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Youth Motor Competence Promotion Model: A Quantitative Investigation into Modifiable Factors

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Abstract:

Objectives: This study aimed to quantify the relationships between enabling, predisposing and reinforcing ecological factors on motor competence and investigate potential sex, weight status, and school level differences.

Methods: Data were collected from 429 children (52% boys; aged 11.1±0.6 years; 87% white British). Cardiorespiratory fitness (20m Multistage Shuttle Run), muscular strength (Handgrip Strength) and online questionnaire (Child Health and Activity Tool; CHAT) data on moderate-to-vigorous physical activity, sport participation and available surrounding physical activity facilities were included as enabling variables. Three predisposing variables were determined from self-report data on benefits/barriers to exercise, adequacy, and predilection. Parental/guardian physical activity levels and persons whom participate in physical activity and sport with the participant (CHAT) were selected as reinforcing variables. Motor competence was determined from cumulative scores for Dragon Challenge tasks (Balance Bench, Core Agility, Wobble Spot, Overarm Throw, Basketball Dribble, Catch, Jumping Patterns, T-Agility, Sprint). Confirmatory Factor Analysis assessed the fit of measured variables into latent factors. Structural equation modelling evaluated relationships between these latent factors.

Results: Motor competence was directly affected by the enabling factor (β=0.50, $p<0.001$) but indirectly affected by reinforcing and predisposing factors, mediated by the enabling factor (β=0.13, $p=0.014$; β=0.25, $p=0.002$). Multi-group comparisons showed that each of these effects did not differ by sex, weight status or school level ($p>0.05$).

Conclusions: This study demonstrated that enabling factors are crucial for the development of motor competence. This is the first study to quantify an ecological model with motor competence as the endogenous variable and is key to future interventions.

Key words: Motor competence, Children, Ecological Model, Enabling, Predisposing, Reinforcing.

Practical Implications:

- This study presents an ecological model to provide an understanding of the multiple influences on motor competence and identify multiple potential pathways that could improve motor competence in children.
- Each direct and indirect effect in the model did not differ by school level, weight status or sex, supporting the notion that the model may be applicable across many groups of primary and secondary level school children.
- This study provides insight for interventions and programmes to promote motor competence that can be used by schools, families, communities, practitioners and academics.
- Given the study revealed a direct effect of the enabling factor on motor competence, actively promoting physical activity, sport participation and health-related fitness, as well as increasing the accessibility of surrounding physical activity facilities, could improve overall motor competence in children.
- Motor competence promotion strategies should also focus on enhancing social support mechanisms such as parental/guardian physical activity levels, the number of persons whom take part in physical activity and sport with children, and children's perceived benefits to, adequacy in, and predilection to physical activity, while decreasing children's perceived barriers to physical activity.

Introduction:

Motor competence, as a global term relating to the development and performance of human movement, represents an individual's ability to perform skilfully on a wide range of motor tasks[1–3], and plays an important role in the growth and development of children[1,2]. Movement skills are imperative to develop, and indeed enhance, motor competence[1–4]. Moreover, movement skills consist of three interrelated constructs: fundamental movement skills (FMS; balance, core stability, coordination, speed variation, flexibility, control, proprioception, and power), combined movement (poise, fluency, precision, dexterity, and equilibrium), and complex movement (bilateral coordination, inter-limb coordination, hand-eye coordination, turning, twisting and rhythmic movements, and control of acceleration/deceleration)[1,4]. Whilst FMS develops rapidly from the age of 3 years, children have the potential for FMS mastery by 7-8 years[1]. Movement patterns, described as general (e.g., sending, receiving, running, jumping), refined (e.g., throwing, catching, sprinting, hopping) and specific (i.e. sport-specific movement patterns), are amalgamations of movements that stem from the selection and application of movement skills[1,4]. More refined and specific movement patterns are achieved when FMS (e.g., balance), combined movement skills (e.g., poise) and complex movement skills (e.g., rhythmic movements) are utilised simultaneously (e.g., jumping patterns)[1,4]. Therefore, the development of combined and complex movement skills is speculated to be imperative to increasing levels of motor competence in children over 8 years old[1,4].

There is a vast array of evidence identifying motor competence as a critical precursor for increasing positive health trajectories, particularly physical activity, across the lifespan[5,6]. Specifically, systematic reviews and longitudinal studies have reported strong evidence for positive associations between motor competence and physical activity levels[3,5], health-related fitness[3,7] and perceived competence[3], as well as an inverse association with weight status[3,8], in paediatric populations. Furthermore, studies have shown that enhanced motor competence during childhood tracks across the lifespan by leading to higher levels of physical activity and health-related fitness during adolescence[3,5], and by supporting functional independence, general health and quality of life in later life, as well as reducing the risk of all-cause mortality[6,9]. Thus, enhanced motor competence in children and young people is foundational for physical activity promotion and associated health benefits, with transferable value throughout the life course.

