

## Validation of the parent-child physical activity perspectives scale (PPPS) and factors impacting parents' perceptions

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### Abstract

Parents' approaches towards their children's physical activity is an important factor determining the children's lifestyle and well-being. The current study presents the development and the validation of the Parent-Child Physical Activity Perspectives Scale (PPPS). The PPPS is unique in the way that it captures parents' attitudes towards, judgment of, and behaviours related to children's physical activity within a single index. The PPPS was validated using data collected from 330 parents (Jewish and Arab Israelis) who observed different levels of religiosity, which enabled the identification of differences in the parents' approaches across a range of social backgrounds. The results of the validation study identified four meaningful factors of children's activity: physical activity/free-play; organized activity; sedentary screen-activity; and school preparation activity. It was concluded that the PPPS is a valid and meaningful measure of parental approaches towards their children's physical activity.

**Keywords :** Questionnaire, parents' attitude, early childhood, physical activity

### Introduction

Children's participation in physical activity in early childhood is considered to be extremely important. A low level of physical activity and, conversely, a high level of sedentary behaviour (Colley et al., 2011), as well as obesity (Roberts et al., 2012), are increasingly threatening the well-being of the satiated part of the world population (Reilly and Kelly, 2011; Tremblay et al., 2012a, 2012b).

Research has shown increasing evidence that raising the level and quality of physical activity of kindergarten children is directly connected to their physical health (Finni et al., 2011). Physical activity has been found to be one of the most important factors in preventing obesity in children. In addition, high-intensity physical activity can prevent diseases linked to the cardio-respiratory system (Pulkki-Råback et al., 2015). Moreover, it can also improve children's motor skill proficiency (Stodden et al., 2008). Improving these skills leads to an increase in the quantity and quality of the physical activity, which in turn leads to further improvement of a child's motor skills (Lopes et al., 2013). Most recently, strong evidence has emerged showing that physical activity aimed at loading weight stress on the bones can contribute to bone health as well (Goldstein et al., 2016). Not only is physical activity important for physical health, but it also brings a plethora of psychosocial benefits (Burdette and Whitaker, 2005; Ginsburg, 2007; Strong et al., 2005; Timmons et al., 2007). Research on the subject shows that physical activity, whether organized or free, is linked to self-esteem (Ekelund et al., 2005). Physical activity and movement-based games provide children with ways to exercise self-control and develop their ability to express feelings (Eaton et al., 2001; ). Additionally, research also shows that movement-based games help develop social skills, such as negotiating, cooperation, and leadership (Lindblom and Ziemke, 2007). Moreover, in addition to all these, physical movement – and especially mindful movement (Zach et al., 2016) – can have a positive impact on short-term concentration (Singh et al., 2012; Taras, 2005), thinking-related cognitive skills, language, and mathematics (Iverson, 2010; Rakison and Woodward, 2008; Son and Meisels, 2006), and on a child's special orientation abilities (Kretch et al., 2014).

In order to ensure a significant impact of movement on a child's physical, psychological, and social health, and on his/her learning in early childhood, it is not sufficient to participate in one kind of physical activity. A significant impact requires varied and significant physical activities (Tremblay et al., 2012a, 2012b). Health organizations and doctors recommend that preschool-age children should take part in enjoyable physical activities three hours a day cumulatively. One of these three hours should be spent in doing medium- to high-intensity activities (Hntiuke et al., 2014) Observation of preschool children shows that they are not sufficiently active to realise the full potential of their physical activities (Timmons et al., 2007). Children have been found to be exposed to a TV or computer screen an average of six hours daily (Goldfield et al., 2012). They spend approximately 80% of their wakeful hours in sedentary behaviours (LeBlanc et al., 2012). In Canada, for

example, it is reported that only 9% of boys and 4% of girls in kindergarten fulfil the Canadian PA Guidelines stating that children at this age should be active, performing medium- to high-intensity activities for at least 60 minutes every day (Timmons et al., 2007). These data point to educational shortcomings of both the home and the school. Children at this age can easily be motivated and would welcome playing movement-based games, enjoying a movement-oriented environment, or taking part in specifically-organized activities. At later stages of their childhood, not having acquired movement habits and motor skills, these children might not be as motivated as their younger counterparts who have been exposed to these activities (Goldfield et al., 2012).

