Use of Commercial Gaming Devices for Stroke Upper Limb Rehabilitation

Katie Thomson
Occupational Therapy Lecturer – Glasgow Caledonian University & PhD Student

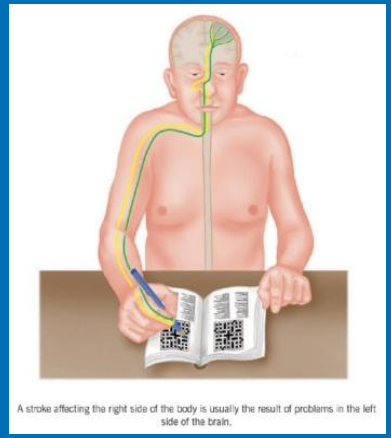
Glasgow Caledonian University

Overview of Presentation

- Topic choice
- Methods
- Brief overview of 3 components of PhD
- Next steps

GCU
Glasgow Caledonian University

Stroke Impact – Upper Limb


A stroke affecting the right side of the body is usually the result of problems in the left side of the brain.

- Stroke can damage motor cortex
- Up to 70% of stroke survivors have initial difficulty using upper limb
- 33% still have difficulty at 6 months
- Major impact on ability to perform everyday activities & quality of life – top research priority

GCU
Glasgow Caledonian University

James Lind Alliance

- Established Top 10 research priorities with stroke survivors, carers, health professionals and researchers

1. What are the best ways to improve cognition after stroke?
2. What are the best ways of helping people come to terms with the long term consequences of stroke?
3. What are the best ways to help people recover from aphasia?
4. What are the best treatments for arm recovery and function?

GCU Glasgow Caledonian University

Upper Limb Rehabilitation

- Brain can create new pathways for recovery of movement
- Intensive, repetitive and functionally relevant movements required
- Barriers include time & monotony

GCU Glasgow Caledonian University

Armeo device

http://www.hocoma.com/media-center/media-images/armeo-manovo/

Glasgow Caledonian University

Commercial gaming devices – Nintendo Wii

GCU
Glasgow Caledonian University

Research Questions

Is the use of commercially available gaming an effective intervention?

How are therapists using commercially available gaming for stroke upper limb rehabilitation?

What are stroke survivors experiences of using commercially available gaming consoles within their stroke upper limb rehabilitation?

GCU
Glasgow Caledonian University

Mixed Methods Sequential Triangulation Design

GCU Glasgow Caledonian University

Systematic Review

Participants: Adult Stroke Survivors with an upper limb impairment

Interventions: Commercial gaming device

Outcomes: Activities of Daily Living

Upper Limb Function

Upper Limb Movement

Study Design: All research studies included

GCU Glasgow Caledonian University

Literature Search

Identification

- 4562 Titles
- Databases: Medline, Embase, Cinahl, Amed, PsychINFO, BNI, PsychBITE etc

Screening

- 61 Abstracts Screened
- 44 Full Text Papers

Eligibility

- 19 Studies Included
- 7 Included Qualitative Data

GCU Glasgow Caledonian University

Quantitative Study Criteria	Yavuzer 2008 (22)	Saposnik 2010 (23)	Manlapaz 09 (24)	Santos 2007 (25)	Rand 2008 (26)	Sevier 2009 (27)	Yong 2010 (28)	Christie 2010 (29)	Young 2010 (30)	Mouwad 2011(31)	Hijmans 2011 (32)	Combs 2012 (33)	Neil 2012 (34)	Flynn 2007 (35)	Lange 2009 (36)	Brosnan 2009 (37)	Trotti, 2009 (38)	Proffitt 2011 (39)	Qualitative Study Criteria	Celinder 2012 (40)
Method of participant recruitment (selection bias)	+	+	?	+	-	-	+	+	?	+	-	-	?	+	?	?	?	?	Recruitment appropriate to aims of research	+
Masking of outcome assessors (detection bias)	+	+	?	-	-	-	-	-	-	-	–	+	-	-	-	-	-	-	Researcher/Participant Relationship (researcher bias/confirmability)	-
Method of dealing with incomplete o or missing data (attrition bias)	-	+	+	+	+	?	?	?	?	+	?	-	+	-	?	?	?	?	Data Analysis sufficiently rigorous (credibility)	?
Other bias (e.g. performance bias, reporting bias, other potential threats to validity)	+	+	?	-	-	-	-	?	?	-	-	-	?	+	+	+	-	-	Other Issues (dependability/ transferability)	+
Type of Study	RCT	RCT	RCT	Case Control	Cohort	Cohort	Cohort	Cohort	Cohort	Cohort	Cohort	Cohort	Cohort	Case Report	Case Report	Case Report	Case Report	Case Report		Qualitative

