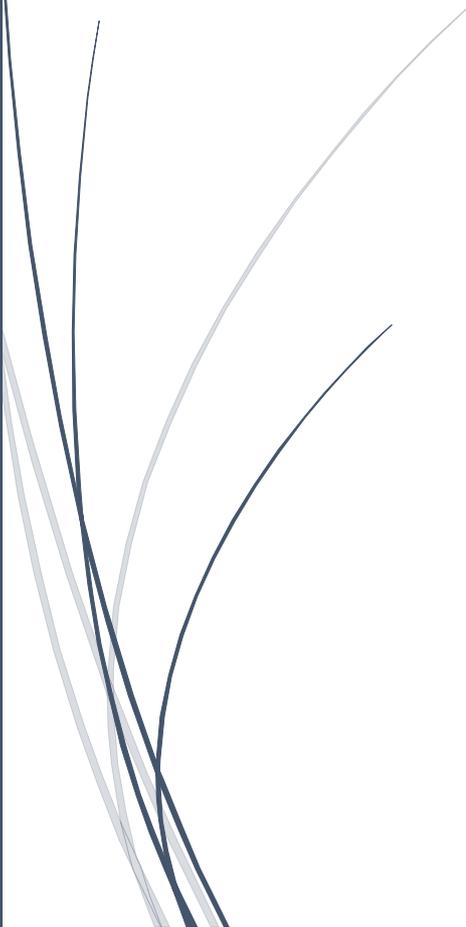




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Determinants of physical activity in young people

A report on the Active Young People NZ Survey



Prepared by Dr Anja Mizdrak
UNIVERSITY OF OTAGO, WELLINGTON

Table of Contents

Introduction	2
Methods.....	2
Datasets	2
Meeting guidelines regression analysis	2
Attitudes to physical activity.....	4
Barriers to PA participation.....	5
Activities that young people want to do more of.....	5
Results.....	5
Meeting guidelines regression analysis	6
Attitudes to physical activity.....	7
Barriers to PA participation.....	9
Activities that young people want to do more of.....	10
Discussion.....	15
Future research opportunities.....	16
References	17
Supplementary Tables	19

Introduction

Physical activity is associated with numerous benefits for young people including health benefits, cognition and educational performance¹⁻⁴. Understanding the determinants of physical activity can contribute to evidence-based planning of interventions as it allows interventions to target factors known to cause inactivity⁵. This report outlines analyses conducted on the Active Young People NZ Survey, conducted by Sport New Zealand. The purpose of these analyses was to identify how physical activity and determinants of physical activity vary by socio-demographic characteristics.

This project has received ethical approval under the University of Otago Human Ethics Committee (Category B).

Methods

Datasets

This analysis used young peoples data from the Active NZ Survey, collected between January 2017 and July 2018. The dataset contains self-reported information on physical activity participation for over 8,000 young people (aged 5-18). For physical activities in the previous 7 days, participants record the type, time spent, and location. The survey also records socio-demographic and other characteristics of participants. This includes gender, age, ethnicity, NZ Index of Multiple Deprivation (NZDep), region, and lifestyle factors (e.g. hours of sleep). The survey was conducted online with young people recruited through adult household members surveyed in the Active NZ Survey. Further details of the survey methodology are available in a Technical Report⁶.

For the purposes of this analysis, we added additional household-level variables to the Active Young People NZ dataset: household income and urban-rural classification. Household income was derived from the reported household income from adult household members surveyed in the Active NZ Survey. 87% of young people were matched to an adult household member, which allowed a household income value to be obtained for 76% (12% of young people were matched with an adult household member who did not provide household income).

Urban-rural classification was created using Stats NZ meshblock level mappings⁷. The groupings used for the analysis were: major urban area, large urban area, medium urban area, small urban area, and rural.

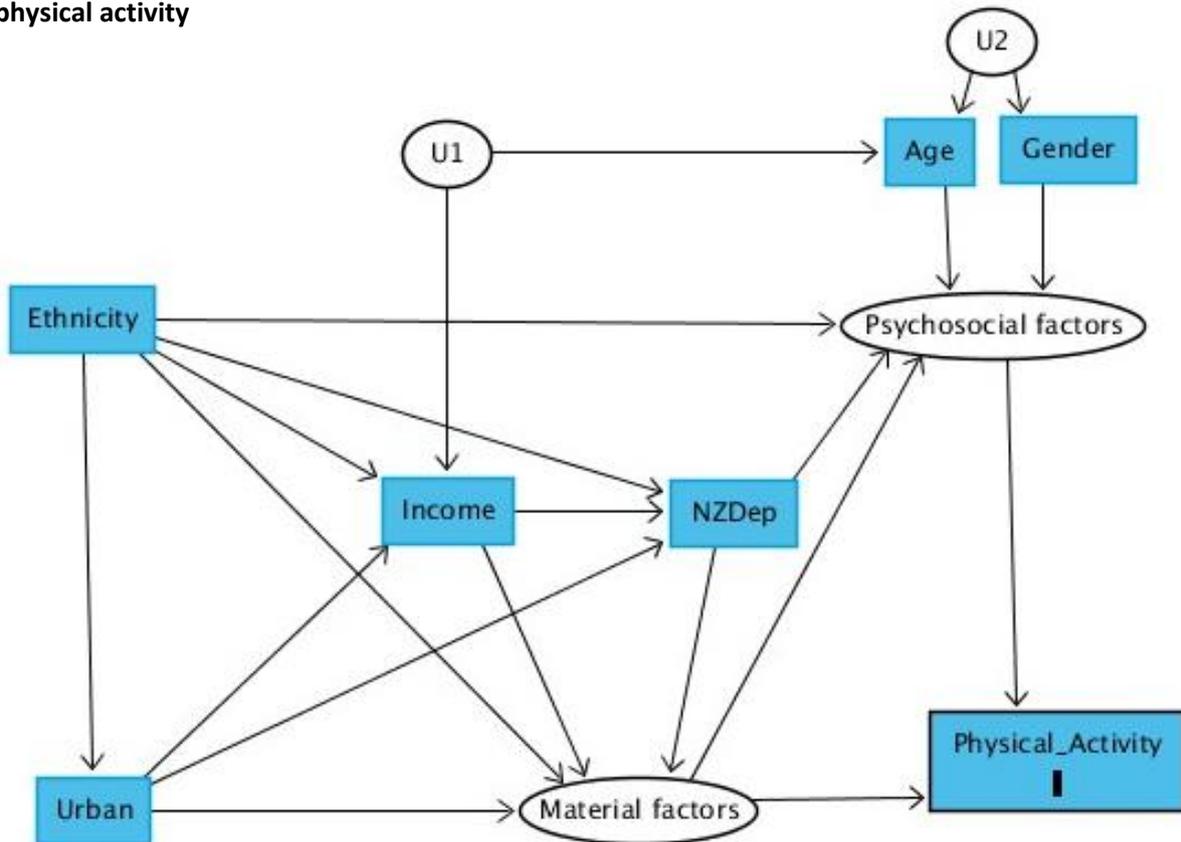
Meeting guidelines regression analysis

Young people were defined as meeting physical activity recommendations if they reported at least 7 hours (420mins) of physical activity per week. This is in line with NZ recommendations that children should accumulate at least one hour physical activity per day⁸. However, we were unable to ascertain the extent to which activity was spread across the week. Whilst the survey asked children to report which of the previous days they had done at least an hour of physical activity, a number of data discrepancies suggested that the responses were unreliable. For example, over 5% of young people did over seven hours of physical activity per week but reported zero days where they were active for at least one hour.

We applied survey weights to provide an initial estimate of the proportion of young people meeting physical activity recommendations in different socio-demographic groups. Then, regression analyses were conducted to attempt to estimate the effect of different socio-demographic characteristics on probability of meeting physical activity recommendations.

The regression analyses were informed by a directed acyclic graph (DAG) representing plausible pathways between socio-demographic exposures, and physical activity as an outcome (Figure 1). Psychosocial and material factors were conceptualised as the immediate determinants of physical activity. Psychosocial factors include motivation, self-efficacy, and internalised beliefs and values. Material factors include physical access to facilities, ability to pay, and opportunity. Both of these immediate determinants are difficult, if not impossible, to measure fully. Each of the socio-demographic factors of interest were conceptualised as an influence on material or psychosocial factors (or both).

Figure 1: Directed acyclic graph (DAG) representing how socio-demographic factors influence physical activity



Blue squares represent measured variables, white ovals represent unmeasured variables. U1 and U2 represent unmeasured relationships between sociodemographic variables, likely introduced as a result of survey design. Graph produced using DAGitty v2.3 (<http://www.dagitty.net/dags.html#>). DAG verified using tests of conditional independence between variables.

The regression analysis was based on a subset of the overall sample – we excluded individuals who do not attend school and those who identified as gender diverse (n = 97/8,983) as there were an insufficient number of individuals in these groups to include robustly in a statistical analysis. Visual inspection of the proportion of young people meeting physical activity recommendations by age revealed that age was non-linear and closely associated with schooling (i.e. grouped according to Primary, Intermediate, and High School). Therefore, regression analyses used school as a marker for age.

We treated meeting recommendations as a binary outcome, as specified above. We ran ordinary least squares regressions (OLS) analyses to give a coefficient for the increase in the proportion meeting recommendations based on each socio-demographic characteristic. All models were

conducted using survey weights, and were replicated with logistic regressions to assess the robustness of results.

