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Factors contributing to Australian adolescents' self-report of their motor skill competence

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Abstract

An adolescents motor skill competence can affect areas such as sports participation, social activities and future academic or employment decisions. The Adolescent Motor Competence Questionnaire (AMCQ) is a 26-item questionnaire that uses a four point Likert response (never, sometimes, frequently, always) to assess motor-related activities during adolescence. This study aims to provide evidence of the construct validity using Principle Component Analysis (PCA) and to identify factors that contributed to Australian adolescent self-reported motor competence. A final aim was to determine whether individual item responses differed between males and females. The AMCQ was completed by 160 adolescents (M_{age} = 14.45 *SD* = .75, 12 to 16). The PCA using varimax rotation extracted four factors (Eiqenvalue of 1.21 or above) explaining 52% of variance and representing Participation in Physical Activity and Sports, Activities of Daily Living, Public Performance, and Peer Comparison. Overall males reported higher AMCQ scores compared to females. Females responded negatively (sometimes/never) to all items particularly those on Physical Activity and Sports and Public Performance. Males who responded negatively had lower AMCQ scores than the females. These findings indicate male and female adolescents may judge their motor competence on different factors, which should be considered when planning physical activity interventions.

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Factors that contribute to an adolescent's judgement or perception of their competence differ across settings or domains such as academic capability, social engagement, athletic prowess, physical appearance, and close friendships (Harter, 2012). One domain of particular importance during adolescence is level of motor competence. Harter (2012) describes motor competence as an adolescent's perceived athletic ability and preference to participate in sports and physical activity such as outdoor games. An adolescent's perceived judgement of their motor competence may influence their ability to participate in activities of daily living and socially desirable activities such as sports and recreational activities (Okely, Booth, & Patterson, 2001; Ullrich-French & Smith, 2009) and is influenced by cultural and societal norms (Harter, 2012; Rose, Hands, & Larkin, 2011). For example, Timler and colleagues (2016) found Australian adolescents' level of motor competence affected their participation in sports and social occasions, the way they compared themselves to their peers, completed school-based activities such as handwriting and other fine motor tasks as well as many activities of daily living. The impact of differences in proficiency of motor performance may be driven by cultural influences such as the value placed on sporting prowess (Hagger, Asci, & Lindwall, 2004).

In Australia, a high value is placed on participating in physical activity and sporting achievements, therefore it is likely that an adolescent's perceived motor competence may be closely linked to their actual motor competence (Stodden et al., 2008) which influences their willingness to be involved in physical activity, as well as their level of self-esteem, self-confidence and even social support (Harter, 2012; Phillips & Pittman, 2007; Vannatta, Gartstein, Zeller, & Noll, 2009). The consequences for those adolescents who experience or perceive themselves to have poor coordination or a lower motor competence, is that they are less likely to join in school or community sporting opportunities and potentially risk lower psychosocial outcomes such as self-concept (Harter, 2012), social support (Barnett, Cliff, Morgan, & van Beurden, 2013), goal orientation (Moreno-Murcia, Sicilia, Cervello, Huescar, & Dumitru, 2011) and self-efficacy

(Cairney et al., 2005). Some may volunteer for sedentary roles such as spectator, team organizer, team manager or score keeper (Fitzpatrick & Watkinson, 2003; Missiuna, Moll, King, Stewart, & Macdonald, 2008). Others may prefer participating in individual sports (Timler et al., 2016) or choose to withdraw from all physical activity opportunities (Fitzpatrick & Watkinson, 2003). Consequently this may affect social support mechanisms (family, sporting, school and issues related to health systems) and even lead to health issues such as higher stress and anxiety (Campbell, Missiuna, & Vaillancourt, 2012; Missiuna, Moll, King, King, & Law, 2006).

An additional factor to be considered is gender difference (Cliff et al., 2009; Reed et al., 2004; Ziviani et al., 2009), as the level of participation in physical activity and the importance they place on their motor competence differs between males and females throughout their lifespan (Cairney, Hay, Faught, Mandigo, & Flouris, 2005; Hands, Larkin, Parker, Straker, & Perry, 2009; Hands, Parker, Rose, & Larkin, 2015; Hill, Brown, & Sorgardt, 2011; Piek, Baynam, & Barrett, 2006). For example, males usually participate in a variety of sporting activities throughout their lifespan as this provides them with many social opportunities. Females tend to participate in physical activity during childhood which tends to become less important during adolescence and into adulthood (Hands et al., 2016). Regardless of level of motor competence, males usually place greater importance on their motor competence and participate in more high intensity physical activity such as sport (Cairney, Kwan, Hay, & Faught, 2013; Hands et al., 2015), while females often participate in less vigorous activity as they place greater importance on looking presentable and being physically attractive (Harter, 2012; Vannatta et al., 2009). For example, Hands et al. (2015) found 14-year-old males rated involvement in physical activity as important as it gave them a chance to compete, to win, and spend time with friends. On the other hand, the 14-year-old females felt physical activity prevented them from doing other things that they liked (Hands et al., 2015).

