THE NEW ZEALAND MEDICAL JOURNAL
Vol 119 No 1235 ISSN 1175 8716

The Dunedin Multidisciplinary Health and Development Study: are its findings consistent with the overall New Zealand population?

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Abstract

Aims To compare the health of the Dunedin Multidisciplinary Health and Development Study members with people of the same age in the nationally representative New Zealand Health and National Nutrition Surveys.

Method Where similar information was obtained, means or proportions and confidence intervals were generated for both the age 26 assessment of the Dunedin sample and for the 25–26 year old participants in the national surveys. The populations were considered to differ when confidence intervals did not overlap.

Results For smoking habit, body mass index, waist-hip ratio, general practitioner and medical specialist consultations, and hospital admissions, the findings of the Dunedin Study were not significantly different to the nationally representative surveys. The Dunedin Study members also did not differ from their national counterparts on SF-36 subscales measuring physical functioning, bodily pain, general health, vitality, and mental health. They had better scores on the three interference subscales of the SF-36 compared to the national sample, and men in the Dunedin Study spent a little more time doing vigorous physical activity.

Discussion For most outcomes, the Dunedin Study members were very similar to the nationally representative samples. There was little evidence that the repeated assessments in the Dunedin Study had significantly altered the Study members' health, either in terms of responses to questionnaires or on physiological measures of health status. Findings from the Dunedin Study are likely to be generalisable to most young New Zealanders. However, the Dunedin Study is under-representative of Māori and Pacific peoples, so these findings need to be interpreted with caution in this context. Implications for the proposed national Longitudinal Study of New Zealand Children and Families are discussed.

The Dunedin Multidisciplinary Health and Development Study ("Dunedin Study") is a long-running cohort study of 1037 children born in Dunedin in 1972–1973. Over the past 30 years, the study has generated more than 900 publications and reports and it is regarded as one of the most important sources of information on the health, development, and behaviour of young people.[1]

However, concerns are sometimes raised about whether the Dunedin Study cohort is truly representative of young New Zealanders and, more importantly, whether findings from the cohort can be generalised to other populations of young people in New Zealand. This report seeks to address some of these concerns by comparing the

health status of the Dunedin Study members with those participating in nationally representative surveys.

Two issues arise. First, are the Study members, who were all born in Dunedin, similar to other New Zealanders of the same age? Second, have the health behaviours of Dunedin Study members changed (due to being intensively studied throughout their lives) to the point where they are no longer representative of the original population from which they were drawn (the so-called "Hawthorne effect"[2]). These are not trivial matters. Despite information to the contrary,[3] misperceptions about Dunedin Study sample persist and at times they raise questions about the value of the Dunedin Study data for policy-making in the New Zealand context.

The Dunedin Study members are now 32 years old, and they are undergoing a further assessment as we prepare to study the positive and problematic aspects of the transition from young adulthood to mid-life. This represents an opportune time to revisit the question of whether the findings from the Dunedin Study are generalisable to other New Zealanders.

In addition, there is another reason to do this review now as the New Zealand Ministries of Social Development, Health, and Education as well as Treasury and The Families Commission are planning to embark upon a national Longitudinal Study of New Zealand Children and Families.[4] Because multi-site studies tend to be more costly, logistically-demanding, and risk greater threats to internal validity (e.g. standardisation of procedures) than single (or perhaps two) site studies, knowledge about the generalisability of findings from regionally-based studies like the Dunedin Study may help to plan the optimal sampling strategy for the National cohort study.

To address these questions about generalisability, we directly compared the Dunedin Study members from their most recently completed assessment in 1998–1999 (when they were all aged age 26) to 25 and 26 year-olds participants in the cross-sectional New Zealand Health Survey in 1996/97[5] and the National Nutrition Survey in 1997.[6] Comparisons were conducted wherever the same or very similar data were collected in the Dunedin Study and the national surveys.

