

1 **Not all play equipment is created equal: associations between equipment at home**
2 **and children's physical activity**

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13 **Abstract**

14 **Background:** Play equipment at home could be targeted in interventions to increase
15 children's physical activity (PA) but evidence is mixed, potentially because current
16 methods do not reflect children's lived experience. We investigated associations
17 between combinations of equipment and PA. **Methods:** Data were from the Mothers
18 and their Children's Health study and the Australian Longitudinal Study on Women's
19 Health. Mothers (N=2409) indicated the types of fixed active (e.g., trampolines),
20 portable active (e.g., bicycles) and electronic (e.g., computers) equipment at home, and
21 the number of days children (N=4092, aged 5-12 years, 51% boys) met PA guidelines.
22 Latent class analysis was used to identify combinations of equipment, and linear
23 regressions to investigate associations with PA. **Results:** Compared to children with
24 high active (fixed and portable) and medium electronic equipment, children with
25 portable active and medium (coefficient = -0.53, 95% CI = -0.72, -0.34) or high
26 electronic equipment (coefficient = -0.58, 95% CI = -0.83, -0.33) met the guidelines on
27 fewer days. Children with similar active equipment (but more electronic equipment)
28 met the PA guidelines on fewer days (mean difference = -0.51, SE = 0.14, $p = .002$).
29 **Conclusion:** Having the right combination of play equipment at home may be important
30 for children's PA.

31 **List of Abbreviations**

32 Physical activity (PA); moderate to vigorous physical activity (MVPA); Australian
33 Longitudinal Study on Women's Health (ALSWH); Mothers and their Children's Health
34 study (MatCH)

35

36 **Introduction**

37 Physical activity (PA) has a range of benefits for children. It develops motor skills,
38 improves cardiorespiratory and musculoskeletal fitness, is protective against injuries
39 and contributes to cognitive development¹⁻³. It is also reduces the risk of non-
40 communicable diseases such as diabetes and obesity^{2,4,5}. Yet PA and fitness have
41 declined over recent decades, with children now less fit than their parents were at the
42 same age⁶. Worldwide, the majority of children do not complete the recommended
43 amount of PA^{2,3,7,8} and in Australia, less than 20% of 5 to 17 year old children meet PA
44 guidelines⁵. This suggests an urgent need for intervention to improve children's PA.

45 The availability of play equipment at home is modifiable and could be targeted in
46 interventions. The home is the most proximal and influential environment for children
47 and is a prime context for intervention⁹, as the majority of children's PA occurs during
48 free time³. In particular, the type of equipment at home creates opportunities for play,
49 targets different areas of motor development (e.g. fine and gross motor), and develops
50 social skills such as turn-taking³. Currently, evidence for the association between home
51 equipment and children's PA is inconsistent, making it difficult to provide evidence
52 based advice to parents on how to equip their home to effectively promote PA for their
53 children. PA equipment at home has been positively associated with children's outdoor
54 play^{10,11}, participation in sports¹², light PA¹³, total PA¹⁴, and MVPA¹⁵⁻¹⁸. In contrast,
55 other studies find no association between home equipment and MVPA^{14,19-22} or meeting
56 PA guidelines²³. Further, it is unclear whether the association between equipment and
57 PA is driven by the overall variety of equipment available in the home, or by access to
58 specific types of equipment. The small number of studies investigating types of
59 equipment have shown fixed equipment, such as basketball hoops, can be associated
60 with higher levels of MVPA^{14,16}, whereas portable equipment, such as balls, is not

61 associated ^{14,16}, although one study found an association for bicycles ¹⁹. Another study
62 found that fixed but not portable equipment was associated with outdoor play, but not
63 with MVPA¹¹. Active electronic games ¹⁶ and bedroom electronics such as televisions ⁴
64 can be associated with less MVPA ^{4,18}.

65 Reviews tend to conclude there is no association between equipment and PA ^{9,24-26},
66 but this broad statement fails to account for nuances. The association between
67 equipment and PA can vary by several factors, including: the sex of the child ^{15,17}; how
68 PA is defined (e.g., as outdoor play time ^{10,11}, meeting PA guidelines ²³, or light versus
69 moderate-to-vigorous PA (MVPA)¹³); when PA is measured (e.g., after school, weekdays
70 or weekends ¹⁸) and how PA is measured (e.g., accelerometer or self/parent report ²⁷).
71 Additionally, the majority of studies examine the overall variety of equipment available,
72 which assumes all types of equipment are equally associated with PA. Conversely,
73 studies that examine individual pieces of equipment assume that the mix of equipment
74 types available in the home has no influence on PA. Neither of these approaches reflects
75 children's lived experience. Children typically have more than one type of equipment at
76 home^{14,16,19}, yet no studies have considered the mix of fixed, portable and electronic
77 equipment available. In the current study we aimed to investigate associations between
78 combinations of play equipment at home and children's PA.