Model 1 included school and gender and was run separately for each ethnic group (European vs. non-European, Māori vs non-Māori, Pacific vs non-Pacific, Asian vs non-Asian) to determine the total effect of ethnicity on probability of meeting physical activity guidelines. Each version of model 1 included a binary ethnicity variable representing whether a person was classified as belonging to a particular ethnic group (e.g. European vs. non-European). All other models used a binary variable for ethnicity (Māori vs. non-Māori).

Model 2 included school, gender, ethnicity, and urban-rural classification to estimate the total effect of urban-rural classification on meeting physical activity guidelines.

Model 3 added household income to estimate the total effect on meeting physical activity guidelines. Owing to observed correlations in the dataset between seemingly unrelated variables due to sampling (e.g. between school and gender), model 3 is also the most appropriate model for determining the total effect of school and gender on meeting guidelines. The main analysis treated household income as a categorical variable to avoid excluding the proportion of the sample missing household income information. We also ran a sensitivity analysis treating household income as a continuous variable.

Finally, model 4 included all the sociodemographic variables (gender, school, ethnicity, urban-rural classification, household income, and NZDep) to determine the total effect of NZDep on meeting physical activity guidelines. As with household income, the main analysis treated NZDep as a categorical variable to avoid biasing results by excluding those missing NZDep information. In addition, we ran a sensitivity analysis treating NZDep as a continuous variable.

Attitudes to physical activity

Following the regression analyses to identify differences in physical activity participation across different groups of young people, we examined attitudes to physical activity. The survey included 18 questions regarding attitudes towards physical activity where participants were asked to rank their agreement with different statements on a Likert scale (1 - Strongly agree to 5 - Strongly disagree)). Of note, there were some changes in the format of questions during the data collection period and differences in the age groups that were required to respond; analyses were restricted accordingly.

Key attitudinal variables were identified by Sport NZ staff. The statements were:

- "I like being physically active"
- "People in my life encourage me to take part in physical activities"*
- "I am good at lots of different physical activities"*
- "I have the chance to do the physical activities I want"*
- "I want to take part in physical activities"*
- "I understand why taking part in physical activity is good for me"*
- "I feel confident to take part in lots of physical activities"*

*Denotes "physical literacy" variable developed by Sport NZ for monitoring through Active NZ survey

The most general measure of attitude to physical activity in the survey asked young people to respond with the extent they agreed with the following statement "I like being physically active". We examined the extent to which responses to "I like being physically active" accurately represented young people's overall attitudes to physical activity. We found a high degree of concordance between responses to "I like physical activity" and other physical literacy variables. Depending on

the statement, 86% to 96% of young people gave a response that was within one point of their response to the “I like being physically active” statement. Given that these results strongly suggested that liking physical activity was a good predictor of overall attitudes, this was selected as the key variable for analysis. We recoded responses as a binary variable with 1 representing young people who said they agreed or strongly agreed with the statement, and 0 otherwise.

The proportion of young people who responded positively across different socio-demographic groups was tabulated, applying survey weights. As inactive young people are the target for intervention, we split the analysis by whether or not young people met physical activity guidelines, to enable us to examine differences in attitudes within the inactive group. Regression specifications were the same as those conducted for meeting physical activity recommendations. Conceptually, this is equivalent to replacing physical activity participation with “I like being physically active” in the DAG in Figure 1.

The same regression analyses were run on the other key physical literacy variables as additional analyses. Analyses were restricted to later survey waves as the physical literacy statements were added later to data collection (i.e. from 5th July 2017). The results for these analyses are presented in supplementary table 3. Due to the large number of analyses conducted, we would expect some statistically significant associations to arise by chance and we recommend caution when results for any of these are not strongly significant and/or not consistent across multiple attitudinal variables.

Barriers to PA participation

Young people aged 8 years and up were asked whether they would or would not like to be more physically active. We examined how this differed for those who do and do not meet physical activity recommendations. Based on responses to whether young people would or would not like to be more physically active, young people were asked about barriers to increasing their physical activity participation. We examined the most commonly listed barriers to greater physical activity participation for different groups, again focusing on young people who do not meet guidelines.

Activities that young people want to do more of

Finally, young people who reported wanting to be more physically active were given the opportunity to state one activity that they would like to do more of. We quantified which of the activities listed by young people were the most popular. We examined the ten most popular activities listed for different groups of young people to identify opportunities for service provision. As with the other analyses, attention was focused on examining patterns for young people who do not currently meet guidelines.

Results

Fifty-eight percent of young people were classified as meeting physical activity recommendations, but there was variation across different socioeconomic groups, as displayed in Table 1. This presents an overall picture, but does not account for the interrelationships between different sociodemographic characteristics (e.g. between age and income as identified in the DAG in Figure 1).

Table 1: Percentage of young people meeting physical activity recommendations

		% Meeting recommendations (95% CI)
Overall		57.7 (56.7-58.8)

Gender	Female	55.0 (53.5-56.4)
	Male	60.5 (59.1-62.0)
	Gender diverse	56.8 (38.4-75.2)
Ethnicity	European	62.2 (61.0-63.4)
	Maori	59.0 (56.8-61.1)
	Pacific	53.0 (50.0-56.0)
	Asian	37.9 (35.0-40.8)
	Other	55.6 (46.5-64.6)
NZDep Quintile	1 (Least deprived)	61.9 (59.9-63.9)
	2	58.7 (56.4-61.0)
	3	59.2 (56.6-61.7)
	4	55.6 (53.0-58.3)
	5 (Most deprived)	49.0 (46.2-51.7)
	Unknown	58.4 (55.2-61.7)
Household income	\$30k or less	51.1 (45.8-56.3)
	\$30-40k	51.9 (45.8-58.0)
	\$40-60k	53.7 (49.9-57.5)
	\$60-80k	60.7 (57.5-64.0)
	\$80-100k	58.2 (55.1-61.3)
	\$100-120k	59.3 (56.0-62.6)
	\$120-160k	62.1 (59.2-65.1)
	\$160-200k	60.1 (56.1-64.1)
	>\$200k	65.8 (62.3-69.4)
	Unknown	54.2 (52.3-56.1)
School	Primary	58.2 (56.5-59.8)
	Intermediate	62.1 (59.6-64.7)
	High school	56.3 (54.7-57.8)
Urban-rural	Major urban area	55.3 (53.8-56.9)
	Large urban area	55.5 (52.6-58.3)
	Medium urban area	60.4 (56.3-64.6)
	Small urban area	63.9 (60.2-67.5)
	Rural	61.9 (59.3-64.5)
	Unknown	58.6 (55.9-61.3)

Meeting guidelines regression analysis

Regression analyses revealed differences in the proportion of young people meeting physical activity recommendations across different socio-demographic groups. Full regression outputs are displayed in Supplementary Table S1. There were significant differences in the proportion of young people meeting physical activity guidelines across different ethnic groups. Young people of European ethnicity were more likely to meet recommendations than non-Europeans (17% increase), and Asian young people were less likely to meet recommendations (22% decrease). Māori young people were no more or less likely to meet recommendations compared to non-Māori. There was a small difference in the percentage of Pacific young people meeting recommendations compared to non-Pacific young people, but this was not significant.

Young people in medium and small urban areas were more likely to meet recommendations than young people in major urban areas (5% and 8% increase respectively, model 2). Young people in rural areas were also more likely to meet recommendation (7% increase). Young people in high school and primary school were significantly less likely to meet recommendations than those in intermediate school (4% decrease in both cases, model 3). Males were significantly more likely to meet recommendations than females (6% increase, model 3).

Household income has a significant impact on the percentage of young people meeting recommendations (model 3), with a 15% increase in the proportion of young people in the highest income group (>\$200k/year) meeting recommendations compared to the lowest income group (<\$30k). Finally, young people in more deprived areas were significantly less likely to meet recommendations, with a 12% difference between the least and most deprived quintiles (model 4). These relationships held in sensitivity analyses where household income and NZDep were classified as continuous variables.

This analysis suggests that there are sociodemographic differences in meeting recommendations. Caution is noted with respect to interpreting the magnitude of the observed differences due to underlying bias in data collection. For example, age and gender are correlated within this dataset suggesting problems with the sampling strategy that may limit the validity of findings. However, the patterns observed with respect to sociodemographic characteristics in this analysis are consistent with international literature. Within countries, boys tend to be more active than girls⁹⁻¹¹. The decline in physical activity in adolescence is also well documented^{9 10 12}. International evidence on the impact of socioeconomic factors on physical activity in young people is more mixed with some studies finding an association between socioeconomic advantage and physical activity^{13 14} while others report no association¹⁵.

Together, the available evidence suggests the need to reach young people in high school, females, and those who are more deprived to intervene in those who are least active. However, targeted interventions need to be balanced against the fact that there are still many young people who are inactive in other groups – 34% of young people who were not in any of the ‘target’ groups were classified as inactive in this analysis compared to 42% who were in at least one of the target groups (female, high school, most deprived quintile by NZDep). Given the suggestion that there may be some ethnic inequalities in physical activity participation, careful measurement and consideration of ethnicity dimensions in service provision is vital to avoid widening inequalities.

Attitudes to physical activity

The majority of young people reported that they like being physically active (86.1%). Attitudes towards physical activity differed between young people who did and did not meet physical activity recommendations. However, even amongst those that do not meet recommendations, 77.3% of young people reported liking physical activity. Table 2 shows the percentage of young people in different socio-demographic groups who report that they agreed or strongly agreed with the statement “I like being physically active”.