During this emotionally fragile phase of adolescence it is important to develop a better understanding about what factors contribute to an adolescent's judgement of their own motor competence (Harter, 2012; Hill et al., 2011; Kroger, 2007; Timler et al., 2016). Apart from involvement in sports and recreational activities and activities of daily living, it is unclear what other influences contribute to an adolescent's judgement of their motor competence. Few measures have been designed to gather this information. One such tool is the Adolescent Motor Competence Questionnaire (AMCQ) which is designed for 12 to 18 year olds and has evidence of internal consistency, test-retest reliability and concurrent, but not construct validity with this age group. The aims of this study, therefore, were to use PCA to provide evidence of the construct validity of the AMCQ and secondly to identify factors that contributed to Australian adolescent self-reported motor competence. A final aim was to determine whether individual item responses differed between males and females.

Method

Participants

A sample of 160 Australian adolescents (103 males, M_{age} = 14.44 years, *SD* = 0.75) completed the Adolescent Motor Competence Questionnaire (AMCQ). They were recruited through personal contacts (n = 6), an adolescent movement clinic (n = 4), community sporting clubs [Australian Rules Football League (AFL; n = 69), netball (n = 6) and basketball clubs (n = 7)] and local schools [independent (n = 60) and government (n = 8)]. The inclusion criteria specified adolescents to be aged between 12 and 16 years; have English as their first language, good linguistic and cognitive ability sufficient to comprehend questions and no other diagnosed disability such as cerebral palsy, learning difficulties or muscular dystrophy. This project was approved by the Human Research Ethics Committee of the University of Notre Dame in Perth, Western Australia.

Measures

The Adolescent Motor Competence Questionnaire (AMCQ; Timler et al., 2016) is a self-report motor competence questionnaire developed for adolescents between the ages of 12- and 18-years of age. It consists of 26 items examining the ecological presence of motor tasks and functional activities of daily living and was informed by the DSM-V criteria for Developmental Coordination Disorder (DCD; American Psychiatric Association [APA], 2013). Participants respond on a 4-point Likert scale of Never (1), Sometimes (2), Frequently (3), and Always (4). The maximum AMCQ score is 104, with a higher score indicating a higher level of motor competence. A score of 83 and below indicates suspected motor difficulties. To account for response bias, fifteen items are negatively worded. These are reverse scored for the analyses to Never (4), Sometimes (3), Frequently (2) and Always (1). The questionnaire was originally designed in consultation with adolescents diagnosed with DCD to ensure the items discriminated between high and low motor competence. The questionnaire has evidence of concurrent validity against the McCarron Assessment of Neuromuscular Development (MAND; McCarron, 1997), test re-test reliability (intra-class correlation coefficients = 0.956), internal consistency ($\alpha = 0.902$; Timler et al., 2016) and can be completed in less than 10 minutes.

Procedures

Data collection took place over a two year period. The questionnaire and written consent forms were distributed to personal contacts (n = 6), an adolescents movement program (n = 4), and sporting clubs [one AFL club (140), two basketball clubs (50) and one netball club (20) were approached and agreed to participate]. The questionnaire and consent form responses were collected two weeks later (response rate 92 returned /210 distributed = 44%). Additional clubs including scouts, a sailing club, a performing arts theatre, and a photography club were contacted in regards to the study, however these clubs did not agree to assist in the recruitment process. Two music schools distributed flyers to age appropriate

participants, although no one agreed to participate. The primary researcher also contacted the Occupational Therapy Association in Perth Western Australia for potential participants, however no response was received.

Students in years 9, 10 and 11 attending schools in the Perth metropolitan were also contacted. A total of 34 government (34/137 schools in Perth = 25%), 54 Independent (54/62 schools in Perth = 87%) and 9 Catholic (9/25 schools in Perth= 36%) schools were contacted within the metropolitan area. However, only 5 government and 7 independent schools agreed to assist in recruiting participants. Potential participants who indicated an interest in being involved were then provided with consent forms and questionnaire, which they could complete online or as a hard copy. Schools that opted for hard copies obtained written consent before the adolescents completed the AMCQ during an allocated class (response rate 38 returned /65 = 58%). One Independent school handed out hardcopies of the questionnaires and consent form with a paid-reply envelope so participants could complete and place both items in the mail at a time convenient for them (response rate 30 returned /140 = 21%). Online completion enabled teachers and year group coordinators to email parents about the study (n = 19 completed). This method was adopted for six schools. The overall response rate was 39% (Total of 160 returned /415). Adolescents were able to complete the questionnaire and online consent form at a time convenient to them.

Data Analysis

SPSS version 23 (SPSS Inc., Chicago, IL, USA) was used to analyse the data. Descriptive statistics were derived for the total sample, males and females. The data were tested for normality, and the skewness (+/-1) and kurtosis (+/-1) values indicated that parametric tests could be used for analyses (Pallant, 2013). Firstly, a Principal Component Analysis (PCA) of the participant's responses was conducted using varimax rotation to examine construct validity and how many factors would emerge from

the 26 items. This was chosen as PCA is a form of factor analysis that is commonly used during scale development and evaluation (Pallant, 2013). A second order analysis was completed to examine if one higher order factor occurred. The factors were named according to the best representation of similar items. As 15 items were negatively worded, scores were reversed and reworded into positive language. The authors grouped the responses into negative (sometimes and never) or positive (frequently and always). Treating the responses at this nominal level made it easier to interpret individual item responses. These terms were chosen to represent responses where activities or experiences were easy or positive compared to difficult or negative (e.g. coming last in a running race). Individual item responses were compared between males and females within each factor. With the total AMCQ score as the dependent variable, a General Linear Model (GLM) analysis was completed separately for each of the 26 items controlling for response category (positive or negative) and gender. Finally a chi square analysis compared the percentage of positive and negative responses by males and females for each item. Given the same dataset was used for multiple statistical analyses, to reduce the chance of Type 1 error statistical significance was set at p<.001.