Ecological models provide a framework of potential influencing factors on health-related behaviours and are useful in emphasising social and psychological influences and environmental contexts[5]. The Youth Physical Activity Promotion Model (YPAP-M)[10], offers an ecological conceptual model framing factors that may enable (e.g., movement skills/motor competence, health-related fitness, environmental attributes, and access), predispose (e.g., perceived competence and self-efficacy) or reinforce (e.g., parental physical activity and family, peer and coach influence) physical activity in children. Although research has investigated the mediating variable framework of the YPAP-M[11], the examination of the influencing factors on motor competence, guided by the model, remains to be explored. Further, few studies have investigated both psychological influences and environmental factors on motor competence[5]. Therefore, the development of an ecological model with motor competence as the endogenous variable would afford new insight and an in-depth understanding of the multiple influences on motor competence. Although the association between motor competence and other factors such as physical activity, health-related fitness, and perceived competence, are expected to be reciprocal[2,3], such a model would enable the investigation of factors that could be specifically modified to increase motor competence. Such a targeted approach could therefore inform intervention development with the objective to promote motor competence in children, as well as explain effects or lack of effects in current intervention strategies.

The aim of the current cross-sectional study was to quantify the direct and indirect relationships between enabling, predisposing and reinforcing ecological factors on motor competence and to investigate potential sex, weight status, and school level differences.

Methods:

Following written informed head teacher and parent consent and participant assent, 429 children (52% boys; aged 11.1±0.6 years; 87% white British) from 11 socio-demographically representative primary and secondary schools (Welsh Index of Multiple Deprivation (WIMD) scores: 815.9±615.8, ranging from 25 (high deprivation) to 1898 (low deprivation); proportion of children in most deprived WIMD quintile rank (<382) = 38.7% and least deprived WIMD quintile rank (>1527) = 21.4%) in South Wales, UK, participated in the study between 2015-2018 as part of the serial Swan-Linx programme[12,13]. Ethical approval was obtained from the Institutional Research Ethics Committee [PG/2014/007; PG/2014/037; PG/2016/003].

Using standard anthropometric techniques[14], stature and body mass were measured to the nearest 0.001m and 0.1kg, with a portable stadiometer [Seca 213, Seca Ltd, Birmingham, UK] and electronic weighing scales [Seca 876, Seca Ltd, Birmingham, UK], respectively. Body Mass Index (BMI) was calculated and age- and sex-specific BMI cut-points were used to classify overweight and obese participants[15]. Participants completed two functional tests from the EUROFIT Test Battery[16], the 20m Multistage Shuttle Run Test (20m MSRT), as measure of cardiorespiratory fitness, and the Handgrip Strength Test, as a measure of upper-body muscular strength.

Children completed a 29-item health and lifestyle online questionnaire (Child Health and Activity Tool; CHAT), akin to the online-based Sportslinx Lifestyle Survey, that has provided valid and reliable results[12]. Children reported the number of days they had engaged in moderate-to-vigorous physical activity (MVPA), described as "any activity or sport where your heart beats faster, you breathed faster and you felt warmer", for ≥60 $min \cdot day^{-1}$ in the last week[17]. Children also detailed the number of organised sports clubs they participated in outside of school[18]. Surrounding physical activity facilities were reported by children as the number of areas close to their home that they could play or take part in physical activity in, such as a garden, grassy area/playing field, playground, park, street, leisure/sport centre or school[18]. Children further reported the number of times a week their parent/s or guardian/s engaged in physical activity (0 days=0, 1-2 days=1, 3-4 days=2, 5+ days=3)[18]. Children reported both parents/guardians or a single parent/guardian that they live with. Where participants reported two parents/guardians, the scores were added together. Thus, larger total scores (out of a maximum total of 6) show more physically active parents, who provide active role modelling. Additionally, participants reported the persons they most prominently participated in physical activity and sport with during and outside of school time (i.e., on their own (=0) or with parents/guardians, siblings, friends, coaches/teachers/other (=1))[18]. The questions used within this study are also utilised as part of valid and reliable national surveillance surveys[17,18].

Benefits (desired outcomes from taking part) and barriers (perceived blocks or hindrances to taking part) to exercise were measured using a nine-item benefits and ten-item barriers subscale from the Children's Perceived Benefits/Barriers to Exercise Questionnaire[19], with responses ranging from 1 (disagree a lot) to 5 (agree a lot). Validity and reliability of the questionnaire has been shown to be good (internal consistency Cronbach's alpha = 0.95 and 0.89, for the benefits and the barriers subscales, respectively; construct and factorial validity were also established)[19,20]. A benefits/barriers differential score was calculated by subtracting the mean barriers' score from mean benefits' score, with higher scores indicating greater perceived benefits compared to perceived barriers to exercise.