Additional studies have found that parents generally seem to think that their children are active, even when actually they are not active enough to make a difference (Adamo et al., 2010). Moreover, adults believe that children do a sufficient amount of running around, according to their needs and nature (Goldfield et al., 2012). The facts, however, contradict this impression. Active parent cooperation is an important and necessary condition in promoting physical activity of children. It is reasonable to assume that parents who remain unconvinced of the necessity of physical activity, and therefore do not give it a high priority, will not provide sufficient opportunities for their children to take part in physical activities. Therefore, we decided to examine parents' attitudes and their priorities (David, 2015). No comprehensive scale to enable us to do this is currently available in the literature, and hence there is a need to devise one, which is the objective of this study. The current study reports on the development of and validation of the Parent-Child Physical Activity Perspectives Scale (PPPS), which aims to provide a valid, comprehensive measure of parental engagement with a child's daily activity.

The aim of the PPPS is to identify the parents' attitudes concerning physical activity when the children are under parental supervision. This newly-developed scale integrates three domains: the importance parents give to different physical activities; parents' perceptions of the optimal frequency of the aforesaid activities; and their judgement of the frequency of activity undertaken by the child. The unique construct of the questionnaire given to the participants aims to shed light on the parents' approach towards their children's physical activities. In addition, this study also assesses the impact of parents' physical activity and demographic characteristics on their approach towards their children's physical activities.

## Materials & Method

In order to explore the attitudes of parents concerning the participation of their children in physical activities in a kindergarten environment and at home (in pre-school, ages: 4-6 years old), a team of four experts in early childhood education devised a list of items related to the common activities children do in the afternoon, during the time they spend with their parents. The initial list consisted of 40 activities which, through an iterative process aiming to reach consensus, was reduced to 13 activities representing the common activities of children in contemporary family life. The questionnaire used in this study included the following topics: demographics, attitudes about the importance of physical activity at home, imbuing knowledge on physical activity, and the role of parents and kindergarten teachers in physical activity. This study was undertaken in Israel consisting with both Jewish and Arab participants. To maintain consistency across languages, the items were designed simultaneously in English, Hebrew, and Arabic; bilingual experts continuously monitored the comparability and coherence of the three languages. The next step consisted of an initial list of items that was presented to a random group of 30 parents (15 males and 15 females), who were separately asked to answer the questions. These parents were requested to provide answers the questions as well as to provide feedback on the items in terms of relevance, appropriateness, and clarity. At this stage the focus was on lacunas in wording, the lucidity of the items, and the visual design of the questionnaire, as well as their estimation of how much time it would take to answer the entire questionnaire (Schwarz and Oyserman, 2001).

Once the questionnaire design was completed, it was given to 330 parents (190 Jews and 140 Arabs) using the Hebrew and Arabic versions, respectively. To encompass the parents' comprehensive perspectives of their children's activities, the parents were requested to provide answers related to three dimensions: P – the perception of importance of each activity (scale from 1=undesirable to 5=essential); F – the frequency each activity is practiced (scale from 1=never to 5= every day); and J – a judgement whether the frequency mentioned is too high, too low, or just right (scale 1=too low, 2=just right, 3=too high). A summary of the perspective of the activity is calculated using the formula:  $P \cdot F / J$ . That is, the maximum score of 25 is given to an activity which is considered to be very important, occurs every day, and is perceived as taking place too few times. The minimum score 1/3 is given to an activity that is perceived undesirable, does not occur, and is perceived to occur too frequently. Obviously a score of 1/3 is unlikely (an activity could not occur too frequently or too little if it does not happen at all), and therefore the expected minimum score was 0.5 ( $=1 \cdot 1/2$ ).

