


Participation of children with and without disabilities in home, school, and community in Hong Kong: A 2-year longitudinal study

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Abstract

Background: Children with disabilities are reported to participate less in activities than their typically developing peers. However, owing to limited longitudinal studies, improvements or deteriorations in their participation over time remain unclear. No studies were also conducted in Hong Kong to describe children’s activity participation over time. **Aim:** To investigate the changes in participation patterns of Hong Kong children with and without disabilities. **Methods:** Thirty-four children with disabilities and 138 without disabilities were recruited from four schools. Their parents completed the Participation and Environment Measure for Children and Youth twice over 2 years. **Results:** After 2 years, both groups of children were found to engage more frequently in using electronic devices and less frequently in indoor play activities/games at home. They also participated more often in school extra-curriculum activities, events and field trips. However, the frequency of community activities remained relatively stable in the two groups. No changes in their levels of involvement in almost of home, school and community activities were identified. **Conclusion:** The findings of increased participation in some home and school activities over time are encouraging. However, stable or possibly decreased participation of children with disabilities in other activities requires further efforts in promoting their participation.

Keywords

participation trajectory, longitudinal study design, children, participation and environment measure for children and youth

Introduction

Participation, defined as ‘involvement in a life situation’ by the World Health Organization (2001), plays an essential role in children’s development (Holloway & Long, 2019; Hoogsteen & Woodgate, 2010). Successful participation contributes to children’s quality of life, functional independence and life satisfaction (Berg et al., 2018; Omura et al., 2018). According to the International Classification of Functioning, Disability and Health (World Health Organization, 2001), participation of a child is related to his/her body functions, body structures, and activity capacity under relevant environments. Children with disabilities who have physical and/or intellectual impairments

may experience functional limitations in task execution, which in turn restrict their participation in daily life activities.

Promoting participation of children with disabilities has been recognised as the ultimate goal of paediatric

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rehabilitation (Law, 2002), followed by several conceptual endeavours in the past decade (Coster & Khetani, 2008; Imms et al., 2017; Whiteneck & Dijkers, 2009). However, no consensus was reached in its conceptualisation (Stallinga et al., 2014) until a rather comprehensive construct of participation was advocated by Coster et al. (2012) and Imms et al. (2017). For instance, some population surveys identified home, school and community as the main areas of a child's engagement and involvement during everyday activities (Dunst et al., 2002; Wilson et al., 2004). This concept was further supported by Bedell et al. (2011) who conducted interviews and focus groups for parents of children with and without disabilities. In their study, parents stated that activities across home, school and community settings shaped and influenced their child's participation in terms of various expectations, routines and resources in each setting. Moreover, two essential components were identified to conceptualise child participation, namely frequency and involvement (Coster et al., 2012; Imms et al., 2017). Frequency is considered as an objective dimension quantified by the number of attendance and/or diversity of activities, which reflects (or is influenced by) a child's activity competence and preference. Involvement is considered as the quality of activity engagement of a child. Involvement of a child in a given activity could be observed by enjoyment, interaction with others or attention, which reflects the child's social and mental aspects of participation.

Given recent advance in the conceptualisation of participation, a contemporary participation measure, that is, Participation and Environment Measure for Children and Youth (PEM-CY), has been developed (Coster et al., 2012). PEM-CY assesses children's participation in home, school and community activities based on the frequency and involvement dimensions. PEM-CY is designed as a parent-report questionnaire and can be used for both children with and without disabilities. Therefore, studies have used PEM-CY to investigate participation patterns of children with disabilities in comparison to children with typical development. For example, children with a specific learning disorder were reported to participate less often in school activities and be less involved in both home and school activities than typically developed children (Şahin et al., 2020). Children with autism spectrum disorder exhibited similar participation frequency and involvement in home activities compared to typically developing peers, but were less involved in school or community activities and participated less often in community activities (Lamash et al., 2020). From these studies, it is revealed that a lower level of involvement appeared to be evident in children with disabilities across all home, school and community settings, while participation frequency might be similar to that of their typically developing peers in specific settings.

Despite the efforts in studying participation patterns of children with disabilities, longitudinal studies of

participation trajectory over time are scarce (Anaby et al., 2012; King et al., 2009). To the best of our knowledge, there are merely two studies that used PEM-CY to explore participation trajectories of children with disabilities over a certain period (Khetani et al., 2018; Simpson et al., 2019). Khetani et al. (2018) found no change in home participation frequency or involvement in critically ill children after 6 months of discharge from the intensive care unit. Simpson et al. (2019) found that children with autism spectrum disorder participated more frequently in socialisation using technology and were more involved in school preparation and personal care management at home after 3 years. However, reduced frequency of these children's interaction with other people/children at home and at school was noted. In addition, several longitudinal studies used different measures (i.e. Children's Assessment Participation and Enjoyment) to investigate leisure participation of children with physical disabilities (Baksjøberget et al., 2017; Imms & Adair, 2017; Majnemer et al., 2015). A decline in the frequency of leisure activities of children with physical disabilities was observed in all studies; however, an increase in social participation over time was found in Imms and Adair's study (2017). A decline was also identified in child enjoyment especially in recreational, active-physical and self-improvement activities (Majnemer et al., 2015). Although the aforementioned studies provided an insight into the participation changes in children with disabilities, typical developing children were not included as a reference point. This might result in difficulties in clarifying whether the observed participation change was specific to children with disabilities or to all other children.