Results

The mean score for the AMCQ was 86.55 (*SD* = 11.41). Males had a higher AMCQ score (*M* = 89.29, *SD* = 10.86) than the females (*M* = 81.60, *SD* = 10.78; *t* (158) = 4.30, *p* <.001). There was no significant difference between hardcopy (*M* = 86.98, *SD* = 10.61) and online AMCQ scores (*M* = 83.37, *SD* = 16.20; *t* (158) = 1.30, *p* = .09)

Factors contributing to self-reported motor competence

The PCA using varimax rotation extracted four factors with an Eiqenvalue of 1.21 or above explaining 52.31% of variance, and supported by the scree plot. The Kaiser-Meyer-Olkin value was .871 (*p* <.001) which indicated the sample was suitable for analysis (Pallant, 2013) as it exceeded the

recommended value of .6. Items loading onto Factor 1 represented *Participation in Physical Activity and Sports* (Table 1). This factor comprised ten items asking about participating in the sports game, ball skills, outdoor games, individual versus team sports, bicycle riding and balancing on one foot. The second factor, *Activities of Daily Living* was represented by eight items related to flossing teeth, getting ready to go out, handwriting, using scissors, changing clothes, and walking in a straight line. The third factor comprised five items addressing *Public Performance* such as stumbling upstairs, being called clumsy, breaking objects, confusion between left and right and difficulty using a fork or a knife. The fourth factor included items related to *Peer Comparisons* such as being able to complete tasks (asking for help), coordinated like their friends, not thinking they are clumsy and not coming last in a running race. Factor loadings for all items ranged between .876 and .348. Some items such as balance, walking along a straight line and coordinated like friends loaded to a similar extent onto several factors. To investigate the construct validity of the AMCQ a second order analysis was undertaken using the first four first order factors. This yielded a one factor solution explaining 59.54% of the variance with factor loadings ranging between .735 and .796.

Group differences for individual items

Not surprisingly, there were significant differences (p<.001) in the participants' mean AMCQ scores between response categories (positive or negative) for all items (Table 2). Those who responded negatively to items had lower Total AMCQ scores than those who responded positively. Significant differences (p<.001) in mean AMCQ scores were also evident between males and females for 12 items (Table 2), in all cases favouring the males. Seven of these items loaded onto the Activities of Daily Living factor. Males scored lower in some items, but these were not significant.

A number of interactions between response category (positive or negative) and gender (p<.05) emerged for eight items from the Participation in Physical Activities and Sports factor (participate in sports

game p = .007, participate in sports at school p = .037, catch a ball consistently p = .005, learn new outdoor games p = .006, ride a bicycle p = .006, balance p = .005) and Public Performance factor (right and left sides identified p = <.001, use a fork and knife p = .001). In these instances, the mean AMCQ scores for the males who responded negatively were lower than the mean scores for the females who also responded negatively. Figure 1 shows the interaction between male and female responses for the item 'use a fork and knife' as an example.

The chi square analyses were significant for a number of items (Table 2/3). A higher percentage of the females compared to males responded negatively to seven items, primarily relating to Participation in Physical Activities and Sports (in particular, ball skills such as hit, kick, and throw) and Peer Comparison. For example, 37% of females compared to 14% males responded negatively to being able to hit a ball with a bat. Most males responded positively to the test items.

Discussion

The PCA of the AMCQ scores identified four factors that contributed to Australian adolescent self-report of their motor skill competence. These were related to Participation in Physical Activities and Sports, Activities of Daily Living, Public Performance and Peer Comparison. The males in the sample had higher mean AMCQ scores than the females and were more likely to respond positively to many of the questionnaire items compared to the females. In particular items relating to Participation in Physical Activities and Sports and Public Performance.

The four factors from the AMCQ were named according to the best representation of items and based on evidence of factors developed for other questionnaires such as Fine Motor/Handwriting, Gross Motor/Planning and General Coordination (Wilson et al., 2009), Fine and Gross Motor Function and Writing, Activities of Daily Living, and Organization Skills (Tal-Saban, Ornoy, Grotto, & Parush, 2012). However, a couple of items on the AMCQ loaded onto a number of factors. For example, 'use of fork and

knife' loaded onto the Public Performance factor even though it is an activity of daily living. Clearly, to use these utensils efficiently a degree of coordination is required. 'Balance' loaded onto Participation in Physical Activities and Sport, however it is also needed during activities of daily living such as dressing and tying shoelaces and can be observed through peer comparisons. 'Walking along a straight line' loaded onto Activities of Daily Living. This activity also requires coordination and can be easily observed by peers. 'Co-ordinated like friends' loaded onto Peer Comparisons, however an adolescent's participation in physical activities and sport and their level of co-ordination are also important for this item. Although some items loaded onto a couple of factors, all four factors converged into one higher order factor of motor competence. This is an important finding to acknowledge as it demonstrates the AMCQ has construct validity.

