Online Appendix C: First to second and third order matrix

Study	I[st] order findings	2[nd] order findings	3[rd] order findings
Berry et al., 1996 [1]	Increased peer interaction and play Independence and freedom Environmental accessibility benefits and difficulties Transportation difficulties can limit use of PWC. Need for follow-up, trials, training, safety and education Children see a PWC as part of themselves Need to consider caregiver's perspective and priorities (recommendation) Therapists and parents have differing perspectives on PM	PM can enhance ability to play PM can increase participation PM can increase independence and freedom PM can increase access to environment although physical environment and transportation difficulties can limit use of PM Others attitudes vary and can limit or enhance PM access and use Training and follow-up are critical to safe and successful use PM can promote psychological, emotional and behavioral development	PM experience can promote developmental change in addition to increasing independent mobility PM can enhance social relationships and the ability to engage in meaningful life experiences Factors in the physical, social and attitudinal environmental can be barriers or facilitators of PM access and use
Durkin, 2009 [2]	PM can facilitate emotional development Therapist attitude can limit or facilitate access to PM Adults can help or hinder learning of PM skills Children learn PM through play and self-directed learning Therapists need to be a 'responsive partner' engaging children in play to facilitate learning Continuum of learning PM skills across three phases Benefits of early mobility experience Expanding understanding wheelchair mobility beyond wheelchair operation to enhancing lifestyle Service delivery impacts PM provision	PM can enhance psychological, emotional and behavioral development Others attitudes vary and can limit or enhance PM access and use PM skills develop through play and self-directed learning across a continuum from early mobility experience through wheelchair operation to enhancing lifestyle Service delivery may limit or enhance PM	PM experience can promote developmental change in addition to increasing independent mobility Factors in the physical, social and attitudinal environmental can be barriers or facilitators of PM access and use
Evans et al., 2007 [3]	Increased independence and participation Improved peer relationships Environmental difficulties Safety issues Transportation difficulties	PM can increase independence and freedom PM can increase participation PM can enhance peer relationships PM can increase access to environment although physical environment and	PM can enhance social relationships and the ability to engage in meaningful life experiences Factors in the physical, social and attitudinal environmental can be barriers or facilitators

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	Need for training in different weather conditions and terrains. PWC features can be barriers or facilitators of use PWC may be a cause of pain PWC provision may benefit caregiver Service delivery influences PWC use PM can increase participation with family	transportation difficulties can limit use of PM PMD features can limit or enhance use PMD can be a cause of pain PM use can benefit caregivers Service delivery may limit or enhance PM use Training and follow-up are critical to safe and successful use	of PM access and use
Frank et al., 2012 [4]	PWC may be a cause of pain Link between pain and posture. PWC features can impact on pain.	PMD features can limit or enhance use PMD can be a cause of pain	Factors in the physical, social and attitudinal environmental can be barriers or facilitators of PM access and use
Frank et al., 2010 [5]	Increased independence and freedom. Decreased physical demands for caregiver. PWC features can be a barrier or facilitator Difficulties with transportation and accessibility Anxiety regarding safety in physical and social environments	PM can increase independence and freedom PM use can benefit caregivers PMD features can limit or enhance use PM can increase access to environment although physical environment and transportation difficulties can limit use of PM	PM experience can promote developmental change in addition to increasing independent mobility Factors in the physical, social and attitudinal environmental can be barriers or facilitators of PM access and use
Gudgeon & Kirk, 2013 [6]	Increased independence Increased participation with other children Increased ability to play with other children Difficulties with transportation and environmental access PWC features can limit use Attitudinal environmental barriers and facilitators Children see the PWC as part of themselves Children enjoy movement and speed for its own sake Keeping safe – fear and anxiety Taking control Importance of a match between user, device and environment	PM can enhance ability to play PM can increase participation PM can increase independence and freedom PMD features can limit or enhance use PM can increase access to environment although physical environment and transportation difficulties can limit use of PM PM can promote psychological, emotional and behavioral development Others attitudes vary and can limit or enhance PM access and use	PM can enhance social relationships and the ability to engage in meaningful life experiences Factors in the physical, social and attitudinal environmental can be barriers or facilitators of PM access and use
Huang et al., 2009 [7]	Increased participation at school with peers Improved peer relationships Able to play and join in games Environmental factors affect use of assistive	PM can increase participation PM can enhance ability to play PM can enhance peer relationships PM can increase access to environment	PM can enhance social relationships and the ability to engage in meaningful life experiences Factors in the physical, social and attitudinal