Moreover, there have also been no longitudinal studies regarding children's activity participation in Hong Kong. Therefore, the aim of this study was to investigate the changes in participation patterns of Hong Kong children with and without disabilities in home, school and community settings over a 2-year interval, by using PEM-CY. Considered academic achievement is a general focus in Hong Kong educational system (Phillipson, 2009; Tam & Chan, 2011), we hypothesised that children without disabilities would participate more in school activities as they grow. However, children with disabilities may stay in the same special/mainstream schools for primary/secondary education. Therefore, we hypothesised that the participation change in children with disabilities at school would be stable. On the other hand, Hong Kong children tend to demonstrate a sedentary lifestyle at home and a low level of physical activity engagement in the community (Huang et al., 2019). Home and community activities appear to be less significant for parents, compared to educational activities. Thus, we hypothesised that no change in home or community participation would be revealed in both children with and without disabilities.

Methods

Participants

Parents of 388 children aged 5–12 years who participated in a child participation study in 2017 in Hong Kong (Chien et al., 2020) were invited to participate in this 2-year follow-up study. These children were initially recruited from three mainstream schools across three major geographical regions in Hong Kong (one each from Hong Kong Island, Kowloon and New Territory) and one special school from Hong Kong Island region. Because no special schools from other regions accepted the invitations for research participation, only this special school from Hong Kong Island region was included in the previous study. Inclusion criteria for participants from the previous study were children who were in school during time of data collection and their parents were able to read and understand written Chinese. Exclusion criteria were children who were not of school-going age, with physical disabilities which necessitated wheelchairs for functional mobility, or with visual impairment, hearing impairment or any other health conditions which could affect their functional mobility. Ethical approval for the previous and current follow-up study was obtained from the university ethics committee (approval numbers: HSEARS20160829001 and HSEARS20190221002).

Procedure

Between March and December 2019, the participants from the previous study were approached. Invitation letters explaining the purpose of the follow-up study together with the research questionnaires were posted to the participants' addresses that were provided in 2017. Participants who were interested in participating in the follow-up study were asked to return their completed questionnaires and consent form using a pre-paid envelope. A reminder letter was sent to participants 2 weeks after the invitation letters were sent.

Instruments

The Chinese version of PEM-CY (Chien et al., 2020) was used in the previous study and present follow-up study. PEM-CY is a parent-report questionnaire that captures children's participation in board types of activities at home (10 items), at school (5 items) and in the community (10 items), alongside environmental factors within each of these settings (12, 17 and 16 items for home, school and community, respectively) (Coster et al., 2011). In this study, analysis was focussed on the frequency and involvement of children's participation across three settings. Parents were asked to report the frequency of their child's participation in each type of activities over last 4 months (0 = never to 7 = daily), and their

involvement while participating in the activities (1 = minimally involved to 5 = very involved). Internal consistency (i.e. Cronbach's alpha coefficients) of the frequency and involvement scales was 0.55–0.63 and 0.68–0.72, respectively. Test-retest reliability (i.e. intraclass correlation coefficients) of the frequency and involvement scales was 0.73–0.84 and 0.80–0.83, respectively (Chien et al., 2020; Coster et al., 2011). Construct validity of the Chinese version of PEM-CY was supported by known-group comparison and confirmatory factor analysis (Chien et al., 2020).

A demographic questionnaire was designed in the previous study to collect the demographic information of participating children and parents. The questionnaire included the child's gender, age, presence (and types, if any) of disability, living district, education level and age of parents and family monthly income.

Data analysis

Data analysis was performed using SPSS Statistics version 25. Descriptive analysis was used to summarise demographic characteristics. The Mann–Whitney *U* test or chi-square test was used to examine the differences in demographic characteristics between the two groups.

The non-parametric approach was used to examine the change in participation patterns in each activity of children with disabilities over 2 years because the PEM-CY item scores did not form a normal distribution. Specifically, the Wilcoxon signed ranks test was used to examine the 2-year difference in participation frequency and involvement for each item in children with disabilities and those with typical development. Due to multiple comparisons, the significance level was adjusted using the Bonferroni correction. Hence, statistical significance was set at $p < 0.005$ for home and community settings and $p < 0.010$ for school settings.

Radar plots were generated to illustrate the change of participation of each group of children with and without disabilities across the 2 years in each setting. Of note, no statistical analysis was performed to examine the differences in participation patterns between children with and without disabilities at each time point in the study. This was because the present study focussed on the longitudinal change of participation patterns in each group of children with and without disabilities.

