



## Parenting styles, parenting practices, and physical activity in 10- to 11-year olds

Russell Jago<sup>a,\*</sup>, Kirsten K. Davison<sup>b</sup>, Rowan Brockman<sup>a</sup>, Angie S. Page<sup>a</sup>,  
Janice L. Thompson<sup>a</sup>, Kenneth R. Fox<sup>a</sup>

<sup>a</sup> Centre for Exercise, Nutrition & Health Sciences, School for Policy Studies, University of Bristol, 8 Priory Road, Bristol BS8 1TZ, UK

<sup>b</sup> Department of Health Policy, Management and Behavior, University at Albany (SUNY), Albany NY, USA

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### ABSTRACT

**Objective.** The objective of this study was to determine whether parenting styles and practices are associated with children's physical activity.

**Methods.** Cross-sectional survey of seven hundred ninety-two 10- to 11-year-old UK children in Bristol (UK) in 2008–2009 was conducted. Accelerometer-assessed physical activity and mean minutes of moderate-to-vigorous physical activity (mean MVPA) and mean counts per minute (mean CPM) were obtained. Maternal parenting style and physical activity parenting practices were self-reported.

**Results.** In regression analyses, permissive parenting was associated with higher mean MVPA among girls (+ 6.0 min/day,  $p < 0.001$ ) and greater mean CPM (+ 98.9 accelerometer counts/min,  $p = 0.014$ ) among boys when compared to children with authoritative parents. Maternal logistic support was associated with mean CPM for girls (+ 36.2 counts/min,  $p = 0.001$ ), while paternal logistic support was associated with boys' mean MVPA (+ 4.0 min/day,  $p = 0.049$ ) and mean CPM (+ 55.7 counts/min,  $p = 0.014$ ).

**Conclusions.** Maternal permissive parenting was associated with higher levels of physical activity than authoritative parenting, but associations differed by child gender and type of physical activity. Maternal logistic support was associated with girls' physical activity, while paternal logistic support was associated with boys' physical activity. Health professionals could encourage parents to increase logistic support for their children's physical activity.

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### Introduction

Many youth do not meet physical activity guidelines (Troiano et al., 2008). Parents are important influences on children's behavior, and this influence is likely to be a function of parenting styles and practices. Parenting styles describe how a parent communicates with his/her child (Baumrind, 1971). Four parenting styles have been defined: authoritarian (demand obedience), authoritative (use reasoning), permissive (acquiesce to child's demands), and uninvolved. Parenting practices describe context-specific behaviors such as what a parent does to facilitate physical activity (Gustafson and Rhodes, 2006; Pugliese and Tinsley, 2007).

A recent US study with 76 US youths reported that children with permissive mothers were the most active and logistic support for activity was associated with increased activity (Hennessey et al., 2010). It is not clear if these associations would be evident in a UK sample. We have developed new scales to assess physical activity-related parenting behaviors (Jago et al., 2009), but we do not know if these behaviors are associated with physical activity. It is also unclear

whether activity-related parenting practices differ by parenting style. This study examined associations between parenting styles, parenting practices, and physical activity among 10- to 11-year olds.

#### Participants and methods

Details on sampling and methods have been reported elsewhere (Brockman et al., 2010). Briefly, participants were nine hundred eighty-six 10- to 11-year-old children recruited from 40 primary schools in Bristol (UK) with complete accelerometer data obtained for 792 participants. The study was conducted between April 2008 and March 2009 and was approved by a University of Bristol ethics committee, and informed parental consent was obtained.

#### Procedures

Physical activity was assessed using GT1M accelerometers (Actigraph, Pensacola, Florida). Participants were included in the analysis if they provided  $\geq 3$  days of accelerometer data with  $\geq 500$  min of data per day. To provide an indication of the volume and intensity of participant physical activity, mean accelerometer counts per minute (CPM) and mean minutes of moderate to vigorous intensity physical activity per day (MVPA) were obtained. A correction factor (0.91) was applied to the

\* Corresponding author. Fax: +44 117 3311148.  
E-mail address: [russ.jago@bris.ac.uk](mailto:russ.jago@bris.ac.uk) (R. Jago).