Perceived adequacy, the perception of capability to achieve some acceptable standard of success, and perceived predilection, the likelihood that one would select a physical activity when given the choice, were measured using a seven-item adequacy and nine-item predilection subscale from the Children's Self-perceptions of Adequacy in and Predilection for Physical Activity Questionnaire[21]. Hay[21], demonstrated adequate validity and strong reliability of the questionnaire (internal reliability ranged from 0.65 - 0.85; test-re-test reliability ranged from 0.78 - 0.91; factorial, construct and predictive validity were also established)[21]. Each item consisted of two mutually exclusive descriptions and children decided which of the two descriptions were most like them and whether the selected description was "sort of" or "really" true for them. The most inactive or inadequate response was scored 1 and the most active/adequate response 4. A cumulative score for both adequacy and predilection were calculated.

Details of the Dragon Challenge have been reported elsewhere[4]. Briefly, the Dragon Challenge consists of nine tasks (Balance Bench, Core Agility, Wobble Spot, Overarm Throw, Basketball Dribble, Catch, Jumping Patterns, T-Agility, and Sprint) which require the application of a different combination of fundamental, combined and complex movement skills, to form refined and specific movement patterns[4]. The Dragon Challenge was administered and assessed using the established methodology[4]. Scoring was completed in situ by expert gold assessors (>50 hours of DC training and in situ experience), in accordance with the instructions specified within the Dragon Challenge manual[4]. Children were scored on their technique and outcome for each task. Good inter- and intra-rater reliability across all tasks and scoring components (all ICCs >0.85), as well as validity, has been previously shown[4]. A cumulative score (0-4) for each task was calculated by summing the technique scores and twice the outcome score, with four showing high motor competence at that task[4].

Descriptive statistics are presented as mean ± SD. All statistical tests were completed using SPSS and SPSS AMOS, v25 [IBM SPSS Statistics Inc., Chicago, IL, USA], with statistical significance set at $p<0.05$. Missing data (6.9%) were imputed using an expectation-maximisation algorithm, an iterative method. Specifically, the missing values are first predicted based on assumed values for the parameters and then these predictions are used to update the parameter estimates[22]. This method is iterated, until the sequence of parameters converges to maximum-likelihood estimates[22]. Independent samples t-tests were used to determine sex differences in measured variables. A Confirmatory Factor Analysis (CFA) was performed to assess the fit of the measured variables into four hypothesised latent variables. Specifically, the 20m MSRT and the handgrip strength test, as well as responses to questions from the CHAT on MVPA, sport participation and available surrounding physical activity facilities were included as indicators of the enabling factor; the benefits/barriers differential score, the adequacy score, and the predilection score were included as indicators of the predisposing factor; responses to questions on parental/guardian physical activity levels and persons whom participate in physical activity and sport with the participant were included as indicators of the reinforcing factor; and cumulative scores for each Dragon Challenge task were included as indicators of the motor competence factor[4]. Comparative fit index (CFI), Goodness of fit index (GFI), Incremental fit index (IFI) and Root mean square error of approximation (RMSEA) were used to assess model fit, with CFI, GFI, and IFI of >0.90 and RMSEA of <0.05 indicating a good fit[23,24]. SEM was then used to evaluate the relationships between enabling, reinforcing, and predisposing latent variables on the motor competence latent variable. The fit was tested at a global level using CFI, GFI, IFI, and RMSEA. Direct effects were measured using direct path coefficients between latent variables. In the case of a mediating latent factor, the indirect effect was measured by taking the product of the two direct effects between the three latent factors. Multi-group comparisons were made using Chi-squared difference tests to determine whether path relationships differed based on the value of a moderator: sex (boys vs. girls), weight status (healthy vs. overweight/obese), and school level (primary vs. secondary). Paths that were non-significant at an overall level, as well as for all values of the moderators, were removed from the final SEM.

Results:

Mean and standard deviations of the measured variables are presented in Table 1.

[INSERT TABLE 1 ABOUT HERE]

The fit for the hypothesised CFA (Figure 1) was good (CFI, 0.927; GFI, 0.944; IFI, 0.929; RMSEA, 0.035; 90% CI 0.026–0.044), after the addition of three correlations between error terms within the same factor.

