast, *Self-Determination Theory* places particular emphasis on the internalization of meaning, with *intrinsic value-based* motivation progressively replacing *extrinsic feeling-based* motivations in healthy psychological development.

Despite being theoretically rich, perspectives on well-being that extend beyond *feeling happy* have been criticized for lacking a rigorous basis in empirical science (Tiberius, 2006). This is largely because the dominant focus of most established observational studies has been on developmental psychopathology. One programme of research that has data on constructs relevant to well-being is the Dunedin Multidisciplinary Health and Development Study (DMHDS, New Zealand), a life course study that has followed nearly 1000 individuals from infancy in 1972 to adulthood with the most recent assessment in 2012. At the age 32 assessment, four domains of positive functioning were examined: sense of coherence, positive coping, social engagement and prosocial values. These measurement domains capture a number of key domains proposed in contemporary theories of well-being and provide a basis for defining multidimensional models of well-being open to empirical scrutiny.

The DMHDS data provide a further opportunity to examine the child and adolescent origins of well-being in adulthood. Little is known about the relationship between adult well-being and foundational aspects of earlier development, such as academic and social-emotional function. This is because most studies have (1) focused within, not beyond, the child and adolescent years (Carroll, Maughan, Goodman, & Meltzer, 2005; Maughan, Rowe, Loeber, & Stouthamer-Loeber, 2003), and (2) focused on psychopathological outcomes rather than well-being (Bond et al., 2004; Masten et al., 2005). Furthermore, the few studies that exist on academic achievement and mental health typically focus on the role of psychosocial problems in later academic under-achievement, not the other way around (Gonzales, Cauce, Friedman, & Mason, 1996; Masten, et al., 2005). Social connectedness has been consistently shown to protect against adverse mental health, substance use, and academic outcomes in adolescence (Bond et al., 2007; Resnick, Harris, & Blum, 1993; Shochet, Dadds, Ham, & Montague, 2006); however, little is known about childhood social connectedness and the longer term implications of child and adolescent social connection later in the life course.

The DMHDS has rich data on both social and academic development with which to further explore pathways to later well-being. For example, social connectedness can be indicated using a wide variety of measures including attachment to parent and peers (Nada-Raja et al., 1992), self-perceived strengths (Williams & McGee, 1991), participation in organized clubs and groups (McGee, Williams, Howden-Chapman, Martin & Kawachi, 2006) and a composite index of adolescent social competence (McGee & Williams, 1991). Likewise, the DHMDS has detailed information on *academic development*, including language and reading ability in childhood, and school achievement in adolescence.

The purpose of the current study was to use DMHDS data to (1) develop a *parsimonious* model of well-being in adulthood, and (2) investigate the relative importance of early *academic* and *social* pathways to adult well-being. Due to scant life course data on well-being, and the absence of testable theories of well-being over the life course, analyses presented are exploratory (rather than confirmatory) and hypothesis generating (rather than hypothesis testing). Structural Equation Modeling (SEM) was used to investigate developmental relationships between adult well-being and social and academic functioning in childhood and adolescence. In doing so, this work advances understanding of the aetiology of well-being with the aim of guiding innovation around promoting positive child and adolescent development through school and family social systems.

Method

Participants and design

The Dunedin Multidisciplinary Health and Development Study (DMHDS) is a longitudinal study of a birth cohort of 1037 people born in Dunedin NZ between 1 April 1972 and 31 March 1973. The participants were first enrolled and assessed at age 3 years, and then subsequently re-assessed at ages 5, 7, 9, 11, 13, 15, 18, 21, 26, 32, and most recently at age 38 years, on a variety of health, behavior, and background measures. In total, 964 participants completed an interview on well-being and self-harm at Phase 32, representing 95% of the 1015 participants known to be alive and

therefore eligible for Phase 32 assessment. The number of participants with missing data varied according to the type of measures. In response to Census questions on ethnicity, more than 90% of the Phase 32 participants identified themselves as “New Zealand/European”. The sample is comparable with other community-based samples from western societies; it is, however, under representative of Maori (tangata whenua or the indigenous people), and Pacific peoples (Poulton et al., 2006).

