Human Movement Science 43 (2015) 155–163

Contents lists available at ScienceDirect

Human Movement Science

journal homepage: www.elsevier.com/locate/humov

Does the *Animal Fun* program improve social-emotional and behavioural outcomes in children aged 4–6 years?

Jan P. Piek [a,*], Robert Kane [a], Daniela Rigoli [a], Sue McLaren [a], Clare M. Roberts [a], Rosanna Rooney [a], Lynn Jensen [b], Alma Dender [c], Tanya Packer [d], Leon Straker [b]

[a] School of Psychology & Speech Pathology, Curtin University, GPO Box U1987, Perth 6845, Western Australia, Australia
[b] School of Physiotherapy and Exercise Science, Curtin University, GPO Box U1987, Perth 6845, Western Australia, Australia
[c] School of Occupational Therapy and Social Work, Curtin University, GPO Box U1987, Perth 6845, Western Australia, Australia
[d] School of Occupational Therapy, Dalhousie University, Box 15000, Halifax, Nova Scotia, Canada

ARTICLE INFO

Article history:
Received 16 April 2015
Revised 29 July 2015
Accepted 7 August 2015
Available online 27 August 2015

Keywords:
Movement intervention
Prosocial behaviour
Hyperactivity
Inattention
Preschool children

ABSTRACT

Animal Fun was designed to enhance motor and social development in young children. Its efficacy in improving motor skills was presented previously using a randomised controlled trial and a multivariate nested cohort design. Based on the Environmental Stress Hypothesis, it was argued that the program would also result in positive mental health outcomes, investigated in the current study. Pre-intervention scores were recorded for 511 children aged 4.83–6.17 years ($M = 5.42$, $SD = .30$). Intervention and control groups were compared 6 months following intervention, and again in their first school year. Changes in teacher-rated prosocial behaviour and total difficulties were assessed using the Strengths and Difficulties Questionnaire, and data analysed using Generalised Linear Mixed Models. There was a significant improvement in prosocial behaviour of children in the intervention group six months after initial testing, which remained at 18-month follow-up. Total difficulties decreased at 6 months for the intervention group, with no change at 18 months. This effect was present only for the hyperactivity/inattention subscale. The only significant change for the control group was an increase in hyperactivity/inattention scores from pre-intervention to 18-month follow-up. The *Animal Fun* program appears to be effective in improving social and behavioural outcomes.

1. Introduction

The importance of motor skills and physical activity for predicting school achievement has been a focus of study for some time (Fedewa & Ahn, 2011; Son & Meisels, 2006), and has been a key topic of discussion given the rising inactivity in children, which is also a known risk factor for health outcomes such as obesity and cardiovascular disease (Okely et al., 2012). There is now growing evidence indicating that motor competence and physical participation are also crucial for positive functioning in the social and emotional domains (Ahn & Fedewa, 2011; Cairney, Rigoli, & Piek, 2013). This suggests that children with

* Corresponding author.
E-mail addresses: j.piek@curtin.edu.au (J.P. Piek), r.t.kane@curtin.edu.au (R. Kane), d.rigoli@curtin.edu.au (D. Rigoli), s.mclaren@curtin.edu.au (S. McLaren), c.roberts@curtin.edu.au (C.M. Roberts), r.rooney@curtin.edu.au (R. Rooney), l.jensen@curtin.edu.au (L. Jensen), a.dender@curtin.edu.au (A. Dender), Tanya.Packer@Dal.Ca (T. Packer), l.straker@curtin.edu.au (L. Straker).

http://dx.doi.org/10.1016/j.humov.2015.08.004
0167-9457/

poor motor coordination, who also withdraw from physical participation partly due to their movement difficulties, may be at significant risk for psychosocial problems.

Several studies have now revealed an important relationship between movement and internalising problems such as increased depressive symptomatology (e.g., Francis & Piek, 2003; Piek, Bradbury, Elsley, & Tate, 2008; Piek et al., 2007; Rigoli, Piek, & Kane, 2012) and anxiety (Pearsall-Jones, Piek, Rigoli, Martin, & Levy, 2011; Schoemaker & Kalverboer, 1994; Sigurdsson, Van Os, & Fombonne, 2002; Skinner & Piek, 2001) in children and adolescents. Other research has found a lower sense of self-worth (Skinner & Piek, 2001) and lower levels of perceived competence in children with motor skill difficulties (Piek, Baynam, & Barrett, 2006; Skinner & Piek, 2001). In fact, movement difficulties have been linked to various negative outcomes such as academic underachievement (Dewey, Kaplan, Crawford, & Wilson, 2002), attention deficit hyperactivity disorder (Pitcher, Piek, & Hay, 2003) and inattention and hyperactivity symptoms (Tseng, Howe, Chuang, & Hsieh, 2007), as well as difficulties in the social domain such as self-reported fewer playmates and being asked less often to play with other children (Schoemaker & Kalverboer, 1994), greater peer exclusion (Livesey, Lum-Mow, Toshack, & Zheng, 2011), and peer-victimisation (Campbell, Missiuna, & Vaillancourt, 2012; Losse et al., 1991). It is plausible that these psychosocial stressors play an important role in understanding the relationship between movement and emotional difficulties (Cairney et al., 2013).