79

80 **Methods**

81 **Participants and procedures**

82 Mothers were recruited to the Mothers and their Children's Health study (MatCH) ²⁸
83 from the Australian Longitudinal Study on Women's Health (ALSWH) ^{29,30}. ALSWH
84 participants were randomly sampled from Australia's universal health insurance system
85 in 1996 and have completed surveys every 3 years. In 2016, women in the cohort born

86 in 1973-78 who 1) had not died or withdrawn, 2) had consented to be contacted about
87 sub-studies and 3) had not reported infertility, were invited to be part of MatCH. Ethics
88 approval for the study was obtained from The University of Newcastle and The
89 University of Queensland. Of the potentially eligible women, 3039 (48% of the women
90 known to be mothers) completed online or paper surveys on their three youngest
91 children aged up to 12 years ($N=5780$). The sample for this study is children aged 5 to
92 12 years with complete data on study variables ($N=4092$) and their mothers ($N=2409$)
93 (see Figure S1 in supplement for recruitment flowchart).

94 **Measures**

95 *Children's physical activity*

96 Children's PA was reported by mothers using an item adapted from the PACE+
97 Adolescent Physical Activity Measure ³¹. The PACE+ reliably measures the accumulation
98 of MVPA, is consistent with PA recommendations, and significantly correlates with
99 accelerometer data ³¹. Mothers were asked, "on how many days did your child spend a
100 total of at least 60 minutes per day in moderate to vigorous physical activity?" Mothers
101 reported PA over the last 7 days and response options were 0 to 7 days. MVPA was
102 defined for parents as activity that includes bursts of high energy, raises the heartrate
103 and makes children huff and puff, and it excluded physical education at school. PA
104 scores indicate the number of days that children were meeting PA guidelines of 60+
105 minutes of MVPA ³².

106 *Active and electronic play equipment*

107 Play equipment at home was reported by mothers using items from the Healthy Active
108 Preschool and Primary Years survey (HAPPY) ³³. Mothers reported the presence of 10
109 types of active play equipment in the home: balls, basketball/netball ring,
110 bats/racquets/golf clubs, climbing equipment/trees, scooter/bicycle/tricycle,

111 skateboard/ripstick, skipping rope, swimming pool, trampoline, and slide/swing.
112 Mothers also reported the presence of 4 types of electronic play equipment in the child's
113 bedroom: television, computer/electronic games, mobile electronic device (including a
114 tablet or phone) and books (including ebooks) and 1 type of electronic play equipment
115 in the home (active electronic games e.g., Wii).

116 ***Covariates***

117 Covariates included in the study were identified in the literature as being potentially
118 related to children's PA ^{4,9,24}. The child's sex was reported by the mother and the child's
119 age was calculated from their date of birth. Mothers were given written instructions on
120 how to measure and report children's height (using the tape measure provided) and
121 weight³⁴. Values were then converted to Body Mass Index (BMI) using established cut
122 offs ^{35,36}. Mothers reported on the impact of children's health issues on the child's
123 everyday life, with responses dichotomized as none/positive or negative. Household
124 socioeconomic status was approximated by two variables: mother's highest educational
125 qualification (secondary school or less, trade/diploma, university degree) and difficulty
126 managing on income (easy, not too bad, difficult sometimes, difficult all the
127 time/impossible). Mother's PA was calculated by asking mothers the number of times
128 and the total time in the last week spent on walking briskly, moderate leisure activity
129 (e.g., tennis, swimming), vigorous leisure activity that made her breathe harder (e.g.,
130 aerobics, running) or vigorous household or garden chores that made her breathe
131 harder. We converted this to a metabolic equivalent of task (MET), with one MET
132 defined as energy expenditure at rest (3.5mL of oxygen uptake/kilogram/minute).
133 Based on MET we categorized mother's PA as very low (<33.3 MET), low (33.3 to <500
134 MET), moderate (500 to <1000 MET) or high (1000 or more MET)³⁷. Mothers reported
135 the age and sex of all children aged under 18 years living at home, from which we

136 calculated the number of children at home and the composition of siblings (boys only,
137 girls only or both). Mothers reported the size of the yard (none/small, medium or large)
138 and whether their home was on a through road or cul-de-sac/court. Lastly, remoteness
139 of residence was calculated from postcodes using the Accessibility/Remoteness Index of
140 Australia (ARIA+)³⁸ and categorized as city, inner regional or outer
141 regional/remote/very remote.