Methods

Sample characteristics

Dunedin Study—This analysis involved 499 male and 481 female members who participated in the Dunedin Study assessment at age 26 years (mean age = 26.0 years, SD = 3 months). The background to the study and Study members are described in detail elsewhere.[1]

Briefly, the Dunedin Study is a longitudinal investigation of the health, development**,** and behaviour of 1037 children born in Queen Mary Maternity Hospital, Dunedin between April 1972 and March 1973. The sample has been assessed with a diverse array of medical, psychological, and sociological measures with high rates of participation at age 3 (n = 1037), age 5 (n = 991), age 7 (n = 954), age 9 (n = 955), age 11 (n = 925), age 13 (n = 850), age 15 (n = 976), age 18 (n = 993), age 21 (n = 992), and age 26 (n = 980, 96% of the living cohort). Seventy-three (7.5%) Study members self-identified as Māori and 15 (1.5%) as Pacific people at age 26.

The age-26 assessments took place at the Dunedin Unit between March 1998 and June 1999. A small number (27/980, 3%) of participants who were unable to attend the Unit were assessed in the field. The assessment took a full day lasting from 8.30am to 5.15pm and involved interviews and physical examinations.

Of those who participated at the age-26 assessment, 41% (404) were still resident in Dunedin at the time of interview, 21% (202) were resident in other parts of the South Island and 17% (168) were

resident in the North Island. Hence, 774 (79%) were resident in New Zealand at the time of interview. Of the remainder, 11% (108) were resident in Australia, 7% (66) were resident in the United Kingdom, and 3% (32) were resident elsewhere.

New Zealand Health Survey ("Health Survey")—The 1996/1997 Health Survey used a clustered stratified design based on geographic areas to obtain a sample with characteristics that were representative of the entire New Zealand civilian population. To obtain more reliable estimates for Māori and Pacific peoples, a proportionately greater sample of these ethnic groups was included. A total of 7862 adults (aged 15 years and over) participated, thus representing a 73.8% response rate. This analysis included the 292 respondents who were aged 25 or 26 at the time of the survey. Of these, 64 (21.9%) identified themselves as Māori and 34 (11.6%) as Pacific people.

National Nutrition Survey (Nutrition Survey)—At the conclusion of the Health Survey, participants were asked if they would undergo further assessment for the 1997 National Nutrition Survey. A total of 4636 adults completed the Nutrition Survey, of which 146 aged 25 or 26 years are included in this analysis. Twenty-eight (19.2%) identified themselves as Māori and 12 (8.2%) as Pacific people.

Comparison measures

Self-reported health status—For both the Dunedin Study and Health Survey samples, self-reported health status during the previous 12 months was measured by the Australian/New Zealand adaptation of the SF-36 survey—a 36-item questionnaire measuring eight aspects of health.[7] These included physical functioning, role physical (the impact of physical health on performance of everyday roles), bodily pain, general health, vitality, social functioning, role emotional (the impact of emotional health on performance of everyday roles), and mental health. This instrument has been shown to be a reliable and valid measure of the health status of New Zealanders.[8]

Body size measurements—The Dunedin Study and Nutrition Survey measured height without shoes and weight in light clothing to calculate body mass index (BMI) in kg/m^2. Waist and hip circumference were measured to calculate the waist:hip ratio—an index of central adiposity. All body size measurements in both the Dunedin Study and Nutrition Survey were taken twice.

Physical activity—Participants in the Dunedin Study were asked if they had done any physical activities that caused them to "breathe hard or puff a lot" in the past 4 weeks and, if so, how much time per week they spent doing these activities in a normal week. This was taken as the time spent per week doing vigorous physical activities. Vigorous physical activity in the Health Survey was taken as the time they reported that they had spent doing physical activities in the past 7 days that had made them "breathe hard or sweat". This question was prompted by a list of likely activities.

Smoking status—In the Dunedin Study, those who currently smoked one or more cigarettes per day and had smoked daily for at least 1 month in the last year were deemed to be current smokers. Study members who were not current smokers but had smoked daily for as long as a year at some time in their lives were deemed to be ex-smokers. In the Health Survey, those who reported that they smoked one or more cigarettes daily were to be deemed current smokers. Ex-smokers were those who had smoked in the past but were not current smokers.

