Games for Rehabilitation
Sheryl Flynn PT, PhD
Belinda Lange Physio, PhD
Tuesday, June 29 from 3:00-4:15pm.

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Using video games for rehabilitation purposes combines innovative computer technology with contemporary rehabilitation and neuroplasticity theories. With technological advances video games can now be played with little active movement and minimal fine motor control. These games are motivating and fun while simultaneously pushing the brain and body to recover. The purpose of this presentation is to provide the audience with 1) provide a review of relevant literature in support of video games for rehabilitation, 2) discuss current off the shelf video games and controllers appropriate for rehabilitation, and 3) provide explicit examples of use of games in the clinic.

I. Review of relevant literature in support of video games for rehabilitation
   1. Video Games for Rehabilitation Reviews
      c. Deutsch & Mirelman Topics in Stroke Rehab 2007
      d. Henderson et al Topics in Stroke Rehab 2007
      e. Adamovich et al, Neurorehabilitation 2009
      f. Special Issue of Physical Therapy Reviews (PTR) October 2009
   2. Evidence
      a. Physiology/Energy Expenditure in Adolescent

b. Balance, Strength and Flexibility
i. Nitz (2009) Climacteric
ii. The Validity of the WiiFit™ Single Limb Stance Test for Use as an Assessment Tool in Typically Developing Children Ages 4-10; a Pilot Study M. Schlueter; A. Myers; J. Schlick; A. McAlister; S. A. Ross

b. Balance and Mobility Post Stroke
i. Sugarman IVR 2009
ii. Deutsch IVR 2009
iii. S. L. Fritz; E. Rivers; A. Merlo-Rains; B. M. Duncan Examining the effect of commercially available video game systems, the Nintendo Wii and Sony PlayStation 2, on balance and mobility in individuals with chronic stroke.
iv. J. C. Wang; B. Crowner Effects of the Wii and Wii Fit on Outcomes in an Individual with Chronic Stroke

d. Pediatrics
i. Deutsch et al Use of a Low-Cost, Commercially Available Gaming Console (Wii) for Rehabilitation of an Adolescent With Cerebral Palsy PTJ 88(10) 1196-1207.
ii. T. L. Millard; D. M. Hayes; J. Martin; B. Woods; A. Weigel Using the Nintendo Wii Fit and Body Weight Support (BWS) to Promote Improvement in Oxygen Uptake Efficiency Slope (OUES) and Economy of Movement in an Adolescent with Cerebral Palsy: A Case Report
iii. K. Nelson; S. Pladera; K. Seidl; J. A. Furz The Effects of a WiiFit Intervention on Balance Performance of a Child With Cerebral Palsy


e. Older Adults
   i. Rand D, Kizony R, Weiss PT The Sony PlayStation II EyeToy: Low Cost virtual reality for use in rehabilitation 2008, JNPT

f. Brain Injury
   i. K. E. Scholl; K. Shields Incorporating the Use of the Nintendo Wii to Achieve Functional Outcomes in a Patient with a Brain Injury: A Case Report
   ii. M. Garrett; D. O’Connell; L. Duncan; A. Smith The Effect of Wii Game on Psychomotor Fitness in an Adolescent Male with Hypoxic Ischemic Encephalopathy (HIE).

g. Burns

h. Adverse Events
   ii. Wells JJ Hit by her brother: , J Trauma. 2008 Nov;65(5):1203

i. Gender Studies

j. User Study
   ii. Reliability and Validity of the Nintendo Wii Fit™ L. Z. Gras; E. Hine; A. Hummer

k. Promised Evidence
   i. Auburn U Elderly http://www.youtube.com/watch?v=NYZGixqKTIU
   ii. Ole Miss- Families and Physical Activity http://www.youtube.com/watch?v=4JP0zY9Zssw
   iii. Teaching your Mom http://vimeo.com/6619561

l. Participation and Screen Time
m. Comparison between traditional and video game based therapy
   i. Brumels et al Clinical Kinesiology 2008
n. Modified or non-commercial DDR

II. Discuss current off the shelf video games and controllers appropriate for rehabilitation
A. Gesture Based
   a. Hand Controllers
      i. Nintendo Wii-mote/Nunchuck
      ii. Move Project (Sony PS3)
   b. Wii Fit board(Nintendo)
   c. Sensorless Motion Capture
      i. EyeToy (Sony PS2)
      ii. Project Natal (Microsoft Xbox 360)

B. Standard controllers
   a. Key Board
   b. Mouse
   c. One Switch
   d. Novint Falcon

C. Dance Pads
   a. Soft Dance Pads
      i. Game Cube
      ii. Wii
      iii. PlayStation, PlayStation 2, PlayStation 3, Xbox
      iv. PC/Computer interface (StepMania)- uses special adapters
   b. Hard Dance Pads
i. Dance Platform connected to arcade games
   ii. iDance
      c. Solid State Pads
         i. Use sensors to detect players location, not pressure
D. Plug and Play
   a. UDance
   b. TV Plug-N-Play iSport Interactive Game
   c. TV Plug-N-Play Blue Advanced Two-Player Dance Pad
      Dance Party Mix 16-Bit Graphics TV Twin Pro Two-Player
      Plug-N-Play Dance Pad with AC Adapter
   d. Xtreme Fit
   e. Plug n Play Interactive Fitness Kick Boxing Game
   f. TV Whac-A-Mole Game
E. Guitar Hero/DJHero
F. Tony Hawk Ride
G. Footgaming (http://www.footgaming.com/)
H. Just Dance
I. Future Games/Exergames/RehabGames
   a. Wii Cyber Bike
   b. EyeToy PS3
   c. Microsoft Project Natal
   d. Honda Bicycle Simulator
J. Virtual Reality - Gaming Systems for the Clinic and Home
   a. Virtual Reality Augmented Bicycle Kit
   b. PS3 and Telerehab
III. Explicit examples of use of games in the clinic.
   A. Multiple Videos/Pictures for discussion- most videos and pictures are available for viewing on www.games4rehab.org Use tag word RESNA.

FYI- Ways to keep current
REFERENCES

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**REFERENCES Wii**


**REFERENCES PLASTICITY**


REFERENCES EYETOY


**REFERENCES DDR**