142 **Statistical analysis**

143 Descriptive statistics were calculated for each variable. Distributions were checked for
144 normality, implausible values and outliers and no abnormalities were detected.

145 To identify different combinations of equipment available to children we conducted a
146 latent class analysis (LCA) (proc LCA³⁹) to identify mutually-exclusive groups based on
147 the combination of equipment. Excluding balls, bikes and books due to very high
148 frequencies (and thus low variability), all remaining types of equipment were entered
149 into a LCA, using a rho prior of 1 to stabilize the model and clustering by mother to
150 account for nesting of children within families. Models were repeated with 2 to 6
151 classes. Based on AIC values, entropy and interpretability, a 4-class model was judged as
152 the best fit to the data (Table S1 in supplement).

153 To investigate whether PA varied according to the equipment groups we used
154 generalized estimating equations to account for children nested within mothers,
155 specifying a normal distribution with an identity link, and estimating least square
156 means (which take into account nesting and unbalanced cell sizes). We ran a series of
157 models with child PA as the outcome: 1) equipment groups were entered in the same
158 regression model; 2) the child's age and sex were added to model 1; and 3) all
159 remaining covariates were added to model 2. We tested pair-wise differences between
160 equipment groups, with Tukey's adjustment for multiple comparisons. All analyses

161 were conducted using SAS (version 9.4).

162

163 **Results**

164 The demographic characteristics for the sample are in the "overall" column of Table 1.

165 On average, children were aged 8.4 years ($SD = 2.2$ years) and half of the sample were

166 girls (49%). The majority of mothers (63%) were university educated and half of the

167 households (51%) had 2 children, with only 6% reporting 1 child. On average, children

168 met PA guidelines on 3.9 ($SD = 2.1$) days/week and 12.7% were overweight or obese.

169 Children had access to 6.8 ($SD = 1.8$) types of active equipment and 1.9 ($SD = 1.0$) types

170 of electronic equipment on average. Looking at the frequency of different types of

171 equipment (Table 2), almost all children had access to balls, a scooter/bicycle/tricycle

172 and books, and only a small percentage had access to a television or

173 computer/electronic game in their bedroom.

174 **Combinations of equipment**

175 LCA identified 4 mutually-exclusive groups with distinct combinations of play

176 equipment (excluding balls, bikes/scooters and books). The demographics and

177 equipment associated with each group are in Tables 1 and 2 (respectively). There were

178 significant differences between groups on the variety of active and electronic equipment

179 on average ($p < 0.001$), and on every individual type of equipment ($p < 0.001$) except

180 books ($p = 0.591$). We called the first group "Plenties" ($n = 1509$, 36.9%) as they had

181 more of all types of active equipment, with a medium amount of electronic equipment

182 (mobile device, active electronic game). We called the second group "Sliders" ($n = 920$,

183 22.5%) as they had a medium amount of active equipment that tended towards fixed

184 (e.g., swings/slide, climbing equipment, trampolines) and very low electronic

185 equipment. We called the third group "Batters" ($n = 1330$, 32.5%) as they had the

186 lowest amount of active equipment, tending towards portable (e.g., bats/racquets,
187 skipping rope, skateboards/ripstick) and medium electronic equipment. We called the
188 last group "Techies" ($n = 333$, 8.1%) as they had a medium amount of active equipment,
189 tending towards portable, and the highest amount of electronic equipment.

190 There were significant differences between groups on child PA ($p < 0.001$), age ($p <$
191 0.001) and BMI ($p < 0.001$), on maternal PA ($p = 0.004$), education ($p < 0.001$), and
192 difficulty managing on income ($p < 0.001$), and on the number of children at home ($p <$
193 0.001), sibling composition ($p < 0.001$), remoteness ($p < 0.001$), and yard size ($p <$
194 0.001) (Table 1). The "Plenties" group had more active mothers, more children in the
195 family, more families with both boys and girls (compared to single sex), and lived
196 outside of cities with larger yards. The "Sliders" group had more younger children,
197 higher maternal education, little difficulty managing on income, and lived in cities with
198 larger yards. The "Batters" group had fewer children in the family and lived in cities
199 with smaller yards. The "Techies" group had more boys, more older children, lower
200 maternal education, more difficulty managing on income, and more only-child families.