[INSERT (A) FIGURE 1: Confirmatory Factor Analysis of the measured variables into four hypothesised latent factors ABOUT HERE]

The hypothesised SEM is shown in Supplementary Material 1 *(see hypothesised SEM, (B) Supplementary Material 1, which displays the paths in the hypothesised model)*. The paths from (i)the reinforcing factor to the motor competence factor and (ii)the predisposing factor to the motor competence factor were not significant (p>0.05). Moreover, these relationships did not differ significantly based on the value of any of the moderators, and so both paths were removed in the final model. *Post-hoc* power analysis identified sufficiency to detect significant effects (statistical power >0.8).

The final SEM (Figure 2) demonstrated a good fit on a global level (CFI, 0.925; GFI, 0.944; IFI, 0.926; RMSEA, 0.036; 90% CI 0.027–0.044). The model revealed that the reinforcing factor was directly related to the predisposing (β=0.45, p<0.001) and enabling factors (β=0.25, p=0.021). An indirect relationship was found between the reinforcing and motor competence factors, mediated by the enabling factor (β=0.13, p=0.014). The predisposing factor was found to have a direct effect on the enabling factor (β=0.49, p<0.001), and an indirect effect on motor competence mediated by the enabling factor (β=0.25, p=0.002). The enabling factor had a direct effect on the motor competence factor (β=0.50, p<0.001). Multi-group comparisons showed that each of these direct effects did not differ by sex, weight status or school level (p>0.05).

[INSERT (C) FIGURE 2: Final SEM evaluating the relationships between enabling, reinforcing, predisposing, and motor competence latent variables. ABOUT HERE]

Discussion:

This is the first study to report the direct and indirect relationships between enabling, predisposing, and reinforcing factors on motor competence. This study presents an ecological model with motor competence as the endogenous variable to provide understanding of the multiple influences on such an outcome[5]. Results from the CFA showed that the fit of the measured variables into the four hypothesised latent factors based on the YPAP-M[10] was good, confirming that the selected measures were associated with the appropriate latent factor.

The finding that the enabling factor had a direct effect on the motor competence factor purports that an increase in the enabling factor resulted in an increase in motor competence, and thus an improvement in competence in movement skills and advanced movement patterns. In accord with systematic reviews, there was a positive association between motor competence and MVPA[3,5], sport participation[3,5,25] and aspects of health-related fitness[3,7]. Further, research suggests that a positive feedback loop exists, in which children with greater levels of physical activity and sport participation develop better motor competence and fitness, consequently further increasing engagement[2,3]. Whilst environmental and access factors have been previously reported to support physical activity[10,26], little evidence has shown the impact on motor competence[5]. It is therefore noteworthy that available surrounding physical activity facilities loaded onto the enabling factor, which was positively associated with motor competence. Overall, the finding that the enabling factor had a direct effect on motor competence supports previous literature, as well as provides further evidence of an association between physical activity[3,5], sport participation[3,5,25], fitness[3,7], and surrounding facilities and motor competence.

In line with previous research that has displayed positive associations between parental influence and family support (reinforcing variables), and physical activity levels and fitness (enabling variables), in children and adolescents[10,26], the direct relationship between the reinforcing and enabling factor further supports the importance of parental/guardian modelling and friends/family encouragement. Conversely, few studies have demonstrated that reinforcing variables can simultaneously influence predisposing variables[11]. The proposed model is of importance since it shows that an increase in the reinforcing factor resulted in an increase in perceived benefits to, adequacy in, and predilection to physical activity (predisposing factor). Given that previous literature has shown a parental influence on movement skills competence[5], it was hypothesised that the reinforcing factor would also have a direct relationship on the motor competence factor, though this direct relationship was not apparent. Rather, results showed an indirect relationship between the reinforcing factor and motor competence factor, mediated by the enabling factor. Consequently, increasing the reinforcing factor (i.e., social support/monitoring) may result in improvements in enabling measured variables as well as motor competence. Overall, the findings regarding the reinforcing factor provide evidence for the impact of psychosocial variables on biological, environmental, behavioural, and psychological variables, as well as indirectly on motor competence levels.

Congruent with previous research, whereby higher levels of self-efficacy, perceived competence, and overall motor competence were related to higher levels of physical activity[26,27], the SEM showed that the predisposing factor (i.e., perceived benefits to, adequacy in, and predilection to physical activity) had a direct effect on the enabling factor (i.e., physical activity, sport participation, health-related fitness, and available surrounding physical activity facilities). While it was hypothesised that the predisposing factor may have a direct relationship on the motor competence factor, an indirect effect, mediated by the enabling factor, was found. Indeed, previous research has shown that perceived competence has a mediating effect on the association between motor competence and physical activity in children and adolescents[28,29]. This study therefore provides further support to the contention that an increase in the predisposing factor will result in an increase in physical activity, sport participation, and health-related fitness, and subsequently an increase in levels of motor competence.