Although due to the comprehensiveness and diversity of activities a factor structure was not sought, a Principal Component Analysis (Varimax rotation) was nevertheless undertaken to identify possible factor structures or communalities among items. The last analysis was aimed at identifying parents' characteristics predicting the scores of each of the factors. The predictors considered were: sector (Jewish/Arab); religiosity; self-report family income (denoted as SES); frequency of physical activity (parent); and overall parent perception of the importance of activities, calculated by the mean score of the *four factors*. The parent's perception of the importance of activities (denoted as Parent.Engagement) was used to control for the general

inclination of parents to perceive children's activities as important. This was added to the regression equations as a control variable only.

## Results

The results are presented in two stages. The first stage presents the evidence supporting the construct validity of the PPPS. The second stage demonstrates the utility of the PPPS, particularly when the participants come from diverse groups.

### Validation process

The results presented in **Error! Reference source not found.** demonstrate that across almost all items the entire range of possible responses was presented. The scores of the indices demonstrate that no unacceptable response was provided (i.e. the minimum index score was  $>0.5$ , as expected).

**Table 1.** Descriptive statistics of raw items and indices.

	Item	N		Mean	Std	Min	Max	Index			
		Valid	Missing					Mean	Std	Min	Max
Practicing reading and maths	q10a	326	0	4.17	0.977	1	5	7.84	3.89	2.00	20.00
	q10b	309	17	3.34	1.200	1	5				
	q10c	309	17	1.85	0.636	1	3				
Activity of wheels: Bikes, roller blades, etc.	q11a	326	0	3.74	1.121	1	5	5.64	3.17	0.67	16.00
	q11b	309	17	2.38	1.177	1	5				
	q11c	307	19	1.77	0.814	1	4				
	q12a	326	0	3.95	0.912	1	5				
Ball games	q12b	309	17	3.28	0.872	1	5	7.15	3.12	2.00	15.00
	q12c	309	17	1.96	0.643	1	4				
	q13a	326	0	3.79	0.862	1	5				
Painting, drawing, and handcrafts	q13b	307	19	3.58	0.845	2	5	7.62	3.05	1.50	15.00
	q13c	309	17	1.93	0.602	1	4				
	q14a	326	0	4.15	1.011	1	5				
Solving cognitive problems with adults	q14b	307	19	3.36	1.254	1	5	9.13	5.19	2.00	25.00
	q14c	308	18	1.64	0.584	1	3				
	q15a	326	0	3.50	1.022	1	5				
Playing in an outdoor playground	q15b	308	18	3.45	1.077	1	5	7.21	4.01	1.50	20.00
	q15c	309	17	1.88	0.607	1	3				
	q16a	326	0	3.17	1.201	1	5				
Computer/mobile games	q16b	309	17	2.67	1.285	1	5	4.12	2.40	0.50	15.00
	q16c	305	21	2.10	0.674	1	3				
	q17a	326	0	3.69	1.008	1	5				
Movement games with friends/siblings	q17b	308	18	3.76	0.986	1	5	7.60	3.13	1.00	15.00
	q17c	307	19	1.99	0.586	1	3				
	q18a	324	2	3.75	1.155	1	5				
Swimming	q18b	309	17	1.84	1.265	1	5	4.76	3.82	0.67	25.00
	q18c	306	20	1.52	0.628	1	4				
	q19a	324	2	3.75	1.010	1	5				
Discussions with friends	q19b	303	23	4.29	0.896	1	5	5.45	3.71	2.00	25.00
	q19c	296	30	2.04	0.453	1	3				
	q20a	324	2	3.63	1.049	1	5				
Extracurricular physical activities	q20b	309	17	2.72	1.473	1	5	5.45	2.60	1.00	15.00
	q20c	309	17	1.78	0.649	1	3				
	q21a	312	14	3.05	1.430	1	5				
Watching TV	q21b	305	21	4.16	0.888	1	5	4.60	2.22	0.50	12.50
	q21c	309	17	2.61	0.574	1	3				
	q22a	324	2	4.01	1.093	1	5				
Family walking/tramping trips	q22b	307	19	2.50	0.985	1	5	7.31	3.91	1.00	20.00
	q22c	307	19	1.43	0.552	1	3				

a= importance of engagement with child activity; b= frequency of activity; c= judgement of the frequency of the activity that occurs

The results from the Principal Component Analysis with Varimax rotation identified four factors, as seen in Table 2. The variance explained by each of the factors (rotated) ranged between 21.35% to 13.13% per factor, and the total variance explained by the four factors, was 61.8%.