Key:

Low risk of bias

Unclear

High risk of bias

GCU Glasgow Caledonian University

Systematic Review

- 19 studies & 215 participants
- Small scale feasibility studies
- No generalisable conclusions
- Trend towards improvement for UL Function/Movement
- 180 minutes of gaming per week

GCU Glasgow Caledonian University

Qualitative Themes

- Variety
- Engagement
- Challenges
- Rehabilitation Impact
- Games
- Skills required

- Thomson et al, 2014 – International Journal of Stroke

GCU Glasgow Caledonian University

Scottish Survey

- 127 Surveys sent to 70 stroke services (14 Health Boards)
- 88% return rate (112/127)
- 18% therapists reported to be using gaming for stroke UL rehab
- 61% therapist would use it
- Nintendo Wii with Wii Sports – 30 mins once or twice per week
- Individual basis, mild upper limb impairment, < 6 months
- 51% therapists reported adverse events

GCU
Glasgow Caledonian University

Why did therapists use gaming devices?

- Fun & meaningful activity
- Socialisation
- Practising movements
- Self- practice

GCU Glasgow Caledonian University

Perceived barriers to use

- Lack of evidence base
- Unfamiliarity for older stroke survivors
- Organisational barriers
- Games too difficult for rehabilitation
- Games not functional

- Thomson et al, 2015 – Disability & Rehabilitation: Assistive Technology

GCU Glasgow Caledonian University

Qualitative Study

- Data Collection – Individual semi-structured interviews
- Sample Size – 12 Stroke Survivors (9 used gaming & 3 declined)
- 3 NHS Boards across central Scotland
- Ethical / R & D Approval

GCU Glasgow Caledonian University

Types of Players & Main Purpose of Playing

- Enthusiastic Players – enjoyed gaming, played for longer, had clear rehabilitation goals
- Unenthusiastic Players – didn't enjoy gaming but did so at therapist's request, played for short periods of time only
- **Main purpose of Playing:**
  - Rehabilitation
  - Entertainment
- Subsidiary purpose:
  - Leisure activity
  - Relationships

GCU Glasgow Caledonian University

Subsidiary purpose:

- Leisure activity

- ***“It's great fun so my objective, that's my Christmas present, a new Wii and so we'll have that for the family coming over” (Participant 8, new to gaming, enthusiastic player).***

Glasgow Caledonian University

Subsidiary purpose:

- Relationships

"My younger daughter and her husband had come up to see me the first weekend that I was back home after the hospital, we had a rare old time playing games on the Wii, I've got friends that will play with the Wii and they are round and instead of playing cards or playing board games they will play a game of golf, you could turn it into something absolutely marvellous in terms of the entertainment" (Participant 8, new to gaming, enthusiastic player).

GCU Glasgow Caledonian University

Themes:

- Gamification – Mastery, Competition & Success

- ***"I want to play good so it gives you an interest in trying to get a good score. Competition is important, I have a high score that I try to beat, it's not the main purpose of using the Wii but it gives you an added incentive" (Participant 3, gaming pre-stroke, enthusiastic player).***

GCU Glasgow Caledonian University

Theme

- Sports

- ***“I think it's a fantastic idea, it gives people an interest. The games are quite good. You can play in your own home any time. You don't need to be a professional. Golf is great. It's more for people who have done sports before. For me it's more natural, playing sports helped” (Participant 2, new to gaming, enthusiastic player).***

Glasgow Caledonian University

Theme

- Innovation

- ***“It's all new technology, I suppose it's why it hasn't been used because it is new isn't it and everybody is just getting used to it now” (Participant 9, new to gaming, enthusiastic player).***

Glasgow Caledonian University

Triangulation – work in progress

- Interpretation of components to gain a more complete picture

- Convergence Coding Matrix:
  - Agreement
  - Partial agreement
  - Silence
  - Dissonance

GCU
Glasgow Caledonian
University

https://www.youtube.com/watch?v=Sk53cBpZ_Ik

Thanks for listening!

Katie.thomson@gcu.ac.uk

GCU
Glasgow Caledonian University

Points for Discussion

- Is commercial gaming being used for rehabilitation in your country?
- What do you think are the advantages & disadvantages?
- The focus of this session has been on upper limb rehabilitation, could it be used for other treatment aims?

GCU Glasgow Caledonian University