Procedure

Every assessment phase of the DMHDS has been subject to the ethical approval from the Ethics Committee attached to the Otago regional District Health Board. Participants, and in earlier phases their parents, gave signed and informed consent before the completion of any assessments. Participants were invited to attend the research unit for a full day of assessments as close as possible to their birthdays. Prior to age 11 years, most children were accompanied by a parent (usually the mother). Thereafter, as adolescents, participants attended themselves and were assessed in individual sessions throughout the day. Parents continued to complete a postal questionnaire about aspects of family life and their child’s health, development and behaviour through the adolescent assessments.

Measures

Well-being in adulthood (32-years).

Adult well-being was indicated by four constructs: sense of coherence, positive coping styles, social participation, and prosocial behaviour. Sense of coherence was assessed using a 13-item brief version of Antonovsky’s (1993) SoC scale which comprises three subscales: comprehensibility (5 items), manageability (4 items), and meaningfulness (4 items). Cronbach alpha for the 13-items was 0.83, and coefficient alphas for the subscales ranged from .79 to .90. Each item was rated on a 7-point Likert type scale with relevant end-points; five of the items were reverse-scored. If responses were missing for up to two items, the missing item was coded 4, the mid-point of the scale.

Social participation was defined by rated involvement in 10 organized activities including: (1) recreational participation in team sports teams and hobby groups; (2) work-related participation in labour unions, service organizations, and business/ professional groups; and (3) community group participation in youth groups (leadership role), church groups, political, neighbourhood, and charity organisations. Involvement was rated 3, 2, 1 and 0 representing “involved a great deal,” “somewhat,” “a little,” and “don’t belong,” respectively. (McGee, Williams, Howden-Chapman, Martin, & Kawachi, 2006). Activities were classified into work-related, recreational and community group involvement. Coefficient alpha for the total scale was 0.69.

Coping behaviours were assessed using the Brief COPE inventory that assesses problem-focused coping responses and those directed towards aspects of the situation other than the stressor per se (Carver, 1997). Potentially negative coping responses such as self-harm, as well as adaptive coping were assessed. Each coping strategy was assessed by two items, rated on a 4 point Likert scale from 1 = “haven’t been doing this at all” to 4 = “I’ve been doing this a lot”. Responses were summed to produce subscale scores for each participant. Active coping, planning, positive reframing, using emotional support and using instrumental support were selected to indicate positive coping strategies. The focus of the current study was on positive coping; the absence of a negative coping response such as self-harm was not considered a positive coping strategy and consequently was not selected as part of the well-being measure.

Prosocial behaviour was defined by responses to a 23 item measure of self-perceived strengths at age 32 years (McGee & Williams, 1991). Responses were scored yes or no. A principal factor analysis, with a varimax rotation, identified a prosocial behaviour factor comprising ratings of *kind, trustworthy, helpful, citizenship and reliable*. Coefficient alpha for this scale was 0.68.

Childhood developmental indicators (birth to 9 years).

Childhood social connectedness was indicated by measures of prosocial behaviour and peer social inclusion. Prosocial behaviour at age 5 years was based on 4- point parental ratings of

behaviours including co-operative playing with other children, level of confidence, conversing with others, and sharing with others. Peer social inclusion was assessed from 5 to 9 years using the “not liked” and “solitary” ratings from the 26 item Rutter Child Scale A for parents and 18 item Child Scale B for teachers (Rutter, Tizard, & Whitmore, 1970). These were rated by parents and teachers on a 3-point scale, with 0 representing “does not apply”, 1 – “applies somewhat”, and 2 “certainly applies”. Behaviours were reverse coded to indicate social connectedness, and a total score was summed across the three ages for parents and teachers separately.

Childhood language development was indicated by language expression and comprehension assessed at age 5 years using the Reynell Receptive Language Scale and Expressive Language Scale (Reynell, 1969), and at age 7 years using the Illinois Test of Psycholinguistic Abilities (Kirk, McCarthy, & Kirk, 1968). At 7 and 9 years, reading ability was assessed by the Burt Word Reading Test (Education, 1976).

