Use of Virtual World Technology for Health Behavior Change

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Health Behavior Change and Virtual Technology

VALUE

- Able to modify "time"

- Able to interact in real time

- User can access the community or health care professional from anywhere regardless of ability or resources beyond a computer and internet access.

- Can experience virtual (vicarious) effects of behaviors on future health without actual increased risk to health

- Can participate in support communities

- Allows for anonymity and interactivity

Overview of Research

1. Ahn (2014): *Incorporating Immersive Virtual Environments in Health Promotion Campaigns: A Construal Level Theory Approach*.

Used immersive virtual environment to virtually simulate sugar sweetened beverage (SSB) consumption and weight gain. Outcome measure was actual SSB consumption and intention to consume comparing tailored vs untailored messaging. Results indicated that using IVEs to depict the negative future consequences of SSB consumption was effective in reducing soft drink consumption 1 week following experimental treatments but no immediate effects of the IVE on intention to consume SSB's.

2. Norris, J. (2009). *The growth and direction of healthcare support groups in virtual worlds.*

Explored the Use of Second Life, IMVU, there.com,& Kaneva for social support. 162 different groups. Found they were particularly valuable for "niche communities" (rare health conditions or unique approaches to conditions).

Research overview cont'd

3. Behm-Morawitz, E. Mirrored selves: The influence of self-presence in a virtual world on health, appearance, and well-being.

Examined the role of self-presence in SL on offline health, appearance, and well-being (N=279). Results showed that virtual world users who reported higher levels of self-presence were more likely to report that they had begun exercising and dieting because of their experiences with their avatar.

4. Johnston, JD, Massey, AP, DeVaneaux, CA. (2012) Innovation in weight loss programs: A 3-dimensional virtual-world approach. Explored the effectiveness of a 12 wk SL weight loss program relative to weight loss and behavior change. (N=54, overweight) Face to Face vs. SL groups. Weight, BMI, health behaviors (ie,self-efficacy, physical activity, fruit and vegetable consumption). Both groups had significant weight loss. No difference between groups. Significant improvements across *all* of the variables for the virtual-world group.

What is

SECOND LIFE

?

http://www.secondlife.com

- Online virtual world (Developed in 2003)
- Inhabited by millions of residents from around the world with an estimated 1 million regular monthly users.
- Web 2.0 social networking technology
  - Simultaneously shared space
  - Fosters real time social interaction
  - Gives users a sense of presence
  - Self representation through the creation and use of 3-D Avatars

Communication in SL

Multiple Mechanisms

Text and Voice **Chat** (recorded text logs)