Results

A total of 190 questionnaires were returned in this follow-up study. Of the 388 parents who participated in the previous study, 17 cannot be contacted through their designated addresses. Therefore, the final return rate was 51.2% (190 of 371 participants) in the follow-up study. Among the returned questionnaires, 18 were excluded because they were

completed by respondents who differed from those in the prior study, totalling 172 data for inclusion in the analysis.

Among the 172 children, there were 34 children with one or more clinical diagnosis/disabilities including attention deficit hyperactivity disorders (13; 38.2%), developmental delay (9; 26.5%), dyslexia (9; 26.5%) and autism spectrum disorders (9; 26.5%). The mean age of the 34 children with disabilities was 8.3 years (standard deviation = 1.7) and that of the 138 children with typical development was 8.6 years (standard deviation = 1.8). No significant age-related difference was found between the groups. However, there was a significant difference in gender proportion ($p = 0.02$). The disability group included 24 boys (70.6%) and 10 girls (29.4%), whereas the non-disability group had 68 boys (49.3%) and 70 girls (50.7%). Most respondents were the mothers of children (131; 76.2%), and no significant differences were found in the mother's age, father's age and family monthly income between the two groups.

Table 1 presents the home participation patterns of children with and without disabilities over time (see Appendix 1 for radar plot). Children with typical development were found to have statistically significant increased frequency of 'Computer and video games' (5.28–5.89, $p < 0.001$) and 'Socialising using technology' (4.15–5.09, $p < 0.001$). In contrast, there was a statistically significant decrease in the frequency of their participation in 'Indoor play and games' (5.18–4.39, $p < 0.001$) and 'Homework' (6.87–6.63, $p = 0.001$).

For children with disabilities, a statistically significant increase in the frequency was found for 'Computer and video games' (4.82–6.09, $p = 0.001$). Additionally, there was an increasing trend in the frequency of 'Socialising using technology' (3.44–4.68) and a declining trend in the frequency of 'Indoor play and games' (5.03–4.06), although these differences did not reach statistical significance (Table 1).

In terms of participation involvement, the two groups had generally unchanged patterns in most home activities (Table 1). A statistically significant decrease was found in 'Indoor play and games' (4.35–3.96, $p < 0.001$) and 'Household chores' (3.35–2.99, $p = 0.001$) only in children with typical development.

Table 2 presents the children's participation in school activities over time (see Appendix 2 for radar plot). For children with typical development, a statistically significant increase was identified in the frequency of 'School-sponsored teams and organisations' (2.99–3.85, $p = 0.001$). Although statistical significance was not achieved, there was also an apparently increasing trend in the frequency of 'Field trips and school events' (2.12–2.46).

For children with disabilities, a statistically significant increase was identified in the frequency of 'Field trips and school events' (1.53–2.26, $p = 0.004$). In addition, as illustrated in Table 2 and Appendix 2, an increasing but not

statistically significant trend was observed in 'School-sponsored teams and organisations' (1.42–2.94).

Apart from the changes in the frequency of some school activities, the two groups had relatively stable levels of participation involvement over 2 years. No statistically significant differences were identified in the involvement in all school activities in both groups.

Table 3 provides the participation frequency and involvement in community activities of both groups over time. There were no statistically significant changes in the frequency or involvement in community activities in both groups. However, some non-significant trends were observed from the radar charts (Appendix 3). These are as follows: a decreasing trend in the frequency of 'Organised physical activities' (3.86–3.40), 'Unstructured physical activities' (3.36–2.83) and 'Getting together with other children' (3.59–3.24) in children with typical development; a decreasing trend in the frequency of 'Organised physical activities' (3.88–3.00) in children with disabilities; and a decreasing trend in the involvement of 'Community events' (3.82–3.59) and 'Unstructured physical activities' (4.17–3.86) in children with typical development.

Discussions

Overall, this study found that, with increasing age, both children with and without disabilities engaged more often in using electronic devices but less often in indoor play activities/games at home. At school, both groups also participated more often in school extra-curriculum activities, events and field trips over time. However, the frequency of community activities remained relatively stable. There were also no changes in the levels of involvement of both groups in almost of home, school and community activities. These findings facilitate a better understanding of the changes in participation patterns in children with and without disabilities over time, and may provide directions for development of participation-focussed interventions.

In this study, the frequency of computer/video games and socialising using technology in both groups increased over time, indicating the rise in use of electronic devices at home. This finding differs from our hypothesis; however, to some extent, it is consistent with previous findings that the use of electronic devices has become common in modern societies and is consistent with teenage behaviour (Lam et al., 2010; Muthuri et al., 2014). In contrast, the frequency of indoor play and games unexpectedly dropped in children with typical development and possibly in children with disabilities. This decrease may be attributive to the increased frequency of using electronic devices, as mentioned earlier. Furthermore, some indoor games, such as puzzles and chess, could be played on electronic devices via the internet. These findings could be alarming, because the use of electronic devices has been considered as a contributing

Table 1. Participation in home activities over time in children with typical development (n = 138) and children without disabilities (n = 34).