201 **Home equipment and children's PA**

202 The series of regression models showed that the groups of equipment were associated
203 with children's PA (Table 3). Children in the "Plenties" group and children in the
204 "Sliders" group had similar PA (regression coefficient (B) = -0.07, 95% $CI = -0.28, 0.14$, p
205 = 0.531). However, children in the "Batters" ($B = -0.49$, 95% $CI = -0.69, -0.29$, $p < 0.001$)
206 and "Techies" ($B = -0.56$, 95% $CI = -0.81, -0.31$, $p < 0.001$) groups met PA guidelines on
207 fewer days of the week on average compared with children in the "Plenties" group.

208 The average number of types of active equipment was similar between the "Sliders"
209 ($M = 6.38$) and "Techies" ($M = 6.77$) groups, but children in the latter group met PA
210 guidelines on fewer days (estimated difference in LS means = -0.51, $SE=0.14$, adjusted p -

211 value = .002). In contrast, the "Sliders" group had fewer types of active equipment on
212 average ($M = 6.38$) than the "Plenties" group ($M = 8.17$), yet there was no significant
213 difference in the number of days on which children met the PA guidelines (estimated
214 difference in LS means = -0.07 , $SE = 0.11$, adjusted p -value = 0.926).

215

216 **Discussion**

217 In this study, we investigated the associations between the types of play equipment
218 available at home and children's PA. We investigated combinations rather than
219 individual types of equipment, as children typically have more than one type of
220 equipment at home and looking at the mix of equipment better reflects children's lived
221 experience. We found that children's PA differed by combinations of play equipment.

222 Compared to children with high active and medium electronic equipment
223 ("Plenties"), children with predominantly fixed active and low electronic equipment
224 ("Sliders") were not significantly different in their PA. This is despite children in the
225 "Sliders" group having fewer types of active equipment on average than children in the
226 "Plenties" group. This suggests children can be just as active with less equipment, as
227 long as it includes fixed equipment such as swings, slides, climbing equipment and
228 trampolines. It also affirms the value of investigating combinations of equipment rather
229 than only the overall variety.

230 In contrast, children with predominantly portable active and either medium
231 ("Batters") or high ("Techies") electronic equipment met PA guidelines on fewer days of
232 the week on average. This is in line with previous research that has found fixed
233 equipment is more likely to be positively associated with PA than portable equipment
234 ^{11,14,16,19}, and that electronic equipment can be associated with less PA ^{4,18}. This suggests
235 portable equipment does not necessarily encourage PA, particularly when paired with

236 high amounts of electronic equipment. It is possible that across the 24-hour cycle,
237 children with more electronic equipment are spending less time on PA and more time
238 sedentary or on screens. It is also possible that, if equipment is in children's bedrooms,
239 it is more difficult for parents to monitor usage and direct children to other types of
240 play. Interventions can successfully reduce the amount of electronic equipment in the
241 home ⁴⁰, or reduce access to it ⁹, and this should be further investigated. Interestingly,
242 even though the average variety of active equipment was equivalent between children
243 in the "Sliders" and "Techies" groups, children in the "Techies" group met the PA
244 guidelines on fewer days on average. This again emphasises that it is the combination of
245 equipment that is linked to PA, not the overall variety.

246 It should also be noted that these combinations of equipment were available to
247 different families, with significant differences in the demographic profiles between
248 groups. It may be that purchasing decisions differ between groups, perhaps informed by
249 educational level. In our study, the group with the highest amount of electronic
250 equipment ("Techies") also had the lowest percentage of mothers with a university
251 education. Another Australian study has found that education level is associated with
252 the play equipment available at home ¹⁹. It may also be that the groups experienced
253 different financial and environmental constraints ⁹. Fixed equipment, such as a slide, is
254 more expensive to purchase than portable equipment, such as a bat or racquet, and
255 generally requires a larger yard. However, in our study the group with the lowest
256 amount of fixed equipment ("Batters") were not the group with the most difficulty
257 managing on income ("Techies"), but they did report the highest percentage of having
258 no yard or a small yard. Yard sizes have decreased in countries such as Australia and the
259 USA ⁹. The availability of parks and recreational areas is positively associated with PA ²⁵,
260 and is an important consideration in the urban design of neighbourhoods with smaller

261 yards.

262 These findings suggest that the type of play equipment available to children matters.
263 Increasing access to fixed active play equipment and reducing access to electronic
264 equipment may have a beneficial effect on PA, although it should be noted that these
265 findings are in addition to balls, bikes and books which were excluded from the
266 combinations as almost all children in our sample had access to these. The combination
267 of equipment available to children, and the association with PA, is an important area for
268 future research as it can inform parental purchasing decisions and potentially be an
269 effective intervention strategy.