The psychosocial difficulties often associated with poor motor coordination are generally thought to be a consequence of motor problems (Cairney et al., 2013), appearing once a child is challenged by social and peer demands in the school years (Piek et al., 2008). Piek et al. (2008) partly supported this notion when they found a significant link between motor ability and anxious/depressive behaviours in children as young as kindergarten age. Schoemaker and Kalverboer (1994) also established a link between motor coordination difficulties and social and affective problems in children as young as six years. Furthermore, Bart, Hajami, and Bar-Haim (2007) found a relationship between children's motor ability in kindergarten and scholastic, social and emotional development a year later in their first year of school. Other findings have shown that motor skill difficulties early in childhood are related to later psychosocial problems in adolescence (Lingam et al., 2012; Losse et al., 1991; Shaffer et al., 1985; Sigurdsson et al., 2002). Unfortunately, as children with motor difficulties avoid participation for fear of failure and/or peer criticism, they also limit their opportunity to practise skills and to participate in a social environment, creating a vicious circle (Skinner & Piek, 2001).

In our recent review paper, we elaborated on a theoretical model, namely the Environmental Stress Hypothesis, in an attempt to understand the relationship between poor movement skills and the associated increased risk for mental health difficulties such as anxiety and depression (Cairney et al., 2013). The Environmental Stress Hypothesis was originally proposed by Cairney, Veldhuizen, and Szatmari (2010) to highlight the role that negative exposure to personal and interpersonal stressors might play in accounting for higher rates of emotional symptoms in children with movement difficulties. In addition to the stressors and protective factors (e.g., self-esteem and social support) originally proposed, we elaborated further on the model by considering the role that physical inactivity and obesity might play in this process, given the important links found between movement ability and these physical health outcomes (Cairney et al., 2013). We argued that incorporating physical inactivity and obesity alongside measures of psychosocial stressors and resources, provides a comprehensive framework from which to explore mediating and moderating influences on the association between movement and psychosocial problems in children. Recent studies examining the Environmental Stress Hypothesis have also demonstrated the application of the model using normative samples, for example, social skills and self-perceptions were found to be important mediating variables for the link between motor ability and emotional outcomes in child and adolescent samples respectively (Rigoli et al., 2012; Wilson, Piek, & Kane, 2012).

Based on the Environmental Stress Hypothesis, and given the evidence showing that children who feel confident about their movement skills engage in physical activity more often than those children who lack confidence in this area (Hay, Hawes, & Faught, 2004; Mandich, Polatajko, & Rodger, 2003), it is plausible that targeting motor skills development may be a suitable approach to increasing physical activity participation in children, ultimately promoting positive social and emotional development. Furthermore, given the increase in social, motor, and other demands upon transitioning to formal schooling, it appears that targeting motor skill development prior to children commencing school may have many beneficial consequences for children.

The preschool age of 2–6 years is a period where basic movements achieved in infancy are refined and extended. Fundamental movement skills (e.g., running, climbing, catching), considered essential for motor development (Gallahue & Ozmun, 2005), are developing at this stage, although children still have difficulties with sequencing and coordination. It is also an important stage for fine motor development through drawing and other tasks involving object manipulation (e.g., jigsaw puzzles, building blocks), which are important precursors to essential skills needed in the school years such as writing and self-grooming. It is now recognised that practice plays an important role in the development of a child's motor competence and can lead to considerable variability in performance (White, Hayes, & Livesey, 2010).

Evidence suggests that most preschool children aged 2–5 years do not meet recommended guidelines published in Australia, the USA, and the United Kingdom for daily physical activity (Howie, Brown, Dowda, McIver, & Pate, 2013). Yet there are few physical activity programs targeting this age group despite the evidence suggesting that the first year of formal schooling is a critical period in terms of a child's development (Entwisle & Alexander, 1998; La Paro, Pianta, & Cox, 2000). Interventions that provide increased participation in physical activities and practice of movement skills are essential for motor skill development. Furthermore, it may also lead to social skill development by providing opportunities to interact with other children in a play situation, ultimately promoting positive mental health outcomes.