

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, social engagement, positive coping 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 academic ability (0.90) was observed across childhood and adolescence. Adolescent social connectedness was a better predictor of adult well-being than academic achievement (0.62 vs. 0.12). There was evidence of an indirect pathway from adolescent academic achievement to adult well-being through social connectedness (0.29). Indicators of well-being in adulthood appear to be better explained by social connection rather than academic competencies pathways. Implications for promoting longer term well-being during the school years are discussed.

Keywords Childhood · Adolescence · Language development · Academic achievement · Social connectedness · Well-being · Adulthood

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1 Introduction

There is an important transition occurring in the mental health literature from a focus on risk and psychopathology to greater consideration of psychological strengths, positive development and capacity building (prevention through health promotion). 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 et al. 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 et al. 2003).

Within psychology, there are now a number of frameworks that have sought to extend 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 and Lindstrom 2005; Simonelli et al. 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 and Deci 2001) and *Positive Psychology* (Seligman and Czikszentmihalyi 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 et al. 2005; Maughan et al. 2003), and (2) focused on psychopathological outcomes rather than well-being (Bond et al. 2004; Masten et al. 2005). 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 et al. 1996; Masten et al. 2005). Furthermore, although social connectedness has been consistently shown to protect against adverse mental health, substance use, and academic outcomes in adolescence (Bond et al. 2007; Resnick et al. 1993; Shochet et al. 2006), little is known about *childhood* social connectedness or 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 and McGee 1991), participation in organized clubs and groups (McGee et al. 2006) and a composite index of adolescent social competence (McGee and Williams 1991). Likewise, the DMHDS 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.

2 Method

2.1 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).

2.2 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.

2.3 Measures

2.3.1 *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 0.79 to 0.90. Each item was rated on a 7-point Likert type scale with relevant endpoints; 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 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 et al. 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 and 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.

2.3.2 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 et al. 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 et al. 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 et al. 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.

2.3.3 Adolescent Developmental Indicators (15–18 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 and Greenberg 1987; Nada Raja et al. 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 0.82 for the parent scale and 0.80 for the peer-scale indicating high internal consistency. Attachment to school was determined by using a visual analogue scale of five concentric circles (Elliott and 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 and 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).

2.4 Statistical Analysis

Structural Equation Modelling (SEM) was performed in MPLUS (Muthén and 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.

3 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.

3.1 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 .

3.2 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.

3.3 Child and Adolescent Academic Development

There was strong continuity between childhood language development and adolescent academic achievement. The direct effect of childhood language development on adolescent academic achievement was 0.90 . However, compared with the social connectedness