Health service utilisation—Dunedin Study members were asked whether and how many times they had used a general practitioner (GP), or a medical specialist (e.g., cardiologist, gastroenterologist, obstetrician/gynaecologist, urologist, orthopaedic surgeon, nephrologist, dermatologist, neurologist, ear, nose & throat specialist, ophthalmologist, respiratory specialist, oncologist, endocrinologist, rheumatologist) in the past year.

Study members were also asked whether they had spent any time in hospital in the past year for a physical health (not mental health) problem. Participants in the NZ Health Survey were asked how many times they had visited a general practitioner in the past year, and were also asked if they had seen a medical specialist but were not prompted by a list of possible specialists.

Statistical methods—Comparisons were conducted between the Dunedin Study members and 25–26 year old participants in the Health and Nutrition Surveys. For all measures, either means (e.g. SF-36 scale scores) or prevalences (e.g. current smokers) are presented together with 95% confidence intervals (CIs).

Sample survey weights were applied for the Health Survey based on each individual's probability of being selected for the survey to provide estimates consistent with the New Zealand population. The Dunedin Study was considered to be significantly different from either of the national samples on a measure if the 95% CIs of the samples did not overlap.

Results

Comparisons between the Dunedin Study and the Health and Nutrition Surveys are shown in the following Tables. Because not all participants in the studies consented to every assessment, the numbers included in the tables vary slightly.

Self-reported health status—There were no significant differences between the Dunedin Study and the Health Survey on SF36 subscales measuring physical functioning; bodily pain; general health; vitality; and mental health (Table 1). On the subscales measuring interference with physical and emotional task roles, members of the Dunedin Study scored better than their Health Survey counterparts. They also reported higher social functioning scores, indicating that they experienced less interference in social activities as a result of a physical or emotional problem.

Body size measures—The Dunedin Study and the Nutrition Survey participants were very similar on measures of Body Mass Index and waist:hip ratio (Table 2). These measures were also similar if the comparison was restricted to Māori [Dunedin Study: mean (95%CI) BMI 25.5 (24.6–26.6), mean waist:hip ratio 0.799 (0.784–81.5); Nutrition Survey: mean BMI 27.5 (23.7–31.3), mean waist:hip ratio 0.808 (0.756–0.861)]

Physical activity—Overall, there were no significant differences in the time spent doing vigorous activity in the participants in the Dunedin Study and the Health Survey (Table 3). However, more men in the Dunedin Study spent more than 300 minutes per week doing vigorous activity and fewer of the Dunedin Study men did no vigorous activity.

Smoking status—The Dunedin Study had a slightly greater proportion of current smokers (37.1% vs 33.0%), and a slightly lower proportion of ex-smokers (11.5% vs 16.6%) than the Health Survey, although neither of these differences were significant (Table 4). Approximately half of both samples had never smoked.

Health service use—Similar proportions of the Dunedin Study and the Health Survey had used a GP in the previous 12 months (78.6% and 76.5%, respectively) and were admitted as an inpatient in the previous 12 months (9.7% and 7.8%, respectively) (Table 5). A slightly, though not significantly, greater proportion of the Health Survey participants had used a medical specialist, as compared to the Dunedin Study (29.2% and 20.5%, respectively). There were no differences between the samples in terms of frequency of GP use.

Table 1. SF-36 Health Survey results. The mean and 95% confidence intervals are presented for men and women in the Dunedin Study at age 26 and 25-26 year-olds in the New Zealand Health Survey for each of the eight subscales. Higher scores represent better health. Significant differences between the Dunedin Study and Health Survey are highlighted in bold.