| Participation | | Time 1 (2017) | Time 2 (2019) | | | |
|---|------------------------------------|------------------------------------|---------------|-------------|---------|---------|
| Dimension | Activities | Mean (SD) | Mean (SD) | Z score | p value | |
| Children with typical development (n = 138) | | | | | | |
| Frequency | Computer and video games | 5.28 (1.78) | 5.89 (1.41) | -3.829 | <0.001* | |
| | Indoor play and games | 5.18 (1.51) | 4.39 (1.99) | -5.247 | <0.001* | |
| | Arts, crafts, music and hobbies | 5.37 (1.48) | 5.01 (1.63) | -2.561 | 0.010 | |
| | Watching TV, videos and DVDs | 6.16 (1.20) | 6.10 (1.21) | -0.542 | 0.588 | |
| | Getting together with other people | 5.19 (1.42) | 4.85 (1.50) | -2.249 | 0.024 | |
| | Socialising using technology | 4.15 (2.63) | 5.09 (2.30) | -4.006 | <0.001* | |
| | Household chores | 4.20 (2.08) | 4.34 (2.09) | -0.976 | 0.329 | |
| | Personal care management | 6.80 (0.93) | 6.80 (0.67) | -0.395 | 0.693 | |
| | School preparation (not homework) | 6.39 (1.36) | 6.48 (1.07) | -0.526 | 0.599 | |
| | Homework | 6.87 (0.40) | 6.63 (0.79) | -3.268 | 0.001* | |
| | Involvement | Computer and video games | 4.42 (0.86) | 4.48 (0.84) | -1.100 | 0.271 |
| | | Indoor play and games | 4.35 (0.97) | 3.96 (1.09) | -3.917 | <0.001* |
| | | Arts, crafts, music and hobbies | 3.95 (1.07) | 3.83 (1.16) | -1.402 | 0.161 |
| | | Watching TV, videos and DVDs | 4.49 (0.81) | 4.48 (0.79) | -0.036 | 0.971 |
| | | Getting together with other people | 3.96 (1.05) | 3.79 (1.09) | -1.729 | 0.084 |
| | | Socialising using technology | 3.86 (1.21) | 4.12 (1.05) | -1.892 | 0.059 |
| Household chores | | 3.35 (1.31) | 2.99 (1.20) | -3.335 | 0.001* | |
| Personal care management | | 3.87 (1.08) | 3.87 (0.98) | -0.075 | 0.941 | |
| School preparation (not homework) | | 3.68 (1.07) | 3.67 (1.02) | -0.249 | 0.804 | |
| Homework | | 3.65 (1.03) | 3.57 (1.00) | -0.859 | 0.390 | |
| Children with disabilities (n = 34) | | | | | | |
| Frequency | | Computer and video games | 4.82 (2.20) | 6.09 (1.28) | -3.215 | 0.001* |
| | | Indoor play and games | 5.03 (1.66) | 4.06 (2.28) | -2.407 | 0.016 |
| | | Arts, crafts, music and hobbies | 5.00 (1.83) | 4.35 (2.21) | -1.658 | 0.097 |
| | | Watching TV, videos and DVDs | 6.21 (1.10) | 6.59 (0.78) | -1.855 | 0.064 |
| | | Getting together with other people | 4.38 (1.74) | 4.62 (1.84) | -0.780 | 0.435 |
| | Socialising using technology | 3.44 (2.72) | 4.68 (2.69) | -2.370 | 0.018 | |
| | Household chores | 3.39 (2.41) | 3.44 (2.26) | -0.262 | 0.794 | |
| | Personal care management | 6.76 (1.05) | 6.62 (0.95) | -1.078 | 0.281 | |
| | School preparation (not homework) | 6.44 (1.19) | 6.18 (1.60) | -0.682 | 0.495 | |
| | Homework | 6.76 (0.50) | 6.53 (1.11) | -0.929 | 0.353 | |
| | Involvement | Computer and video games | 4.66 (0.87) | 4.76 (0.61) | -0.303 | 0.762 |
| | | Indoor play and games | 4.06 (1.15) | 3.63 (1.22) | -1.658 | 0.097 |
| | | Arts, crafts, music and hobbies | 3.64 (1.37) | 3.77 (1.15) | -0.179 | 0.858 |
| | | Watching TV, videos and DVDs | 4.74 (0.62) | 4.73 (0.63) | 0 | 1.000 |
| | | Getting together with other people | 3.27 (1.01) | 3.59 (1.08) | -1.132 | 0.258 |
| | | Socialising using technology | 3.83 (1.17) | 4.14 (1.27) | -0.637 | 0.524 |
| Household chores | | 2.90 (1.32) | 2.81 (1.20) | -0.533 | 0.594 | |
| Personal care management | | 3.62 (1.02) | 3.29 (1.12) | -1.641 | 0.101 | |
| School preparation (not homework) | | 3.24 (1.13) | 3.12 (1.12) | -0.444 | 0.657 | |
| Homework | | 3.09 (1.08) | 3.00 (0.99) | -0.206 | 0.837 | |

Abbreviations: SD, standard deviation

*indicates p value of <0.005 after the significance level was adjusted using the Bonferroni correction.