These results highlight the greater perceived importance placed by males on participation and sport based activities and physical activity than females (Harter, 2012; Ullrich-French, & Smith 2009). It has been suggested that cultural norms often dictate what each gender "should" focus on regarding certain activities, which in turn affects self-perceptions. These different expectations and social norms for men and women are then reinforced through environmental influences, including the media and parents (Harter, 1993). This is supported given the strong sporting culture in Australia and the level of adoration afforded to our sporting heroes, particularly male athletes (Vandello, Bosson, Cohen, Burnaford, & Weaver, 2008). Unfortunately, female athletes are often not given the same level of recognition (Angelini, 2008). Parents of boys have also been reported to hold higher perceptions of their competence in physical tasks and consider sport as more important, in comparison to girls (Fredricks & Eccles, 2005). Even from a young age, Australian males see participation in physical activities as an opportunity to win, compete and hang out with their friends (Hands et al., 2015; Rose et al., 2011). In this study, even the males with self-reported low levels of motor competence responded positively to most

items relating to sport participation. Cairney et al. (2013) also found that Canadian males, regardless of motor skill competence, were more likely to participate in physical activities. It is possible that males benefit from sports participation to a greater extent than females as studies have found that males prefer competitive orientated activities (Mehta & Strough, 2010), experience positive social involvement in organized physical activities which improves resiliency skills (Zimmerman et al., 2013), and develop larger social support networks with team mates and adult figures (Guan & Fuligni, 2016; Ullrich-French & Smith, 2009). This contributes to a positive sense of self and a healthy identity (Doumen et al., 2012). In our study, more females, regardless of level of perceived motor competence, responded negatively towards participation in physical activities such as ball skills, and participating in sports. This finding is not surprising as adolescent females tend to participate in less physical activity (Cairney et al., 2005; Cairney et al., 2013). They tend to place greater importance on close friendships, emotional support, activities relating to their appearance (Byrd-Craven & Geary, 2007; Harter, 2012; Rose et al., 2011) and participate in co-operative rather than competitive activities (Hands et al., 2015; Labbrozzi, Robazza, Bertollo, Bucci, & Bortoli, 2013; Mehta & Strough, 2010; Rose et al., 2011). Consequently factors that contribute to their perceived motor competence are not strongly related to sports participation. Studies have shown that only females with high levels of actual and perceived motor competence continue to participate in sports during their adolescence (Barnett, Dawes, & Wilmut, 2013). This may be dependent on the changes in a female's motor proficiency from childhood through to adolescence (Barnett, van Beurden, Morgan, Brooks, & Beard, 2010). For example, many begin to place greater focus on developing close friendships rather than physical activities (Tatlow-Golden & Guerin, 2017).

It is unclear from the results whether females have a more realistic view of their own ability, assess themselves more negatively compared to their male counterparts or males overrate their motor competence. The gender interactions for six items involving participating in sports, catching a ball,

learning new outdoor games, riding a bicycle and balancing revealed that those males who responded negatively had a lower overall AMCQ score compared to the females who responded negatively. This suggests that those males with lower self-reported motor competence were more aware of their inability to complete these physical performance tasks than other factors.

There is some evidence that females receive health benefits from lighter physical activity and do not require the same intensity and amount of physical activity compared to males (Hands, Parker, Larkin, Cantell, & Rose, 2016), and are often less motivated to participate (Labbrozzi et al., 2013). Other studies have also suggested that perceived competence plays a role in engagement of physical activity (Ferrer-Caja & Weiss, 2000; Sollerhed et al., 2008), therefore girls may choose to participate less due to feelings of poor competency in physical activity tasks and place less value on sports participation (Fredricks & Eccles, 2005; Slater & Tiggemann, 2011). Furthermore, males and females may experience contrasting views towards sporting stereotypes (Schmalz & Davison, 2006) and gender identity roles (Spoor & Hoye, 2014) as well as use different coping strategies to deal with their perceived inadequacies in their motor competence (Harter, 2012; Miyahara & Cratty, 2004). These include placing themselves out of sight during team sport selections, using humour to diffuse the situation (Fitzpatrick & Watkinson, 2003; Missiuna et al., 2008), devalue the area/domain of disadvantage, select a reference group that suits their perceptions and discount any negative attitudes directed towards them (Crocker & Major, 1989). It is possible that females base their judgement of their own motor competence on factors associated with activities of daily living rather than participation in sport and deal with the impact in different ways to males.

The ability to efficiently complete some activities of daily living emerged as a factor influencing adolescent self-report motor competence. The males had higher AMCQ mean scores, when controlling for response category, for all items relating to activities of daily living than the females. The males may

be discounting the importance of performing these activities well compared to females who tend to place more importance on their personal appearance and body image (Harter, 2012; Kilpatrick, Herbert, & Bartholomew, 2005; Weiss & Smith, 2002), fine motor skills such as neat and fast handwriting and creative activities such as arts and crafts (Barnett, Henderson, Scheib, & Schulz, 2011). Furthermore, social norms place greater pressure on females to perform well in daily activities (Vandello et al., 2008).