SF36 scales	Dunedin Study			New Zealand Health Survey		
	Male (n=499)	Female (n=480)	All (n=979)	Male (n=98)	Female (n=194)	All (n=292)
Physical functioning	94.4 (93.5–95.4)	91.1 (89.9–92.3)	92.8 (92.0–93.6)	89.9 (85.5–94.3)	92.4 (89.8–94.9)	91.2 (88.8–93.7)
Role physical	91.5 (89.3–93.6)	87.3 (84.7–89.9)	**89.4 (87.7–91.1)**	79.6 (65.8–93.4)	80.0 (71.9–88.1)	**79.8 (72.2–87.3)**
Bodily pain	80.1 (78.4–81.9)	77.7 (75.8–79.6)	78.9 (77.6–80.2)	79.0 (72.0–86.1)	78.7 (73.6–83.7)	78.8 (74.6–82.9)
General health	77.5 (76.1–78.9)	77.2 (75.7–78.8)	77.4 (76.3–78.4)	75.0 (69.0–80.9)	75.2 (71.8–78.7)	75.1 (71.9–78.3)
Vitality	68.8 (67.5–70.1)	62.0 (60.5–63.6)	65.5 (64.5–66.5)	68.5 (64.2–72.7)	61.2 (57.7–64.7)	64.6 (61.9–67.2)
Social functioning	90.8 (89.4–92.1)	87.7 (86.1–89.3)	**89.3 (88.2–90.3)**	88.0 (83.3–92.6)	81.9 (77.0–86.9)	**84.7 (81.3–88.2)**
Role emotional	93.5 (91.6–95.3)	**89.1 (86.8–91.4)**	**91.3 (89.8–92.8)**	85.6 (78.3–92.9)	**71.6 (61.7–81.5)**	**78.1 (71.6–84.7)**
Mental health	80.4 (79.3–81.5)	77.0 (75.7–78.4)	78.8 (77.9–79.6)	78.6 (74.7–82.5)	74.2 (71.0–77.4)	76.3 (73.8–78.8)

Table 2. Body Mass Index (BMI) and waist:hip ratio means (95%CI) for the Dunedin Study members at age 26, and for 25 & 26 year olds from the National Nutrition Survey. Data from pregnant women are excluded.

Variable	Dunedin Study			National Nutrition Survey		
	Male	Female	All	Male	Female	All
BMI	25.2 (24.8–25.5) n=494	24.9 (24.4–25.4) n=445	25.0 (24.8–25.3) n=939	25.7 (23.9–27.4) n=49	25.0 (23.9–26.1) n=97	25.3 (24.3–26.3) n=146
Waist:hip ratio	0.849 (0.846–0.853) n=489	0.745 (0.741–0.750) n=438	0.800 (0.796–0.805) n=927	0.860 (0.832–0.888) n=47	0.761 (0.740–0.781) n=95	0.806 (0.783–0.829) n=142

Table 3. Time spent in vigorous activity during a typical week by the Dunedin Study members at age 26 and the 25–26 year olds in the New Zealand Health Survey (percentage and 95%CI of sample). Significant differences between the Dunedin Study and Health Survey are highlighted in bold.

Time interval	Dunedin Study						New Zealand Health Survey					
	Male (N=496)		Female (N=476)		All (N=972)		Male (N=98)		Female (N=194)		All (N=292)	
	n	%	n	%	n	%	n	%	n	%	n	%
0 mins	138	**27.8 (23.9–32.0)**	183	38.4 (34.1–42.9)	321	33.0 (30.1–36.1)	42	**47.7 (34.7–60.7)**	80	32.9 (24.4–41.4)	122	39.9 (31.9–47.9)
<150 mins	95	19.2 (15.8–22.9)	109	22.9 (19.2–26.9)	204	21.0 (18.4–23.7)	14	12.6 (5.2–20.0)	54	29.8 (20.5–39.2)	68	21.7 (15.4–27.9)
150–300 mins	110	22.2 (18.6–26.1)	128	26.9 (23.0–31.1)	238	24.5 (21.8–27.3)	19	21.5 (10.6–32.5)	30	19.8 (9.8–29.8)	49	20.6 (13.3–28.0)
>300 mins	153	**30.8 (26.8–35.1)**	56	11.8 (9.0–15.0)	209	21.5 (19.0–24.2)	23	**18.2 (10.0–26.3)**	30	17.5 (9.8–25.2)	53	17.8 (12.2–23.4)

Table 4. Smoking status (percentage and 95% CI) of the Dunedin Study members at age 26 and the 25-26 year olds in the New Zealand Health Survey sample.