Table 2. Participation in school activities across time in children with typical development (n = 138) and children with disabilities (n = 34).

| Participation | | Time 1 (2017) | Time 2 (2019) | | |
|---|--|---------------|---------------|---------|---------|
| Dimension | Activities | Mean (SD) | Mean (SD) | Z score | p value |
| Children with typical development (n = 138) | | | | | |
| Frequency | Classroom activities | 6.01 (1.38) | 5.93 (1.11) | -1.256 | 0.209 |
| | Field trips and school events | 2.12 (1.51) | 2.46 (1.35) | -2.474 | 0.013 |
| | School-sponsored teams and organisations | 2.99 (2.45) | 3.85 (2.24) | -3.212 | 0.001* |
| | Getting together with peers outside of class | 6.65 (0.79) | 6.45 (1.03) | -2.170 | 0.030 |
| | Special roles at school | 4.24 (3.05) | 4.72 (2.66) | -1.262 | 0.207 |
| Involvement | Classroom activities | 3.82 (1.01) | 3.88 (0.94) | -0.675 | 0.499 |
| | Field trips and school events | 4.05 (1.04) | 3.86 (1.12) | -1.601 | 0.109 |
| | School-sponsored teams and organisations | 3.78 (1.12) | 3.86 (1.17) | -0.306 | 0.759 |
| | Getting together with peers outside of class | 4.39 (0.94) | 4.45 (0.87) | -0.197 | 0.844 |
| | Special roles at school | 4.28 (0.96) | 4.12 (1.02) | -1.290 | 0.197 |
| Children with disabilities (n = 34) | | | | | |
| Frequency | Classroom activities | 6.15 (0.99) | 5.79 (1.27) | -1.285 | 0.199 |
| | Field trips and school events | 1.53 (0.86) | 2.26 (1.26) | -2.855 | 0.004* |
| | School-sponsored teams and organisations | 1.42 (2.19) | 2.94 (2.30) | -2.451 | 0.014 |
| | Getting together with peers outside of class | 6.12 (1.63) | 5.91 (1.66) | -0.676 | 0.499 |
| | Special roles at school | 1.85 (2.77) | 2.85 (2.83) | -1.514 | 0.130 |
| Involvement | Classroom activities | 3.32 (1.07) | 3.52 (1.03) | -1.035 | 0.300 |
| | Field trips and school events | 3.79 (1.18) | 3.78 (1.24) | -1.303 | 0.193 |
| | School-sponsored teams and organisations | 2.92 (1.32) | 3.64 (1.08) | -0.680 | 0.496 |
| | Getting together with peers outside of class | 3.78 (1.41) | 3.70 (1.19) | -0.183 | 0.855 |
| | Special roles at school | 2.94 (1.52) | 3.45 (1.18) | -0.711 | 0.477 |

Abbreviations: SD, standard deviation

*indicates p value of <0.010 after the significance level was adjusted using Bonferroni correction.

factor to a sedentary lifestyle, associated with diverse health issues such as obesity and sleep deficiency (Antczak et al., 2021; Keane et al., 2017).

Regarding changes in participation involvement in home activities, children with typical development had a decreased level of involvement in household chores and indoor play/games. One reason might be the availability of domestic helpers in many Hong Kong families (He & Wu, 2019), including 35.5% of participants in this study. Accordingly, children may undertake fewer responsibilities of household chores. In addition, the decrease in involvement in indoor play/games might be related to the decrease in the frequency of this type of activity. It is reasonable that if children do not engage in indoor play/games as frequently as before, they would not be involved as much during participation. However, children with disabilities did not demonstrate decreased levels of involvement in the two activities over time. This is probably because the levels of their involvement in household chores and indoor play/games at baseline were already low, compared to those of children with typical development.

Regarding changes in school participation, both groups exhibited an increasing trend in the frequency of

two specific school activities; these are field trips and school events as well as school-sponsored teams and organisations. These findings were partly consistent with our hypothesis that typically developing children would participate more in school activities. Given that children may gain a greater sense of self and activity competence as they grow, this could increase their willingness to participate more often in school extra-curricular activities, field trips and school events (Imms et al., 2017). Parents may also choose to participate in more variety of preferred school activities for their children. At the same time, more choices of field trips, school events, clubs, teams or organisations at school might be offered to students in higher grades. When children participate in more school activities, the frequency of participation would be expected to increase accordingly. However, it is noted that no increase was found in their levels of involvement in school activities. This indicates that children with typical development attended school activities more often but were not more involved in school-sponsored teams and organisations.