270 **Strengths and limitations**

271 Our study has several strengths. It used a large national sample and included children
272 from a wide range of ages. It included as covariates some of the most important
273 correlates of children's PA, such as maternal PA. It also suggested a new way of
274 investigating specific types of equipment using LCA. Our study also has several
275 limitations. Primarily, because the study was cross-sectional we cannot look at the
276 direction of the association between children's equipment and PA. Also, PA data were
277 reported by the mother, which may capture different information than objectively-
278 measured data ²⁴. Parent-reports typically capture structured and planned activities
279 that are more likely to be recalled, while accelerometers capture incidental and
280 sporadic activities ²⁷ but can still under-report PA ^{14,19}. A more robust design might
281 include both objectively-measured and self- or parent-reported data, however our
282 findings were in line with those from studies using objective data ¹⁸. Mothers were only
283 able to report on the 15 types of play equipment listed, which may not fully capture the
284 variety of equipment in the home. However, a similar study ¹¹ that provided a list of 30
285 types of play equipment also found that fixed rather than portable equipment was

286 associated with children's PA. Studies in this area typically measure play equipment by
287 indicating the types of equipment available ^{4,12,15,17,19,20}, as we have done, however
288 future studies should consider assessing how frequently each type of equipment is used.
289 This could further our understanding of why specific types of play equipment are more
290 strongly associated with physical activity and could inform both interventions and
291 advice to parents. Compared to mothers in the ALSWH cohort, mothers who completed
292 the MatCH survey were more likely to have a university education and be employed ²⁸,
293 and this should be taken into account when generalizing findings. Finally, we did not
294 measure determinants of children's PA outside the home, such as school,
295 neighbourhood and public transport.

296

297 **Conclusions**

298 Our study provides evidence from a large Australian community sample that the
299 combination of play equipment at home is associated with children's PA. Play
300 equipment is modifiable and could be targeted as part of public health campaigns aimed
301 at increasing PA. Specifically, it may be beneficial for children to have access to fixed
302 active play equipment; to support families living in urban areas with a higher
303 proportion of small yards; and to suggest that parents limit access to electronic play
304 equipment, particularly in children's bedrooms ^{18,32}. Overall, having the right
305 combination of equipment, rather than the most equipment, is what matters for
306 children's PA.

307

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315 In terms of author contributions, GDM and AJD conceptualised, coordinated and
316 supervised data collection of the ALSWH and MatCH studies. GDM, AJD, KH, KMM, KE
317 and YC designed the current study; AJD and KE provided input on the statistical
318 analyses. KM, YC and GDM analysed and interpreted the data. KM wrote and revised the
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321

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Tables

Table 1 Demographic characteristics and means (SE) by explanatory variables for active and electronic equipment

	Overall	PA		Plenties ^a	Sliders ^a	Batters ^a	Techies ^a	p-value
	No. (%)	Mean (SE)	p-value	No. (%)	No. (%)	No. (%)	No. (%)	
No. active equipment	6.82 (1.76) ^b	-	-	8.17 (0.04) ^c	6.38 (0.05) ^c	5.40 (0.05) ^c	6.77 (0.10) ^c	<0.001
No. elec. Equipment	1.92 (1.00) ^b	-	-	1.97 (0.03) ^c	1.29 (0.03) ^c	1.88 (0.03) ^c	3.75 (0.05) ^c	<0.001
PA (days)	3.89 (2.10) ^b	-	-	4.16 (0.07) ^c	4.00 (0.08) ^c	3.62 (0.07) ^c	3.57 (0.11) ^c	<0.001
Children								
Sex								
Male	2086 (51)	4.03 (0.05)	<0.001	787 (52)	440 (48)	678 (51)	181 (54)	0.111
Female	2006 (49)	3.74 (0.05)		722 (48)	480 (52)	652 (49)	152 (46)	
Age (years) (M, SD)								
5 to 8 years	2102 (51)	3.86 (0.05)	0.236	741 (49)	626 (68)	637 (48)	98 (29)	<0.001
9 to 12 years	1990 (49)	3.91 (0.05)		768 (51)	294 (32)	693 (52)	235 (71)	