Smoking status	Dunedin Study						New Zealand Health Survey					
	Male (N=499)		Female (N=481)		All (N=980)		Male (N=98)		Female (N=194)		All (N=292)	
	n	%	n	%	n	%	n	%	n	%	n	%
Never smoked	266	53.3 (48.8–57.8)	241	50.1 (45.5–54.7)	507	51.7 (48.6–54.9)	47	51.9 (38.3–65.5)	81	49.0 (38.3–59.7)	128	50.4 (41.8–58.9)
Ex-smoker	54	10.8 (8.2–13.9)	64	13.3 (10.4–16.7)	118	12.0 (10.0–14.2)	15	13.1 (5.8–16.9)	31	19.7 (10.6–28.8)	46	16.6 (10.5–22.7)
Current smoker	179	35.9 (31.7–40.3)	176	36.6 (32.3–41.1)	355	36.2 (33.2–39.3)	36	35.0 (21.5–48.5)	82	31.3 (22.2–40.4)	118	33.0 (25.0–41.0)

Table 5. Twelve-month health service use (percentage and 95% CI of sample) by the Dunedin Study members at age 26 and the 25–26 year olds in the New Zealand Health Survey

Health service use	Dunedin Study						New Zealand Health Survey					
	Male (N=498)		Female (N=479)		All (N=977)		Male (N=98)		Female (N=194)		All (N=292)	
	n	%	n	%	n	%	n	%	n	%	n	%
Used GP	331	66.5 (62.1–70.6)	429	89.6 (86.5–92.3)	760	77.8 (75.2–80.4)	64	66.9 (54.9–78.9)	163	85.1 (77.2–92.9)	227	76.5 (69.5–83.5)
Used specialist	73	14.7 (11.7–18.1)	122	25.5 (21.6–29.6)	195	20.0 (17.5–22.5)	25	29.9 (16.7–43.0)	51*	28.5 (18.8–38.2)	76*	29.2 (21.1–37.2)
Admitted as inpatient	39	7.8 (5.6–10.6)	55	11.5 (8.8–14.8)	94	9.6 (7.8–11.4)	9	9.0 (5.2–12.7)	29	10.1 (5.6–14.5)	38	7.8 (1.5–14.0)
	Male (N=331)		Female (N=429)		All (N=760)		Male (N=62) *		Female (N=163)		All (N=225) *	
	n	%	n	%	n	%	n	%	n	%	n	%
Used GP once	136	41.1 (35.7–46.4)	66	15.4 (12.1–19.2)	202	26.6 (23.5–29.9)	16	33.4 (15.2–51.7)	23	11.7 (6.3–17.0)	39	20.5 (11.6–29.4)
Used GP twice	74	22.4 (18.0–27.2)	104	24.2 (20.3–28.6)	178	23.4 (20.5–26.6)	18	29.9 (15.4–44.4)	37	24.0 (15.2–32.9)	55	26.4 (18.5–34.2)
Used GP 3–5 times	81	24.5 (19.9–29.5)	149	34.7 (30.2–39.4)	230	30.3 (27.0–33.7)	17	24.3 (10.8–37.8)	63	41.0 (29.3–52.7)	80	34.3 (25.1–43.4)
Used GP 6–11 times	27	8.2 (5.4–11.6)	72	16.8 (13.4–20.7)	99	13.0 (10.7–15.6)	7	9.6 (1.9–17.4)	22	14.0 (5.5–22.5)	29	12.2 (6.2–18.2)
Used GP >11 times	13	3.9 (2.1–6.6)	38	8.9 (6.3–12.0)	51	6.7 (5.0–8.7)	4	2.7 (0.0–5.9)	18	9.3 (3.5–15.1)	22	6.6 (2.9–10.3)

* Data from two members of the Health Survey sample not available

Discussion

Dunedin Study members were similar to their age matched peers in the national Health and Nutrition samples on most of the health measures we compared. This included five of the eight subscales of self-reported health status from the SF36; smoking behaviour; physical activity; two physical measurements (BMI and waist:hip ratio); and use of general practice and specialist health services.