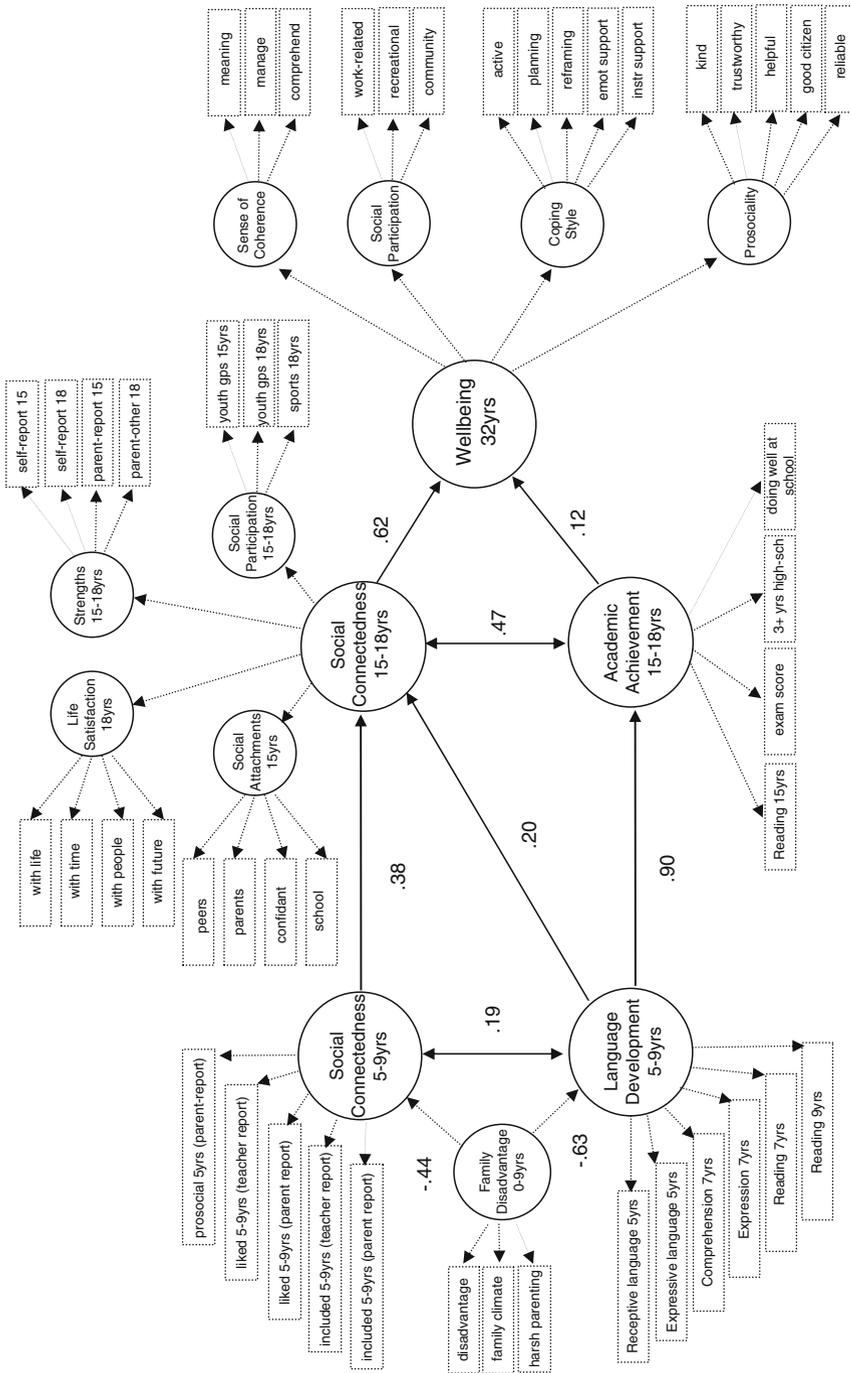


Fig. 1 A developmental model of child and adolescent social and academic pathways to wellbeing in adulthood

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	0.66	0.05	12
	Family climate of mental health	0–9	0.39	0.05	7.3
	Harsh parenting	0–9	0.42	0.05	8.5
Language development	Reynell receptive language test	5	0.57	0.03	23
	Reynell expressive language test	5	0.44	0.03	13
	ITPA comprehension test	7	0.50	0.03	15
	ITPA expression test	7	0.39	0.03	11
	Burt reading test	7	0.78	0.02	39
	Burt reading test	9	0.77	0.02	36
Social connectedness	Prosocial (parent report)	5	0.47	0.05	10
	Liked by others (teacher report)	5–9	0.62	0.05	12
	Liked by others (parent report)	5–9	0.48	0.06	8.8
	Included by others (teacher report)	5–9	0.42	0.04	10
	Included by others (parent report)	5–9	0.36	0.04	8.2
Adolescence					
Academic achievement	Burt reading test	15	0.75	0.02	35
	School certificate exam	18	0.78	0.03	31
	3 + years high school completed	n/a	0.63	0.05	14
	Doing well at school	18	0.62	0.03	24
Social attachments	Peer attachment	15	0.59	0.03	18
	Parent attachment	15	0.58	0.03	19
	Confidant	15	0.52	0.05	11
	School attachment	15	0.59	0.04	14
Life satisfaction	Satisfaction with life	18	0.75	0.04	19
	Satisfaction with time	18	0.54	0.04	12
	Satisfaction with people	18	0.65	0.04	16
	Satisfaction with future	18	0.52	0.04	12
Strengths	Strengths according to self	15	0.54	0.04	16
	Strengths according to self	18	0.46	0.04	13
	Strengths according to parent	15	0.61	0.04	17
	Strengths according to parent	18	0.42	0.04	11
Social participation	Cultural/youth groups	15	0.62	0.06	10
	Cultural/youth groups	18	0.66	0.07	10
	Sports	18	0.40	0.06	6.2
Adulthood					
Sense of coherence	Meaning	32	0.86	0.04	21
	Manageability	32	0.70	0.03	22
	Comprehensibility	32	0.62	0.03	20
Social participation	Work-related	32	0.70	0.06	13
	Recreational	32	0.64	0.05	13
	Community	32	0.62	0.05	12