Table 2: Proportion who enjoy physical activity, stratified by whether or not young people met physical activity guidelines

	% Who enjoy physical activity (95% CI)
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		Overall	Meet guidelines	Don't meet guidelines
Overall		86.1 (85.4-86.9)	92.6 (91.8-93.3)	77.3 (75.9-78.6)
Gender	Female	85.3 (84.2-86.3)	91.6 (90.5-92.7)	77.5 (75.7-79.4)
	Male	87.1 (86.1-88.1)	93.5 (92.6-94.4)	77.2 (75.2-79.2)
	Gender diverse	67.6 (50.2-85.0)	79.8 (60.1-99.6)	51.5 (23.3-79.7)
Ethnicity	European	87.5 (86.7-88.3)	93.3 (92.5-94.1)	77.8 (76.2-79.5)
	Maori	84.2 (82.7-85.8)	91.7 (90.1-93.2)	73.5 (70.5-76.5)
	Pacific	84.9 (82.8-87.1)	91.1 (88.8-93.4)	77.9 (74.3-81.5)
	Asian	83.6 (81.3-85.8)	90.1 (87.2-93.0)	79.5 (76.5-82.6)
	Other	88.1 (82.3-94.0)	93.9 (88.1-99.7)	80.9 (70.2-91.6)
NZDep quintile	1 (Least deprived)	88.4 (87.1-89.7)	94.7 (93.5-95.8)	78.2 (75.4-80.9)
	2	86.7 (85.1-88.3)	93.3 (91.8-94.8)	77.3 (74.3-80.4)
	3	87.1 (85.3-88.8)	91.9 (90.1-93.7)	80.0 (76.7-83.3)
	4	84.5 (82.5-86.4)	90.5 (88.4-92.6)	76.8 (73.3-80.2)
	5 (Most deprived)	81.3 (79.2-83.5)	89.3 (86.8-91.7)	73.6 (70.2-77.0)
	Unknown	86.9 (84.7-89.2)	93.2 (91.0-95.3)	78.0 (73.7-82.3)
Household income	\$30k or less	79.9 (75.6-84.1)	91.0 (86.8-95.2)	67.7 (60.5-74.9)
	\$30-40k	82.7 (78.1-87.3)	88.8 (83.5-94.2)	76.2 (68.7-83.7)
	\$40-60k	83.9 (81.1-86.7)	90.7 (87.6-93.7)	75.9 (71.0-80.7)
	\$60-80k	86.6 (84.3-88.8)	90.3 (87.8-92.8)	80.8 (76.6-85.0)
	\$80-100k	87.8 (85.7-89.8)	93.1 (91.1-95.2)	80.2 (76.3-84.0)
	\$100-120k	90.2 (88.2-92.2)	94.9 (93.0-96.9)	83.2 (79.3-87.2)
	\$120-160k	86.8 (84.8-88.9)	92.0 (90.0-94.1)	78.3 (74.2-82.4)
	\$160-200k	85.4 (82.5-88.3)	91.0 (88.0-94.0)	76.9 (71.5-82.4)
	>\$200k	91.7 (89.6-93.7)	94.9 (92.9-96.9)	85.4 (80.8-89.9)
	Unknown	84.2 (82.8-85.6)	93.2 (91.9-94.5)	73.5 (71.0-76.0)
School	Primary	84.0 (82.1-85.9)	90.3 (88.4-92.2)	73.5 (69.8-77.2)
	Intermediate	85.5 (84.4-86.6)	93.6 (92.6-94.6)	75.1 (73.1-77.1)
	High school	87.8 (86.7-88.9)	92.4 (91.2-93.6)	81.3 (79.3-83.4)
Urban-rural	Major urban area	85.6 (84.5-86.7)	92.3 (91.2-93.4)	77.3 (75.3-79.2)
	Large urban area	87.8 (85.9-89.7)	93.8 (91.9-95.7)	80.3 (76.9-83.8)
	Medium urban area	87.9 (85.1-90.7)	94.1 (91.5-96.6)	78.3 (72.6-83.9)
	Small urban area	81.8 (78.8-84.7)	88.7 (85.7-91.8)	69.4 (63.5-75.3)
	Rural	87.6 (85.8-89.3)	93.6 (92.0-95.3)	77.7 (74.1-81.3)
	Unknown	86.3 (84.3-88.2)	92.7 (90.8-94.6)	77.1 (73.4-80.8)

When we examined attitudes differences the young people who did not meet physical activity recommendations, there were few significant differences across sociodemographic groups (see Supplementary Table S2 for full regression outputs). There were no significant differences in the proportion of young people who like physical activity by urban-rural status (model 2). There was no difference in the proportion of males and females that like being physically active (model 3). Young people in primary school were more likely to report liking physical activity (7% increase) than those in intermediate school (model 3). There was no significant difference between young people in intermediate school and high school (model 3). There was some evidence that young people in

households with higher incomes are more likely to enjoy being active, a result replicated across some but not all other attitudinal variables (model 3). Finally, there was no difference in the proportion of inactive young people who like being physically active based on neighbourhood deprivation (model 4). There was some evidence that Māori young people who do not meet recommendations are less likely to enjoy being physically active than non-Māori, but this result was of borderline significance and not replicated in regression analyses on more than one of the other attitudinal variables. There were no other differences in the proportion of young people enjoying physical activity by ethnicity.

The high proportion of inactive young people who report liking being physically active suggests there is latent demand for physical activity opportunities amongst young people. The lack of differences in attitudes across sociodemographic groups suggests that the demand for physical activity is similar across different groups of young people, but that opportunities differ.

Barriers to PA participation

65.6% (95%CI 64.1 – 67.2%) of young people who do not meet recommendations reported wanting to do more physical activity. 61.2% (95% CI 60.0 – 62.6%) of young people who do meet recommendations also reported wanting to do more physical activity.

Tables 3a-3c list the most common barriers in different sub-groups of young people. Across all respondents, the most common barrier reported was “too busy”. Further research is needed to understand why young people feel they are “too busy” to be more active – and intervention strategies need to be cogniscent of other demands on young people’s time when designing interventions. For example, it may be easier for young people to increase their physical activity if it is tied in with other activities (e.g. transport or within the classroom).

Table 3a: Most common overall barriers

All responders (n = 6,442)	
41	Too busy
19	I already do a good amount of physical activity
16	I'm too tired / don't have the energy
15	I prefer to do other things
15	It's too hard to motivate myself

When we examine the most common barriers among individuals who don’t meet guidelines, being “too busy” is again the most common barrier. Other barriers relating to motivation, energy, and preferences are also common to the overall population. In addition, 12% of young people not meeting guidelines state affordability as a barrier to not doing more physical activity. This suggests that there is a sub-group of inactive young people who may be able to be more active if cost of physical activity opportunities was reduced. The same barriers were the most common in the sub-group of inactive young people who themselves stated that they want to do more physical activity.

Table 3b: Most common barriers for those not meeting guidelines

Those not meeting guidelines (n = 2,562)		Those not meeting guidelines who want to do more (n = 1,640)	
35	Too busy	39	Too busy
21	It's too hard to motivate myself	23	It's too hard to motivate myself

19	I prefer to do other things	21	I'm too tired / don't have the energy
19	I'm too tired / don't have the energy	14	I prefer to do other things
12	My family can't afford it	14	My family can't afford it

Most barriers were similar across different groups of inactive young people. However, the cost barrier was more commonly reported in deprived groups. For both inactive females and inactive high school students, fitness appeared to be a barrier to participation. This may suggest that current physical activity opportunities do not meet the needs of inactive young people and may need to be adapted to be more inclusive for young people regardless of current fitness.

Table 3c: Most common barriers for sub-groups of young people not meeting guidelines

Inactive females (n = 1,455)		Inactive high school (n = 1,251)		Inactive and deprived (quintiles 4 and 5) (n = 685)	
36	Too busy	41	Too busy	31	Too busy
23	It's too hard to motivate myself	31	It's too hard to motivate myself	21	It's too hard to motivate myself
22	I'm too tired / don't have the energy	27	I'm too tired / don't have the energy	18	I'm too tired / don't have the energy
17	I prefer to do other things	18	I prefer to do other things	17	My family can't afford it
14	I'm not fit enough	17	I'm not fit enough	15	I prefer to do other things

Activities that young people want to do more of

Tables 4a-4f show the most common activities that young people would like to do more of, separately for different groups of young people. Overall, the most common activities that young people would like to do are mostly activities that are also the most common activities overall¹⁶.

The top ten most common activities listed by young people as activities they would like to do more of represented the responses of over half those surveyed. The activities chosen by young people were evenly split between individual activities (e.g. running, gymnastics) and team sports (e.g. football, netball).

Table 4a: Overall activities young people want to do more of

All kids	n	%
Running, jogging or cross-country	354	6.72
Football, soccer or futsal	352	6.68
Swimming	325	6.17
Dance/dancing (e.g. ballet, hip hop etc)	277	5.26
Gymnastics (e.g. rhythmic, artistic)	271	5.14
Rugby or Rippa Rugby	228	4.33
Netball	216	4.10
Cycling or biking	214	4.06
Workout (weights or cardio)	178	3.38
Basketball or Mini-ball	176	3.34
Horse riding (e.g. Pony club)	176	3.34

There were some differences in the top activities listed by males and females but six of the top ten activities were shared by males and females. Activities that features in the top ten for both males and females included a mixture of team and individual sports.