**Table 2.** Principal component analysis.

Activities		Component					Factor descriptor
		1	2	3	4	5	
Activity of wheels: Bikes, roller blades, etc.	Index.11	<b>0.840</b>	-0.171	0.033	-0.134	0.222	<b>Physical activity – Free-play</b>
Ball games	Index.12	<b>0.791</b>	-0.023	0.067	0.253	-0.105	
Family walking/tramping trips	Index.22	<b>0.723</b>	0.193	0.012	0.123	-0.096	
Playing in an outdoor playground	Index.15	<b>0.664</b>	0.290	-0.201	0.010	-0.423	
Discussions with friends	Index.19	0.446	0.351	-0.371	0.391	-0.047	<b>Organized activity</b>
Extracurricular physical activities	Index.20	0.042	<b>0.847</b>	0.011	-0.072	0.253	
Solving cognitive problems with adults	Index.14	0.067	<b>0.805</b>	-0.110	0.160	-0.154	
Computer/mobile games	Index.16	0.041	0.005	<b>0.868</b>	0.187	0.084	
Watching TV	Index.21	-0.029	-0.101	<b>0.793</b>	-0.188	-0.028	<b>Sedentary screen- activity</b>
Practicing reading and maths	Index.10	0.068	-0.069	0.190	<b>0.851</b>	0.034	<b>School preparation activity</b>
Painting, drawing, and handicrafts	Index.13	0.129	0.190	-0.246	<b>0.776</b>	-0.133	
Swimming	Index.18	-0.022	0.143	-0.015	-0.026	0.907	
Movement games with friends/siblings	Index.17	0.487	0.383	-0.190	0.169	-0.500	

Extraction Method: Principal Component Analysis; Rotation Method: Varimax with Kaiser Normalization. a. Rotation converged in 6 iterations.

A paired t-test was used to compare parents' perceptions of their children's physical activities, with their perceptions related to the other factors (organised activity, screen sedentary activity, and school preparation activity). This comparison was made across sectors (Table 3) and across religiosity (Table 4).

The results demonstrated that among the Israeli-Jewish parents, physical activity was perceived more positively than sedentary activity, yet school preparation activity was perceived as more positive than physical activity. Among the Israeli-Arab parents, perception of physical activity was significantly lower than perceptions of organised activity and school preparation activity, whereas no difference was found between physical activity and sedentary activity.

The same comparisons undertaken by level of religiosity identified that across all levels of religiosity, perception of physical activity received higher scores than perceptions of sedentary activity and lower scores than school preparation activity.

**Table 3.** Comparison of parent perceptions across three domains by sector.

Sector		Paired Differences Mean	SD	SE	95% CI of the Diff		t	df	P	P<.05 (corrected)
					Lower	Upper				
Jewish	Physical_Activity Organised_Activity	- 0.006	3.675	0.268	-0.523	0.535	0.023	187	0.982	N.S.
	Physical_Activity Sedentary_Activity	- <b>3.860</b>	<b>3.344</b>	<b>0.244</b>	<b>3.379</b>	<b>4.341</b>	<b>15.825</b>	<b>187</b>	<b>0.000</b>	<b>0.000</b>
	Physical_Activity School Preparation Activity	- <b>-1.059</b>	<b>4.263</b>	<b>0.311</b>	<b>-1.673</b>	<b>-0.446</b>	<b>-3.408</b>	<b>187</b>	<b>0.001</b>	<b>0.005</b>
	Physical_Activity Organised_Activity	- <b>-1.304</b>	<b>4.432</b>	<b>0.403</b>	<b>-2.102</b>	<b>-0.506</b>	<b>-3.237</b>	<b>120</b>	<b>0.002</b>	<b>0.009</b>
Arabs	Physical_Activity Sedentary_Activity	- 0.249	2.293	0.208	-0.164	0.662	1.194	120	0.235	N.S.
	Physical_Activity School Preparation Activity	- <b>-0.665</b>	<b>2.021</b>	<b>0.184</b>	<b>-1.029</b>	<b>-0.301</b>	<b>-3.619</b>	<b>120</b>	<b>0.000</b>	<b>0.003</b>