Streaming Audio and Video

Virtual libraries

Live **events**: concerts, lectures, classes

Note cards & Objects
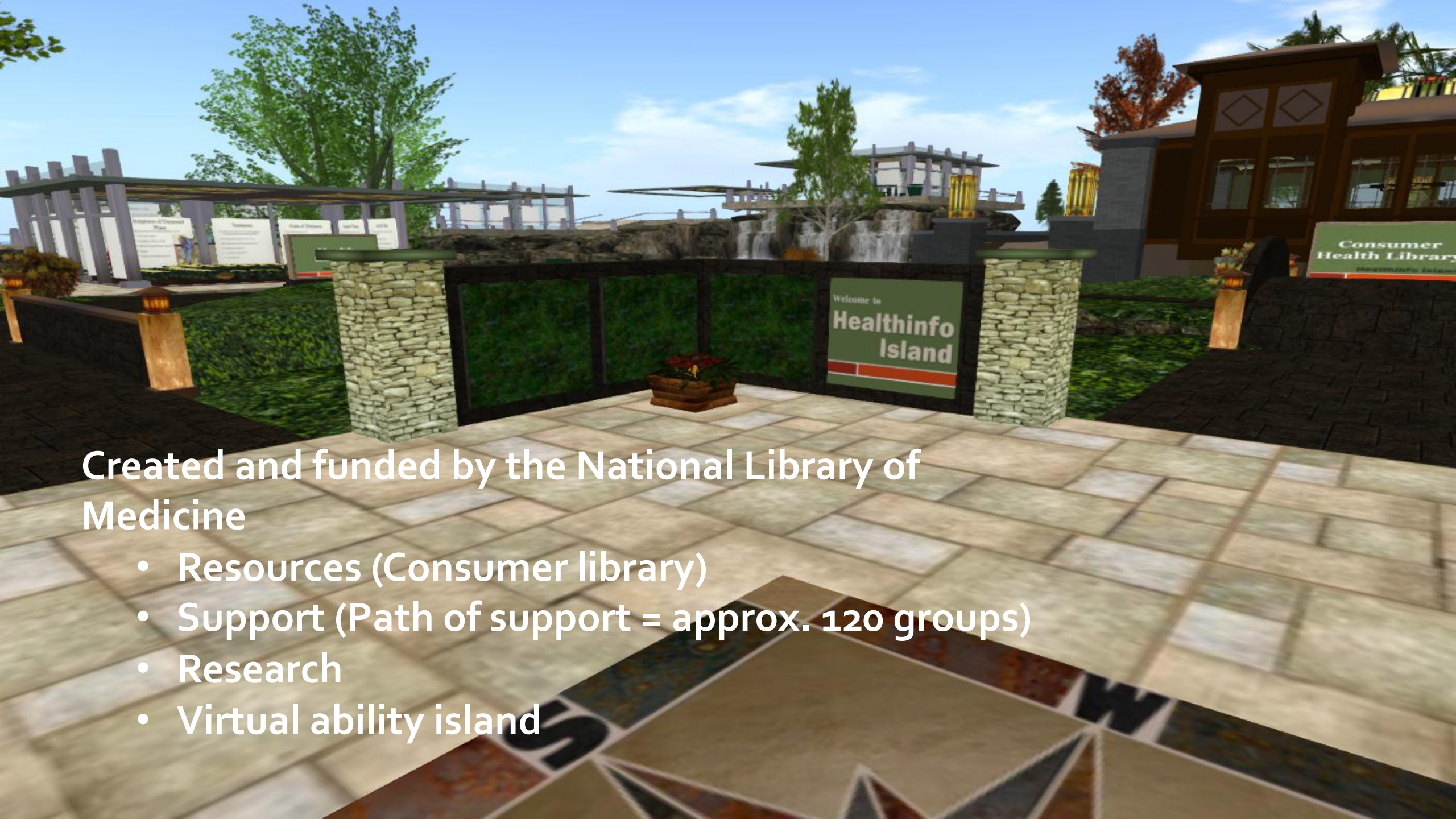
Health in Second Life

Health Info Island

NLM

CDC

Created and funded by the National Library of Medicine
- Resources (Consumer library)
- Support (Path of support = approx. 120 groups)
- Research
- Virtual ability island

http://maps.secondlife.com/secondlife/Healthinfo%20Island/128/127/24

Using On-line Virtual Worlds to Encourage Healthy Lifestyle Choices Among College Students

- Purpose
  - To examine the use of Second Life for the delivery of health communication messages designed to encourage individuals to make healthy lifestyle choices regarding physical activity and nutrition.
  - Primary outcomes
    - Usability
    - Participant satisfaction
    - Change in health behavior theory constructs (stage of change, motivation, self-efficacy, intention)
  - Secondary outcomes
    - Body image and body ratings of self and avatar

Cowdery, J.E., Kindred, J., Michalakis, A., & Suggs, L.S. (2011) Promoting health in a virtual world: Impressions of health communication messages delivered in Second Life. *First Monday*, Volume 16,9 – 5.

Methodology

- **40** University students recruited through classes and flyers. No prior SL experience.

- Participants attended an **orientation session** where they created their Avatar and completed a **pre-test** assessment

- They then attended a brief (15 min) **health education intervention** in Second Life.

- Participants completed a **post-test** survey and were asked to attend a **focus group** to discuss the experience (conducted in real world and SL).