There were significant differences between the Dunedin Study members and the nationally representative samples on three of the eight subscales of the SF36. The SF36 is a widely-used, validated, and reliable instrument that provides a multidimensional assessment of health. The 8 subscales measure physical, emotional, and social factors and the SF36 is used to provide a reasonable overall assessment of a person's health in the context of large Health Surveys. However, despite its usefulness, the SF36 remains a self-report measure and has the accompanying limitations. For example, reports can be confounded by mood or certain personality traits.[9] The three subscales on which the Dunedin Study members differed from their peers in the Health Survey were "role physical", "social functioning", and "role emotional" (only differed in women).

Interestingly, the Dunedin Study members tended to score higher (better health) on these scales than the participants in the Health Survey. If the repeated interviews of the Dunedin cohort had altered their perception of their health (the "Hawthorne effect"), we might have predicted that they would become more sensitised to their health problems. In fact, the Dunedin Study members reported less interference in their roles than participants in the national studies. It is possible that these minor differences arose because of a selection bias of more health-focussed individuals among the 74% of people who agreed to participate in the Health Survey.

For some measures, slightly different methodologies were used by the Dunedin Study and the national surveys. For example, members of the Dunedin sample were considered smokers if they had smoked one cigarette a day for at least a month of the previous year AND they currently smoked at least one cigarette a day—whereas members of the Health Survey were only asked if they currently smoked at least one cigarette a day (they need not have smoked for a month). Also, members of the Health Survey weren't required to have smoked for a year to be considered ex-smokers. Despite this, the proportions of smokers and ex-smokers in the samples were quite similar. For the *health service utilisation* measures, the methods used by both studies seem comparable except that members of the Dunedin sample were given a checklist of specialists who they may have visited in the previous year—whereas members of the Health Survey were not. Similarly the *physical activity measures* were similar, although worded slightly differently and the Health Survey respondents were shown a checklist of activities. Taken together these measures indicate that the samples are broadly comparable in terms of health-risk behaviours and lifestyle factors (smoking and physical activity) and health problems indexed by health service use. It is notable that on the comparison of the two objective physical health markers (body mass index and waist hip ratio), the Dunedin Study members and the National Nutrition sample were almost identical.

Have we changed people? It would appear not. Participants in the Dunedin Study look the same as research-naïve participants in the national studies in almost all respects.

These findings are consistent with an earlier study comparing respiratory symptoms among Dunedin Study participants at age 21 with those of 20–22-year-old participants in the New Zealand section of the European Community Respiratory Health Study.[10] This was a once-only postal questionnaire conducted in Auckland, Wellington, Christchurch, and Hawke's Bay which used virtually identical questions to those used in the Dunedin Study. There was no difference in the prevalence rates of any of the reported symptoms or asthma medication-use between the samples. Thus, in two comparisons we have found little evidence that the health status of our study members has been altered by virtue of their involvement in a longitudinal study.

These finding have several implications for planning of future cohort studies, including the New Zealand Longitudinal Study of Children and Families. The first relates to the need to distinguish between 'representativeness' and 'generalisability'. Classically, representativeness refers to sampling methods that faithfully represent *all* members of the target population (in a New Zealand nationally representative study this would mean the whole of the country), whereas generalisability refers to the ability to extrapolate findings to the wider population, despite imperfect representativeness. Deriving a sample that is perfectly representative of the major population groups of interest (in terms of socioeconomic status and geographic location for example) is resource intensive and costly. Moreover, for a longitudinal study, generalisablility is more important than representativeness. By its nature, a cohort study *cannot* remain truly representative of the population of interest. Thus, although the Dunedin Study sample appears to be broadly representative of New Zealand children born in 1972/1973, they will not necessarily be representative of children born in 1992 or 2002. Nevertheless, it is today's New Zealand children that are most likely to benefit from the lessons that we have learned from the Dunedin Study. The value of a cohort study is that it provides a means of testing hypotheses about the importance of early influences and the sequence of events in growth and development. Unless there are good reasons to suspect otherwise, the findings are likely to be generalisable to other people in similar circumstances.