**Table 4.** Comparison of parent perceptions across three domains by religiosity.

Religiosity		Paired Difference s Mean	SD	SE	95% CI of the Difference		t	df	P	P<.05 (corrected)
					Lower	Upper				
Secular	Physical Activity – Organised_Activity	-0.067	4.380	0.462	-0.984	0.851	-0.144	89	0.886	N.S.
	<b>Physical Activity – Sedentary_Activity</b>	<b>3.832</b>	<b>4.051</b>	<b>0.427</b>	<b>2.984</b>	<b>4.681</b>	<b>8.976</b>	<b>89</b>	<b>0.000</b>	<b>0.000</b>
	<b>Physical Activity – School_Preparation_Activity</b>	<b>-1.710</b>	<b>5.477</b>	<b>0.577</b>	<b>-2.857</b>	<b>-0.563</b>	<b>-2.962</b>	<b>89</b>	<b>0.004</b>	<b>0.047</b>
Traditional	Physical Activity – Organised_Activity	0.501	2.196	0.206	0.094	0.909	2.438	113	0.016	N.S.
	<b>Physical Activity – Sedentary_Activity</b>	<b>1.617</b>	<b>2.811</b>	<b>0.263</b>	<b>1.095</b>	<b>2.139</b>	<b>6.142</b>	<b>113</b>	<b>0.000</b>	<b>0.000</b>
	Physical Activity – School_Preparation_Activity	-0.336	1.792	0.168	-0.669	-0.004	-2.003	113	0.048	N.S.
Orthodox	<b>Physical Activity – Organised_Activity</b>	<b>-2.220</b>	<b>4.708</b>	<b>0.496</b>	<b>-3.206</b>	<b>-1.234</b>	<b>-4.474</b>	<b>89</b>	<b>0.000</b>	<b>0.000</b>
	<b>Physical Activity – Sedentary_Activity</b>	<b>2.070</b>	<b>2.673</b>	<b>0.282</b>	<b>1.510</b>	<b>2.630</b>	<b>7.346</b>	<b>89</b>	<b>0.000</b>	<b>0.000</b>
	<b>Physical Activity – School_Preparation_Activity</b>	<b>-0.975</b>	<b>2.315</b>	<b>0.244</b>	<b>-1.460</b>	<b>-0.491</b>	<b>-3.997</b>	<b>89</b>	<b>0.000</b>	<b>0.002</b>
Ultra-Orthodox	Physical Activity – Organised_Activity	-0.533	5.251	1.356	-3.441	2.374	-0.393	14	0.700	N.S.
	Physical Activity – Sedentary_Activity	2.683	5.531	1.428	-0.380	5.747	1.879	14	0.081	N.S.
	Physical Activity – School_Preparation_Activity	0.028	4.487	1.159	-2.457	2.513	0.024	14	0.981	N.S.

**[Are “Orthodox” and “Ultra-Orthodox” just Jewish? Should you put that in?]**

The final analysis (Univariate Analysis) focused on factors impacting on perception of physical activity. The variables considered were: sector, level of religiosity, SES, and level of actual activity undertaken by the parents. In addition, approaches to organised activity and sedentary activity were included in the model as control variables (Table 5).

The results demonstrated that a higher score of approaches towards physical activity is positively associated with parent frequency of physical activity, lower SES, being Jewish, and having a positive approach towards organised activity. Once all other variables are controlled, the Jewish Ultra-Orthodox expressed a higher perception of physical activity than all other religiosity groups, although the results were statistically significant only in the comparison to secular parents.