Table 4b: Activities young people want to do more of stratified by gender

Females	n	%	Males	n	%
Dance/dancing (e.g. ballet, hip hop etc)	261	9.38	Football, soccer or futsal	266	10.7
Gymnastics (e.g. rhythmic, artistic)	250	8.98	Rugby or Rippa Rugby	187	7.52
Netball	214	7.69	Running, jogging or cross-country	147	5.91
Swimming	212	7.61	Cycling or biking	139	5.59
Running, jogging or cross-country	207	7.44	Basketball or Mini-ball	134	5.39
Horse riding (e.g. Pony club)	166	5.96	Swimming	113	4.54
Workout (weights or cardio)	102	3.66	Cricket	107	4.30
Hockey or floorball	92	3.30	Mountain biking	104	4.18
Football, soccer or futsal	86	3.09	Don't know	78	3.14
Surfing	80	2.87	Workout (weights or cardio)	76	3.06
Cycling or biking	75	2.69	Hockey or floorball	71	2.85

NB: Shading indicates activities common to both groups

The majority of activities listed by young people who do not currently meet recommendations are the same as the activities listed by those who do meet recommendations. This suggests that those who do not meet recommendations are likely to have similar preferences (in terms of activities they perceive as desirable) but may not have the opportunities to take part. This is an important finding as it suggests that increased provision of already popular activities may be sufficient to improve physical activity levels in inactive young people. However, further work is needed to determine whether the way in which to provide these activities to meet the needs of those who are not currently meeting recommendations.

Table 4e: Activities young people want to do more of stratified by meeting recommendations

Meet recommendations	n	%	Don't meet recommendations	n	%
Football, soccer or futsal	212	6.86	Running, jogging or cross-country	165	7.56
Running, jogging or cross-country	189	6.12	Swimming	148	6.78
Gymnastics (e.g. rhythmic, artistic)	179	5.79	Football, soccer or futsal	140	6.42
Swimming	177	5.73	Dance/dancing (e.g. ballet, hip hop etc)	117	5.36
Dance/dancing (e.g. ballet, hip hop etc)	160	5.18	Cycling or biking	108	4.95
Rugby or Rippa Rugby	144	4.66	Gymnastics (e.g. rhythmic, artistic)	92	4.22
Netball	128	4.14	Netball	88	4.03
Basketball or Mini-ball	114	3.69	Rugby or Rippa Rugby	84	3.85
Cycling or biking	106	3.43	Workout (weights or cardio)	83	3.80
Horse riding (e.g. Pony club)	98	3.17	Horse riding (e.g. Pony club)	78	3.57
Hockey or floorball	95	3.08	Hockey or floorball	68	3.12

NB: Shading indicates activities common to both groups

While six of the top ten activities listed were also the same across young people of different ages, high school students also listed a number of individual activities not reported in younger children (tramping, surfing, workout). This may suggest a desire in some young people to move away from activities traditionally offered to children, and towards those that may be more associated with adults. For example, individual workout is the third most popular activity reported by adults¹⁶.

Table 4d: Activities young people want to do more of stratified by school

Primary		
Swimming	206	9.04
Football, soccer or futsal	189	8.3
Gymnastics (e.g. rhythmic, artistic)	177	7.77
Dance/dancing (e.g. ballet, hip hop etc)	145	6.37
Rugby or Rippa Rugby	142	6.23
Cycling or biking	130	5.71
Netball	85	3.73
Don't know	81	3.56
Horse riding (e.g. Pony club)	72	3.16
Running, jogging or cross-country	69	3.03
Basketball or Mini-ball	64	2.81
Intermediate		
Football, soccer or futsal	56	6.24
Netball	51	5.69
Dance/dancing (e.g. ballet, hip hop etc)	50	5.57
Swimming	49	5.46
Gymnastics (e.g. rhythmic, artistic)	44	4.91
Basketball or Mini-ball	43	4.79
Horse riding (e.g. Pony club)	43	4.79
Hockey or floorball	40	4.46
Running, jogging or cross-country	36	4.01
Cricket	28	3.12
Cycling or biking	28	3.12
High school		
Running, jogging or cross-country	249	11.88
Workout (weights or cardio)	167	7.97
Football, soccer or futsal	107	5.10
Dance/dancing (e.g. ballet, hip hop etc)	82	3.91
Netball	80	3.82
Surfing	74	3.53
Swimming	70	3.34
Basketball or Mini-ball	69	3.29
Hockey or floorball	65	3.10
Tramping or bush walks	65	3.10
Horse riding (e.g. Pony club)	61	2.91

NB: Shading indicates activities common to both groups

79% of young people listed an activity different to activities that they already do when asked what they would like to do more of. For young people who do not meet recommendations, 85% listed an activity that was different to what they already do. The majority of activities listed by young people wanting to do something different to what they are currently doing are nevertheless still the activities that are popular overall.

Table 4e: Activities young people want to do more of stratified by current participation

Young people who listed different activities to what they are currently participating in		
Swimming	136	5.84
Gymnastics (e.g. rhythmic, artistic)	127	5.45
Dance/dancing (e.g. ballet, hip hop etc)	123	5.28
Don't know	106	4.55
Rugby or Rippa Rugby	99	4.25
Football, soccer or futsal	95	4.08
Horse riding (e.g. Pony club)	94	4.03
Running, jogging or cross-country	90	3.86
Netball	87	3.73
Surfing	75	3.22
Cycling or biking	68	2.92
Inactive young people who listed different activities to what they are currently participating in		
Swimming	70	6.33
Dance/dancing (e.g. ballet, hip hop etc)	63	5.70
Running, jogging or cross-country	55	4.97
Horse riding (e.g. Pony club)	53	4.79
Gymnastics (e.g. rhythmic, artistic)	49	4.43
Football, soccer or futsal	48	4.34
Cycling or biking	44	3.98
Netball	43	3.89
Don't know	41	3.71
Hockey or floorball	36	3.25
Rugby or Rippa Rugby	35	3.16

Finally, we examined the activities that inactive young people in the groups who are least likely to meet recommendations reported wanting to do more of. Again, inactive young people reported wanting to do more of activities that were generally popular overall, with a mixture of team sports and individual sports listed.

Table 4f: Activities young people want to do more of for sub-groups of young people not meeting recommendations

Inactive females	n	%	Inactive high school	n	%	Inactive and most deprived (quintile 4 and 5)	n	%
Dance/dancing (e.g. ballet, hip hop etc)	111	8.9	Running jogging or cross-country	123	13.3	Swimming	41	6.5
Swimming	109	8.7	Workout (weights or cardio)	79	8.5	Netball	35	5.6
Running jogging or cross-country	93	7.4	Football soccer or futsal	51	5.5	Rugby or Rippa Rugby	34	5.4
Gymnastics (e.g. rhythmic artistic)	88	7	Surfing	35	3.8	Football soccer or futsal	33	5.3
Netball	86	6.9	Tramping or bush walks	35	3.8	Dance/dancing (e.g. ballet hip hop etc)	31	5
Horse riding (e.g. Pony club)	73	5.8	Swimming	34	3.7	Running jogging or cross-country	31	5
Workout (weights or cardio)	49	3.9	Netball	33	3.6	Gymnastics (e.g. rhythmic artistic)	28	4.5
Football soccer or futsal	46	3.7	Dance/dancing (e.g. ballet, hip hop etc)	32	3.5	Cycling or biking	26	4.1
Tramping or bush walks	41	3.3	Cycling or biking	30	3.2	Workout (weights or cardio)	26	4.1
Cycling or biking	40	3.2	Hockey or floorball	29	3.1	Don't know	21	3.3

Examining the activities that young people state that they would like to do more of provides an indication of the activities that would be worthwhile to promote for young people. Overall, we find that the activities listed by young people who are not meeting recommendations are very similar to the activities listed by young people who are meeting recommendations. International evidence from the UK suggests that some physical activities are much more likely to be maintained into adulthood than others¹⁷. This combined with the preferences stated by young people in the Active NZ Survey suggest that individual activities such as running and swimming may be good candidates for investment, but further exploration of physical activity preferences is warranted.

One limitation of this analysis was that young people could only select one activity that they would like to do more of. Whilst common activities dominated, there may be activities that are less common as a first preference but that would nevertheless be popular with young people. Future data collection should consider providing young people to select multiple activities (e.g. up to three) to provide a better idea of the types of activities that would be more popular. This sort of data would also provide the opportunity to identify the breadth of individuals' physical activity preferences (e.g. whether individuals have strong preferences for an individual vs a team activity). In addition, future data collection should explicitly ask young people to state whether they have previously tried the activity they have selected to inform programme investment and development.

Discussion

Fifty-eight percent of young people currently meet physical recommendations. Regression analyses demonstrated that there were significant differences in the proportion of young people meeting recommendations across different socio-demographic groups. Young people who are female, more deprived, or in high school are less likely to meet physical activity recommendations.

National and international guidelines recommend that physical activity bouts need to be spread out throughout the week for maximal benefit^{8,18}. In this analysis, we were unable to ascertain how physical activity bouts were spaced throughout the week. Therefore, the true proportion of young people meeting guidelines is likely to be lower than reported here. Studies that have objectively measured physical activity participation (e.g. using accelerometers) have found under 10% of young people meet recommendations⁹, and estimates of prevalence from survey data vary widely depending on the ability to classify spread of physical activity across the week¹⁹. Improving the ascertainment of the spread of physical activity throughout the week is an important issue to address with future data collection to accurately quantify the percentage of young people meeting recommendations.