Not surprisingly, Public Performance emerged as a factor evidenced by stumbling upstairs, being called clumsy, frequently breaking objects, confusing left and right sides, and having difficulty using a fork or a knife. This result suggests that an adolescent's perceived and actual motor competence may be closely related. These movement difficulties are very public and reinforce to the adolescent their own inadequacies (Cairney et al., 2005; Fitzpatrick, & Watkinson, 2003; Stodden et al., 2008). Interestingly, only males with very low perceived competence reported having difficulty distinguishing between right and left side and using eating utensils. This may be a result of many males discounting the importance of these skills, whereas the females may be more accepting of their difficulties.

Finally, issues associated with Peer Comparisons emerged as an important factor. Those with lower motor competence were aware they were more uncoordinated than their friends, they knew they would come last in a running race, thought they were clumsy and often had to ask for help. Peer acceptance and spending time with friends becomes very important during adolescence (Guan & Fuligni, 2016). Several qualitative studies have found that level of motor competence affects social acceptance during this time (Barnett et al., 2013; Payne, Ward, Turner, Clare Taylor, & Bark, 2013). Rose and colleagues (2015) also found that self-perceptions around close friendships, social acceptance, romantic appeal and physical appearance were dependent upon level of motor competence among Australian adolescents.

Strengths and limitations

This is the first time that a study has been undertaken to identify factors that contribute to Australian adolescents' self-report of their motor competence. Interestingly, clear gender differences in response patterns emerged. While the sample size was adequate, generalization of the results to the broader Australian population is not possible due to recruitment difficulties. Participants were drawn from a range of sources. In order to ensure an adequate representation of adolescents with low motor competence, it was important not to over recruit participants through sporting associations, which was the easiest way to access adolescents outside school. Significant differences in the Total AMCQ scores were found between those recruited through sporting clubs (M = 91.75, SD = 6.95) compared to those recruited elsewhere (M = 82.18, SD = 12.57; t (138.15) = 6.08, p <.001). The latter group comprised adolescents attending a movement clinic as well as many community contacts. This recruitment process ensured participants had motor competence levels ranging from high to low, which was important for the purpose of the study. The exact response rate was not calculated from the schools or clubs that were contacted due to the complexity of trying to recruit a sample with a range of motor competence levels. It also may have contributed to fewer females than males being recruited into the study. The sample comprised a broad age range, so some developmental differences may be present but the sample size did not allow for smaller age groupings. The variation in the data collection between online and hardcopy surveys may have affected the results, however this method had to be adopted in order to reach a desired sample size and no significant differences were found.

Conclusions

In this study four factors that contributed to Australian adolescents' self-reporting of their motor competence were identified. These related to participation in physical activities and sport, activities of daily living, Public Performance and peer comparison. Overall, males had higher self-reported motor

competence scores compared to females. Males self-reported responses showed that they were particularly influenced by their ability to participate in sports and physical activities. On the other hand, activities related to daily living and the impact of Public Performance were more influential for the females. These gender differences in responses to aspects of motor performance should be considered when designing interventions or building support networks for adolescents with motor difficulties. For example, males place greater importance on sporting prowess and should be provided with competitive and noncompetitive options to be physically active, whereas females place more importance on completing activities of daily living. Programs should facilitate the promotion of an active lifestyle rather than a focus on participation and competition in team based sports and physical activities.

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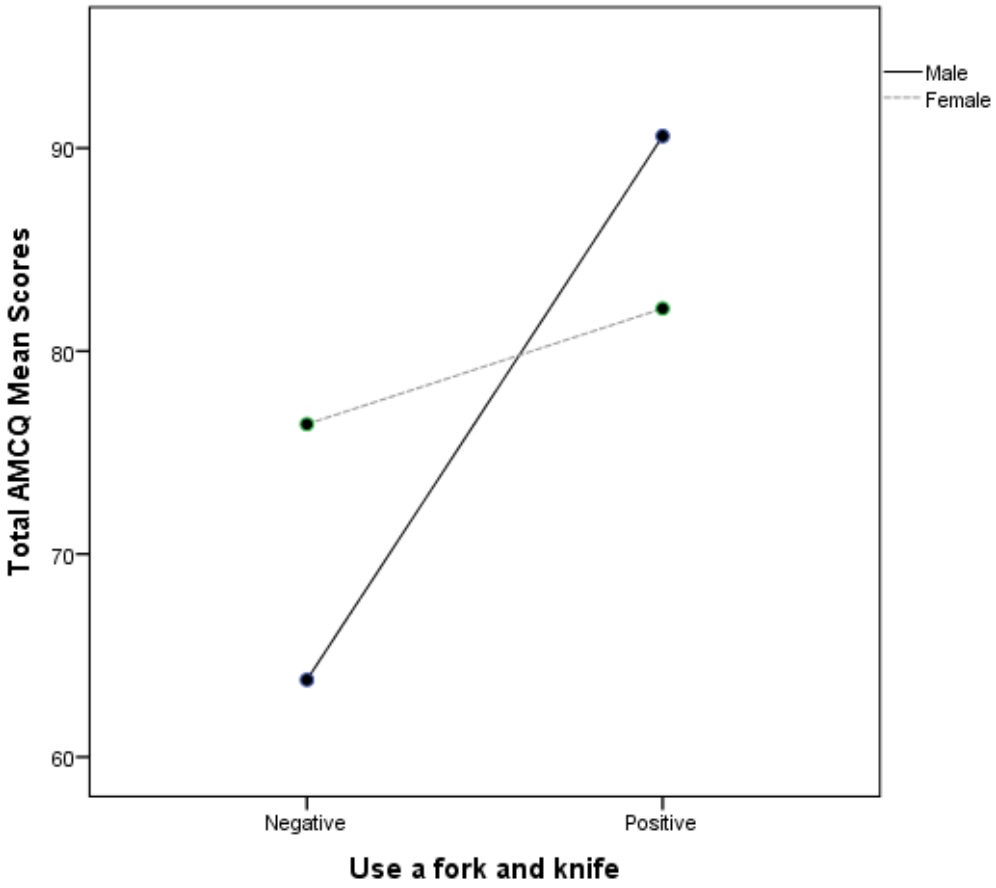