**Table 5. Factors associated with approaches to physical activity.**

Dependent Variable	Physical Activity					
	Parameter	B	SE	t	Sig.	95% CI Lower Upper
Intercept		3.803	1.302	2.922	0.004	1.241 6.364
q8 Frequency of sports		0.625	0.208	3.002	0.003	0.215 1.036
q9 SES		-0.643	0.169	-3.801	0.000	-0.976 -0.310
Organised_Activity		0.184	0.043	4.247	0.000	0.099 0.270
Sedentary_Activity		0.064	0.098	0.653	0.515	-0.129 0.256
School_Preparation_Activity		0.087	0.056	1.564	0.119	-0.023 0.197
[Sector=0] Jewish		4.796	1.630	2.943	0.004	1.588 8.004
[Sector=1] Arabs		0 <sup>a</sup>				
[q6.Religiosity=1] Secular		-4.139	1.448	-2.859	0.005	-6.989 -1.290
[q6.Religiosity=2] Traditonal		-0.154	0.897	-0.171	0.864	-1.920 1.612
[q6.Religiosity=3] Orthodox		-1.142	0.883	-1.294	0.197	-2.880 0.595
[q6.Religiosity=4] Ultra- Orthodox		0 <sup>a</sup>				

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[Sector=0] * [q6.Religiosity=1]	0 <sup>a</sup>					
[Sector=0] * [q6.Religiosity=2]	-3.780	1.693	-2.233	0.026	-7.113	-0.448
[Sector=0] * [q6.Religiosity=3]	-3.013	1.730	-1.742	0.083	-6.418	0.391
[Sector=0] * [q6.Religiosity=4]	0 <sup>a</sup>					
[Sector=1] * [q6.Religiosity=2]	0 <sup>a</sup>					
[Sector=1] * [q6.Religiosity=3]	0 <sup>a</sup>					
[Sector=1] * [q6.Religiosity=4]	0 <sup>a</sup>					

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a. This parameter is set to zero because it is redundant.

## Discussion

The PPPS provides a comprehensive summary of parent perceptions of their children's activities while they are under their supervision. The main question regarding the PPPS is what confers validity to this index-based tool.

An index is an important tool for capturing perceptions, behaviours, and judgements all together. As an index, the PPPS, as conceptualised here, uses a simple formula that grades activities based on perceived importance and frequency, including a judgement of activities not sufficiently practiced. The PPPS is an index, and as such the scores it yields are useful as a comparative rather than an absolute measure. Over time, once further research utilises the PPPS, it may be possible to establish meaningful standards for the PPPS scores, similar to the Body Mass Index  $[BMI = \text{Weight in Kg} / (\text{Height in M})^2]$  (Nickerson et al., 2018).

The PPPS covers a range of perspectives related to perceptions, actual activities, and judgement of activities. In that way, not only does the PPPS encompass attitudes toward behaviours, but it also makes these attitudes personal, by linking the perception of the importance of an activity to its practice at home, including the judgement of that activity. No such comprehensive scale has been previously reported in the literature. The activities covered by the PPPS represent most of the common activities that children are engaged in when they are with their parents. In this regard, the PPPS demonstrates a strong face validity as well as content validity (Cronbach, 1946). The results of the Principal Component Analysis support the PPPS' construct validity by identifying four distinct factors that accounted for 61.8% of the variance among the participants' responses, while no factor explained less than 13.3% of the variance, which strongly suggests that the factors are meaningful (Garson, 2013; Gorsuch, 2003). An important feature of the PPPS lies within its utility (Kroner and Weekes, 1996; Levine et al., 2003).

The results (see Table 5) suggest that the PPPS is a useful tool for capturing overarching perspectives of parents' perceptions of their children's activities. These results are in line with previous studies (David, 2015; Goldfield et al., 2012) – with the exception of the findings related to the Jewish Ultra-Orthodox respondents, since as far as we know no previous study for comparison is available. This study may have a number of limitations. Despite the supporting evidence of the PPPS' validity, the factors identified in this study comprise only a few items each. Further study is required to expand the list of items, in order to enhance the statistical reliability of the PPPS. Second, there is a need to repeat the study using a more diverse population, so that the robustness of the PPPS across different populations can be identified.

## Conclusions

Overall, the PPPS was found to be a useful tool for identifying parents' approaches towards their young children's physical activity. The PPPS is a short, simple – yet integrative and meaningful – tool, which encompasses not only attitudes but also judgement and practice. As such, it is deemed to provide a more realistic understanding of parents' approaches than any other tool that measures solely attitudes, judgement, or behaviour.

**Conflict of Interest** The authors declare no conflict of interest.

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