

Supplementary Online Content

Kimberly Hieftje, Ph.D., E. Jennifer Edelman, M.D., M.H.S., Deepa R. Camenga, M.D., M.H.S., Lynn E. Fiellin, M.D. Electronic Media-Based Health Interventions for Behavior Change in Youth: A Systematic Review

eTable 1: Summary of studies utilizing electronic media for health or safety behavior change

This supplementary material has been provided by the authors to give readers additional information about their work.

eTable 1: Summary of studies utilizing electronic media for health or safety behavior change

Source/ year	Intervention Setting/ Subjects	Media Structure	Research Design	Intervention/ Follow- up/Control	Outcomes	Results/ Conclusions	Quality Score
Nutrition/Physical Activity							
Cullen, K. W., K. Watson, et al. (2005).	26 grade schools; N = 1578 students (ages 8-12; 46.6% male)	Computer game; <i>Squire's Quest</i> , content includes activities promoting FJV consumption	Cluster- RCT	Computer-based game for ten 25 min session for 5 weeks vs. control (no game)	Servings of fruit, 100% juice, and vegetable consumption, measured by the Food Intake Recording Software System (FIRSS), administered 4 days at baseline and follow-up for past 24hr dietary recall (via multimedia program)	Intervention group consumed 1.0 servings of FJV more than control group; increases (mean difference \pm SE) in servings of: fruit (0.26 \pm 0.05,p<0.001) and 100% juice (0.06 \pm 0.03,p<0.05) during snacks and vegetables (0.16 \pm 0.05,p<0.01) during lunch but no other differences	2
Dunton, G. F., R. Lagloire, et al. (2009).	16 middle school classrooms; N = 683 students, 16 teachers, (Mean = 12.47 (SD=.60); 53.5% male)	Video clips as part of program; <i>Exercise your Options</i> : teacher- delivered physical activity and nutrition curriculum	Nonexperi- mental pre- post survey pilot evaluation	Teacher delivered physical activity and nutrition curriculum with video clips, 8 sessions with booklet and video clips/ post- survey immediately after 8 wk curriculum	Student survey assessed physical activity, sedentary behaviors, nutrition behaviors measured via YRBS (Youth Risk Behavior Surveillance System) and modified YRBS items (student survey)	Increase of physical activity (4.01 vs. 4.44 days/week; p<0.001), daily dairy product consumption (2.84 vs. 3.14; p=0.001); Decrease in TV/DVD watching (1.57 vs. 1.41 hr/day; p=0.024),videogame playing/nonschool- related computer use (1.68 vs. 1.37;p=0.002) Decrease in daily consumption of	1

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						sweets/sugars (4.17 vs. 3.44;p<0.001); no change in consumption of fruits (p=0.69) and vegetables (p=0.88)	
Goran, M. I. and K. Reynolds (2005)	4 grade schools; N=209 (ages 8.8-11.1, Mean = 9.5; 41% male)	Computer game CD-ROM; <i>Impact</i> . Interactive educational learned game	RCT-cluster design	Computer-based game for 8 wk sessions w/ 8 CD-ROM interactive lessons (45 min each), + 4 classroom lessons (45 min each) + 4 family-based assignments (45 min each) vs. control (educational CD-ROMs not related to health outcomes)	Physical activity, decrease sedentary behavior, change in BMI	Gender-by-treatment interactions for BMI z-score (p=0.016). BMI z-score adjusted mean value +/- SE after intervention: girls: 0.69 ± 0.04 (control) vs. 0.62 ± 0.04 (intervention) but not boys: 0.54 ± 0.05 (control) vs. 0.69 ± 0.05 (intervention); Gender-by-treatment interactions for % body fat (p=0.009). % body fat adjusted mean +/- SE after intervention: girls: 23.4 ± 0.4% (control) vs. 22.0 ± 0.4% (intervention) but not boys: 21.4 ± 0.5% (control) vs. 22.5 ± 0.5% (intervention)	2
Jago, R., T. Baranowski, et al. (2006)	42 Boy Scouts Troop Meetings; N = 473 (ages 9-18, Mean = 13; 100% male)	Internet; <i>Fit for Life</i> . Physical activity badge included skill building activities at troop meetings,	RCT	Internet-based program 2x wk for 9 wks, 1 & 6 mo f/u vs. control (fruit & vegetable intervention)	Increase in physical activity	Small marginally significant decrease in sedentary behavior (12 min/day) (p=0.051) and significant increased in light physical activity (p=0.011) between baseline and 1 month follow up (146.3 vs. 155.9 min/day) in wave	2