Second, a potentially greater threat to study validity is from non-random loss to follow-up. In the context of a new national cohort study, a strong argument can be made for resources being spent on maintaining cohort retention, and ensuring high quality measurements, especially if the generalisability of findings to the wider population from a single site can be demonstrated, as appears to be the case here. In support of this argument, Youth 2000, a nationwide survey of health and wellbeing amongst New Zealand secondary school students has been analysed by region. Although there were minor differences between the 15 regions, the conclusions drawn about health, risk behaviour, and health service needs for each region were identical.[11]

The findings provide broad support for the generalisability of findings from the Dunedin Study (and by implication similar studies such as the Christchurch Health & Development Study[12]) to other New Zealanders. However, the cross-sectional comparisons presented here risk underplaying the ways in which longitudinal designs enhance generalisability compared to cross-sectional studies. For example, prospective-longitudinal studies provide better estimates of lifetime exposures than cross-sectional, retrospective studies.[13]

Longitudinal studies also permit casual inferences about a range of exposures and outcomes, and it is this information that is most useful for policy-making. In this

regard, it is noteworthy that both the Dunedin and Christchurch longitudinal studies produce highly replicable findings in the international context, which given the similarities between countries such as Australia, USA, Canada, and the UK[14] is perhaps not surprising. Indeed it is precisely this generalisability that has resulted in significant investment in the Dunedin Study by the U.S. National Institutes of Health, and more recently by the UK Medical Research Council.

However, there are some limitations to our findings, particularly in the capacity of this analysis to inform on the generalisability of findings to specific ethnic groups (Māori, Pacific, and European/Other). We have not been able to examine whether health outcomes within specific ethnic groups (Māori, Pacific, European/Other) are comparable between the Dunedin Study and the national surveys. Summary data for the individual ethnic groups in the New Zealand Health Survey for this age-group were not available. There may also be limitations due to small numbers of Māori and Pacific ethnic groups in both the Dunedin Study and in the national surveys, which may reduce the precision of estimates making statistical comparison difficult.

Finally, Māori, and Pacific people are under-represented in the Dunedin Study when compared with the National Surveys (where data is weighted to match the census population). Given differences in health status between ethnic groups, this may impact on comparisons between the total Dunedin cohort and the New Zealand Survey populations. For these reasons we need to be cautious about concluding that the Dunedin cohort findings are able to be generalised on the basis of ethnicity and this issue needs to be investigated further. Nevertheless, with regards to Māori, it is noted that 73 Dunedin Study members self-identified as Māori at age 26. By comparison, there were 64 Māori participants in the 25 and 26 year-old age range in the New Zealand Health Survey. Hence, although the Dunedin Study may under-represent Māori as a proportion of its total sample, it actually has a larger number of Māori participants of this age than the nationally representative sample.

In conclusion, there appear to be few important differences in self-reported and objectively measured health between participants in the long-running Dunedin Study, and participants of similar ages in nationally-representative surveys. This suggests that the Dunedin Study members have not been changed by undergoing repeated assessments throughout their lives, and that findings from the Dunedin Study are likely to be broadly generalisable to the wider New Zealand population. These findings may be relevant to the design of future New Zealand cohort studies.

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Acknowledgements: The Dunedin Multidisciplinary Health and Development Research Unit is funded by the Health Research Council of New Zealand. Collection of data used in this report was also funded by the National Heart Foundation (NZ) and the US National Institute of Mental Health grant MH45070. The New Zealand Health Survey and National Nutrition Survey were funded by the Ministry of Health.

We are grateful to the Dunedin Study members and their parents for their continued support and to the participants in the New Zealand Health and National Nutrition Surveys. We thank Karen Blakey for help in compiling data from the National Health Survey, and Professor David Fergusson for helpful comments. We also wish to thank Dr Phil A Silva, the Dunedin Study founder.

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