3200 cpm (Puyau et al., 2002) threshold to yield a MVPA cutpoint of 2912 cpm (Corder et al., 2007).

To limit participant burden, only maternal parenting style was assessed using the 30-item Children’s Report of Parent Behavior Inventory (CPRBI-30) (Schludermann and Schluderman, 1988). Mothers were classified as authoritative, authoritarian, permissive, or uninvolved/neglectful based on acceptance ( $\alpha=0.88$ ) and control ( $\alpha=0.67$ ) scores. As only 3.8% of mothers were classified as uninvolved, these participants were removed from analyses.

Maternal and paternal logistic support (e.g., enrolling children in activities, providing transportation to parks and playgrounds) for physical activity and physical activity modeling were assessed using the child-completed Activity Support Scale ( $\alpha>0.7$ ) (Davison et al., 2003). Participants also completed four recently validated scales: (1) General Parenting Support (i.e., children’s perception of support;  $\alpha$ , 0.8; ICC, 0.8); (2) Active Parents (children’s perceptions of their parents’ activity on both weekdays and weekend days;  $\alpha$ , 0.7; ICC, 0.6); (3) Past Parental Activity (i.e., children’s perception of their parents’ prior physical activity level,  $\alpha$ , 0.7; ICC, 0.6); and (4) Guiding support (i.e., parental rules for physical activity,  $\alpha$ , 0.7; ICC, 0.7) (Jago et al., 2009).

**Confounders**

Height and weight were measured, and a body mass index (kg/m<sup>2</sup>) standard deviation score (BMI SDS) was calculated (Cole et al., 1995). Highest education within the household was obtained by parental report. To account for the season of assessment, the hours of daylight on the first day of data collection was calculated.

**Analysis**

Analysis of variance tests with follow-up Scheffé tests were used to examine if physical activity or parenting practices differed by parenting style. Linear regression models were used to examine if parenting styles and parenting practices predicted physical activity. The model included parenting style and any parenting practice variable that was correlated ( $p<0.05$ ) with physical activity (data not reported). All models were adjusted for the highest level of education

in the household, BMI SDS, and hours of daylight. Models were run separately for boys and girls. Robust standard errors were used to account for the clustering of participants within schools. All analyses were performed in Stata version 10.1 (College Station, Texas). Alpha was set at 0.05.

**Results**

Compared to girls, boys engaged in more minutes of MVPA per day (41.3 vs. 29.2,  $p<0.001$ ) and had a higher CPM (599.2 vs. 502.9,  $p<0.001$ ). Boys also reported higher maternal and paternal logistic support and modeling (Table 1).

Girls with permissive mothers engaged in more minutes of MVPA than girls with authoritative mothers (Table 2) and reported higher maternal and paternal logistic support and modeling. Boys with permissive mothers engaged in a greater volume of physical activity than those with authoritative mothers. Boys with permissive or authoritative mothers reported higher maternal and paternal logistic support and modeling than boys with authoritarian mothers. Boys with authoritative mothers reported higher general parenting support and higher scores for active parents than boys with authoritarian mothers.

Regression analyse showed that girls with permissive mothers engaged in more minutes of MVPA than those with authoritative mothers (Table 3). Higher guiding support was also associated with girls’ MVPA minutes ( $t=2.10$ ,  $p=0.043$ ). Higher maternal logistic support ( $t=3.29$ ,  $p=0.002$ ) was positively associated with girls’ CPM. For boys, higher paternal logistic support was associated with higher daily MVPA. Boys with permissive mothers had a higher mean CPM than boys with authoritative mothers. Higher levels of paternal logistic support were also associated with higher CPM.

**Discussion**

In this study, children’s physical activity differed by maternal parenting style with permissive parenting associated with higher levels of physical activity. Girls with permissive mothers had higher daily MVPA, while boys with permissive mothers had a higher volume of physical activity. Parental logistic support was consistently

**Table 1**  
Descriptive statistics for all participants with valid accelerometer data and stratified by gender (Bristol, UK 2008–2009).