Family disadvantage during childhood was indicated by three separate indices measuring socioeconomic status, family climate of mental health, and parent-child interaction practices. These indices and the measures used to derive them are fully described by (McGee, Williams, & Nada-Raja, 2001). In brief, an index of socioeconomic disadvantage from ages 5 to 9 years was constructed from data on the child’s father having a semi-skilled or unskilled job; the child’s mother being 20 years or younger at first pregnancy; the mother having no formal educational qualifications beyond high school level; and single parenting, mainly relevant to the mother. Family climate of mental health from ages 5 to 9 years was defined by an index assessing low within-family social support at ages 7 and 9; high levels of maternal depression when the child was aged 5, 7 or 9; parental separation up to age 9; and other adverse family circumstances (e.g., family violence or father’s mental ill-health) reported by the parents. Finally, harsh parent-child interaction from ages 3 to 9 years was identified by four items including maternal rejection observed during psychometric testing when the child was aged 3; parental reports of low egalitarianism at ages 5 or

7; parental reports of high authoritarianism at ages 5 or 7; and a measure of lax inconsistent discipline at ages 7 or 9 years.

Adolescent developmental indicators (15 to 18 years).

Adolescent social connectedness was indicated by four constructs; namely, quality of social attachments, participation in organised clubs and groups, self-perceived competencies or strengths, and life satisfaction between 15 and 18 years.

Attachment to parents and friends was assessed at age 15-years using a shortened version of the Inventory of Parent and Peer Attachment (Armsden & Greenberg, 1987; Nada Raja, McGee, & Stanton, 1992). Twelve items assessed perceived levels of communication with, trust in, and alienation from parents and similarly another 12 items measured these perceptions for the child's peers. Each item was rated on a 4-point Likert type scale of 1 = "almost never or never", 2 = "sometimes", 3 = "often", and 4 = "almost always or always". Alpha was .82 for the parent scale and .80 for the peer-scale indicating high internal consistency. Attachment to school was determined by using a visual analogue scale of five concentric circles (Elliott & Voss, 1974). Each adolescent was asked to imagine that the circles represented all the activities and things taking place at their school and then to rate "how far from the centre of things are you?". The innermost circle represented a high involvement in school activities (coded as 1) and the outermost circle represented a low involvement (coded 5). At age 15 years of age, participants were also asked about having someone to talk to if they "had a problem or felt upset about something". Response options were yes or no (McGee et al., 1990).

Participation in clubs and groups was assessed at age 15 and 18 years. Participants were asked "Do you belong to any organized clubs or groups or activities outside school – e.g. scouts, gym, soccer, cricket, music or ballet?" Responses were recorded verbatim (McGee, et al., 2006) and classified into either participation in cultural/youth groups or sports groups. Adolescent activity

items were coded by author RM and research assistant into the pre-coded categories from childhood/preadolescence. Number of activities was counted to provide a cumulative total.

Self-perceived strengths were assessed at age 15 and 18 years and defined by total scores on a 22 item scale completed by the adolescent participant and a parent/significant other at both ages. Examples of strengths include, outgoing, kind, independent, good at sports and lots of hobbies. A principal components analysis performed separately on participant and parent/significant other response sets indicated single constructs for both, with Cronbach's alphas being 0.78 and 0.89, respectively (Williams & McGee, 1991).

Life satisfaction was assessed at 18-years in 10 domains, each assessed on a 4-point Likert scale from 1 = "very unhappy" to 4 = "very happy". The 10 domains were life as a whole, the future, standard of living, people worked with, sense of independence, social life, income received, getting on with people, activities engaged with in spare time, and work. Coefficient alpha for the total scale was 0.75. A principal factor analysis using the 10 variables suggested a one factor solution, and items loading at 0.9 or above were selected to represent this factor. These were satisfaction with life as a whole, with activities engaged with in spare time, getting on with people, and with the future.