When we examined attitudes towards physical activity, we found that a high proportion of young people like being physically active. Whilst the proportion of young people who like being physically active differs between those who do and do not meet recommendations, the direction of the relationship cannot be established from cross-sectional data. Young people who do meet recommendations may like physical activity because they are active, or young people who like being physical active may be more likely to meet recommendations. The high proportion of inactive young people who like physical activity is promising for intervention development.

Amongst young people who do not meet recommendations, the extent to which young people like being physically active does not differ much by socio-demographic characteristics. The fact that a high proportion of inactive children like being physically active but do not meet guidelines suggests that it is not attitudes, but opportunity that is the driver of socio-demographic differences in physical activity participation. Better assessment of opportunities for physical activity is needed to understand how material factors influence physical activity participation.

The high proportion of young people who want to do more physical activity, including amongst those who do not currently meet guidelines, suggests there is an unmet need for physical activity opportunities for young people.

Whilst we tried to analyse barriers to physical activity participation in the dataset, the high proportion of young people listed non-specific barriers (e.g. "too busy") that provide little insight into the types of interventions and physical activity promotion programmes that may increase participation. Motivational barriers (e.g. "I'm too tired", "It is too hard to motivate myself") may suggest that the opportunities that are available to young people may be difficult to access (e.g. require long travel times). The cost of participation also appears to be a barrier to increased physical activity participation for some young people, especially for those in more deprived areas.

Finally, we examined the types of activities that young people would like to do more of. The majority of activities listed by survey participants are those that are already common, but that they do not currently do (e.g. running and swimming). This may indicate that young people selected activities in the survey that they have participated in previously but do not currently take part in. Young people not meeting recommendations stated wanting to do more of the activities that are already common,

and also stated fitness as a barrier to participation. This suggests that existing opportunities for physical activity may not tailor well to the needs of those who are currently less active.

Future research opportunities

The Active NZ Young People's Survey is a valuable dataset for examining young people's physical activity patterns. This analysis focused on identifying differences in physical activity participation across different demographic groups, and on trying to identify promising directions for intervention opportunities. As the most detailed survey of physical activity participation in NZ (and amongst the most detailed self-reported surveys internationally), plenty of research opportunities remain.

This analysis found sociodemographic differences in young people's physical activity participation. We conceptualised physical activity participation as the product of psychosocial and material influences. We investigated that attitudes towards physical activity (a marker and outcome of psychosocial factors), but we were not able to assess differences in material factors specifically related to physical activity (e.g. access to leisure facilities). Better measurement of individual participants' material circumstances, ideally objectively measured, could provide much more conclusive evidence on the types of services to provide. For example, cost was a commonly listed barrier to increased physical activity participation. This partially reflects household income, but may also reflect differences in the cost of specific activities for young people living in different areas.

There is also a need to support the quantitative analyses conducted here with qualitative research examining physical activity in young people. This is necessary to understand physical activity for groups of young people poorly captured in the quantitative analysis (e.g. young people who identify as gender diverse, and those not attending school), as well as to provide context to the quantitative findings for young people overall. Qualitative research may be particularly important to unpick barriers to participation given the high proportion of young people reporting vague barriers such as that they are too busy.

There are a number of promising opportunities for using linked data to better understand physical activity participation. In this analysis, we linked young people to adult survey participants to determine household income. However, other characteristics of the household, or adult household members may also be important in young people's physical activity. For example, assessing the extent to which young people's physical activity is related to the physical activity and other lifestyle behaviours of adult household members. Better assessment of material factors related to young people's physical activity could be obtained by linking survey responses with local area information (e.g. presence of facilities, cost). There is also the potential to assess the impact of physical activity on long-term wellbeing and related measures. For example, by linking physical activity to health or educational outcomes.

Finally, the high proportion of young people not meeting physical activity recommendations is a cause for concern, especially given limited budgets available for promoting physical activity. To determine how best to allocate resources to achieve the maximal increase in physical activity, advanced cost-effectiveness analyses are necessary. There is wide variability in the health gains that could be achieved from different physical activity interventions in adults (e.g. see ²⁰). Estimates of disease risk associated with low levels of physical activity are well established for adults; this allows sophisticated modelling of health gains of increasing physical activity out into the future^{21 22}. There is a need to conduct similar analyses for children to inform effective investment in physical activity promotion.

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Supplementary Tables

S1: Regression results for meeting physical activity recommendations

Dependent variable: Meets recommendations (Yes=1)		Model 1a			Model 1b			Model 1c			Model 1d			Model 1e			Model 2			Model 3			Model 4		
		Estimates	CI	p	Estimates	CI	p	Estimates	CI	p	Estimates	CI	p	Estimates	CI	p	Estimates	CI	p	Estimates	CI	p	Estimates	CI	p
(Intercept)		0.59	0.56-0.62	<0.001	0.47	0.42-0.51	<0.001	0.6	0.57-0.63	<0.001	0.62	0.58-0.65	<0.001	0.59	0.56-0.62	<0.001	0.57	0.53-0.60	<0.001	0.5	0.42-0.57	<0.001	0.56	0.48-0.64	<0.001
School	Intermediate	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	High school	-0.06	-0.09--0.02	0.003	-0.05	-0.09--0.02	0.003	-0.06	-0.09--0.02	0.003	-0.05	-0.09--0.02	0.004	-0.06	-0.09--0.02	0.003	-0.06	-0.09--0.02	0.002	-0.04	-0.08--0.01	0.017	-0.05	-0.08--0.01	0.014
	Primary	-0.04	-0.07--0.01	0.023	-0.03	-0.07--0.00	0.051	-0.04	-0.07--0.00	0.029	-0.04	-0.07--0.00	0.026	-0.04	-0.07--0.01	0.023	-0.04	-0.07--0.00	0.028	-0.04	-0.07--0.01	0.022	-0.03	-0.07--0.00	0.043
Gender	Female	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Male	0.06	0.03-0.08	<0.001	0.06	0.03-0.09	<0.001	0.06	0.03-0.08	<0.001	0.06	0.03-0.08	<0.001	0.06	0.03-0.08	<0.001	0.06	0.03-0.09	<0.001	0.06	0.03-0.09	<0.001	0.06	0.03-0.08	<0.001
Ethnicity	Non-Māori	0.01	-0.02--0.05	0.54	.	.	.	.	.	.	.	.	.	.	.	.	0	-0.03--0.04	0.885	0.01	-0.02--0.05	0.545	0.03	-0.00--0.07	0.084
	European	.	.	.	0.17	0.13-0.20	<0.001	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Pacific	.	.	.	.	.	.	-0.05	-0.11--0.00	0.065	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Asian	.	.	.	.	.	.	.	.	.	-0.22	-0.26--0.18	<0.001	.	.	.	.	.	.	.	.	.	.	.	.
	Other	.	.	.	.	.	.	.	.	.	.	.	.	-0.02	-0.12--0.09	0.737	.	.	.	.	.	.	.	.	.
Urban	Major urban area	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Large urban area	.	.	.	.	.	.	.	.	.	.	.	.	0	-0.04--0.04	0.89	0	-0.04--0.05	0.82	0.01	-0.03--0.05	0.544	0.01	-0.03--0.05	0.544
	Medium urban area	.	.	.	.	.	.	.	.	.	.	.	.	0.05	0.00--0.11	0.047	0.06	0.00--0.11	0.041	0.05	0.00--0.11	0.046	0.05	0.00--0.11	0.046
	Small urban area	.	.	.	.	.	.	.	.	.	.	.	.	0.08	0.03--0.13	0.001	0.09	0.04--0.14	<0.001	0.1	0.05--0.15	<0.001	0.1	0.05--0.15	<0.001
	Rural	.	.	.	.	.	.	.	.	.	.	.	.	0.07	0.03--0.11	<0.001	0.07	0.03--0.11	<0.001	0.06	0.02--0.10	0.001	0.06	0.02--0.10	0.001
Unknown	.	.	.	.	.	.	.	.	.	.	.	.	0.03	-0.01--0.07	0.106	0.03	-0.01--0.07	0.119	0.03	-0.04--0.09	0.455	0.03	-0.04--0.09	0.455	
Household income	<\$30k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	\$30-40k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	-0.01	-0.11--0.09	0.809	-0.02	-0.12--0.08	0.681
	\$40-60k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.01	-0.07--0.09	0.773	0	-0.08--0.08	0.986
	\$60-80k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.08	0.00--0.16	0.045	0.07	-0.01--0.14	0.098
	\$80-100k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.06	-0.02--0.13	0.135	0.04	-0.04--0.11	0.363
	\$100-120k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.07	-0.01--0.15	0.082	0.04	-0.04--0.12	0.295
	\$120-160k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.1	0.02--0.18	0.009	0.07	-0.01--0.14	0.087
	\$160-200k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.08	-0.00--0.16	0.059	0.05	-0.04--0.13	0.293
	>\$200k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.15	0.07--0.23	<0.001	0.11	0.03--0.18	0.01
Unknown	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.03	-0.04--0.10	0.425	0.01	-0.06--0.08	0.749	
NZDep	1 (Least deprived)	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	5 (Most deprived)	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Unknown	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Observations	8,886			8,886			8,886			8,886			8,886			8,886			8,886			8,886			