	All (n = 792)		Girls (n = 409)		Boys (n = 341)		p <sup>1</sup>
	n	(%)	n	(%)	n	(%)	
<i>Parenting style (categories)</i>							
Authoritative	346	(43.7)	201	(49.1)	138	(40.5)	0.43
Authoritarian	224	(28.3)	120	(29.3)	102	(29.9)	
Permissive	80	(10.1)	43	(10.5)	37	(10.9)	
Uninvolved	30	(3.8)	10	(2.4)	19	(5.6)	
Missing	112	(14.1)	35	(98.6)	45	(13.2)	
	Mean	(SD)	Mean	(SD)	Mean	(SD)	p <sup>2</sup>
Mean minutes MVPA per day	35.0	(16.9)	29.2	(12.7)	41.3	(18.6)	<0.01
Mean counts per minute	550.8	(172.3)	503.0	(150.7)	599.2	(176.9)	<0.01
Mother logistic support (range 1–4)	3.2	(0.7)	3.1	(0.7)	3.2	(0.7)	<0.01
Father logistic support (range 1–4)	2.2	(0.6)	2.1	(0.7)	2.4	(0.6)	<0.01
Mother activity Modeling (range 1–4)	3.1	(0.7)	3.0	(0.8)	3.1	(0.7)	0.01
Father activity modeling (range 1–4)	2.4	(0.6)	2.3	(0.6)	2.4	(0.5)	<0.01
General parenting support (range 1–4)	3.2	(0.7)	3.2	(0.7)	3.2	(0.1)	0.12
Active parents (range 1–4)	2.7	(0.9)	2.7	(0.9)	2.8	(0.9)	<0.01
Past activity (range 1–4)	2.2	(1.0)	2.2	(0.9)	2.2	(1.0)	0.44
Guiding support (range 1–4)	2.5	(1.0)	2.4	(1.0)	2.5	(1.0)	0.07
Index multiple deprivation score (range 4 –61)	21.5	(16.3)	21.4	(16.9)	21.3	(16.1)	0.54
BMI atandard deviation score	0.4	(1.2)	0.4	(1.20)	0.6	(1.1)	<0.01
Hours of daylight per day	11.4	(2.3)	11.5	(2.5)	11.2	(2.6)	0.96

p<sup>1</sup> = Chi-squared test of differences in parenting style by gender excluding uninvolved/neglectful and missing groups).

p<sup>2</sup> = Independent sample t-tests for gender differences.

Bold items in text indicate  $p<0.05$ .

**Table 2**  
Mean differences in physical activity and parenting practice variables by parenting style for boys and girls (Bristol, UK, 2008–2009).