Play equipment and children's physical activity

	Overall	PA		Plenties ^a	Sliders ^a	Batters ^a	Techies ^a	p-value
	No. (%)	Mean (SE)	p-value	No. (%)	No. (%)	No. (%)	No. (%)	
BMI								
Underweight	392 (17.9)	3.96 (0.08)	<.001	137 (9)	95 (10)	132 (10)	28 (8)	<0.001
Normal	2447 (59.8)	3.97 (0.04)		967 (64)	573 (62)	757 (57)	150 (45)	
Overweight/Obese	521 (12.7)	3.65 (0.08)		172 (11)	103 (11)	178 (13)	68 (13)	
Missing	732 (17.9)	3.77 (0.10)		233 (15)	149 (16)	263 (20)	87 (26)	
Impact of child's health								
None/positive	3323 (81)	3.97 (0.04)	<0.001	1250 (83)	732 (80)	1078 (81)	263 (79)	0.148
Negative	769 (19)	3.56 (0.07)		259 (17)	188 (20)	252 (19)	70 (21)	
Mothers								
Physical activity level								
Very low	522 (13)	3.27 (0.12)	<0.001	191 (12)	120 (13)	160 (12)	51 (15)	0.004
Low	1284 (31)	3.76 (0.07)		421 (28)	321 (35)	441 (33)	101 (30)	
Moderate	938 (23)	4.04 (0.09)		358 (24)	217 (24)	287 (22)	76 (23)	

Play equipment and children's physical activity

	Overall	PA		Plenties ^a	Sliders ^a	Batters ^a	Techies ^a	p-value
	No. (%)	Mean (SE)	p-value	No. (%)	No. (%)	No. (%)	No. (%)	
High	1348 (33)	4.17 (0.07)		539 (36)	262 (28)	442 (33)	105 (32)	
Education. qualification								
Year 12 or less	555 (14)	3.66 (0.08)	<0.001	209 (14)	77 (8)	170 (13)	99 (30)	<0.001
Trade/diploma	954 (23)	3.70 (0.11)		358 (24)	176 (20)	301 (23)	119 (36)	
University	2583 (63)	4.02 (0.05)		942 (62)	667 (73)	859 (64)	115 (34)	
Managing income								
Easy	762 (19)	4.03 (0.09)	0.055	283 (19)	204 (22)	242 (18)	33 (10)	<0.001
Not bad	1606 (39)	3.97 (0.07)		588 (39)	349 (38)	562 (42)	107 (32)	
Difficult sometimes	1155 (28)	3.77 (0.08)		451 (30)	248 (27)	345 (26)	111 (33)	
Diff. always/impossible	569 (14)	3.73 (0.12)		187 (12)	119 (13)	181 (14)	82 (25)	
Households								
No. children at home								
1 child	259 (7)	3.59 (0.14)	0.038	42 (3)	56 (6)	124 (9.3)	37 (11)	<0.001

Play equipment and children's physical activity

	Overall	PA		Plenties ^a	Sliders ^a	Batters ^a	Techies ^a	p-value
	No. (%)	Mean (SE)	p-value	No. (%)	No. (%)	No. (%)	No. (%)	
2 children	2100 (51)	3.89 (0.06)		672 (44)	493 (54)	765 (57)	170 (51)	
3 or more children	1733 (42)	3.98 (0.07)		795 (53)	371 (40)	441 (33)	126 (38)	
Sibling composition								
Boys only	901 (22)	4.14 (0.09)	<0.001	300 (20)	196 (21)	330 (25)	75 (23)	<0.001
Girls only	767 (19)	3.49 (0.09)		210 (14)	212 (23)	275 (21)	70 (21)	
Both	2424 (59)	3.93 (0.05)		999 (66)	512 (56)	725 (54)	188 (56)	
Remoteness								
City	2317 (57)	3.94 (0.05)	0.075	724 (48)	523 (57)	906 (68)	164 (49)	<0.001
Inner regional	1145 (28)	3.73 (0.08)		482 (32)	265 (29)	306 (23)	92 (28)	
Outer region./remote	630 (15)	3.97 (0.11)		303 (20)	132 (14)	118 (9)	77 (23)	
Yard size								
No/small yard	351 (9)	3.72 (0.14)	0.204	29 (2)	36 (4)	271 (20)	15 (5)	<0.001
Medium yard	2268 (55)	3.86 (0.05)		731 (48)	477 (52)	848 (64)	212 (64)	

Play equipment and children's physical activity

	Overall	PA		Plenties ^a	Sliders ^a	Batters ^a	Techies ^a	p-value
	No. (%)	Mean (SE)	p-value	No. (%)	No. (%)	No. (%)	No. (%)	
Large yard	1473 (36)	3.98 (0.07)		749 (50)	407 (44)	211 (16)	106 (32)	
Street type								
Through road	2834 (69)	3.91 (0.05)	0.451	1041 (69)	629 (68)	950 (71)	214 (65)	0.065
Cul-de-sac	1258 (31)	3.84 (0.08)		468 (31)	291 (32)	380 (29)	119 (35)	

^a Combinations of equipment were determined using latent class analysis. "Plenties" had more of all types of active equipment, with a medium amount of electronic equipment (mobile device, active electronic game). "Sliders" had a medium amount of active equipment that tended towards fixed (e.g., slide, climbing equipment) and very low electronic equipment. "Batters" had a slightly lower amount of active equipment that tended towards portable (e.g. bat, skipping rope) and medium electronic equipment. "Techies" had a medium amount of active equipment, tending towards portable, with a high amount of electronic equipment.