Figure 1.

"Factors Contributing to Australian Adolescents' Self-Report of Their Motor Skill Competence"
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Table 1: F*actor analysis (principal components with varimax rotation) and loading factors of the AMCQ*

Factor	Items	component			
		1	2	3	4
Participation in physical activity and sports	Participate in sports game	,876			
	Hit a ball with bat	,803			
	Kick a ball	,802			
	Participate in sports at school	,792			
	Throw a ball	,728			
	Catch a ball consistently	,717	,315		
	Learn new outdoor games	,653	,304		
	Participate in team sports	,544			
	Ride a bicycle	,427		,303	
	Balance	,348	,345		,330
Activities of Daily Living	Easy to floss teeth		,657		
	Easy to get ready to go out		,664		
	Easy to read handwriting		,637		
	Easy to use scissors		,635		
	Fast handwriting		,578		
	Change clothes easily		,510		
	Walk along a straight line		,485	,381	,314
Public Performance	Do not stumble upstairs			,756	
	People do not say I am clumsy	,338		,636	,400
	Do not break objects		,327	,632	
	Right and left sides identified			,618	
	Use a fork and knife			,592	
Peer comparison	Complete tasks				,688
	Co-ordinated like friends	,472		,317	,548
	Do not think I am clumsy			,401	,484
	Do not come last in a running race				,366
% of variance		20.55	12.36	11.46	7.9

Note: Loadings <.3 have been removed

All items have been changed in to positive worded items

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Table 2: *Mean total AMCQ scores [M(SD)] for positive and negative responses to each item for the total sample (N = 160),and for males (n = 103) and females (n = 57).*

Factor	Item	Response category				Gender	
		Positive	**n**	**Negative**	**n**	**Male**	**Female**
Participation in physical activity and sport	Participate in sports game	89.43 (8.63)	132	72.96 (13.17)	28	80.72 (1.53)	79.70 (1.31)
	Hit a ball with bat	89.93 (8.37)	125	74.49 (12.71)	35	84.17 (1.13)	79.75 (1.25)
	Kick a ball	91.20 (7.22)	112	75.71 (12.09)	48	84.01 (1.08)	82.77 (1.20)
	Participate in sports at school	89.32 (8.91)	131	74.03 (13.15)	29	82.29 (1.45)	79.60 (1.36)
	Throw a ball	89.45 (8.02)	135	70.88 (14.16)	25	82.09 (1.25)	78.15 (1.27)
	Catch a ball consistently	88.90 (8.30)	145	63.87 (12.73)	15	74.82 (1.91)	75.62 (1.45)
	Learn new outdoor games	88.21 (9.21)	149	64.09 (14.85)	11	75.20 (2.06)	75.53 (1.94)
	Participate in team sports	89.22 (9.90)	124	77.36 (11.64)	36	**85.71 (1.19)**	**80.05 (1.35)**
	Ride a bicycle	87.96 (9.91)	149	67.45 (13.64)	11	75.72 (2.44)	77.10 (1.93)
	Balance	87.72 (10.11)	149	70.73 (16.16	11	75.89 (2.94)	78.47 (1.91)
Activities of Daily Living	Easy to floss teeth	88.79 (8.96)	126	78.24 (15.27)	34	**86.30 (1.09)**	**77.96 (1.44)**
	Easy to get ready to go out	88.03 (9.72)	144	73.25 (16.47)	16	**83.24 (1.38)**	**74.82 (1.70)**
	Easy to read handwriting	88.50 (9.30)	111	82.12 (14.29)	49	**88.19 (1.04)**	**79.34 (1.45)**
	Easy to use scissors	89.11 (9.07)	128	76.31 (14.00)	32	**85.43 (1.11)**	**77.94 (1.39)**
	Fast handwriting	88.64 (9.52)	121	80.08 (14.21)	39	**87.10 (1.12)**	**79.43 (1.44)**
	Change clothes easily	88.18 (9.31)	141	74.42 (17.31)	19	**84.09 (1.37)**	**76.84 (1.59)**
	Walk along a straight line	87.90 (10.04)	145	73.53 (15.53)	15	**83.71 (1.60)**	**77.28 (1.66)**
Public Performance	Do not stumble upstairs	88.35 (8.99)	148	64.33 (14.88)	12	**79.12 (1.53)**	**73.10 (1.59)**
	People do not say I am clumsy	88.75 (8.86)	141	70.21 (14.83)	18	81.78 (1.45)	77.40 (1.41)
	Do not break objects	87.97 (9.67)	146	71.79 (17.13)	14	**82.70 (1.53)**	**75.44 (1.71)**
	Right and left sides identified	87.54 (10.01)	149	73.18 (19.44)	11	73.15 (2.88)	80.77 (1.87)
	Use a fork and knife	87.65 (9.93)	150	70.10 (18.62)	10	77.20 (2.25)	79.25 (2.29)
Peer Com-parison	Complete tasks	88.07 (10.18)	136	77.96 (14.18)	24	**85.77 (1.29)**	**78.20 (1.57)**
	Co-ordinated like friends	88.71 (8.80)	144	67.13 (13.98)	16	80.03 (1.52)	76.25 (1.42)
	Do not think I am clumsy	90.46 (8.50)	104	79.29 (12.59)	56	86.79 (1.07)	82.02 (1.31)
	Do not come last in a running race	89.15 (9.35)	103	81.86 (13.26)	57	**88.00 (1.10)**	**81.54 (1.39)**