Adolescent academic achievement was indicated by 4 constructs: (1) reading score on the Burt Word Reading Test at age 15 years, (2) total achievement on the NZ Department of Education's School Certificate exam in the third year of high school, (3) completing more than 3 years of high school, and (4) a rating of having done well at school assessed in the mental health interview at age 18 years (response options: 1= well below average 2 = a little below average 3= average 4= a little above average 5=well above average).

Statistical Analysis

Structural Equation Modelling (SEM) was performed in MPLUS (Muthén & Muthén, 1998-2007). Individual measurement models were constructed for each of the latent indicators used in the analysis, and then assembled into a developmental model testing the relative contribution of

familial, social and academic pathways in the emergence of well-being in adulthood. Sex differences were investigated by fitting the final model to both sexes separately. Both direct (unmediated) and indirect (mediated) effects are presented as standardised estimates. A standardised estimate expresses the proportion of a standard deviation change in one variable due to a 1 standard deviation change in a second variable. Standardised effects were examined between 6 developmental ordered latent variables:

- *Level of family disadvantage in childhood*: indicated by the indices of socioeconomic disadvantage, family climate of mental health, and harsh parent-child interaction.
- *Social connectedness in childhood*: a first order latent variable indicated by the parent and teacher ratings of being liked, not being alone, and showing prosocial behaviours.
- *Language development in childhood*: a first order latent variable indicated by language comprehension and expression, and reading ability.
- *Social connectedness in adolescence*: a second order latent variable indicated by 4 first order latent variables representing social attachments (parents, peers, school, confidant), participation in youth groups and sporting clubs, strengths and life satisfaction.
- *Academic achievement in adolescence*: a first order latent variable indicated by reading ability, exam performance, high school completion, and doing well at school.
- *Well-being in adulthood*: a second order latent variable indicated by four first order latent variables representing SoC, social connectedness, coping skills and prosocial orientation.

Results

SEM was conducted on data from 804 participants. Figure 1 presents the best fitting model of the relationship between the child and adolescent social and academic development and later adult well-being. First and second order latent variable loadings for observed variables are presented in

Table 1. Standardised direct effects between latent variables are presented in Table 2. The fit of the model was acceptable, with CFI=0.77, TLI=0.84 and RMSEA = 0.056.

Insert Tables 1 & 2 about here

Insert Figure 1 about here

Childhood Disadvantage

The direct (unmediated) effect of childhood disadvantage on childhood social connectedness and language was -0.44 and -0.63, respectively. The indirect (mediated) effect of childhood disadvantage on adolescent social connectedness was -0.17 (the product of the two constituent pathways, -0.44×0.38), and -0.57 (-0.63×0.90) for adolescent academic achievement. The indirect effect of childhood disadvantage on adult well-being was -0.17.

Child and Adolescent Social Connectedness

There was moderate continuity in social connectedness between childhood and adolescence. The direct effect of child social connectedness on adolescent social connectedness was 0.38. The direct effect of adolescent social connectedness on adult well-being was even more substantial, 0.62. Furthermore, there was an indirect effect (0.24) of childhood social connectedness on adult well-being.

Child and Adolescent Academic Achievement

There was strong continuity from language abilities from childhood to adolescence. The direct effect of childhood language development on adolescent academic achievement was 0.90. However, compared with the social connectedness pathway, the direct effect of adolescent academic

achievement on adult well-being was smaller (0.12). The indirect effect of childhood language development on adult well-being was similar to the *direct* adolescent effect (0.11).

Social and Academic Pathways

There was a weak prospective relationship between childhood language abilities and adolescent social connectedness (0.20), indicating a potential for early academic achievement to influence social connectedness. There was no relationship between childhood social connectedness and adolescent academic achievement. The cross sectional picture suggests a similarly weak relationship between language development and social connectedness in childhood (0.19); however, the relationship was considerably stronger in adolescence (0.47). Based on the assumption that academic achievement may influence social connectedness (as indicated prospectively), the indirect effect of adolescent academic achievement on adult well-being through adolescence social connectedness would be 0.29.