Table 1 continued

Latent variable	Observed variables	Age (yrs)	Estimate	S.E.	Est./S.E.
Coping style	Active coping	32	0.65	0.03	24
	Planning	32	0.69	0.03	27
	Positive reframing	32	0.50	0.03	17
	Emotional support	32	0.73	0.02	32
	Instrumental support	32	0.75	0.02	34
Prosociality	Kind	32	0.74	0.05	15
	Trustworthy	32	0.91	0.06	16
	Helpful	32	0.68	0.06	12
	Good citizen	32	0.63	0.05	12
	Reliable	32	0.88	0.05	18
2nd order					
Social connectedness 15–18 years	Social attachments	15–18	0.87	0.04	24
	Life satisfaction	15–18	0.59	0.04	14
	Strengths	15–18	0.89	0.04	25
	Social participation	15–18	0.49	0.05	9.2
Wellbeing 32-years	Sense of coherence	32	0.56	0.42	13
	Social participation	32	0.42	0.05	8.0
	Coping style	32	0.60	0.04	15
	Prosociality	32	0.44	0.05	8.1

All estimates $p < 0.001$

Table 2 Standardised direct effects between latent variables

Latent variables	Estimate	S.E.	Est./S.E.	p value (2-tailed)
Family disadvantage 0–9 years to				
Language development 5–9 years	−0.63	0.05	−13	0.00
Social connectedness 5–9 years	−0.44	0.07	6.4	0.00
Language development 5–9 years to				
Social connectedness 5–9 years	0.19	0.08	−2.5	0.01
Social connectedness 15–18 years	0.20	0.05	3.7	0.00
Academic achievement 15–18 years	0.90	0.02	43	0.00
Social connectedness 5–9 years to				
Social connectedness 15–18 years	0.38	0.06	−6.4	0.00
Academic achievement 15–18 years to				
Social connectedness 15–18 years	0.47	0.08	5.7	0.00
Wellbeing 32 years	0.12	0.06	2.2	0.03
Social connectedness 15–18 years to				
Wellbeing 32 years	0.62	0.06	11	0.00

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).

3.4 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.

3.5 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.

4 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 adolescent social connectedness to adult well-being. In contrast, the pathway from 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 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 pathway between adolescent social connection and well-being over a decade later illustrates the enduring significance of positive social relationships. There are numerous perspectives on the mechanisms connecting social context with 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 and Liviatan 2006; Newton 2007; Park and Peterson 2009; Richardson et al. 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 (Astin and Jenkins 1995; Kurzban and Leary 2001; Schultz 2000; Underwood and 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 and 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 predicts social competence in adolescence (McGee and 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 et al. 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 (inverse) 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 and Vaillant 1981; Werner and 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.