Overall, previous research supports the synergistic relationships of biological, environmental, psychosocial and behavioural factors on the evolution and continued development of motor competence across the lifespan[3,5,6]. The current study supports the strength of these relationships, particularly in terms of promoting motor competence in an ecological model that can be used to inform interventions. One such intervention strategy would be to promote physical activity, sport participation, health-related fitness, and available surrounding physical activity facilities, given the direct effect of the enabling factor on motor competence in the current results. Potential strategies to enhance these variables could be that schools offer additional after-school programmes (given the pressures that exist on curricular time) to provide opportunities for physical activity and sport participation, particularly vigorous and muscle/bone strengthening activities that enhance health-related fitness. Parents should also be aware of the importance of providing additional opportunities for their children to participate in. Furthermore, schools could enable access to school grounds outside of the daily timetable and term times, to provide additional physical activity facilities for children to easily access. Moreover, whilst both the reinforcing and predisposing factor only had a direct effect on the enabling factor, the indirect effect of these factors on motor competence, indicates that an increase in either reinforcing or predisposing factor was indirectly associated with an increase in motor competence. Thus, interventions to promote motor competence could also focus on enhancing social support mechanisms such as parental/guardian physical activity levels, the number of persons whom take part in physical activity and sport with children, and children's perceived benefits to, adequacy in, and predilection to physical activity, while decreasing children's perceived barriers to physical activity. Contrary to previous findings that show increasing age, healthy weight status and being male are correlates for certain aspects of motor competence[5], multi-group comparisons did not display these differences. Consequently, the SEM revealed an ecological model that can be used to inform interventions for the improvement of motor competence in children via multiple pathways regardless of age, weight status, and sex.

The use of SEM in the current study provides a novel approach to identifying modifiable factors that can increase motor competence in children, allowing the investigation of the concurrent influences of multiple variables. Indeed, SEM explicitly models measurement error, thereby providing more accurate relationships among latent factors, a frequently cited limitation of many studies[30]. Furthermore, the assessment of fundamental, combined and complex movement skills and varying complexities of movement patterns provides a more inclusive measure to inform motor competence[4].

Whilst there are numerous strengths, the current study is not without limitations. Specifically, the measures chosen to best predict each latent variable in the model were selected from measures involved in the Swan-Linx programme, and therefore other quantitative measures (e.g., accelerometer data) may have increased the strength of the model. Future research could also expand the measures used to assess enabling and reinforcing factors (e.g., reinforcing factors could include encouragement for motor competence from peers and parents or other aspects of social support), as well as investigate whether there is a difference between single parent versus dual parent role-modelling. Further, an expectation-maximisation algorithm was used to impute missing data, although this imputation method has previously been validated[22]. Whilst no differences were found between primary and secondary school level children, it is possible that age differences may be apparent with a larger age-range, or that biological age may account for greater variation. Finally, the sample within the current study was largely homogenous, with 87% of the sample being white British children. Whilst this is closely aligned to the ethnicity proportions of the population in Wales, the results cannot be generalised beyond this particular racial/ethnic group. Future studies should aim to adopt the current analyses to test the significance of the model across a larger age range and differing ethnic groups, as well as across different countries. The replication of the current study with the inclusion of a wider range of participants would enhance the significance of the model and make it more generalisable.

Conclusion:

In conclusion, the present study found that the enabling factor had a direct effect, whilst the reinforcing and predisposing factors had an indirect effect, on motor competence. Each direct and indirect effect did not differ by school level, weight status or sex, supporting the contention that the model is applicable across many groups of primary and secondary level school children. These findings are the first to be set in this framework and reveal that there are multiple potential pathways that could inform future interventions that aim to promote motor competence.

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Conflict of Interest:

The authors declare there are no known conflicts of interest in the present study. The results of the study are presented clearly, honestly, and without fabrication, falsification, or inappropriate data manipulation.

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Table 1. Descriptive statistics, mean ± SD, of measured variables