Intervention Space

- Open air amphitheater
- Owned by NMC (New Media Consortium)
- Common area on Education Island
- Lecturer: Health Educator Avatar, "Ms. Howlett"
- Communication:
  - 'Chat' feature: type with text appearing on screen

http://maps.secondlife.com/secondlife/Teaching%206/149/161/21
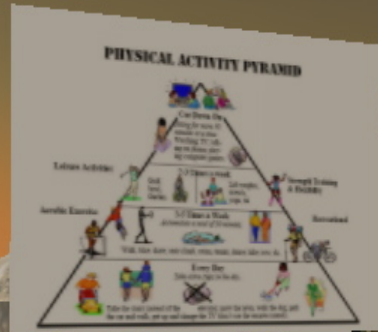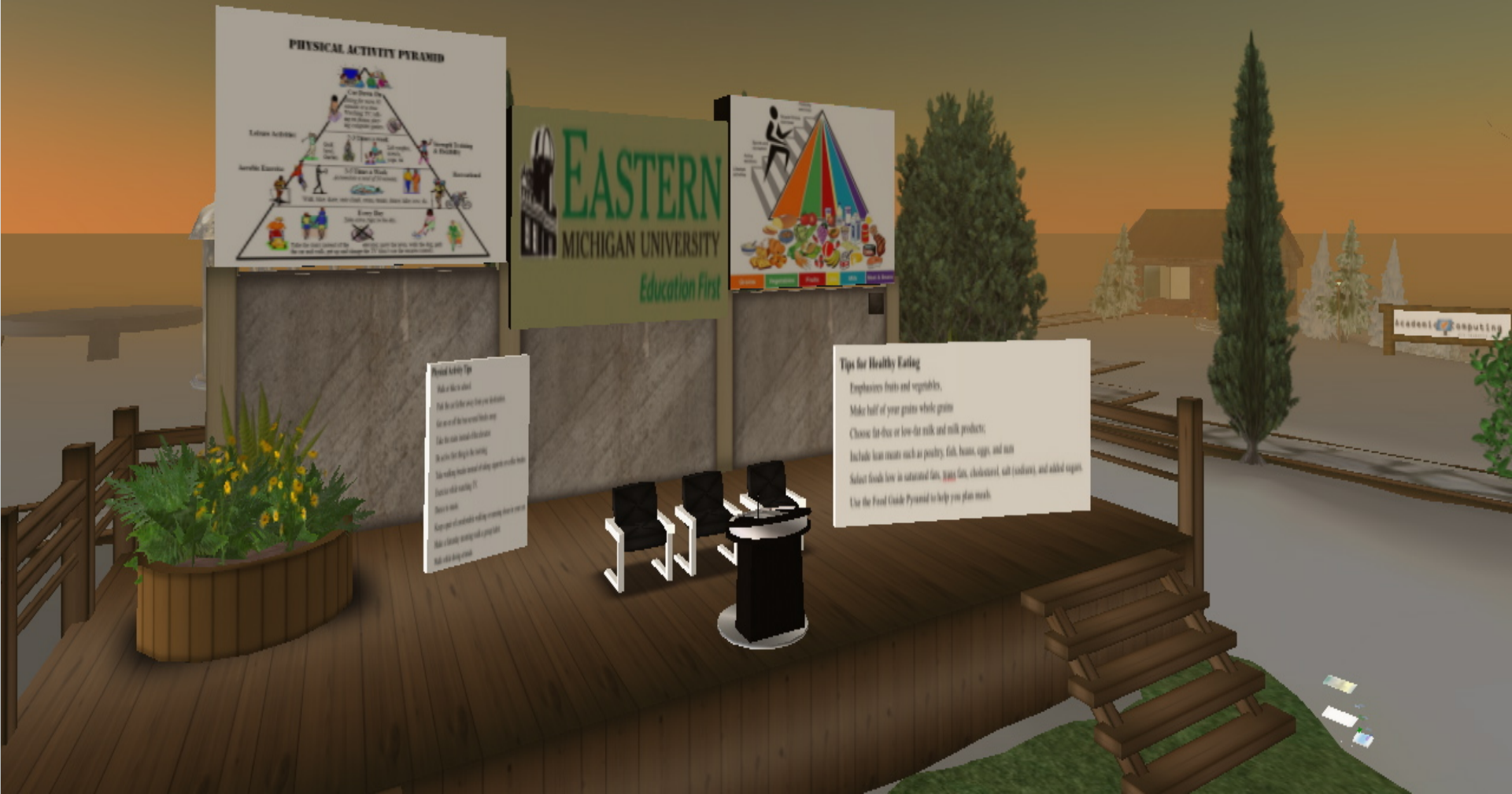
Intervention