^b Values represent mean and standard deviation

^c Values represent least-square means (or estimated marginal means), which are calculated from a linear model which takes into account clustering of children within families and unbalanced cell sizes, and provide standard errors rather than standard deviations.

Table 2 Active and electronic equipment at home overall and by equipment group

		"Plenties" ^a	"Sliders" ^a	"Batters" ^a	"Techies" ^a	
	Number (%) "yes"	<i>n</i> =1509	<i>n</i> =920	<i>n</i> =1330	<i>n</i> =333	p-value
Active equipment						
Balls	4060 (99)	1505 (100)	914 (99)	1309 (98)	332 (100)	<0.001
Scooter/bicycle/tricycle	4047 (99)	1500 (100)	907 (99)	1310 (99)	330 (99)	<0.001
Bats/racquets/clubs	3452 (85)	1461 (98)	680 (74)	1030 (78)	281 (85)	<0.001
Skipping rope	3406 (84)	1393 (94)	681 (74)	1049 (79)	283 (86)	<0.001
Trampoline	2668 (66)	1285 (88)	644 (70)	545 (41)	194 (60)	<0.001
Skateboard/ripstick	2413 (60)	1291 (89)	206 (22)	704 (53)	212 (64)	<0.001
Basketball/netball ring	2349 (59)	1245 (87)	291 (32)	602 (45)	211 (65)	<0.001
Climbing equipment/trees	2291 (57)	1224 (84)	702 (76)	212 (16)	153 (47)	<0.001
Slide/swing	1946 (49)	1075 (75)	715 (78)	0 (0)	126 (49)	<0.001
Swimming pool	1264 (32)	629 (45)	166 (18)	368 (28)	101 (31)	<0.001
Electronic equipment						

Play equipment and children's physical activity

Books (including ebooks)	3788 (93)	1391 (92)	854 (93)	1229 (92)	314 (94)	0.591
Active electronic game	2003 (50)	918 (64)	200 (22)	631 (48)	254 (77)	<0.001
Mobile device	1493 (36)	541 (36)	108 (12)	531 (40)	313 (94)	<0.001
Television	320 (8)	41 (3)	14 (2)	40 (3)	225 (68)	<0.001
Computer/electronic game	254 (6)	11 (1)	0 (0)	23 (2)	220 (66)	<0.001

^a Combinations of equipment were determined using latent class analysis. "Plenties" had more of all types of active equipment, with a medium amount of electronic equipment (mobile device, active electronic game). "Sliders" had a medium amount of active equipment that tended towards fixed (e.g., slide, climbing equipment) and very low electronic equipment. "Batters" had a slightly lower amount of active equipment that tended towards portable (e.g, bat, skipping rope) and medium electronic equipment. "Techies" had a medium amount of active equipment, tending towards portable, with a high amount of electronic equipment.

Table 3 Regression coefficients for associations between combinations of equipment and children's PA

	Model 1 ^a		Model 2 ^b		Model 3 ^c	
	B (95% CI)	<i>p</i>	B (95% CI)	<i>p</i>	B (95% CI)	<i>p</i>
Intercept	4.16 (4.02, 4.29)	<0.001	4.08 (3.85, 4.30)	<0.001	4.69 (4.36, 5.03)	<0.001
"Plenties" ^d	0 [Reference]		0 [Reference]		0 [Reference]	
"Sliders" ^d	-0.15 (-0.36, 0.06)	0.2	-0.11 (-0.32, 0.10)	0.3	-0.07 (-0.28, 0.14)	0.5
"Batters" ^d	-0.53 (-0.72, -0.34)	<0.001	-0.53 (-0.72, -0.34)	<0.001	-0.49 (-0.69, -0.29)	<0.001
"Techies" ^d	-0.58 (-0.83, -0.33)	<0.001	-0.68 (-0.93, -0.44)	<0.001	-0.56 (-0.81, -0.31)	<0.001