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	devices (physical and attitudinal) discussion on attitude not relating to PM specifically	although physical environment and transportation difficulties can limit use of PM	environmental can be barriers or facilitators of PM access and use
May & Rugg, 2010 [8]	Environmental influences (physical and attitudinal) Increased happiness Increased social participation Mobility facilitates independence. attitudinal environment quotes not related to child	PM can increase access to environment although physical environment and transportation difficulties can limit use of PM PM can increase independence and freedom PM can increase participation PM can promote psychological, emotional and behavioral development	PM experience can promote developmental change in addition to increasing independent mobility PM can enhance social relationships and the ability to engage in meaningful life experiences Factors in the physical, social and attitudinal environmental can be barriers or facilitators of PM access and use
McGarry et al., 2012 [9]	Increased confidence, motivation and positive affect Increased vocalization, ability to play, arm and hand use PM use associated with change in parental attitude Increased independence Increased head up and looking in direction of movement Smart wheelchair features enhanced learning	PM can promote psychological, emotional and behavioral development PM can increase ability to play PM can promote self-initiated communication and motor development PM can increase independence and freedom PMD features can limit or enhance use PM use can change attitudes of others	PM experience can promote developmental change in addition to increasing independent mobility PM can enhance social relationships and the ability to engage in meaningful life experiences Factors in the physical, social and attitudinal environmental can be barriers or facilitators of PM access and use
Nilsson & Nyberg, 2003 [10]	Increased wakefulness and alertness Improved response to external stimuli Change in affect Increased use of hands and arms Increased understanding of cause-effect Increased head up and looking in direction of movement	PM can promote psychological, emotional and behavioral development PM can promote self-initiated communication and motor development	PM experience can promote developmental change in addition to increasing independent mobility
Skar, 2002 [11]	Using PWC to participate in play with other children Caregivers may be a barrier or facilitator of play Physical environment barriers (playground) Children see technical aids as a part of themselves.	PM can enhance ability to play PM can increase participation PM can increase access to environment although physical environment and transportation difficulties can limit use of PM PM can promote psychological, emotional and behavioral development	PM experience can promote developmental change in addition to increasing independent mobility PM can enhance social relationships and the ability to engage in meaningful life experiences Factors in the physical, social and attitudinal environmental can be barriers or facilitators of PM access and use

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Wiart et al., 2004 [12]	Dealing with the child's disability – PM as a 'last resort' Change in parental attitude and response PM enables increased independence and personal control Increased ability to play Difficulty with environmental barriers and transportation Positive effect of child's use of PM on societal attitudes Professional attitudes can be barriers to PM More meaningful relationships with peers Increased participation in age appropriate activities PM enables engagement in meaningful life experiences Parent and therapist attitudes differ	PM can increase access to environment although physical environment and transportation difficulties can limit use of PM PM can increase independence and freedom PM can increase participation PM can enhance peer relationships Others attitudes vary and can limit or enhance PM access and use PM use can change attitudes of others PM can enhance ability to play	PM can enhance social relationships and the ability to engage in meaningful life experiences Factors in the physical, social and attitudinal environmental can be barriers or facilitators of PM access and use
Benedict et al., 1999 [13]	Mobility devices can increase social interaction with siblings and peers. Use of a PWC can reduce caregiver burden. Increased environmental access and exploration. Increased independence Increased self-confidence, autonomy, accomplishment and self-identity	PM can increase access to environment although physical environment and transportation difficulties can limit use of PM PM can increase participation PM can increase independence and freedom PM can promote psychological, emotional and behavioral development PM use can benefit caregivers	PM experience can promote developmental change in addition to increasing independent mobility PM can enhance social relationships and the ability to engage in meaningful life experiences Factors in the physical, social and attitudinal environmental can be barriers or facilitators of PM access and use
Bottos et al., 2001 [14]	Parent views changed after provision of PWC. Improvement in child behavior (energy and affect) Increased independence	PM can promote psychological, emotional and behavioral development PM can increase independence and freedom PM use can change attitudes of others	PM experience can promote developmental change in addition to increasing independent mobility Factors in the physical, social and attitudinal environmental can be barriers or facilitators of PM access and use
Douglas & Ryan, 1987 [15]	Increased perceptual awareness and visual memory Increased confidence, initiation and sense of responsibility	PM skills develop through play and self-directed learning across a continuum from early mobility experience through wheelchair operation to enhancing lifestyle	PM experience can promote developmental change in addition to increasing independent mobility PM can enhance social relationships and the