Contradictory to our original hypothesis, children with disabilities were found to participate more frequently in

Table 3. Participation in community activities over time in children with typical development (n = 138) and children without disabilities (n = 34).

| Participation | | Time 1 (2017) | Time 2 (2019) | Z score | p value | |
|---|---|---|---------------|-------------|---------|-------|
| Dimension | Activities | Mean (SD) | Mean (SD) | | | |
| Children with typical development (n = 138) | | | | | | |
| Frequency | Neighbourhood outings | 5.36 (1.05) | 5.39 (1.04) | -0.044 | 0.965 | |
| | Community events | 1.74 (1.43) | 1.88 (1.53) | -0.769 | 0.442 | |
| | Organised physical activities | 3.86 (2.26) | 3.40 (2.33) | -2.011 | 0.044 | |
| | Unstructured physical activities | 3.36 (1.84) | 2.83 (1.76) | -2.711 | 0.007 | |
| | Classes and lessons (not school-sponsored) | 3.96 (2.30) | 3.65 (2.42) | -1.364 | 0.172 | |
| | Organisations, groups, clubs and volunteer or leadership activities | 1.64 (2.15) | 1.89 (2.24) | -1.356 | 0.175 | |
| | Religious gatherings and activities | 1.77 (2.17) | 1.80 (2.37) | -0.300 | 0.764 | |
| | Getting together with other children | 3.59 (1.92) | 3.24 (1.89) | -2.040 | 0.041 | |
| | Working for pay | 0.26 (1.23) | 0.29 (1.23) | -0.032 | 0.975 | |
| Involvement | Overnight visits or trips | 0.97 (0.90) | 1.04 (1.05) | -0.649 | 0.516 | |
| | Neighbourhood outings | 4.21 (0.98) | 4.10 (0.88) | -0.800 | 0.424 | |
| | Community events | 3.82 (1.07) | 3.59 (1.15) | -2.027 | 0.043 | |
| | Organised physical activities | 4.11 (0.97) | 3.95 (1.19) | -0.713 | 0.476 | |
| | Unstructured physical activities | 4.17 (0.98) | 3.86 (1.08) | -2.329 | 0.020 | |
| | Classes and lessons (not school-sponsored) | 3.83 (1.03) | 3.73 (1.01) | -1.040 | 0.298 | |
| | Organisations, groups, clubs and volunteer or leadership activities | 3.84 (1.21) | 3.76 (1.29) | -0.309 | 0.757 | |
| | Religious gatherings and activities | 3.46 (1.19) | 3.08 (1.39) | -1.908 | 0.056 | |
| | Getting together with other children | 4.26 (0.96) | 4.21 (1.00) | -1.877 | 0.060 | |
| Children with disabilities (n = 34) | Working for pay | 2.63 (1.51) | 3.15 (1.52) | - | - | |
| | Overnight visits or trips | 4.40 (1.00) | 4.26 (1.02) | -1.755 | 0.079 | |
| | Frequency | Neighbourhood outings | 5.41 (1.26) | 5.62 (0.99) | -1.162 | 0.245 |
| | | Community events | 1.38 (1.26) | 1.74 (1.76) | -0.908 | 0.364 |
| | | Organised physical activities | 3.88 (2.21) | 3.00 (2.26) | -2.280 | 0.023 |
| | | Unstructured physical activities | 3.15 (1.93) | 2.53 (2.14) | -1.565 | 0.118 |
| | | Classes and lessons (not school-sponsored) | 3.44 (2.39) | 3.35 (2.58) | -0.275 | 0.784 |
| | | Organisations, groups, clubs and volunteer or leadership activities | 1.33 (2.21) | 1.50 (2.19) | -0.820 | 0.412 |
| | | Religious gatherings and activities | 1.52 (2.22) | 1.35 (2.15) | -0.535 | 0.593 |
| Getting together with other children | | 3.39 (1.87) | 3.38 (2.02) | -0.385 | 0.700 | |
| Working for pay | | 0.06 (0.35) | 0.15 (0.86) | -0.447 | 0.655 | |
| Involvement | Overnight visits or trips | 0.82 (0.88) | 0.88 (0.69) | -0.471 | 0.637 | |
| | Neighbourhood outings | 4.00 (1.04) | 4.00 (0.88) | -0.293 | 0.769 | |
| | Community events | 3.28 (1.37) | 3.38 (1.12) | -0.347 | 0.729 | |
| | Organised physical activities | 4.00 (1.09) | 3.82 (1.22) | -1.355 | 0.175 | |
| | Unstructured physical activities | 3.94 (1.26) | 3.88 (1.08) | -1.483 | 0.138 | |
| | Classes and lessons (not school-sponsored) | 3.58 (1.03) | 3.35 (1.15) | -1.103 | 0.270 | |
| | Organisations, groups, clubs and volunteer or leadership activities | 3.50 (1.31) | 3.77 (1.24) | -0.378 | 0.705 | |
| | Religious gatherings and activities | 3.54 (1.33) | 3.55 (0.82) | -0.378 | 0.705 | |
| | Getting together with other children | 3.86 (1.27) | 3.93 (0.96) | -0.088 | 0.930 | |
| Children with disabilities (n = 34) | Working for pay | 2.00 (1.41) | - | - | - | |
| | Overnight visits or trips | 4.71 (0.59) | 4.26 (1.01) | -0.857 | 0.391 | |