^a No covariates

^b Controlling for age and sex

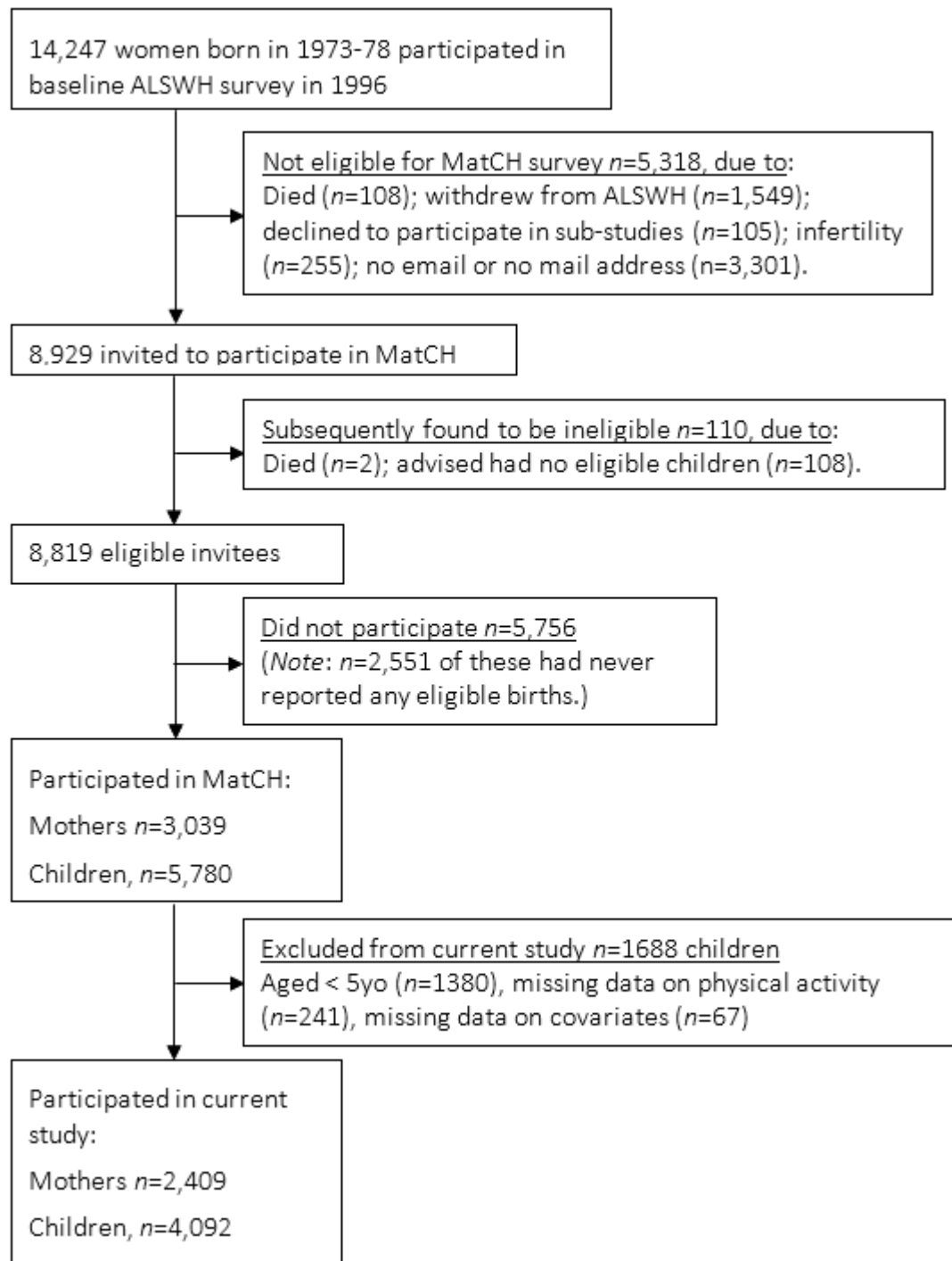
^c Controlling for all covariates

^d Combinations of equipment were determined using Latent Class Analysis. "Plenties" had more of all types of active equipment, with a medium amount of electronic equipment (mobile device, active electronic game). "Sliders" had a medium amount of active equipment that tended towards fixed (e.g., slide, climbing equipment) and very low electronic equipment. "Batters" had a slightly lower amount of active equipment

Play equipment and children's physical activity

that tended towards portable (e.g, bat, skipping rope) and medium electronic equipment. "Techies" had a medium amount of active equipment, tending towards portable, with a high amount of electronic equipment.

1 Supplementary material



2

3 Figure S1 Recruitment flowchart

4 **Table S1** Fit statistics for latent class analysis (LCA) of active and electronic equipment

Number of classes	Log-likelihood	Degrees of Freedom	AIC	Entropy
2 classes	-26385.53	4070	4683.80	0.53
3 classes	-25986.37	4057	3911.49	0.57
4 classes	-25774.19	4044	3513.13	0.62
5 classes	-25666.63	4031	3324.00	0.60
6 classes	-25634.03	4018	3284.80	0.60

5

6