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	Enhanced language development Increased independence and exploratory behaviors Testing boundaries of behavior Increased directional control over wheelchair Increased social interaction	PM can promote psychological, emotional and behavioral development PM can promote self-initiated communication and motor development PM can increase independence and freedom PM can increase participation	ability to engage in meaningful life experiences
Everard, 1984 [16]	Increased assertiveness and confidence. Developed concept of danger. Increased activity level. Increased positive self-image. Increased participation and more typical peer relationships. Increased ability to play. Testing boundaries of behavior. Incentive to walk unaffected or even increased. Positive effect of child's use of PM on others' attitudes.	PM can promote psychological, emotional and behavioral development PM can promote self-initiated communication and motor development PM can enhance peer relationships PM can increase participation PM can increase independence and freedom PM can enhance ability to play PM use can change attitudes of others	PM experience can promote developmental change in addition to increasing independent mobility PM can enhance social relationships and the ability to engage in meaningful life experiences Factors in the physical, social and attitudinal environmental can be barriers or facilitators of PM access and use
Horne & Ham, 2003 [17]	Improved quality of life for child and family Increased independence and freedom. Improved attitude of others towards the child Increased confidence, motivation, happiness and decreased frustration. Increased integration and participation with other children and in family life. Increased participation in games and activities and increased communication. Environmental accessibility benefits and difficulties Concerns re appropriateness of equipment, training, safety, need for follow-up and service delivery process Therapist attitude can limit or enhance PM access PMD features can limit use	PM can increase access to environment although physical environment and transportation difficulties can limit use of PM PM can promote psychological, emotional and behavioral development PM can promote self-initiated communication and motor development PM can increase participation PM can increase independence and freedom PM can enhance ability to play PM use can benefit caregivers PM use can change attitudes of others Service delivery may limit or enhance PM use Training and follow-up are critical to safe and successful use Others attitudes vary and can limit or enhance PM access and use PMD features can limit or enhance use	PM experience can promote developmental change in addition to increasing independent mobility PM can enhance social relationships and the ability to engage in meaningful life experiences Factors in the physical, social and attitudinal environmental can be barriers or facilitators of PM access and use
Jones et al., 2003 [18]	Testing boundaries of behaviour Increased independence	PM can promote psychological, emotional and behavioural development PM can increase independence and freedom	PM experience can promote developmental change in addition to increasing independent mobility
Nisbet et al.,	Increased confidence, positive affect and	PM skills develop through play and self-	PM experience can promote developmental

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1996 [19]	motivation Increased vocalization, curiosity and assertiveness Increased ability to play and participate in games and outings. Increased participation with other children Increased hand function and use Increased cause-effect Child sees PM as part of himself Increased directional control over wheelchair Smart wheelchair features enhanced learning	directed learning across a continuum from early mobility experience through wheelchair operation to enhancing lifestyle PM can promote self-initiated communication and motor development PM can promote psychological, emotional and behavioral development PM can enhance ability to play PM can increase participation PMD features can limit or enhance use	change in addition to increasing independent mobility PM can enhance social relationships and the ability to engage in meaningful life experiences
Nisbet, 2002 [20]	Increased directional control over wheelchair Improved cause-effect Improved sleeping, eating, gaining weight, increased initiation/less passive Improved grasp Improved attitudes of others towards the child Increased participation with peers in school and outings Therapist attitude can impact on PM provision Smart wheelchair features enhanced learning	PM skills develop through play and self-directed learning across a continuum from early mobility experience through wheelchair operation to enhancing lifestyle PM can promote self-initiated communication and motor development PM can promote psychological, emotional and behavioral development PM can increase participation PMD features can limit or enhance use Others attitudes vary and can limit or enhance PM access and use	PM experience can promote developmental change in addition to increasing independent mobility PM can enhance social relationships and the ability to engage in meaningful life experiences Factors in the physical, social and attitudinal environmental can be barriers or facilitators of PM access and use
Wiart et al., 2003 [21]	Increased confidence and self-esteem Increased freedom. Enhanced participation with peers. Physical access and transportation difficulties Children see PWC as part of themselves Therapist and parents have differing perspectives on PM Parents report joy in watching child move freely to play with others Lack of accessibility linked to societal attitudes towards people with disabilities	PM can increase access to environment although physical environment and transportation difficulties can limit use of PM PM can promote psychological, emotional and behavioral development PM can increase participation PM can increase independence and freedom Others attitudes vary and can limit or enhance PM access and use	PM experience can promote developmental change in addition to increasing independent mobility PM can enhance social relationships and the ability to engage in meaningful life experiences Factors in the physical, social and attitudinal environmental can be barriers or facilitators of PM access and use

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