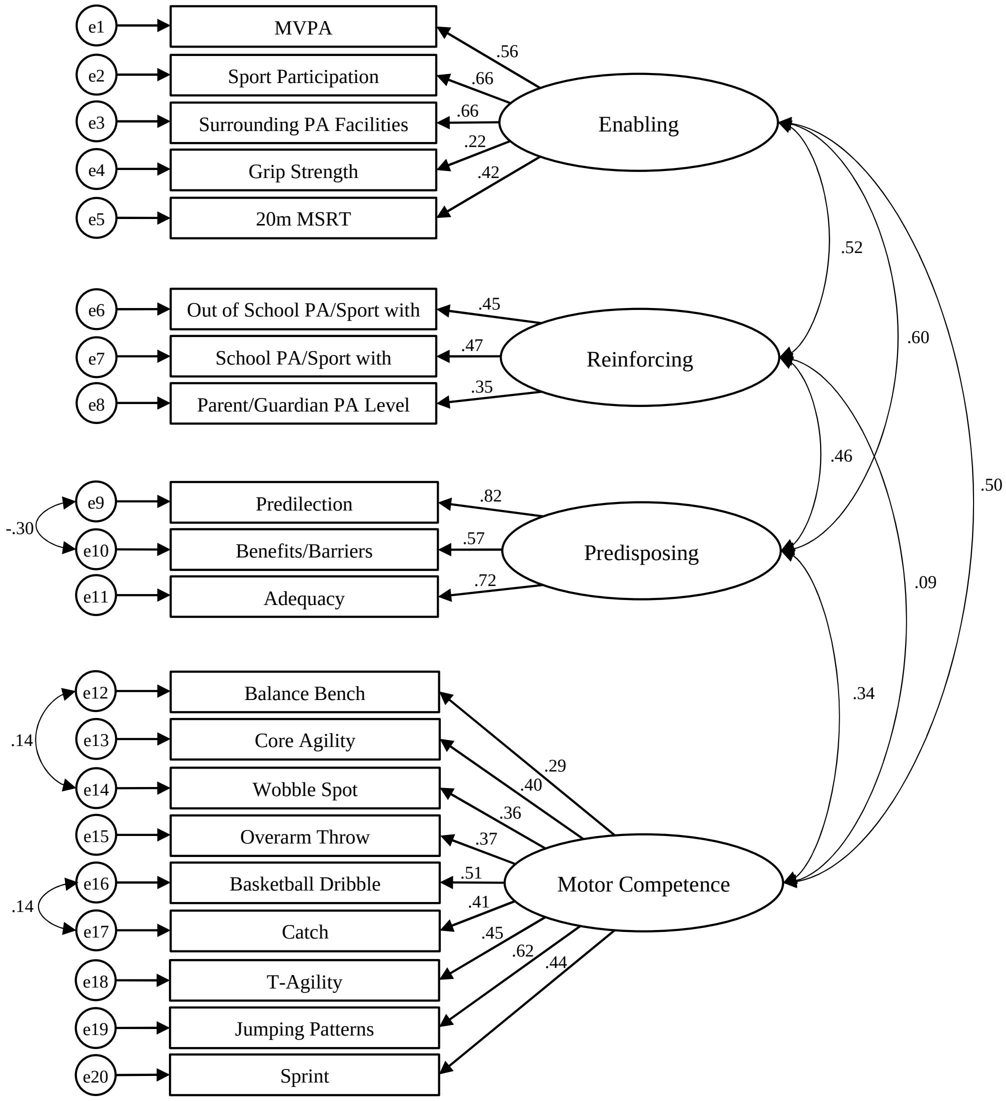
Variables	Boys	Girls	All
Primary School	73.5%	67.9%	70.9%
Secondary School	26.5%	32.1%	29.1%
Unhealthy Weight	35.9%	40.0%	37.9%
Healthy Weight	64.1%	60.0%	62.1%
MVPA (0-7 days)	2.4 ± 1.2	2.2 ± 1.1	2.3 ± 1.2
Sport Participation (number of sports)	2.7 ± 2.7*	2.3 ± 2.1	2.5 ± 2.4
Surrounding PA Facilities (0-8 facilities)	3.0 ± 2.0	3.2 ± 2.0	3.1 ± 2.0
Grip Strength (kg)	17.7 ± 3.9	17.1 ± 3.8	17.4 ± 3.8
20m MSRT (shuttles)	31.9 ± 18.1**	22.5 ± 11.9	27.4 ± 16.1
Out of School PA/Sport with (0-1)	0.9 ± 0.3	0.8 ± 0.4	0.9 ± 0.3
Out of School PA/Sport with others	86.7%	84.4%	85.6%
School PA/Sport with (0-1)	0.9 ± 0.2	0.9 ± 0.2	0.9 ± 0.2
School PA/Sport with others	95.2%	95.4%	95.3%
Parents PA Levels (0-6)	2.4 ± 1.5	2.7 ± 1.4	2.5 ± 1.5
Predilection (9-36)	28.3 ± 4.5	28.2 ± 5.3	28.2 ± 4.9
Benefits/Barriers to PA (-41-35)	1.4 ± 0.9	1.3 ± 0.8	1.4 ± 0.8
Adequacy (7-28)	21.1 ± 3.6	20.8 ± 3.7	20.9 ± 3.6
Balance Bench (0-4)	1.4 ± 1.1	1.6 ± 1.2*	1.5 ± 1.1
Core Agility (0-4)	1.3 ± 0.9	1.5 ± 1.0	1.4 ± 1.0
Wobble Spot (0-4)	1.3 ± 1.5	1.4 ± 1.5	1.4 ± 1.5
Overarm Throw (0-4)	2.1 ± 0.9**	1.3 ± 1.0	1.7 ± 1.0
Basketball Dribble (0-4)	2.3 ± 1.0**	1.7 ± 1.2	2.0 ± 1.1
Catch (0-4)	1.5 ± 1.3**	0.9 ± 1.1	1.2 ± 1.3
T-Agility (0-4)	1.3 ± 1.1	1.2 ± 1.0	1.2 ± 1.1
Jumping Patterns (0-4)	2.0 ± 1.0	2.0 ± 1.0	2.0 ± 1.0
Sprint (0-4)	2.5 ± 0.8*	2.3 ± 0.9	2.4 ± 0.8