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		internet- based role modeling, goal setting, goal review and problem solving				1 of study only	
Madsen, K. A., S. Yen, et al. (2007)	Home; N= 30 (ages 9- 18, Mean = 13; 40% male)	Videogame; <i>Dance Dance Revolution</i> . Interactive dance videogame	Pilot - pre post test	Videogame with instructions to use 30 min/d, 5d/wk for 2 months, 3 & 6 mo f/u	Memory card/self-report for mins per week activity	No association between game play and BMI	0
Moore, J. B., L. R. Pawloski, et al. (2009)	Schools; N = 126 (ages 9-11; 36.5% male)	Internet game; <i>Color My Pyramid Game</i> . Interactive, web-based game which teaches children about the food pyramid and physical activity	Pretest- posttest quasi- experi- mental pilot	Internet game for 6 classes over 3 mo period vs. control (didactic presentation of game)	Nutrition Self- care practices (Adolescent Nutrition Self- Care Questionnaire (ANSQ), Physical Activity Log (Student Physical Activity (SPA), and Nutritional Status (Research Anthropometric Form (RA))	Increase in pre- and post-game measures of in self-care behavior (154.8 vs. 162.1; Cohen's d=0.261), physical activity, min/day activity (31.4 vs. 60.1; Cohen's d=0.598), and mean systolic blood pressure (113.9 vs. 108.0; Cohen's d=0.578); no changes in BMI (77.0 vs. 77.3, Cohen's d=0.011)	0
Turnin, M. C., M. T. Tauber, et al. (2001)	15 Primary schools in France; N = 1876 (ages 7-12, Mean = 9; 47.5% male)	Computer game; <i>Alimentary my Dear Joe</i> . Teaches kids about nutrition	RCT	Computer-based game and conventional nutritional teaching, 2 hrs/wk for 5 wks vs. control	Dietary intake assessed with diet records	No difference in caloric intake (1899 control vs. 1896 intervention) more carbohydrate (46.4% vs. 45.7%, p<0.05), less fat (37.1% vs. 37.6%, p<0.05), less	1

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				(conventional nutritional teaching only)		protein (16.5% vs. 16.7%, p<0.05), less saccharose (11.5% vs. 12.2%, p<0.001), more calcium (771mg vs. 731mg, p<0.001) and more fiber (12.6mg vs. 12.1mg, p<0.05)	