S2: Regression results for positive responses to “I like being physically active” among young people not meeting recommendations

"I like being physically active"		Model 1a			Model 1b			Model 1c			Model 1d			Model 1e			Model 2			Model 3			Model 4					
		Estimates	CI	p	Estimates	CI	p	Estimates	CI	p	Estimates	CI	p	Estimates	CI	p												
(Intercept)		0.75	0.70-0.80	<0.001	0.72	0.66-0.78	<0.001	0.74	0.69-0.79	<0.001	0.73	0.68-0.78	<0.001	0.74	0.69-0.79	<0.001	0.75	0.70-0.80	<0.001	0.66	0.54-0.77	<0.001	0.66	0.54-0.77	<0.001			
School	Intermediate	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	High school	0.01	-0.04-0.07	0.639	0.02	-0.04-0.07	0.553	0.02	-0.04-0.07	0.537	0.02	-0.04-0.07	0.55	0.02	-0.04-0.07	0.539	0.01	-0.04-0.07	0.646	0.02	-0.03-0.07	0.464	0.02	-0.03-0.07	0.479			
	Primary	0.08	0.03-0.13	0.003	0.08	0.03-0.13	0.002	0.08	0.03-0.13	0.003	0.08	0.03-0.13	0.003	0.08	0.03-0.13	0.003	0.08	0.03-0.13	0.003	0.07	0.02-0.12	0.006	0.07	0.02-0.12	0.006			
Gender	Female	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Male	-0.01	-0.04-0.03	0.781	0	-0.04-0.03	0.81	0	-0.04-0.03	0.79	0	-0.04-0.03	0.79	0	-0.04-0.03	0.799	-0.01	-0.04-0.03	0.707	-0.01	-0.04-0.03	0.615	-0.01	-0.04-0.03	0.618			
Ethnicity	Non-Maori	-0.05	-0.10-0.00	0.044	.	.	.	.	.	.	.	.	.	.	.	.	-0.05	-0.10-0.00	0.053	-0.04	-0.09-0.01	0.101	-0.04	-0.09-0.01	0.143
	European	.	.	.	0.02	-0.02-0.06	0.32	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Pacific	.	.	.	.	.	.	0	-0.07-0.07	0.988	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Asian	.	.	.	.	.	.	.	.	.	.	.	0.03	-0.02-0.07	0.268	.	.	.	.	.	.	.	.	.	.
Urban	Major urban area	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Large urban area	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.04	-0.01-0.09	0.158	0.04	-0.01-0.09	0.124	0.04	-0.01-0.09	0.136
	Medium urban area	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.02	-0.05-0.09	0.664	0.01	-0.06-0.08	0.755	0.01	-0.06-0.08	0.835
	Small urban area	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	-0.06	-0.15-0.02	0.119	-0.07	-0.15-0.01	0.11	-0.07	-0.15-0.02	0.113
	Rural	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.01	-0.04-0.07	0.614	0.01	-0.04-0.07	0.636	0.01	-0.04-0.06	0.749
Household income	Unknown	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	-0.05-0.05	0.988	-0.01	-0.06-0.05	0.849	-0.03	-0.11-0.06	0.567
	<\$30k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	\$30-40k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.09	-0.04-0.22	0.19	0.08	-0.05-0.21	0.219	0.08	-0.05-0.21	0.219
	\$40-60k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.07	-0.05-0.19	0.248	0.07	-0.05-0.18	0.255	0.07	-0.05-0.18	0.255
	\$60-80k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.12	0.01-0.23	0.036	0.11	0.00-0.22	0.044	0.11	0.00-0.22	0.044
	\$80-100k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.11	0.00-0.22	0.041	0.11	-0.00-0.22	0.053	0.11	-0.00-0.22	0.053
	\$100-120k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.15	0.04-0.26	0.009	0.14	0.03-0.25	0.011	0.14	0.03-0.25	0.011
	\$120-160k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.1	-0.01-0.21	0.073	0.1	-0.01-0.21	0.084	0.1	-0.01-0.21	0.084
\$160-200k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.08	-0.04-0.20	0.172	0.08	-0.04-0.20	0.191	0.08	-0.04-0.20	0.191	
>\$200k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.17	0.06-0.28	0.003	0.16	0.05-0.27	0.004	0.16	0.05-0.27	0.004	
Unknown	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.06	-0.04-0.17	0.24	0.06	-0.05-0.17	0.262	0.06	-0.05-0.17	0.262	
NZDep	1 (Least deprived)	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	5 (Most deprived)	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Unknown	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Observations		3,538			3,538			3,538			3,538			3,538			3,538			3,538			3,538			3,538		

S3: (Additional analysis) Regression results for positive responses to physical literacy statements among young people not meeting recommendations

"People in my life encourage me to take part in physical activities"		Model 1a			Model 1b			Model 1c			Model 1d			Model 1e			Model 2			Model 3			Model 4		
		Estimates	CI	p	Estimates	CI	p	Estimates	CI	p	Estimates	CI	p	Estimates	CI	p	Estimates	CI	p	Estimates	CI	p	Estimates	CI	p
(Intercept)		0.87	0.82-0.92	<0.001	0.85	0.79-0.91	<0.001	0.85	0.80-0.90	<0.001	0.86	0.81-0.91	<0.001	0.86	0.81-0.91	<0.001	0.87	0.82-0.92	<0.001	0.74	0.61-0.87	<0.001	0.73	0.59-0.87	<0.001
School	Intermediate	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	High school	-0.1	-0.16-0.04	<0.001	-0.1	-0.15-0.04	0.001	-0.1	-0.16-0.04	0.001	-0.1	-0.15-0.04	0.001	-0.1	-0.15-0.04	0.001	-0.11	-0.16-0.05	<0.001	-0.09	-0.15-0.03	0.001	-0.09	-0.15-0.04	0.001
	Primary	0.04	-0.01-0.09	0.109	0.04	-0.01-0.09	0.096	0.04	-0.01-0.09	0.128	0.04	-0.01-0.09	0.09	0.04	-0.01-0.09	0.1	0.03	-0.01-0.08	0.157	0.03	-0.02-0.08	0.212	0.03	-0.02-0.08	0.191
Gender	Female	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Male	0.01	-0.03-0.05	0.632	0.01	-0.03-0.05	0.603	0.01	-0.03-0.05	0.589	0.01	-0.03-0.05	0.589	0.01	-0.03-0.05	0.618	0.01	-0.03-0.04	0.679	0.01	-0.03-0.04	0.702	0.01	-0.03-0.04	0.707
Ethnicity	Non-Maori	-0.04	-0.10-0.01	0.143	.	.	.	.	.	.	.	.	.	.	.	.	-0.03	-0.09-0.02	0.223	-0.02	-0.07-0.03	0.438	-0.02	-0.07-0.04	0.54
	European	.	.	.	0.01	-0.03-0.05	0.622	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Pacific	.	.	.	.	.	.	0.04	-0.03-0.11	0.255	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Asian	.	.	.	.	.	.	.	.	-0.03	-0.07-0.02	0.289	.	.	.	.	.	.	.	.	.	.	.	.	.
	Other	.	.	.	.	.	.	.	.	.	.	.	0	-0.14-0.14	0.956	.	.	.	.	.	.	.	.	.	.
Urban	Major urban area	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Large urban area	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.02	-0.03-0.08	0.439	0.03	-0.03-0.08	0.375	0.03	-0.03-0.08	0.355	
	Medium urban area	.	.	.	.	.	.	.	.	.	.	.	.	.	.	-0.02	-0.09-0.06	0.669	-0.03	-0.10-0.05	0.467	-0.03	-0.11-0.05	0.446	
	Small urban area	.	.	.	.	.	.	.	.	.	.	.	.	.	.	-0.17	-0.28-0.07	0.001	-0.16	-0.27-0.06	0.002	-0.16	-0.26-0.06	0.002	
	Rural	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	-0.06-0.06	0.905	0	-0.06-0.06	0.963	0	-0.06-0.05	0.884	
	Unknown	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.05	-0.00-0.09	0.053	0.04	-0.00-0.09	0.064	0.02	-0.06-0.10	0.569	
Household income	<\$30k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	\$30-40k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.02	-0.14-0.18	0.787	0.02	-0.14-0.18	0.822
	\$40-60k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.11	-0.02-0.25	0.106	0.11	-0.02-0.25	0.108
	\$60-80k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.19	0.06-0.31	0.004	0.18	0.05-0.31	0.006
	\$80-100k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.12	-0.02-0.25	0.088	0.11	-0.03-0.24	0.115
	\$100-120k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.17	0.04-0.30	0.01	0.17	0.03-0.30	0.013
	\$120-160k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.16	0.04-0.29	0.012	0.16	0.03-0.29	0.015
	\$160-200k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.14	0.00-0.28	0.044	0.14	0.00-0.28	0.049
	>\$200k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.22	0.09-0.34	0.001	0.22	0.09-0.35	0.001
Unknown	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.08	-0.05-0.21	0.205	0.08	-0.05-0.21	0.226	
NZDep	1 (Least deprived)	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	5 (Most deprived)	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Unknown	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Observations		2,437			2,437			2,437			2,437			2,437			2,437			2,437			2,437		