Note. MVPA = Moderate-to-vigorous physical activity; PA = Physical activity; 20m MSRT = 20m Multistage Shuttle Run Test; Independent samples t-test: * = <0.05, ** = <0.001

A. **Figure 1:** Confirmatory Factor Analysis of the measured variables into four hypothesised latent factors

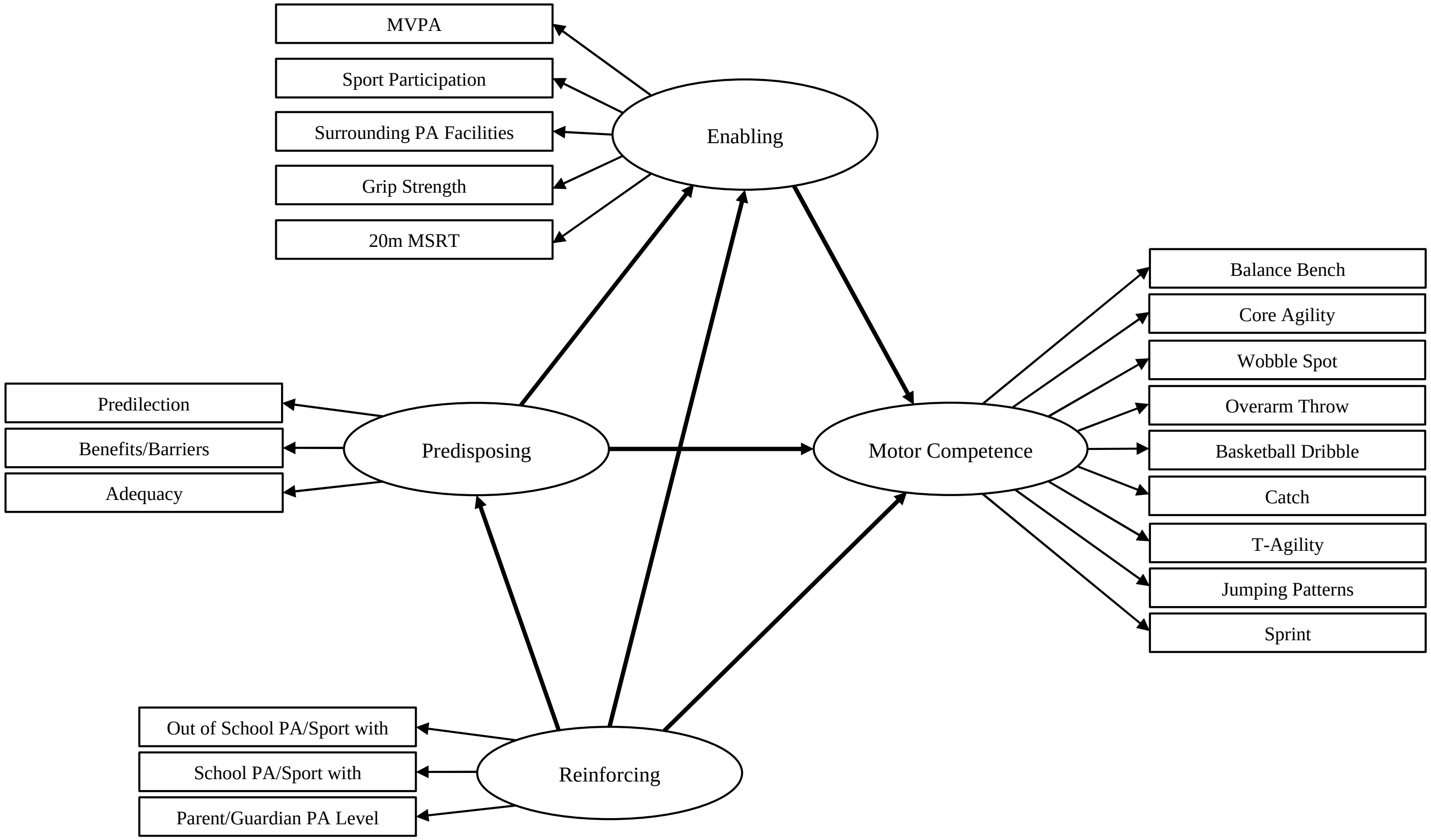
B. **Supplementary Material 1.** Hypothesised model, which presents the paths in the hypothesised structural equation model. Pdf

C. **Figure 2:** Final SEM evaluating the relationships between enabling, reinforcing, predisposing, and motor competence latent variables.