Further model evaluations

The model was robust to a change in childhood cognitive indicators. Thus, substituting measures of childhood IQ for childhood language development did not significantly alter model estimates. Fit statistics for both the male and female models were acceptable. There was no suggestion of significant sex differences in path estimates from social connectedness and academic achievement in adolescence to later well-being. Factors loadings for each indicator were similar for males and females.

Discussion

The purpose of the study was to describe aetiological pathways for a multidimensional model of adult well-being. There was a strong pathway from child and adolescent social connectedness to adult well-being, while the pathway from early language development through adolescent academic achievement to adult well-being was weak. There was notable continuity across child and adolescent academic and social pathways, with continuity between child language and adolescent

academic outcomes being particularly high. While there was evidence of a weak relationship between early childhood language and adolescent social connectedness, there was no evidence of a prospective relationship between child social connectedness and later adolescent academic achievement. Quality of the early family environment was a key predictor of child and adolescent academic and social development; however, effects did not persist into adulthood.

The strong pathway between child and adolescent social connection and well-being over a decade later illustrates the enduring significance of positive social relationships over the lifespan to adulthood. There are numerous perspectives on the relationship between the social context and well-being. One that has so far received little research attention is the role of self-other interactions in *prosocial values formation*. Eudaimonistic theories of well-being such as *Virtue Ethics* and *Positive Psychology* place particular emphasis on the role of positive value systems as a condition of human flourishing (Nadler & Liviatan, 2006; Newton, 2007; Park & Peterson, 2009; Richardson, Hammock, Smith, Gardner, & Signo, 2006). Much of the cognitive infrastructure needed to explore and consolidate values, for example *perspective taking and empathic reasoning*, is forged through self-other interactions in the social context (Astington & Jenkins, 1995; Kurzban & Leary, 2001; Schultz, 2000; Underwood & Moore, 1982). Thus a potentially important mechanism linking social connectedness to later well-being may be the maturation of prosocial value systems that are capable of structuring healthy ways of relating to self, others and the world.

In contrast, there was no substantial relationship between indicators of academic development (language and school achievement) and adult well-being. It could be argued that a path might have been observed had education related outcomes, such vocational satisfaction or economic security, been included in our model of well-being. However, the purpose of this study was to examine a model of well-being that extended beyond more traditional desire-satisfaction measures such as life satisfaction, security or any other potential indicator of success. Furthermore, the lack of association

between academic achievement and later well-being is consistent with a large literature showing a lack of association between socioeconomic prosperity and well-being (Diener & Oishi, 2003).

Within the child and adolescent years, we observed notable continuities in academic and social pathways. Continuity in the academic pathway was stronger than the social pathway. One explanation of such continuity is that passage through childhood and adolescence is substantially determined by the quality (and adequacy) of the adult world, and capacity to stray from social norms and values (healthy or unhealthy) is arguably limited by the dependencies of this period. However, despite evidence of continuity within pathways, we observed little evidence of relationships between pathways. There was a weak prospective relationship between childhood language development and adolescent social connectedness, and no evidence of the reverse (i.e., childhood social connectedness to adolescent academic achievement), a finding consistent with our earlier observation that pre-adolescent IQ predicted social competence in adolescence (McGee & Williams, 1991).

These observations suggest that the social and academic pathways are not intimately related to one another and to some extent may constitute weakly related but parallel paths. This idea of dual-developmental pathways has been explored in other research in the Dunedin study, e.g. in the separation between pathways to literacy and pathways to behaviour problems (McGee, Prior, Williams, Smart, & Sanson, 2002). If social and academic pathways are separate, then, positive social development across childhood and adolescence requires investments beyond development of the academic curriculum. This could be achieved through the development of a social curriculum that parallels the academic curriculum to deliver long term outcomes on dimensions such as those we have modelled in adulthood. Positive results from trials of school based interventions that include a social curriculum have been reported (Bond, et al., 2004). However, additional research on the antecedents of social connectedness (and relationships with developing value systems) would provide a stronger basis for educational policy around promotion of well-being.