	Girls			P-value	Boys			P-value
	Authoritative mean (SD)	Authoritarian mean (SD)	Permissive mean (SD)		Authoritative mean (SD)	Authoritarian mean (SD)	Permissive mean (SD)	
CPM	503.4 (158.3)	507.8 (152.0)	524.8 (134.2)	0.71	586.6 (181.7)	593.9 (161.3)	673.0 (210.3)	<b>0.03<sup>B</sup></b>
MVPA	28.2 (12.6)	29.5 (12.2)	33.7 (12.2)	0.03 <sup>B</sup>	40.3 (18.9)	42.2 (18.5)	44.8 (21.5)	0.42
Mother logistic support	3.3 (0.6)	2.7 (0.7)	3.5 (0.5)	<0.01 <sup>A,B,C</sup>	3.4 (0.6)	2.9 (0.8)	3.5 (0.5)	<0.01 <sup>A, C</sup>
Father logistic support	2.2 (0.6)	2.0 (0.6)	2.5 (0.5)	<0.01 <sup>A,B,C</sup>	2.5 (0.5)	2.2 (0.5)	2.5 (0.6)	<0.01 <sup>A, C</sup>
Mother modeling	3.2 (0.6)	2.5 (0.7)	3.6 (0.5)	<0.01 <sup>A,B,C</sup>	3.4 (0.5)	2.7 (0.7)	3.5 (0.6)	<0.01 <sup>A, C</sup>
Father modeling	2.4 (0.5)	2.1 (0.5)	2.7 (0.4)	<0.01 <sup>A,B,C</sup>	2.5 (0.5)	2.3 (0.5)	2.6 (0.5)	<0.01 <sup>A, C</sup>
General parenting support	3.3 (0.6)	2.9 (0.8)	3.4 (0.5)	<0.01 <sup>A,C</sup>	3.5 (0.7)	3.0 (0.7)	3.3 (0.7)	<0.01 <sup>A</sup>
Active parents	2.8 (0.8)	2.4 (0.9)	3.3 (0.8)	<0.01 <sup>A,B,C</sup>	2.9 (0.8)	2.7 (0.8)	3.0 (1.0)	<b>0.02<sup>A</sup></b>
Past activity	2.2 (1.0)	2.2 (0.9)	2.1 (1.1)	0.53	2.2 (1.0)	2.3 (0.9)	2.1 (1.0)	0.24
Guiding support	2.6 (1.0)	2.4 (0.9)	2.2 (1.2)	<b>0.05</b>	2.6 (1.1)	2.5 (0.9)	2.4 (1.1)	0.46

See Table 1 for variable units and range.

A = authoritative vs. authoritarian,  $p < 0.05$ ; B = authoritative vs. permissive,  $p < 0.05$ ; C = authoritarian vs. permissive,  $p < 0.05$ . (If  $p$  value is significant and no code, the main effect was  $p < 0.05$  but none of the pairwise comparisons had  $p < 0.05$ .)

associated with higher physical activity among girls and boys. As the data are cross-sectional, it is not possible to determine the direction of these associations. It may be the case that a child who has an interest in physical activity seeks additional logistical support for physical activity.

The link between permissive parenting and children's physical activity is contrary to previous research related to diet and parenting styles (Kremers et al., 2003; Wake et al., 2007) but is consistent with a recent physical activity study (Hennessy et al., 2010). We also found that boys and girls with permissive mothers reported higher maternal and paternal logistic support and modeling than girls with authoritative mothers. This finding might indicate that permissive mothers are more supportive of physical activity than authoritative mothers, thereby suggesting that physical activity-related parenting behaviors are different to the well-established diet and parenting style associations. However, our findings should not be viewed as an endorsement for permissive parenting. Rather we would argue that more work is needed to identify why children with permissive mothers have higher physical activity.

A number of high-profile policy campaigns (Department of Health, 2009) seek to garner parental support for physical activity. The data presented here suggest that encouraging parents to provide increased logistic support for their child's physical activity, by for example enrolling them in activities and taking them to places where they can

be active, could be important for advancing these efforts and should be emphasized in policy and intervention development.

## Conclusions

Permissive parenting was associated with higher levels of physical activity among 10- to 11-year-old children. Maternal logistic support was associated with girls' physical activity, while paternal logistic support was associated with boys' physical activity. To promote physical activity, public health professionals could encourage parents to increase logistic support for their children's physical activity.

## Conflicts of interest statement

We have no conflicts of interest to declare.

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**Table 3**  
Regression models predicting minutes of MVPA per day and mean CPM by gender<sup>a</sup> (Bristol, UK, 2008–2009).