"I am good at lots of different physical activities"		Model 1a			Model 1b			Model 1c			Model 1d			Model 1e			Model 2			Model 3			Model 4		
		Estimates	CI	p	Estimates	CI	p	Estimates	CI	p	Estimates	CI	p	Estimates	CI	p	Estimates	CI	p	Estimates	CI	p	Estimates	CI	p
(Intercept)		0.62	0.56-0.68	<0.001	0.62	0.54-0.69	<0.001	0.6	0.54-0.67	<0.001	0.62	0.56-0.69	<0.001	0.61	0.55-0.67	<0.001	0.61	0.54-0.67	<0.001	0.49	0.35-0.62	<0.001	0.47	0.32-0.61	<0.001
School	Intermediate	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	High school	-0.1	-0.17-0.03	0.005	-0.1	-0.17-0.03	0.006	-0.1	-0.17-0.03	0.005	-0.1	-0.17-0.03	0.007	-0.1	-0.17-0.03	0.005	-0.11	-0.18-0.04	0.003	-0.11	-0.18-0.03	0.004	-0.1	-0.18-0.03	0.004
	Primary	0.04	-0.03-0.11	0.226	0.04	-0.02-0.11	0.22	0.03	-0.03-0.10	0.309	0.04	-0.02-0.11	0.186	0.04	-0.03-0.11	0.226	0.04	-0.03-0.11	0.233	0.04	-0.03-0.10	0.247	0.03	-0.03-0.10	0.298
Gender	Female	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Male	0.01	-0.04-0.06	0.759	0.01	-0.04-0.06	0.758	0.01	-0.04-0.06	0.692	0.01	-0.04-0.06	0.685	0.01	-0.04-0.06	0.728	0.01	-0.04-0.05	0.809	0.01	-0.04-0.05	0.833	0	-0.04-0.05	0.844
Ethnicity	Non-Maori	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	European	-0.02	-0.09-0.05	0.514	0	-0.06-0.05	0.917	.	.	.	.	.	.	.	.	.	-0.02	-0.09-0.05	0.507	-0.02	-0.08-0.05	0.658	-0.02	-0.09-0.05	0.53
	Pacific	.	.	.	.	.	.	0.1	-0.00-0.19	0.05	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Asian	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Other	.	.	.	.	.	.	.	.	.	-0.07	-0.13--0.01	0.025	.	.	.	.	.	.	.	.	.	.	.	.
	Unknown	.	.	.	.	.	.	.	.	.	.	.	.	0.07	-0.11-0.25	0.425	.	.	.	.	.	.	.	.	.
Urban	Major urban area	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Large urban area	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	-0.07-0.08	0.922	0.01	-0.06-0.09	0.733	0.01	-0.07-0.08	0.842
	Medium urban area	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.06	-0.04-0.16	0.259	0.06	-0.04-0.16	0.239	0.06	-0.04-0.16	0.246
	Small urban area	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	-0.1	-0.21-0.00	0.054	-0.09	-0.20-0.02	0.095	-0.1	-0.21-0.01	0.074
	Rural	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.09	0.01-0.16	0.021	0.09	0.02-0.17	0.011	0.1	0.03-0.17	0.007
	Unknown	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.04	-0.03-0.11	0.23	0.04	-0.03-0.11	0.271	-0.01	-0.13-0.10	0.846
Household income	<\$30k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	\$30-40k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.06	-0.11-0.22	0.486	0.06	-0.11-0.22	0.486	0.06	-0.11-0.23	0.479
	\$40-60k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.09	-0.06-0.24	0.252	0.09	-0.06-0.24	0.231	0.09	-0.06-0.24	0.231
	\$60-80k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.12	-0.02-0.26	0.101	0.12	-0.02-0.26	0.101	0.13	-0.02-0.27	0.083
	\$80-100k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.17	0.03-0.30	0.016	0.17	0.03-0.30	0.016	0.18	0.04-0.32	0.01
	\$100-120k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.12	-0.02-0.26	0.103	0.12	-0.02-0.26	0.103	0.13	-0.01-0.27	0.075
	\$120-160k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.12	-0.02-0.26	0.087	0.12	-0.02-0.26	0.087	0.14	-0.00-0.28	0.055
	\$160-200k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.07	-0.09-0.22	0.39	0.07	-0.09-0.22	0.39	0.09	-0.07-0.25	0.275
	>\$200k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.21	0.06-0.35	0.005	0.21	0.06-0.35	0.005	0.22	0.08-0.37	0.003
	Unknown	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.12	-0.01-0.25	0.069	0.12	-0.01-0.25	0.069	0.13	-0.00-0.26	0.056
NZDep	1 (Least deprived)	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	5 (Most deprived)	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Unknown	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Observations	2,437			2,437			2,437			2,437			2,437			2,437			2,437			2,437		

"I have the chance to do the physical activities I want"		Model 1a			Model 1b			Model 1c			Model 1d			Model 1e			Model 2			Model 3			Model 4		
		Estimates	CI	p	Estimates	CI	p	Estimates	CI	p	Estimates	CI	p	Estimates	CI	p	Estimates	CI	p	Estimates	CI	p	Estimates	CI	p
(Intercept)		0.74	0.68-0.80	<0.001	0.68	0.61-0.75	<0.001	0.73	0.68-0.79	<0.001	0.74	0.68-0.80	<0.001	0.73	0.67-0.79	<0.001	0.73	0.66-0.79	<0.001	0.62	0.47-0.76	<0.001	0.66	0.51-0.81	<0.001
School	Intermediate	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	High school	-0.04	-0.10-0.03	0.262	-0.03	-0.10-0.03	0.305	-0.03	-0.10-0.03	0.319	-0.03	-0.10-0.03	0.34	-0.03	-0.10-0.03	0.31	-0.04	-0.11-0.02	0.215	-0.03	-0.10-0.03	0.357	-0.03	-0.10-0.03	0.316
	Primary	0.02	-0.04-0.08	0.543	0.03	-0.04-0.09	0.422	0.02	-0.04-0.09	0.451	0.02	-0.04-0.09	0.445	0.02	-0.04-0.08	0.503	0.02	-0.05-0.08	0.612	0.02	-0.04-0.08	0.55	0.02	-0.04-0.08	0.554
Gender	Female	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Male	0.02	-0.02-0.07	0.356	0.02	-0.02-0.07	0.281	0.02	-0.02-0.07	0.369	0.02	-0.02-0.07	0.297	0.02	-0.02-0.07	0.356	0.02	-0.02-0.07	0.363	0.02	-0.02-0.07	0.273	0.02	-0.02-0.07	0.303
Ethnicity	Non-Maori	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	European	-0.04	-0.11-0.02	0.179	0.07	0.02-0.13	0.007	.	.	.	.	.	.	.	.	.	-0.04	-0.11-0.02	0.197	-0.02	-0.09-0.04	0.448	-0.01	-0.08-0.05	0.648
	Pacific	.	.	.	.	.	.	-0.04	-0.13-0.05	0.387	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Asian	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Other	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	-0.07	-0.13--0.01	0.018	.	.	.	.	.	.
Urban	Major urban area	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Large urban area	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Medium urban area	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Small urban area	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Rural	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Unknown	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Household income	<\$30k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	\$30-40k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	\$40-60k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	\$60-80k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	\$80-100k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	\$100-120k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	\$120-160k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	\$160-200k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	>\$200k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Unknown	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
NZDep	1 (Least deprived)	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	5 (Most deprived)	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Unknown	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Observations		2,437			2,437			2,437			2,437			2,437			2,437			2,437			2,437		

"I want to take part in physical activities"		Model 1a			Model 1b			Model 1c			Model 1d			Model 1e			Model 2			Model 3			Model 4		
		Estimates	CI	p	Estimates	CI	p	Estimates	CI	p	Estimates	CI	p	Estimates	CI	p	Estimates	CI	p	Estimates	CI	p	Estimates	CI	p
(Intercept)		0.77	0.71-0.83	<0.001	0.74	0.67-0.81	<0.001	0.76	0.71-0.82	<0.001	0.76	0.70-0.81	<0.001	0.75	0.70-0.81	<0.001	0.76	0.71-0.82	<0.001	0.68	0.53-0.82	<0.001	0.7	0.55-0.84	<0.001
School	Intermediate	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	High school	0	-0.06-0.06	0.973	0	-0.06-0.07	0.928	0	-0.06-0.07	0.897	0	-0.06-0.07	0.927	0	-0.06-0.06	0.97	0	-0.07-0.06	0.882	0	-0.07-0.06	0.971	0	-0.07-0.06	0.894
	Primary	0.02	-0.04-0.08	0.594	0.02	-0.04-0.08	0.518	0.02	-0.04-0.08	0.471	0.02	-0.04-0.08	0.552	0.02	-0.04-0.08	0.586	0.01	-0.04-0.07	0.633	0.01	-0.05-0.07	0.731	0.01	-0.05-0.07	0.726
Gender	Female	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Male	-0.02	-0.06-0.02	0.385	-0.02	-0.06-0.03	0.428	-0.02	-0.06-0.02	0.37	-0.02	-0.06-0.03	0.397	-0.02	-0.06-0.03	0.444	-0.02	-0.07-0.02	0.354	-0.02	-0.06-0.02	0.354	-0.02	-0.07-0.02	0.309
Ethnicity	Non-Maori	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	European	-0.05	-0.12-0.01	0.103	0.03	-0.03-0.08	0.315	.	.	.	.	.	.	.	.	.	-0.05	-0.12-0.01	0.118	-0.04	-0.11-0.02	0.189	-0.03	-0.09-0.03	0.368
	Pacific	.	.	.	.	.	.	-0.05	-0.15-0.04	0.253	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Asian	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Other	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	-0.06-0.06	0.977	.	.	.	.	.	.
Urban	Major urban area	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Large urban area	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Medium urban area	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Small urban area	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Rural	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Unknown	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Household income	<\$30k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	\$30-40k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	\$40-60k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	\$60-80k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	\$80-100k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	\$100-120k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	\$120-160k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	\$160-200k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	>\$200k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Unknown	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
NZDep	1 (Least deprived)	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	5 (Most deprived)	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Unknown	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Observations		2,437			2,437			2,437			2,437			2,437			2,437			2,437			2,437		