Family disadvantage was a strong predictor of both social connectedness and language development in childhood, and continued to have an indirect effect in adolescence, but more so for social than academic outcomes. These results emphasise the central importance of the early family environment in child and adolescent development. There was further evidence of an effect of family disadvantage on adult well-being, although the effect was weaker than adolescence, which implies that other factors that come into play across development have important counter-balancing effects. A better understanding of these moderating factors would provide important insights into selective prevention in highly disadvantaged groups.

Another feature of the data is the high stability of the relative order and size of factor loading for all indicators for males and females. The nature of direct and indirect effects between indicators was also similar for males and females. This suggests that child and adolescent functioning, with respect to the psychosocial and education variables we modelled, are remarkably similar between males and females. The similarity in the factor loading structure of the adult well-being indicator likewise suggests that we should conceive of well-being among males and females in very similar ways. Thus from our data, sex-specific approaches to promoting psychosocial health by adulthood may not be necessary. However, we are further exploring this theme with respect to associations between well-being and both income and satisfaction with personal relationships in men and women using the DMHDS data.

Significant strengths of the DMHDS are the consistently high response rates and low sample attrition from childhood to adulthood. The study is also based on a sample which is broadly representative of the wider NZ demography, although somewhat under-representative in terms of people from Maori and Pacific origins. The study is one of a few birth cohorts with prospective data on positive psychological development. As such, the data presented provide one of the first insights into the life course epidemiology of healthy psychological development. However, despite 964 participants completing the positive development questionnaires there was some missing data. The

final model included 804 complete case records. Much of the data were missing within respondents making it unlikely that data not included in the analysis would bias results. Imputation techniques were therefore not employed. Furthermore, relative to the number of participants, the number of variables used placed limits on modelling with the SEM procedure. This is reflected in close to sub-optimal TLI and CFI fit statistics.

It is worth noting that our work was originally developed in the area of competence and resilience (Vaillant & Vaillant, 1981; Werner & Smith, 1982) and that many of the measures were chosen over 20-years ago before the rise in interest in well-being. As such, we have adopted the view that the research presented here should be considered as an exploratory modelling exercise, with more focused work on subsections of the overall model to be developed in future research. For example, we did not investigate the possibility that personality dimensions may underpin the association we report between social connectedness and adult well-being. Yet, a better understanding of the role of personality in positive development is likely to yield important insights into effective approaches to preventive intervention. Similarly, we intend more detailed investigations of links between well-being and mental disorder, family, education and work outcomes, which could yield valuable insights into promoting well-being. There is also the possibility that broader macrosocial factors may influence pathways to well-being. Each of these represents important future directions for research.

In this study we have focused on a description of psychological well-being in adulthood defined by a trans-theoretical analysis of key elements in both historical and contemporary discourse on well-being: positive emotional functioning, sense of coherence, social engagement and character values. Our findings show that social connectedness is a more important pathway to adult well-being (as we have defined it) than academic ability. There were also notable continuities in academic and social pathways which we have suggested may reflect high stability in the social context of early development. However, academic and social pathways were largely independent of

each other across development, which points to the importance of parallel investments in the social development of children and adolescents during the school years. We have suggested that development of a social curriculum may provide structure in provision of program and activities that enhance social inclusion and connection. However, further research on the developmental origins of well-being is needed to inform a social curriculum.

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Table 1

First and second order latent variable loadings for observed variables in the model.