- Lecture: 15 minutes
  - Covered physical activity and nutrition
    - Recommendations and guidelines
    - Tips
  - Approximately 10 min Q & A & Discussion

- Interactive signs: allowed for a closer look

- Note cards: to keep sign information in avatar's inventory

The Health Educator: Ms. Howlett

EMU Stage and Signs

Intervention Session

Focus Group Interviews

Results
Sample Demographic Characteristics

N=40

Gender

- Male 37.5% (n=15)
- Female   62.5% (n=25)

Race

- African-American 32.5% (n=13)
- Caucasian 57.5% (n=23)

Age

X = 22.2 yrs, SD = 2.9

Range 18-31 yrs

Results

- Application of information to real life - Diet

Diet	Female N (%)	Male N (%)	Total N (%)
Strongly disagree	0	0	0
Somewhat disagree	0	1 (6.7)	1 (2.5)
Disagree	4 (16.0)	0 (0.0)	4 (10.0)
Somewhat agree	12 (48.0)	9 (60.0)	21 (52.5)
Strongly agree	9 (36.0)	5 (33.3)	14 (35.0)

I thought about the health information I received regarding nutrition as it applies to my real life eating habits. (strongly disagree – strongly agree)

Results

- Application of information to real life – Physical Activity

Physical Activity	Female N (%)	Male N (%)	Total N (%)
Strongly disagree	0	0	0
Somewhat disagree	0	0	0
Disagree	4 (16.0)	0 (0.0)	4 (10.0)
Somewhat agree	12 (48.0)	11 (73.3)	23 (57.5)
Strongly agree	9 (36.0)	4 (26.7)	13 (32.5)

I thought about the health information I received regarding physical activity as it applies to my real life activity habits. (strongly disagree-strongly agree)

Results

- Self-Efficacy Dietary Behaviors

"As a result of the SL program, how confident do you feel that you can…"

Item (moderate to completely confident)	Pretest n (%)	Post-test n (%)	Δ in %	P-value*
Find appropriate online resources.	28 (70.0)	32 (82.1)	+12.1	0.060
Prepare a healthy meal.	25 (62.5)	27 (69.2)	+6.7	0.000
Choose healthy foods when eating out.	26(65.0)	24 (63.2)	-1.8	0.199
Follow a healthful diet when with others.	18 (45.0)	25 (64.1)	+19.1	0.020

*Pearson Chi-square
Original 5 pt. Likert Scale from "Not at all confident" to "Completely confident" recoded into
 "Not Confident" and "Confident".

Results

- Self-Efficacy Physical Activity Behaviors

"As a result of the SL program, how confident do you feel that you can be physically active when…"

Item (moderate to completely confident)	Pretest n (%)	Post-test n (%)	Δ in %	P-value*
You don't have anyone to exercise with	20 (50.0)	25 (64.1)	+14.1	0.000
You feel tired	8 (20.0)	14 (35.9)	+15.9	0.001
You haven't been exercising regularly	17 (42.5)	25 (64.1)	+21.6	0.006
You can't find an activity you enjoy	11 (27.5)	17 (43.6)	+16.1	0.000
It's raining or snowing	10 (25.0)	13 (34.2)	+9.2	0.005
Your schedule is not consistent	10 (25.0)	16 (41.0)	+16.0	0.004

*Pearson Chi-square
Original 5 pt. Likert Scale from "Not at all confident" to "Completely confident" recoded into "Not Confident" and "Confident".

Results

- Motivation

"On a scale from 1 to 10, how motivated are you…"

Motivation (1-10 scale)	Mean Pre-test	Mean Post-test	P-value*
To improve eating habits	X=7.07 (sd 1.8)	X=7.15 (sd 1.6)	.878
To increase physical activity	X=6.9 (sd 2.3)	X=7.3 (sd 1.8)	.502

*Paired samples 2-sided T-test

Results

- Intention

"I intend to…"	Pretest n (%)	Post-test n (%)	Δ in %	P-value*
…improve my eating habits	36 (90)	37 (92.5)	+2.5	0.161
…increase my physical activity	36 (90)	35 (87.5)	-2.5	0.000
…search for health info on the internet	19 (47.5)	25 (62.5)	+15.0	0.001

*Pearson Chi-square.
 Original 6 pt. Likert Scale from "Extremely unlikely" to "Extremely Likely" recoded into "Unlikely" and "Likely".