Bold: Gender difference p<.001

Note: All items have been positively worded

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Table 3: *The number and proportion of positive and negative responses for males (n = 103) and females (n = 57) for each item*

Factor	Item	Gender				
		Male Positive n (%)	Negative n (%)	Female Positive n (%)	Negative n (%)	x^2
Participation in physical activity and sport	Participate in sports game	**93 (91)**	**10 (10)**	**39 (68)**	**18 (32)**	**.001**
	Hit a ball with bat	**89 (86)**	**14 (14)**	**36 (63)**	**21 (37)**	**.001**
	Kick a ball	**88 (85)**	**15 (15)**	**33 (58)**	**24 (42)**	**<.001**
	Participate in sports at school	91 (88)	12 (12)	40 (70)	17 (30)	.005
	Throw a ball	**95 (92)**	**8 (8)**	**40 (70)**	**17 (30)**	**<.001**
	Catch a ball consistently	98 (95)	5 (5)	47 (82)	10 (18)	.009
	Learn new outdoor games	98 (95)	5 (5)	51 (89)	6 (11)	.179
	Participate in team sports	87 (84)	16 (16)	37 (65)	20 (35)	.005
	Ride a bicycle	99 (96)	4 (4)	50 (88)	7 (12)	.046
	Balance	100 (97)	3 (3)	49 (86)	8 (14)	.008
Activities of Daily Living	Easy to floss teeth	79 (77)	24 (23)	47 (82)	10 (18)	.382
	Easy to get ready to go out	91 (88)	12 (12)	53 (92)	4 (7)	.342
	Easy to read handwriting	66 (64)	37 (36)	45 (79)	12 (21)	.048
	Easy to use scissors	83 (81)	20 (19)	45 (79)	12 (21)	.823
	Fast handwriting	78 (76)	25 (24)	43 (75)	14 (25)	.989
	Change clothes easily	92 (89)	11 (11)	49 (86)	8 (14)	.542
	Walk along a straight line	97 (94)	6 (6)	48 (84)	9 (16)	.019
Public Performance	Do not stumble upstairs	98 (95)	5 (5)	50 (88)	7 (12)	.091
	People do not say I am clumsy	**98 (95)**	**5 (5)**	**43 (75)**	**14 (25)**	**<.001**
	Do not break objects	95 (92)	8 (8)	51 (89)	6 (11)	.565
	Right and left sides identified	100 (97)	3 (3)	49 (86)	8 (14)	.008
	Use a fork and knife	98 (95)	5 (5)	52 (91)	5 (8.8)	.334
Peer Com-parison	Complete tasks	88 (85)	15 (15)	48 (84)	9 (16)	.634
	Co-ordinated like friends	**100 (97)**	**3 (3)**	**44 (77)**	**13 (23)**	**<.001**
	Do not think I am clumsy	**78 (75)**	**25 (24)**	**26 (46)**	**31 (54)**	**<.001**
	Do not come last in a running race	74 (72)	29 (28)	29 (51)	28 (49)	.007

Bold: p<.001

Note: All items have been positively worded

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Table 2: *Mean total AMCQ scores [M(SD)] and percentage [n(%)] for positive and negative responses to each item for the total sample (N = 160), males (n = 103) and females (n = 57).*