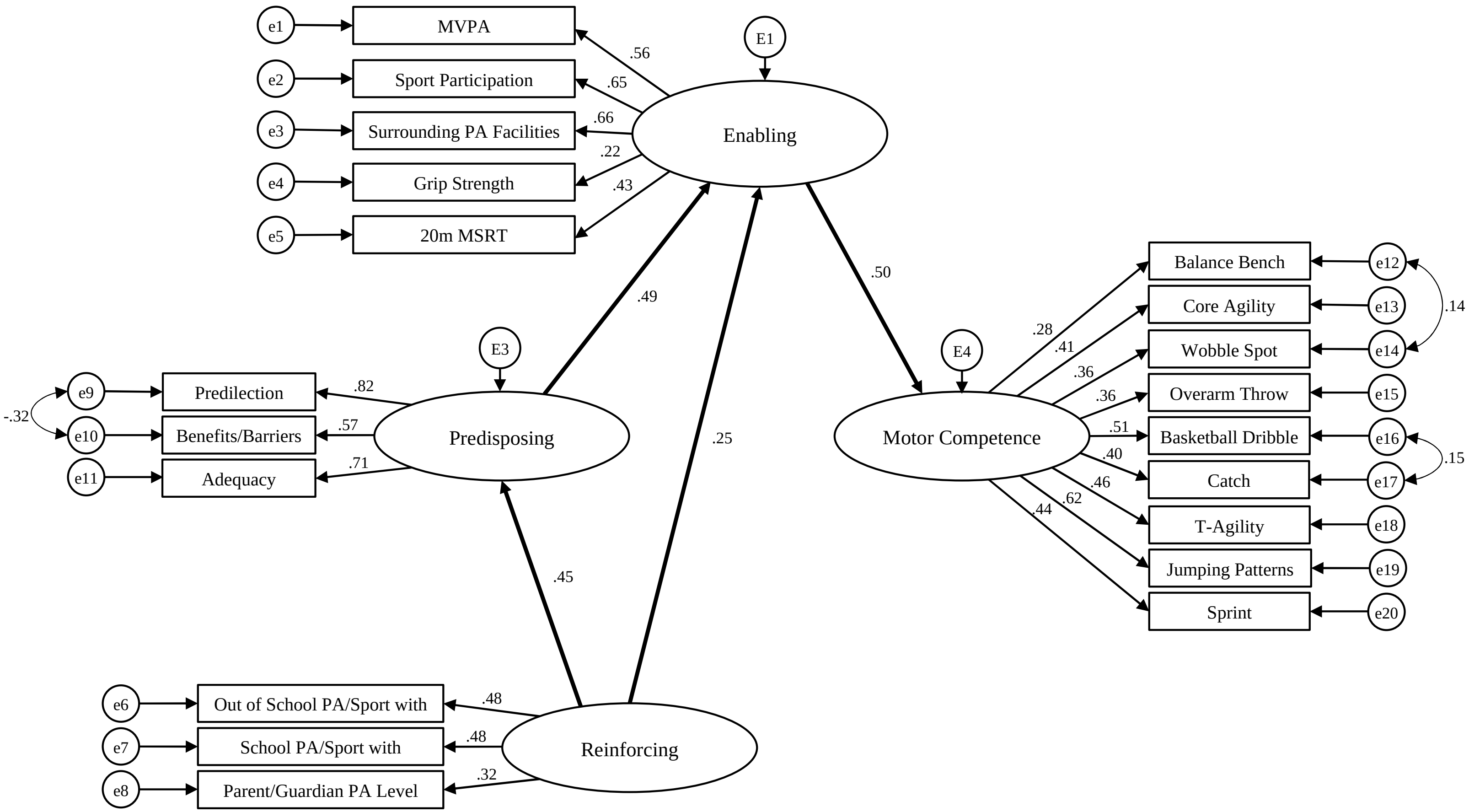
(A) Figure 1: Confirmatory Factor Analysis of the measured variables into four hypothesised latent factors

458



(B) Supplementary Material 1. Hypothesised SEM, which displays the paths in the hypothesised structural equation model

459



(C) Figure 2: Final SEM evaluating the relationships between enabling, reinforcing, predisposing, and motor competence latent variables.

460