Abbreviations: SD, standard deviation

*indicates p value of <0.005 after the significance level was adjusted using the Bonferroni correction.

field trips, school events and, possibly, school-sponsored teams and organisations over time. We speculated that this might relate to trust-building in parents of children with disabilities. For example, field trips and school events are

school activities which might not be arranged regularly, because unexpected weather and sensory qualities of environment have been reported to be barriers to participation of children with disabilities (Coster et al., 2013). Organising

field trips and school events also requires adequate resources such as manpower, resilience to emergency situations and supportive attitude from the schools. Parents of children with disabilities may be hesitant regarding their child's attendance. This can be seen from the low participation frequency at baseline. With time, parents may build more trust with the school and/or more confidence about their child's abilities. Parents may feel more reassured of allowing their child to attend school trips and events more often, contributing to the substantial increase in the frequency of this activity. This trust-building factor in those parents toward their child's abilities and school resources may also explain the increasing trend in the frequency of their children's participation in school-sponsored teams and organisations.

As expected, both groups had no significant change in their patterns of participation in community activities. Nevertheless, we observed a probable decrease in the frequency of engaging in organised/unstructured physical activities for children with and without disabilities. This decreasing trend somewhat differs from our expectation. Considering that every child has 24 h a day, the decreased participation in physical activities might be caused by his/her increased participation in electronic devices and school extra-curricular activities, as found in this study. Additionally, the [Sport Commissions of the Hong Kong Special Administrative Region \(2012\)](#) reported that only 8.3% of children aged 7–12 years participated in sufficient physical activities. [Huang et al. \(2019\)](#) also found that children and adolescents in Hong Kong had lower levels of physical activity engagement and higher sedentary behaviours in the last 10 years, lending credibility to the findings of this study.

Study limitations

This study has several limitations. First, this study recruited a small sample size of children (especially those with disabilities) and, thus, it was not possible to perform sub-group analyses based on children's age or disability types. There was also only one special school which was recruited in the study. Considering that children's age, type of disabilities and living areas may have impacts on their participation ([Brown et al., 2011](#); [Bult et al., 2011](#)), the results of the present study have to be interpreted with cautions. Second, participation has been considered as a multicomponent construct ([Imms et al., 2017](#)). Although both constructs of frequency and involvement of participation were studied, information on the actual time (i.e. hours) spent on every episode of the activities was not captured in the PEM-CY. The PEM-CY is also a questionnaire completed by parents rather than children. Therefore, the involvement of participation, being a subjective experience, may not be easy for parents to

observe and report on behalf of their child. Second, the data in this study were collected across a 2-year interval. Two years might be short to detect substantial changes in the patterns of activity participation. Third, the findings from this study could only reveal the change in participation patterns of children in Hong Kong. There could be cultural influences on children's participation patterns; therefore, the findings may not be generalised to other cultures.

Implications for practice

This study provides information on the 2-year trajectory of participation of children with and without disabilities, which can be used clinically. For example, the information can be used by child-related professionals who provide participation-focussed interventions that target activities in which children with disabilities show less participation (e.g. organised physical activities). Policy makers and health service planners can pay attention to the areas of participation that might be increased (e.g. using electronic devices) or decreased (e.g. physical activities) in children with typical development. Since physical inactivity is one of the leading risk factors for child health ([Keane et al., 2017](#); [Wu et al., 2017](#)), public health recommendations and policies are needed to prevent prolonged use of electronic devices in children and promote their engagement in physical activities over time.

In addition, parents of children with disabilities can be provided with the information about the participation trajectories. This could reassure them that the decline of their child's participation in certain activities over time is similar to those of typically developing peers. This information can also be used to encourage parents that there is increased frequency of participation in certain activities in children, regardless of having a disability. Therefore, parents could have an informed expectation of the changes in their child's participation, as they grow, for proper preparation of the necessary support and resources.

Conclusion

This is the first longitudinal study investigating participation patterns of children with and without disabilities, through the use of PEM-CY, in Hong Kong. The frequency of participation in several home and school activities was found to change over time in both groups of children with and without disabilities. However, the frequency of participation in community activities remained stable over time in the two groups. No change in involvement was noted. These findings add to the existing knowledge by identifying relatively similar participation trajectories between children with and without disabilities. Knowledge of the participation patterns may assist families, child-related professionals

and legislators in promoting the optimal course of participation for children with and without disabilities.