	Latent variable	Observed variables	Age (yrs)	Estimate	S.E.	Est./S.E.
Childhood	Family Disadvantage	Socio-economic disadvantage	0-9	0.663	0.054	12.381
		Family climate of mental health	0-9	0.391	0.053	7.34
		Harsh parenting	0-9	0.421	0.049	8.522
	Language Development	Reynell receptive language test	5	0.57	0.025	22.662
		Reynell expressive language test	5	0.436	0.033	13.368
		ITPA comprehension test	7	0.495	0.033	14.83
		ITPA expression test	7	0.393	0.034	11.419
		Burt reading test	7	0.777	0.02	39.361
		Burt reading test	9	0.767	0.021	36.458
	Social Connectedness	Prosocial (parent report)	5	0.47	0.046	10.11
		Liked by others (teacher report)	5-9	0.619	0.051	12.188
		Liked by others (parent report)	5-9	0.479	0.055	8.773
		Included by others (teacher report)	5-9	0.415	0.04	10.479
		Included by others (parent report)	5-9	0.361	0.044	8.246
Adolescence	Academic Achievement	Burt reading test	15	0.746	0.021	35.319
		School certificate exam	18	0.776	0.025	30.579
		3+ years high school completed	n/a	0.631	0.046	13.636
		Like school	18	0.623	0.026	24.044
	Social Attachments	Peer attachment	15	0.592	0.034	17.608
		Parent attachment	15	0.583	0.031	18.612
		Confidant	15	0.516	0.049	10.628
		School attachment	15	0.591	0.041	14.42
	Life Satisfaction	Satisfaction with life	18	0.748	0.039	19.401
		Satisfaction with time	18	0.544	0.044	12.268
		Satisfaction with people	18	0.645	0.041	15.614
		Satisfaction with future	18	0.519	0.043	12.072
	Strengths	Strengths according to self	15	0.54	0.034	15.882
		Strengths according to self	18	0.462	0.035	13.036
		Strengths according to parent	15	0.608	0.035	17.412
		Strengths according to parent	18	0.421	0.039	10.743
	Social Participation	Cultural/youth groups	15	0.621	0.062	10.051
		Cultural/youth groups	18	0.659	0.065	10.142
		Sports	18	0.398	0.064	6.239
Adulthood	Sense of Coherence	Meaning	32	0.855	0.04	21.272
		Manageability	32	0.7	0.032	22.173
		Comprehensibility	32	0.622	0.031	20.12
	Social Participation	Work-related	32	0.703	0.056	12.599
		Recreational	32	0.638	0.048	13.207
		Community	32	0.615	0.051	12.063
		Active coping	32	0.652	0.027	24.259
	Coping Style	Planning	32	0.685	0.026	26.821
		Positive reframing	32	0.497	0.028	17.436
		Emotional support	32	0.727	0.023	32.19
		Instrumental support	32	0.747	0.022	34.248
	Prosociality	Kind	32	0.739	0.05	14.752
		Trustworthy	32	0.908	0.056	16.178
		Helpful	32	0.683	0.057	12.086
		Good citizen	32	0.626	0.051	12.353
		Reliable	32	0.876	0.048	18.279
2nd order	Social Connectedness 15-18-years	Social Attachments	15-18	0.869	0.036	23.833
		Life Satisfaction	15-18	0.59	0.042	14.071
		Strengths	15-18	0.891	0.035	25.381
		Social Participation	15-18	0.489	0.053	9.154
	Wellbeing 32-years	Sense of Coherence	32	0.556	0.420	13.325
		Social Participation	32	0.419	0.052	8.023
		Coping Style	32	0.597	0.039	15.152
		Prosociality	32	0.44	0.054	8.144

Note: all estimates $p < 0.001$

Table 2

Standardised direct effects between latent variables.

Latent variables	Estimate	S.E.	Est./S.E.	<i>p</i> -value (2-tailed)
Family disadvantage 0-9yrs to:				
Language Development 5-9yrs	-0.63	0.048	-13.097	0.00
Social Connectedness 5-9yrs	-0.44	0.068	6.403	0.00
Language development 5-9yrs to:				
Social Connectedness 5-9yrs	0.19	0.076	-2.532	0.011
Social Connectedness 15-18yrs	0.20	0.054	3.66	0.00
Academic Achievement 15-18yrs	0.90	0.021	42.598	0.00
Social Connectedness 5-9yrs to:				
Social Connectedness 15-18yrs	0.38	0.059	-6.394	0.00
Academic Achievement 15-18yrs to:				
Social Connectedness 15-18yrs	0.47	0.082	5.663	0.00
Wellbeing 32yrs	0.12	0.058	2.155	0.03
Social Connectedness 15-18yrs to:				
Wellbeing 32yrs	0.62	0.056	10.941	0.00