References

- Antonovsky, A. (1993). The structure and properties of the sense of coherence scale. *Social Science and Medicine*, *36*(6), 725–733.
- Aristotle. (2004). *The Nicomachean ethics*. (trans: Thomson, J.A.K.). London: Penguin, Penguin Classics.
- Arnsden, G. C., & Greenberg, M. T. (1987). The inventory of parent and peer attachment: Individual differences and their relationship to psychological well-being in adolescence. *Journal of Youth and Adolescence*, *16*(5), 427–454.
- Astington, J. W., & Jenkins, J. M. (1995). Theory of mind development and social understanding. *Cognitive & Emotion*, *9*(2), 151–165.
- Bentham, J. (1789). *An introduction to the principles of morals and legislation*. Garden City: Doubleday.
- Bond, L., Bulter, H., Thomas, L., Carlin, J., Glover, S., Bowes, G., et al. (2007). Social and school connectedness in early secondary school as predictors of late teenage substance use, mental health, and academic outcomes. *Journal of Adolescent Health*, *40*(4), 357.e9–357.e18.
- Bond, L., Patton, G., Glover, S., Carlin, J., Butler, H., Thomas, L., et al. (2004). The gatehouse project: Can a multilevel school intervention affect emotional wellbeing and health risk behaviours? *Journal of Epidemiology and Community Health*, *58*, 997–1003.
- Carroll, J. M., Maughan, B., Goodman, R., & Meltzer, H. (2005). Literacy difficulties and psychiatric disorders: Evidence for comorbidity. *Journal of Child Psychology and Psychiatry*, *46*(5), 524–532.
- Carver, C. S. (1997). You want to measure coping but your protocol's too long: Consider the brief cope. *International Journal of Behavioral Medicine*, *4*(1), 92–100.
- Diener, E., & Oishi, S. (2003). Money and happiness: Income and subjective wellbeing across nations. In E. Diener & E. M. Suh (Eds.), *Culture and subjective wellbeing*. Cambridge, Massachusetts: The MIT Press.
- Education S. C. f. R. i. (1976). *The burt word reading test-1974 revision*. London: Hoddeer & Stoughton.
- Elliott, D. S., & Voss, H. L. (1974). *Delinquency and dropout*. Lexington, Massachusetts: D. C. Heath and Co.
- Erikson, E. H. (1968). *Identity: Youth and crisis*. London: Faber and Faber Ltd.
- Eriksson, M., & Lindstrom, B. (2005). Validity of Antonovsky's sense of coherence scale: A systematic review. *Journal of Epidemiology and Community Health*, *59*, 460–466.
- Feather, N. T. (1995). Values, valences, and choice: The influence of values on the perceived attractiveness and choice of alternatives. *Journal of Personality and Social Psychology*, *68*(6), 1135–1151.
- Gonzales, N. A., Cauce, A. M., Friedman, R. J., & Mason, C. A. (1996). Family, peer, and neighbourhood influences on academic achievement among african-american adolescence: One-year prospective effects. *American Journal of Community Psychology*, *24*(3), 365–387.
- Irwin, T. H. (1994). Happiness, virtue and morality. *Ethics*, *105*, 153–177.
- Kirk, S. A., McCarthy, J. M., & Kirk, W. D. (1968). *The illinois test of psycholinguistic abilities*. Urbana IL: University Press.
- Kurzban, R., & Leary, M. R. (2001). Evolutionary origins of stigmatization: The functions of social exclusion. *Psychological Bulletin*, *127*(2), 187–208.
- Masten, A. S., Roisman, G. I., Long, J. D., Burt, K. B., Obradovic, J., Riley, J. R., et al. (2005). Developmental cascades: Linking academic achievement and externalizing and internalizing symptoms over 20-years. *Developmental Psychology*, *41*(5), 733–746.
- Maughan, B., Rowe, R., Loeber, R., & Stouthamer-Loeber, M. (2003). Reading problems and depressed mood. *Journal of Abnormal Child Psychology*, *31*(2), 219–229.
- McGee, R., Feehan, M., Williams, S., Partridge, F., Silva, P. A., & Kelly, J. (1990). DSM-III disorders in a large sample of adolescents. *Journal of the American Academy of Child and Adolescent Psychiatry*, *29*, 611–619.
- McGee, R., Prior, M., Williams, S., Smart, D., & Sanson, A. (2002). The long-term significance of teacher-rated hyperactivity and reading ability in childhood: Findings from two longitudinal studies. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, *43*(8), 1004–1017.
- McGee, R., & Williams, S. M. (1991). Social competence in adolescence: Preliminary findings from a longitudinal study of New Zealand 15 year olds. *Psychiatry*, *54*, 281–291.
- McGee, R., Williams, S., Howden-Chapman, P., Martin, J., & Kawachi, I. (2006). Participation in clubs and groups from childhood to adolescence and its effects on attachment and self-esteem. *Journal of Adolescence*, *29*(1), 1–17.
- McGee, R., Williams, S., & Nada-Raja, S. (2001). Low self-esteem and hopelessness in childhood and suicidal ideation in early adulthood. *Journal of Abnormal Child Psychology*, *29*(4), 281–291.
- Muthén, L. K., & Muthén, B. O. (1998-2007). *Mplus user's guide*. Los Angeles, CA: Muthen & Muthen.