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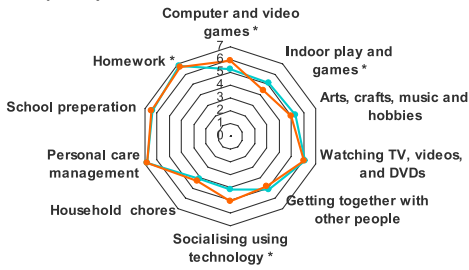
Appendix I

Radar Plots of the Changes in Participation of Children with and without Disabilities in Home Activities over the Two Years

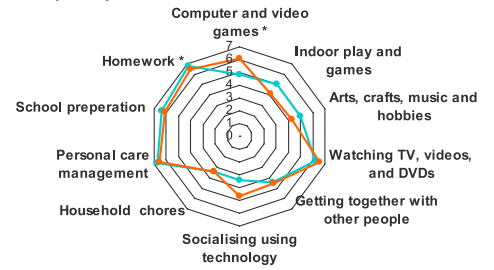
Children with Typical Development (n = 138)

Children with Disabilities (n = 34)

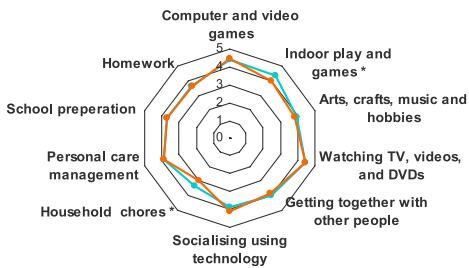
Frequency



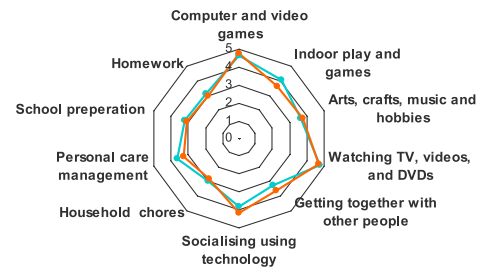
Frequency



Involvement



Involvement



Note. The brighter line indicates the data collected in 2017, and the darker line indicates the data collected in 2019.

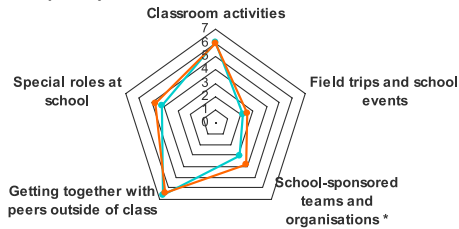
*indicates the significant difference in the participation data between 2017 and 2019.

Appendix 2

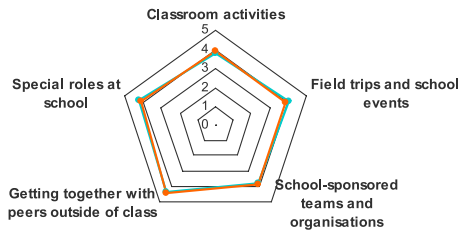
Radar Plots of the Changes in Participation of Children with and without Disabilities in School Activities over the Two Years

Children with Typical Development (n = 138)

Frequency

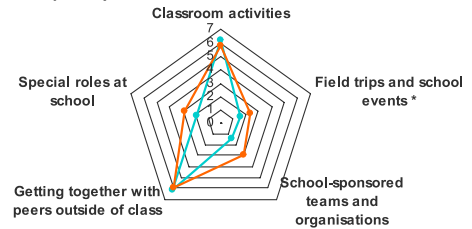


Involvement

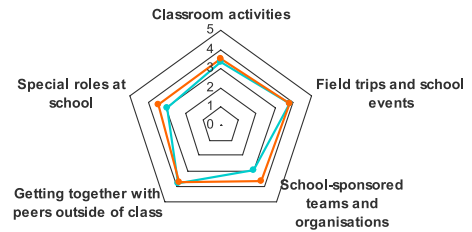


Children with Disabilities (n = 34)

Frequency



Involvement



Note. The brighter line indicates the data collected in 2017, and the darker line indicates the data collected in 2019.

*indicates the significant difference in the participation data between 2017 and 2019.

Appendix 3

Radar Plots of the Changes in Participation of Children with and without Disabilities in Community Activities over the Two Years

Children with Typical Development (n = 138)

Children with Disabilities (n = 34)

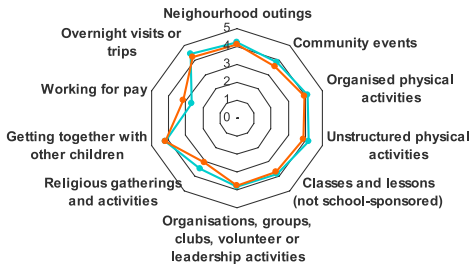
Frequency



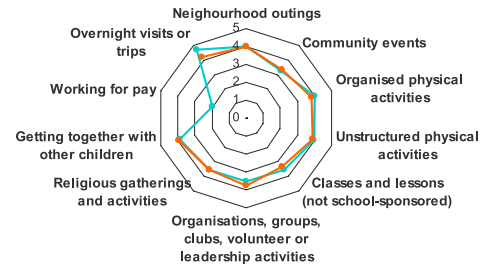
Frequency



Involvement



Involvement



Note. The brighter line indicates the data collected in 2017, and the darker line indicates the data collected in 2019.
 *indicates the significant difference in the participation data between 2017 and 2019.