"I understand why taking part in physical activity is good for me"		Model 1a			Model 1b			Model 1c			Model 1d			Model 1e			Model 2			Model 3			Model 4					
		Estimates	CI	p	Estimates	CI	p	Estimates	CI	p	Estimates	CI	p	Estimates	CI	p												
(Intercept)		0.9	0.86-0.95	<0.001	0.84	0.78-0.91	<0.001	0.87	0.83-0.92	<0.001	0.88	0.83-0.92	<0.001	0.87	0.83-0.92	<0.001	0.91	0.86-0.96	<0.001	0.78	0.64-0.92	<0.001	0.8	0.66-0.94	<0.001			
School	Intermediate	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	High school	0.05	-0.00-0.10	0.056	0.06	0.01-0.11	0.027	0.06	0.01-0.11	0.029	0.06	0.01-0.11	0.027	0.06	0.01-0.11	0.027	0.04	-0.01-0.09	0.086	0.05	-0.00-0.10	0.061	0.04	-0.00-0.09	0.078			
	Primary	-0.1	-0.15--0.05	<0.001	-0.1	-0.15--0.04	<0.001	-0.1	-0.15--0.05	<0.001	-0.1	-0.15--0.05	<0.001	-0.1	-0.15--0.05	<0.001	-0.11	-0.16--0.06	<0.001	-0.11	-0.16--0.06	<0.001	-0.11	-0.16--0.06	<0.001			
Gender	Female	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Male	-0.01	-0.04-0.02	0.574	-0.01	-0.04-0.03	0.701	-0.01	-0.04-0.03	0.615	-0.01	-0.04-0.03	0.634	-0.01	-0.04-0.03	0.59	-0.01	-0.04-0.02	0.502	-0.01	-0.05-0.02	0.461	-0.01	-0.05-0.02	0.42			
Ethnicity	Non-Maori	-0.1	-0.16--0.05	0.001	.	.	.	.	.	.	.	.	.	.	.	.	-0.1	-0.16--0.04	0.001	-0.09	-0.15--0.03	0.002	-0.08	-0.13--0.02	0.006
	European	.	.	.	0.04	-0.00-0.09	0.054	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Pacific	.	.	.	.	.	.	0	-0.07-0.07	0.95	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Asian	.	.	.	.	.	.	.	.	.	.	.	-0.01	-0.06-0.03	0.569	.	.	.	.	.	.	.	.	.	.
	Other	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	-0.06	-0.19-0.07	0.362	.	.	.	.	.	.
Urban	Major urban area	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Large urban area	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.03	-0.02-0.08	0.182	0.04	-0.01-0.09	0.115	0.04	-0.00-0.09	0.072
	Medium urban area	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.04	-0.01-0.10	0.115	0.04	-0.01-0.10	0.116	0.04	-0.01-0.10	0.11
	Small urban area	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	-0.15	-0.26--0.05	0.004	-0.15	-0.25--0.04	0.006	-0.14	-0.24--0.04	0.007
	Rural	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.01	-0.04-0.06	0.565	0.02	-0.03-0.07	0.458	0.01	-0.04-0.06	0.649
Unknown	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	-0.01	-0.06-0.04	0.682	-0.01	-0.06-0.03	0.554	-0.09	-0.19-0.01	0.083	
Household income	<\$30k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.13	-0.03-0.29	0.114	0.12	-0.04-0.28	0.13
	\$30-40k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.11	-0.04-0.26	0.148	0.11	-0.04-0.26	0.144
	\$40-60k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.13	-0.01-0.27	0.072	0.12	-0.02-0.26	0.086
	\$60-80k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.14	-0.01-0.28	0.061	0.13	-0.02-0.27	0.084
	\$80-100k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.15	0.01-0.29	0.041	0.14	-0.00-0.28	0.054
	\$100-120k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.12	-0.02-0.26	0.09	0.11	-0.03-0.25	0.121
	\$120-160k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.16	0.02-0.31	0.026	0.15	0.01-0.30	0.034
	\$160-200k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.19	0.04-0.33	0.011	0.17	0.03-0.31	0.016
>\$200k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.11	-0.03-0.26	0.116	0.11	-0.03-0.25	0.136	
Unknown	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
NZDep	1 (Least deprived)	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	5 (Most deprived)	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Unknown	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Observations		2,437			2,437			2,437			2,437			2,437			2,437			2,437			2,437			2,437		

"I feel confident to take part in lots of different physical activities"		Model 1a			Model 1b			Model 1c			Model 1d			Model 1e			Model 2			Model 3			Model 4		
		Estimates	CI	p	Estimates	CI	p	Estimates	CI	p	Estimates	CI	p	Estimates	CI	p	Estimates	CI	p	Estimates	CI	p	Estimates	CI	p
(Intercept)		0.61	0.55-0.67	<0.001	0.66	0.58-0.73	<0.001	0.6	0.54-0.67	<0.001	0.6	0.54-0.67	<0.001	0.61	0.54-0.67	<0.001	0.59	0.53-0.66	<0.001	0.53	0.39-0.67	<0.001	0.53	0.38-0.68	<0.001
School	Intermediate	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	High school	-0.11	-0.18-0.04	0.002	-0.11	-0.18-0.04	0.002	-0.11	-0.18-0.04	0.002	-0.11	-0.18-0.04	0.002	-0.11	-0.18-0.04	0.002	-0.11	-0.18-0.04	0.002	-0.11	-0.18-0.04	0.002	-0.11	-0.18-0.04	0.003
	Primary	0.05	-0.01-0.12	0.108	0.05	-0.02-0.11	0.137	0.05	-0.01-0.12	0.119	0.05	-0.01-0.12	0.11	0.05	-0.01-0.12	0.106	0.05	-0.01-0.12	0.1	0.05	-0.01-0.12	0.113	0.05	-0.02-0.12	0.139
Gender	Female	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Male	0.05	0.01-0.10	0.03	0.05	0.00-0.10	0.039	0.05	0.01-0.10	0.028	0.05	0.00-0.10	0.031	0.05	0.01-0.10	0.03	0.05	0.00-0.10	0.031	0.05	0.01-0.10	0.03	0.05	0.00-0.10	0.032
Ethnicity	Non-Maori	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	European	-0.01	-0.08-0.06	0.823	-0.07	-0.13-0.02	0.009	.	.	.	.	.	.	.	.	.	-0.01	-0.08-0.06	0.757	-0.01	-0.08-0.06	0.826	-0.01	-0.08-0.06	0.793
	Pacific	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Asian	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Other	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Urban	Major urban area	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Large urban area	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	-0.01	-0.08-0.07	0.868	0	-0.07-0.07	0.997	0	-0.07-0.08	0.994
	Medium urban area	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.02	-0.08-0.12	0.696	0.03	-0.07-0.13	0.594	0.03	-0.07-0.13	0.579
	Small urban area	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	-0.01	-0.12-0.10	0.851	-0.01	-0.12-0.11	0.903	-0.01	-0.12-0.10	0.852
	Rural	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.06	-0.02-0.13	0.127	0.06	-0.02-0.13	0.122	0.06	-0.01-0.13	0.102
Unknown	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.04	-0.03-0.11	0.227	0.04	-0.03-0.11	0.268	-0.02	-0.13-0.09	0.764	
Household income	<\$30k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	\$30-40k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.06	-0.10-0.23	0.468	0.07	-0.10-0.23	0.433	0.07	-0.10-0.23	0.433
	\$40-60k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.05	-0.10-0.19	0.548	0.05	-0.10-0.20	0.502	0.05	-0.10-0.20	0.502
	\$60-80k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.02	-0.13-0.16	0.805	0.03	-0.12-0.17	0.729	0.03	-0.12-0.17	0.729
	\$80-100k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.07	-0.07-0.21	0.334	0.08	-0.06-0.22	0.272	0.08	-0.06-0.22	0.272
	\$100-120k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.08	-0.07-0.22	0.288	0.09	-0.06-0.23	0.24	0.09	-0.06-0.23	0.24
	\$120-160k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.06	-0.08-0.20	0.399	0.07	-0.07-0.21	0.343	0.07	-0.07-0.21	0.343
	\$160-200k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.12	-0.04-0.27	0.137	0.13	-0.03-0.28	0.107	0.13	-0.03-0.28	0.107
>\$200k	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.07	-0.08-0.22	0.357	0.08	-0.08-0.23	0.322	0.08	-0.08-0.23	0.322	
Unknown	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.06	-0.08-0.19	0.413	0.06	-0.08-0.19	0.413	0.06	-0.08-0.19	0.388	
NZDep	1 (Least deprived)	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	5 (Most deprived)	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Unknown	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Observations		2,437			2,437			2,437			2,437			2,437			2,437			2,437			2,437		