	Mean MVPA			Mean CPM		
	Coeff	95% CI	$p$	Coeff	95% CI	$p$
<i>Girls (n = 330)</i>						
Parenting style—Ref authoritative						
Authoritarian	1.7	−1.54 to 4.90	0.30	8.9	−30.19 to 48.06	0.65
Permissive	6.0	3.15 to 8.92	<0.01	23.2	−21.91 to 68.24	0.31
Mothers logistic support	1.7	−0.50 to 3.93	0.13	36.2	13.93 to 58.44	<0.01
Guiding support	1.2	0.04 to 2.36	<b>0.04</b>	14.6	−0.67 to 29.88	0.06
		Model $R^2 = 0.07$			Model $R^2 = 0.12$	
<i>Boys (n = 218)</i>						
Parenting style—Ref authoritative						
Authoritarian	3.0	−1.94 to 8.02	0.23	8.0	−43.07 to 58.99	0.75
Permissive	5.1	−1.46 to 11.67	0.12	98.9	21.17 to 176.69	<b>0.01</b>
Father logistic support	4.0	0.02 to 8.04	<b>0.05</b>	55.7	12.10 to 99.37	<b>0.01</b>
Active Parents	−0.5	−3.29 to 2.34	0.73	15.0	−6.35 to 36.38	0.16
		Model $R^2 = 0.09$			Model $R^2 = 0.22$	

Mean MVPA = mean minutes of moderate to vigorous intensity physical activity per day.

Mean CPM = mean accelerometer counts per minute.

BMI SDS = body mass index, standard deviation score.

<sup>a</sup> All models are adjusted for parental education, hours of daylight and BMI SDS.

necessarily those of the NHS, the National Institute for Health Research, or the Department of Health.

## References

- Baumrind, D., 1971. Current patterns of parental authority. *Dev. Psychol. Monogr.* 4, 101–103.
- Brockman, R., Jago, R., Fox, K.R., 2010. The contribution of active play to the physical activity of primary school children. *Prev. Med.* 51, 144–147.
- Cole, T.J., Freeman, J.V., Preece, M.A., 1995. Body mass index reference curves for the UK, 1990. *Arch. Dis. Child.* 73, 25–29.
- Corder, K., Brage, S., Ramachandran, A., Snehalatha, C., Wareham, N., Ekelund, U., 2007. Comparison of two Actigraph models for assessing free-living physical activity in Indian adolescents. *J. Sports Sci.* 25, 1607–1611.
- Davison, K.K., Cutting, T.M., Birch, L.L., 2003. Parents' activity-related parenting practices predict girls' physical activity. *Med. Sci. Sports Exerc.* 35, 1589–1595.
- Department of Health, 2009. *Change 4 Life*. <http://www.nhs.uk/change4life/Pages/Default.aspx>2009.
- Gustafson, S.L., Rhodes, R.E., 2006. Parental correlates of physical activity in children and early adolescents. *Sports Med.* 36, 79–97.
- Hennessy, E., Hughes, S.O., Goldberg, J.P., Hyatt, R.R., Economos, C.D., 2010. Parent-child interactions and objectively measured child physical activity: a cross-sectional study. *Int. J. Behav. Nutr. Phys. Act.* 7, 71.
- Jago, R., Fox, K.R., Page, A.S., Brockman, R., Thompson, J.L., 2009. Development of scales to assess children's perceptions of friend and parental influences on physical activity. *Int. J. Behav. Nutr. Phys. Act.* 6, 67.
- Kremers, S.P., Brug, J., de Vries, H., Engels, R.C., 2003. Parenting style and adolescent fruit consumption. *Appetite* 41, 43–50.
- Pugliese, J., Tinsley, B., 2007. Parental socialization of child and adolescent physical activity: a meta-analysis. *J. Fam. Psychol.* 21, 331–343.
- Puyau, M.R., Adolph, A.L., Vohra, F.A., Butte, N.F., 2002. Validation and calibration of physical activity monitors in children. *Obes. Res.* 10, 150–157.
- Schludermann, S., Schluderman, E., 1988. *Questionnaire for Children and Youth (CRPBI-30)*. University of Manitoba, Winnipeg.
- Troiano, R.P., Berrigan, D., Dodd, K.W., Masse, L.C., Tilert, T., McDowell, M., 2008. Physical activity in the United States measured by accelerometer. *Med. Sci. Sports Exerc.* 40, 181–188.
- Wake, M., Nicholson, J.M., Hardy, P., Smith, K., 2007. Preschooler obesity and parenting styles of mothers and fathers: Australian national population study. *Pediatrics* 120, e1520–e1527.