Results

- Body Mass Index (based on self reported height and weight)

BMI	Female N (%)	Male N (%)	Overall N (%)
Normal	17 (68.0)	6 (40.0)	23 (57.5)
Overweight	3 (12.0)	4 (26.7)	7 (17.5)
Obese	5 (20.0)	5 (33.3)	10 (25.0)

Results

- Body Weight Self-Rating

Self-rating	Female N (%)	Male N (%)	Overall N (%)
Markedly underweight	0 (0.0)	1 (6.7)	1 (2.5)
Slightly underweight	1 (4.0)	0 (0.0)	1 (2.5)
Average weight	15 (60.0)	6 (40.0)	21 (52.5)
Slightly overweight	8 (32.0)	6 (40.0)	14 (35.0)
Markedly overweight	1 (4.0)	2 (13.3)	3 (7.5)

Results

- Rating of Avatar Body Weight

Avatar rating	Female N (%)	Male N (%)	Overall N (%)
Markedly underweight	0 (0.0)	1 (6.7)	1 (2.5)
Slightly underweight	7 (28.0)	0 (0.0)	7 (17.5)
Average weight	16 (64.0)	11 (73.3)	27 (67.5)
Slightly overweight	2 (8.0)	2 (13.3)	4 (10.0)
Markedly overweight	0 (0.0)	1 (6.7)	1 (2.5)

Results

- Avatar appearance compared to real life appearance

Appearance	Female N (%)	Male N (%)	Overall N (%)
Avatar is less attractive	6 (24.0)	8 (53.3)	14 (35.0)
Avatar is equally attractive	14 (56.0)	6 (40.0)	20 (50.0)
Avatar is more attractive	5 (20.0)	1 (6.7)	6 (15.0)

Focus Group Key Themes

Information was **useful** and informative

Intervention was **creative**

Health Educator was **professional**, **credible**, and looked **physically fit**

Appreciated **anonymity** of the format

- Encourages more people to ask questions
- Ensures confidentiality

Intervention encouraged them to **think about their own behaviors**

Conclusions

- Participants were **receptive** to receiving health information in SL.

- Prefer a more traditional intervention method with a credible source.

- Future projects should include how experiences change with **long term participation** in SL.

- **Potential** for the delivery of effective health communication messages promoting healthy behavior change using 3-D virtual world technology.