Asthma/Lung Function

Bartholomew, L. K., R. S. Gold, et al. (2000).	4 Hospital- based clinic and community pediatric practices; N = 133 (ages 7-17, Mean = 11.5; 64.7% male)	Computer game; Watch, Discover, Think and Act. Player makes choices to manage the game character's asthma	Pretest- posttest random- ized interven- tion trial	Computer-based asthma game played at visits (40 mins) vs. control (usual care); 4 to 15.6 month f/u	Child Asthma Self- Management; Clinic Appointment Return Rate; Asthma symptoms; Functional status, hospitalizations, ED visits	Differences in pre- and post-test results between intervention and control groups: Effect sizes: Child Self- Management = 0.44; Emergency visits = 0.03; Hospitalizations = -0.14; Clinic appointment return rate was 71% (intervention) vs. 60% (control) (p=0.04). Intervention effect on symptoms with intervention subjects having lower symptoms scores at post test, moderated by severity of asthma (t(116) = -1.96; p=0.02), slight improvement in functional status scores at 8 months (139.6 vs. 137.3); no difference in ED visits	2
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Huss, K., M. Winkelstein, et al. (2003)	Home; N=148 (ages 7-12, Mean = 9.6; 44% male)	<i>Computer game; Wee Willie Wheezie</i> , boy with asthma maneuvers through various homelike settings while attempting to avoid asthma allergens and irritants	RCT	Computer-based asthma game and conventional education (written asthma materials and non-asthma related computer game) vs. control (conventional education only); 12 week f/u	Change in asthma symptoms	No significant changes in asthma symptoms	3
McPherson, A. C., C. Glazebrook, et al. (2006)	Hospital-based clinic; N = 101 (ages 7-14; 53% male)	<i>Computer game; Asthma Files</i> . Interactive game with secret-agent theme	RCT	Computer-based game + booklet, 90 mins vs. control (asthma booklet only); 1 and 6 month follow up	Oral steroid use, School absence, GP visits, or hospital visits	1 month: no significant differences in school absence, GP visits, hospital admissions. 6 months: intervention group had lower use of oral steroids (OR 2.96, 95% CI 1.014-8.612, p=0.03) and lower percent reporting any school absence (OR 2.394, 95% CI 1.021-5.618)	3
Rubin, D. H., J. M. Leventhal, et al. (1986)	Hospital based clinics, private office, and HMO; N = 65 (ages 7-12, Mean = 9.5-9.7; 53-58% male)	Computer game, <i>Asthma Command</i> ; Players use knowledge of asthma to maneuver through obstacles in	RCT single blind trial (researchers and physicians were blinded to treatment condition)	Computer-based game, 45 min session every 6 wks for 10 mos vs. control (computer game not related to asthma)	Asthma self management, acute visits due to asthma, Hospital days due to asthma, school days absent	Higher asthma behavioral child assessment score (mean \pm SD) in intervention (64.1 \pm 7.7) vs. control (57.8 \pm 8.8) (p=0.008); no differences in morbidity data (doctor's visits, hospitalizations, school	3

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		game and score points				days absent)	
Shames, R. S., P. Sharek, et al. (2004)	Home; N =119 (ages 5-12; 57.9% male)	Videogame on Super Nintendo; Bronkie's Asthma Adventure	RCT (no blinding)	Disease management program including asthma videogame, f/up at 8, 32, 52 weeks vs. control (usual care plus commercial videogame)	Primary: Frequency of asthma symptoms days Secondary: No wheezing days in past 2 mo; asthma attacks in past 2 mo; days used rescue inhaler; # urgent care visits	No change in days with asthma symptoms at 8, 32, or 52 weeks (p=0.06). No difference in any of other clinical outcomes. Intervention associated with higher scores in physical QOL measures at weeks 32 (score 78 vs. 59 p<0.05) and 52 (79.9 vs. 69.9 P<0.05)	2
Vilozni, D., M. Barker, et al. (2001)	Kindergarte n class; N=112 (ages 3-6; 43.7%)	Computer Game; <i>SpiroGame</i> . Teaches child who is undergoing testing to differentiate between inhalation and exhalation. And teaches an FVC (forced vital capacity) maneuver	RCT (no blinding) with cross- over	Computer-based game for 1 session of 5-10 min of gameplay vs. control (MasterLab System: candle- blowing simulation for 3 to 7 min)	Performance on spirometry	Successful spirometry was achieved by 69.6% SpiroGame vs. 47.1% of control (p=0.002); FEV1 values achieved by 79% with Spirogram but 4% with candle- blowing	2

Safety Behaviors

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Coles, C. D., D. C. Strickland, et al. (2007).	Hospital- based clinic; N = 32 (ages 4-10, Mean = 6.9 (SD = 1.78), 65.5% male)	Computer game; Fire and street safety game	Pilot - Randomize d, single blind pre/post within and between group analysis	Computer-based game play, game play until mastery of skills (<30 min) f/up at 1 wk	Street and fire safety behavior skills	87.5% of subjects were able to perform three out of four steps correctly immediately following the learning session on fire safety skills and 81.3% on street safety skills. At one week post intervention, 81.3% were able to perform three out of four steps correctly on fire safety skills, and 75.1% of street safety skills	1
Fisher, D. L., N. E. Laurie, et al. (2002)	Driver's education course; N=45 (ages 16-17, % of male not stated)	Computer simulator program; <i>Driver ZED</i> (Zero Errors Driving). Risk awareness training program evaluated on a driving simulator	Experiment comparing the perform- ance of trained young drivers to untrained young drivers and older experien- ced drivers	Computer-based young driver risk awareness training program and driving simulator "Driver ZED", 1 1/2 hr session vs. control (no training)	Driving performance on simulator (three virtual worlds, each for 5 miles; 12 pairs of scenarios, 4 of which appeared in each database) -- report on 6 scenarios	Training improved the driving skills of younger inexperienced drivers. The authors rejected the hypothesis that the number of trained young drivers who applied their brakes was attributable to chance ($p < 0.025$). They rejected the hypothesis that the number of experienced drivers who applied their brakes opposite a truck was attributable simply to chance ($p < 0.05$), this did not persist for young drivers	0