		Response category						Percentage			
Factor	**Item**	**Total**				**Gender**					
						Male	**Female**	**Male**		**Female**	
		Positive M(SD)	n	Negative M(SD)	n	M(SD)	M(SD)	Positive n (%)	Negative n(%)	Positive n (%)	Negative n(%)
Participation in physical activity and sport	Participate in sports game	89.43 (8.63)	132	72.96 (13.17)	28	80.72 (1.53)	79.70 (1.31)	**93 (91)**	**10 (10)**	**39 (68)**	**18 (32)**
	Hit a ball with bat	89.93 (8.37)	125	74.49 (12.71)	35	84.17 (1.13)	79.75 (1.25)	**89 (86)**	**14 (14)**	**36 (63)**	**21 (37)**
	Kick a ball	91.20 (7.22)	112	75.71 (12.09)	48	84.01 (1.08)	82.77 (1.20)	**88 (85)**	**15 (15)**	**33 (58)**	**24 (42)**
	Participate in sports at school	89.32 (8.91)	131	74.03 (13.15)	29	82.29 (1.45)	79.60 (1.36)	91 (88)	12 (12)	40 (70)	17 (30)
	Throw a ball	89.45 (8.02)	135	70.88 (14.16)	25	82.09 (1.25)	78.15 (1.27)	**95 (92)**	**8 (8)**	**40 (70)**	**17 (30)**
	Catch a ball consistently	88.90 (8.30)	145	63.87 (12.73)	15	74.82 (1.91)	75.62 (1.45)	98 (95)	5 (5)	47 (82)	10 (18)
	Learn new outdoor games	88.21 (9.21)	149	64.09 (14.85)	11	75.20 (2.06)	75.53 (1.94)	98 (95)	5 (5)	51 (89)	6 (11)
	Participate in team sports	89.22 (9.90)	124	77.36 (11.64)	36	**85.71 (1.19)**	**80.05 (1.35)**	87 (84)	16 (16)	37 (65)	20 (35)
	Ride a bicycle	87.96 (9.91)	149	67.45 (13.64)	11	75.72 (2.44)	77.10 (1.93)	99 (96)	4 (4)	50 (88)	7 (12)
	Balance	87.72 (10.11)	149	70.73 (16.16	11	75.89 (2.94)	78.47 (1.91)	100 (97)	3 (3)	49 (86)	8 (14)
Activities of Daily Living	Easy to floss teeth	88.79 (8.96)	126	78.24 (15.27)	34	**86.30 (1.09)**	**77.96 (1.44)**	79 (77)	24 (23)	47 (82)	10 (18)
	Easy to get ready to go out	88.03 (9.72)	144	73.25 (16.47)	16	**83.24 (1.38)**	**74.82 (1.70)**	91 (88)	12 (12)	53 (92)	4 (7)
	Easy to read handwriting	88.50 (9.30)	111	82.12 (14.29)	49	**88.19 (1.04)**	**79.34 (1.45)**	66 (64)	37 (36)	45 (79)	12 (21)
	Easy to use scissors	89.11 (9.07)	128	76.31 (14.00)	32	**85.43 (1.11)**	**77.94 (1.39)**	83 (81)	20 (19)	45 (79)	12 (21)
	Fast handwriting	88.64 (9.52)	121	80.08 (14.21)	39	**87.10 (1.12)**	**79.43 (1.44)**	78 (76)	25 (24)	43 (75)	14 (25)
	Change clothes easily	88.18 (9.31)	141	74.42 (17.31)	19	**84.09 (1.37)**	**76.84 (1.59)**	92 (89)	11 (11)	49 (86)	8 (14)
	Walk along a straight line	87.90 (10.04)	145	73.53 (15.53)	15	**83.71 (1.60)**	**77.28 (1.66)**	97 (94)	6 (6)	48 (84)	9 (16)
Public Performance	Do not stumble upstairs	88.35 (8.99)	148	64.33 (14.88)	12	**79.12 (1.53)**	**73.10 (1.59)**	98 (95)	5 (5)	50 (88)	7 (12)
	People do not say I am clumsy	88.75 (8.86)	141	70.21 (14.83)	18	81.78 (1.45)	77.40 (1.41)	**98 (95)**	**5 (5)**	**43 (75)**	**14 (25)**
	Do not break objects	87.97 (9.67)	146	71.79 (17.13)	14	**82.70 (1.53)**	**75.44 (1.71)**	95 (92)	8 (8)	51 (89)	6 (11)
	Right and left sides identified	87.54 (10.01)	149	73.18 (19.44)	11	73.15 (2.88)	80.77 (1.87)	100 (97)	3 (3)	49 (86)	8 (14)
	Use a fork and knife	87.65 (9.93)	150	70.10 (18.62)	10	77.20 (2.25)	79.25 (2.29)	98 (95)	5 (5)	52 (91)	5 (8.8)
P e a	Complete tasks	88.07 (10.18)	136	77.96 (14.18)	24	**85.77 (1.29)**	**78.20 (1.57)**	88 (85)	15 (15)	48 (84)	9 (16)

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		Response category						Percentage			
Factor	**Item**	**Total**				**Gender**					
						Male	**Female**	**Male**		**Female**	
		Positive M(SD)	n	Negative M(SD)	n	M(SD)	M(SD)	Positive n (%)	Negative n(%)	Positive n (%)	Negative n(%)
	Co-ordinated like friends	88.71 (8.80)	144	67.13 (13.98)	16	80.03 (1.52)	76.25 (1.42)	**100 (97)**	**3 (3)**	**44 (77)**	**13 (23)**
	Do not think I am clumsy	90.46 (8.50)	104	79.29 (12.59)	56	86.79 (1.07)	82.02 (1.31)	**78 (75)**	**25 (24)**	**26 (46)**	**31 (54)**
	Do not come last in a running race	89.15 (9.35)	103	81.86 (13.26)	57	**88.00 (1.10)**	**81.54 (1.39)**	74 (72)	29 (28)	29 (51)	28 (49)

Bold: Gender difference p<.001

Note: All items have been positively worded