Application
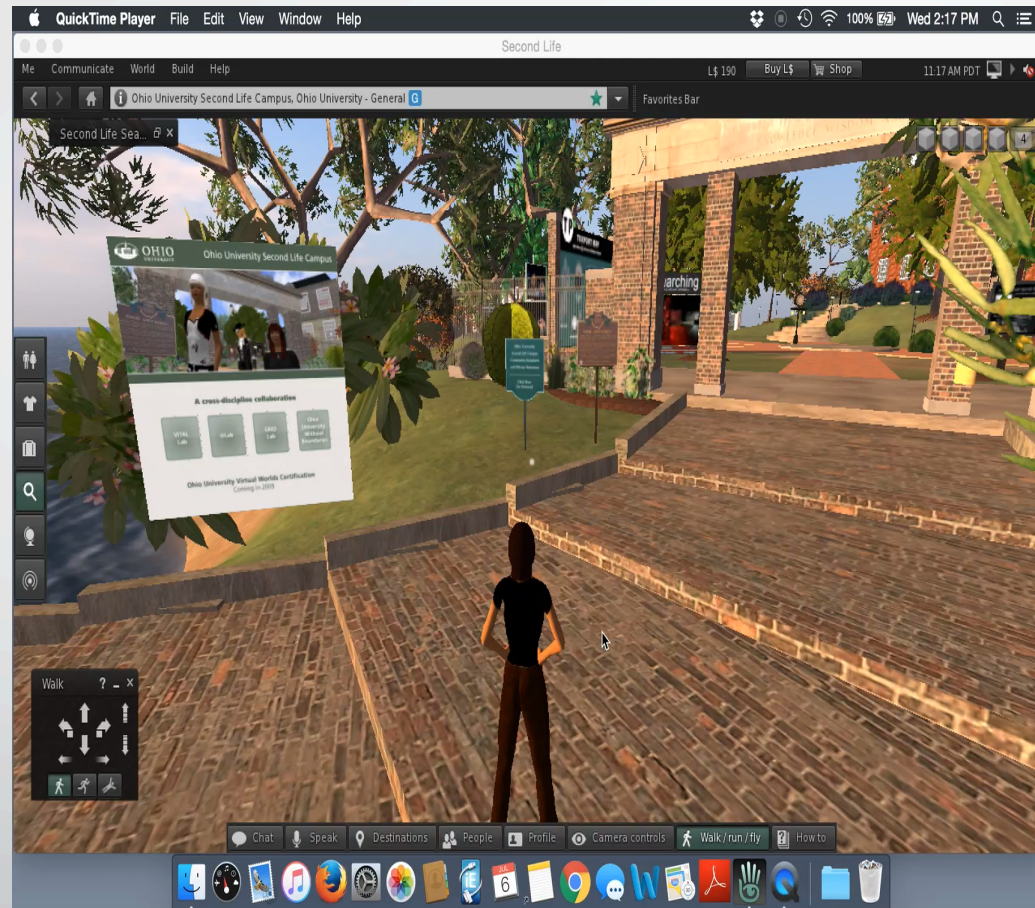
Future Work

Continued monitoring and evaluation of health outcomes and how users create and participate in virtual worlds is needed.

Actual need vs. perception (stage etc.)

Issues surrounding the **use of avatars**
(self identity i.e. body image, message processing etc.)

References & additional studies of interest:

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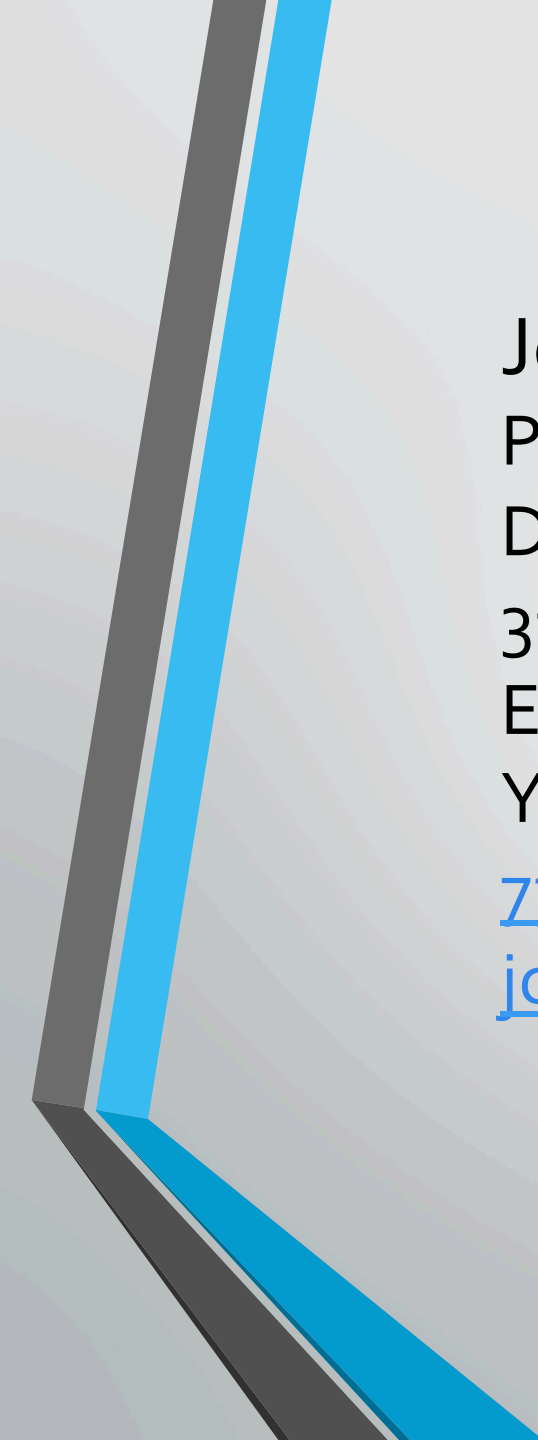
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