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Padgett, L. S., D. Strickland, et al. (2006)	Hospital-based clinic; N = 5 (ages 5-7, 80% male)	Computer game; Fire safety game to accommodate the verbal strengths and visual-spatial and fine motor weaknesses of children with FAS	Pretest-posttest pilot	Computer-based game, game play until mastery of skills, follow up at 1 wk	Fire safety behavior skills	Immediately post-intervention, all children reached 100% accuracy on completing each of three safety steps in both real world simulation and picture sequence test	0

Sexual Risk Behaviors

Downs, J. S., P. J. Murray, et al. (2004)	4 Hospital-based adolescent clinics and two community practices and a women's teaching hospital; N = 300 (ages 14-18; 0% male)	Interactive video. Video with still material on STIs	RCT	Interactive video about STIs, f/u at 1, 3, and 6 mos vs. Two controls (content matched 127 page book vs. topic-matched commercially available brochures)	Sexual risk behaviors (self-report -sexual behavior in the previous 3 months: 1) # sexual partners; 2) condom use frequency; 3) correct condom use; STI acquisition (self-report; Ct via PCR assay based on self-administered introital swabs) (assessed at 3, 6 months; Ct at 6 months)	Complete abstinence more likely in video group from baseline to 3 months (OR=2.50, p=0.027), but did not persist over time (OR=1.45, p=0.344). No difference in how condoms were used at 3 (p=0.57) or 3-6 months (p=0.15), but trend towards more condom use among the video group. Condom failures: no significant difference b/t conditions from baseline to 3 month visit (p=0.05), between 3-6 months, those in the video group reported fewer condom	3
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						failures compared to controls (p=0.02). Control condition were more likely to report an STI diagnosis in general (OR=2.79, p=0.05) and chlamydia infection specifically (OR7.75, p=0.05). Clinical lab test to detect chlamydia was underpowered	
Tortolero, S. R., C. M. Markham, et al. (2010)	10 middle schools; ; N = 907 (Mean age = 13, 61% male)	Computer based program; <i>It's Your Game, Keep it Real</i> . Integrates group based and individual activities on laptop computers. Computer component contains virtual world interface, educational activities that target determinants of risk taking	RCT	Curriculum, <i>It's Your Game: Keep it Real</i> , with computer based activities, 12 lessons (45 minutes per lesson); 6 parent-child homework activities vs. control (regular health classes); f/u in the 9th grade	Self-reported sexual initiation by 9th grade	The control group was more likely to have initiated oral, vaginal, or anal sex by the 9th grade (29.9% vs. 23.4%, ARR 1.29; 95% CI: 1.02-1.64 than the intervention group; The control group was more likely to have initiated oral sex (17.6% vs. 10%, ARR 1.76; 95% CI: 1.21-2.56) or anal sex (9.9% vs. 3.7%, ARR 2.67; 95% CI: 1.45-4.94) by the 9th grade than the intervention group	3

Diabetes

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Brown, S. J., D. A. Lieberman, et al. (1997)	Hospital- based Clinic and Kaiser Permanente clinic; N = 59 (ages 8- 16, % of males not stated)	Videogame on Super Nintendo; <i>Packy and Marlon</i> . Challenges on diabetes	RCT	Videogame play occurring at home (unrestricted game play) f/up at 3 and 6 mos vs. control game with no health content (pinball)	Diabetes self- care, health outcomes (urgent doctor visits, HbA1c)	No significant differences between intervention (-0.43)and control (0.04) in mean difference of urgent visits for diabetes- related problems in (p=0.08)	1