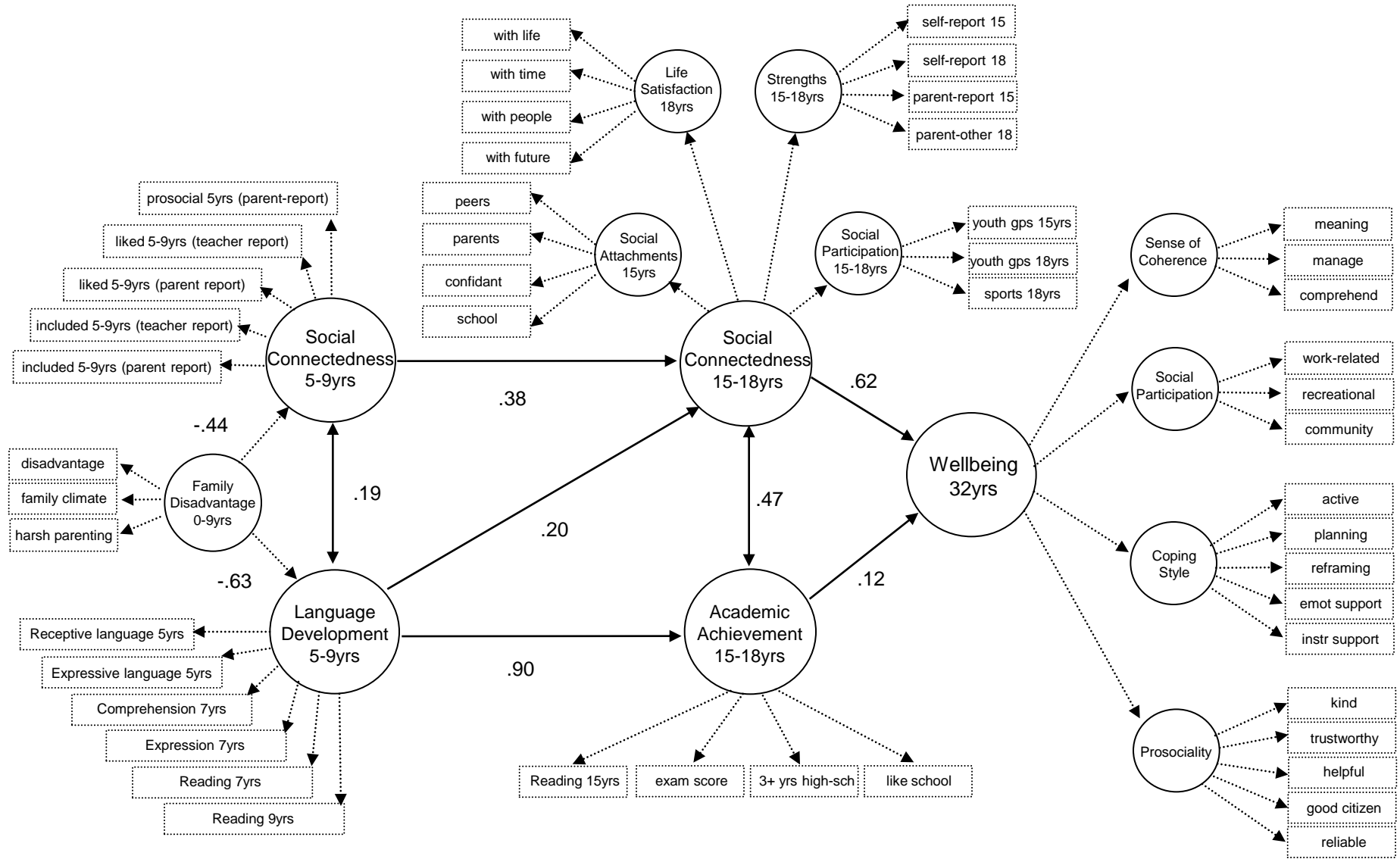


Fig 1 A developmental model of child and adolescent social and academic pathways to wellbeing in adulthood.