- Nada Raja, S., McGee, R., & Stanton, W. R. (1992). Perceived attachments to parents and peers and psychological well-being in adolescence. *Journal of Youth and Adolescence*, 21(4), 471–485.
- Nadler, A., & Liviatan, I. (2006). Intergroup reconciliation: Effects of adversary's expression of empathy, responsibility, and recipients' trust. *Personality and Social Psychology Bulletin*, 32(4), 459–470.
- Newton, K. (2007). Social and political trust. In R. J. Dalton & H.-D. Klingemann (Eds.), *Oxford handbook of political behavior*. Oxford: Oxford University Press.
- Park, N., & Peterson, C. (2009). The cultivation of character strengths. In M. Ferrari & G. Potworowski (Eds.), *Teaching for wisdom* (pp. 59–77). Netherlands: Springer.
- Poulton, R., Hancox, R., Milne, B., Baxter, J., Scott, K., & Wilson, N. (2006). The dunedin multidisciplinary health and development study: Are its findings consistent with the overall New Zealand population? *New Zealand Medical Journal*, 199(1235), U2002.
- Resnick, M., Harris, L. J., & Blum, R. W. (1993). The impact of caring and connectedness on adolescent health and well-being. *Journal of Paediatrics and Child Health*, 29(S1), S3–S9.
- Reynell, J. (1969). *Reynell developmental language scales*. London: National Foundation for Educational Research.
- Richardson, D. R., Hammock, G. S., Smith, S. M., Gardner, W., & Signo, M. (2006). Empathy as a cognitive inhibitor of interpersonal aggression. *Aggressive Behavior*, 20(4), 275–289.
- Rogers, C. R. (1961). *On becoming a person*. Boston: Houghton Mifflin.
- Rutter, M., Tizard, J., & Whitmore, K. (1970). *Education, health and behaviour*. London: Longmans.
- Ryan, R. M., & Deci, E. L. (2001). On happiness and human potentials: A review of research on hedonic and eudaimonic wellbeing. *Annual Review of Psychology*, 52, 141–166.
- Ryff, C. (1989). Happiness is everything or is it? Explorations on the meaning of psychological wellbeing. *J. Personality and Social Psychology*, 57, 1069–1081.
- Schultz, P. W. (2000). Empathising with nature: The effects of perspective taking on concern for environmental issues. *Journal of Social Issues*, 56(3), 391–406.
- Seligman, M. E. P., & Csikszentmihalyi, M. (2000). Positive psychology: An introduction. *American Psychologist*, 55, 5–14.
- Sheldon, K. M., Arndt, J., & Hauser-Marko, L. (2003). In search of the organismic valuing process: The human tendency to move towards beneficial goal choices. *Journal of Personality*, 71(5), 835–870.
- Shochet, I. M., Dadds, M. R., Ham, D., & Montague, R. (2006). School connectedness is an underemphasized parameter in adolescent mental health: Results of a community prediction study. *Journal of Clinical Child & Adolescent Psychology*, 35(2), 170–179.
- Simonelli, F., Guerreiro, A. I. F., Simonelli, I., & di Pasquale, C. (2010). Six assertions about the salutogenic approach and health promotion. *Italian Journal of Public Health*, 7(2), 94–101.
- Tiberius, V. (2006). Well-being: Psychological research for philosophers. *Philosophy Compass*, 1(5), 493–505.
- Underwood, B., & Moore, B. (1982). Perspective-taking and altruism. *Psychological Bulletin*, 91(1), 143–173.
- Vaillant, G. E., & Vaillant, C. O. (1981). Natural history of male psychological health, X: Work as a predictor of positive mental health. *American Journal of Psychiatry*, 138, 1433–1440.
- Walen, S. R., DiGiuseppe, R., & Dryden, W. (1992). *A practitioner's guide to rational emotive therapy*. New York: Oxford University Press.
- Waterman, A. S. (2004). Finding someone to be: Studies on the role of intrinsic motivation in identity formation. *Identity*, 4(3), 209–228.
- Werner, E. E., & Smith, R. S. (1982). *Vulnerable, but invincible: A longitudinal study of resilient children and youth*. New York: McGraw-Hill.
- Williams, S., & McGee, R. (1991). Adolescents' self-perceptions of their strengths. *Journal of Youth and Adolescence*, 20, 325–337.