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The Media is the Message

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BMI ≥ 85th Percentile (age 4-12)

Data from the National Longitudinal Survey of Youth 1986-1998, NHANES

- Obesity explained by numerous factors related to energy consumption and physical activity & persists into adulthood
- Childhood obesity related to increased risk of: heart disease; type 2 diabetes; psycho-social concerns; increased risk of some forms of cancer

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Success Rates of 21 Obesity Interventions for Youth ~ 50%

Type of Intervention	Number of Studies	Number of Studies Reduced obesity (%)
School Setting	6	1 (17%)
Community Setting	4	3 (75%)
Clinic / Research Setting	11	7 (64%)
Child Alone	3	0 (0%)
Child + Parent	12	9 (75%)
Nutrition	2	1 (50%)
Nutrition + Exercise	15	9 (60%)
Healthy Lifestyle Approach	4	0 (0%)
6-12 years of age	16	9 (56%)
12-18 years of age	5	2 (40%)

Summerbell CD. (2006) Cochrane Review; McLean N. (2002) IJO; Saelens BE (2002) Obes Res; Levine MD. (2001) Int J Eat Disord; Eliakim A (2002) Eur J Pediatr; Gately PJ (2000) IJO; Brownell KD (1985) Pediatrician; Braat C (1997) Acta Paediatr; Rolland-Cachera MF (2004) IJO; Nemet D (2005) Pediatrics.


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Two part talk

- Part 1: Using media to intervene



- Part 2: Mobile Body Area Networks to measure and intervene





Part 1: Interactive Multimedia for Promoting ACTivity in children (IMPACT)



Goran and Reynolds, Obesity 2005

Overall Objective

- To develop and test a theory-based CD-ROM multi-media intervention for increasing physical activity and preventing obesity in 4th grade children
- Intervention will include three components:
 - CD-ROM
 - Classroom
 - Family

Theory Based Intervention

- Based on SCT
- Addressing issues at the following levels:
 - Knowledge
 - Modeling
 - Outcome expectancies
 - Self-monitoring
 - Barriers
 - Safety
 - Environment



The Technology Paradox

- Use sedentary activity (computers) to promote increased activity??!!...seems weird, but....
- Amount of sedentary activity not related to amount of reported activity
- Hours of activity is correlated with adiposity (indep of sedentary activity)
- We cannot ignore the power and natural attraction to computers and new media
- Goal - tap powers of the technology/media to promote healthy behavior change (more activity)
- Intervention not limited to computer game



Hypothesis

- That media/technology/entertainment can be used to promote healthy behavior
- In this case, that the IMPACT intervention will produce an increase in physical activity



Overview of 8-Lesson Plan

- Goal Setting (CD 1, Class 1)
- Self-monitoring (CD 2, Class 2, Home 1)
- Outcome expectancies (CD 3)
- Identifying new activities (CD 4, Home 2)
- Overcoming barriers (CD 5, Class 3)
- TV reduction (CD 6, Home 3)
- Safety (CD 7)
- Environmental (CD 8, Class 4, Home 4)



Key Features of CD Sessions

- Kids travel to a different country to gather an ingredient of the anecdote
- 2-3 interactive games
- “passive” learning in script
- 1 “bad” side-kick
- 1 “good” side kick; friendly/quirky guide



Benefits of IMPACT to Schools

- Satisfies the Health Curriculum
- Follows the technology standards for application of technology in instruction
- Includes elements of language arts, geography science and mathematics
- Parent Involvement



Overview of Episodes

- Episode 1: The school
 - Intro to the characters and mission
- Episode 2: Himalaya Mountains
 - climb mountain (self-monitor)
- Episode 3: Amazon
 - Outcome expectancies - activity is good
- Episode 4: Egypt
 - Activity pyramid



Overview of Episodes

- Episode 5: Desert island
 - Being resourceful (barriers)
- Episode 6: Tokyo
 - Reducing TV
- Episode 7: Mexico City
 - Hydration; crime (safety)
- Episode 8: Back to the school
 - Putting it all together; change the environment




impact
cd-rom project

Interactive Multimedia for Promoting Physical ACTivity in Children


quake alexi veronica macy oliver

just when you thought health education was boring...
5 kids... 2 wizards... 1 mission...
promoting physical activity and health for children

Study Design

Randomized controlled intervention

- Pilot study
- 2 treatment schools
- 2 control schools (matched for SES, ethnicity)
- Evaluated through data collection before, during, and after the intervention
- Major outcomes include obesity indices, physical activity by accelerometry



Major Findings From Trial

- No overall changes in total physical activity
- In girls, there was a small but significant increase in light intensity physical activity
- Significant overall improvements in behavioral outcomes related to physical activity, including self-efficacy (“I can do it”), social norms (“it’s cool”) and outcome expectancies (“it’s good for me”)
- Significant treatment effect for obesity reduction in girls, not boys



Conclusions

- The IMPACT CD-ROM is a fun and innovative educational approach to health behavior and is effective, probably through subtle changes in behavior
- Future applications; other health behaviors
- Gender effects
- Other age/ethnic groups
- Broad dissemination




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Part 2: KNOWME NETWORKS

- Wireless Body Area Networks to Measure and improve obesity-related behaviors



Murali Annavaram
Shri Narayanan
Mitra Urbashi
Gaurav Suikhatme
Ming Li
Gautam Thatte
Viktor Rozgic
Harshvardhan
Vathsangam
Sabyasachi Ghosh
Sangwon Lee
Adar Emken
Donna Spruijt-Metz

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KNOWME Network Goals

- Targeting pediatric obesity in minority youth
 - Personalized tracking & report
 - Person-to-person networking
 - User interface for health professionals, children, families
- Multimodal wireless body area network
 - Track stress levels, physical activity levels, blood glucose levels, (diet) other vital signs
 - Time of day, geographical location, video/audio tags
- Measure and understand energy expenditure

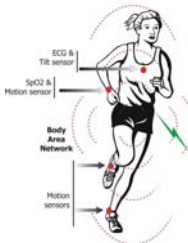
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Body Area Continual Feedback Network

- Novel sensing network for a holistic assessment of the state of a child
 - motion, physical activity, geospatial context
 - metabolic information
 - cognitive, emotional data
 - user initiated data (SMS, speech notes, images/videos)
- Interdisciplinary Solution
 - metabolic health research
 - engineering methods for assessment/cognition
 - wireless communications
 - sensor networks, and actuated systems
 - computer architecture
 - data bases
 - social networking



Jovanov et al. Journal of NeuroEngineering and Rehabilitation 2006

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Multimodal Sensor Systems

- Nokia N95 cellphone serves as fusion center
- Alive Technologies ECG/ACC
- KNOWME Accelerometer
- GSR, GPS...etc.

K sensors
N measurements

- Benefits of multimodal sensing
 - Fewer sensors deployed
 - Richer feature set available

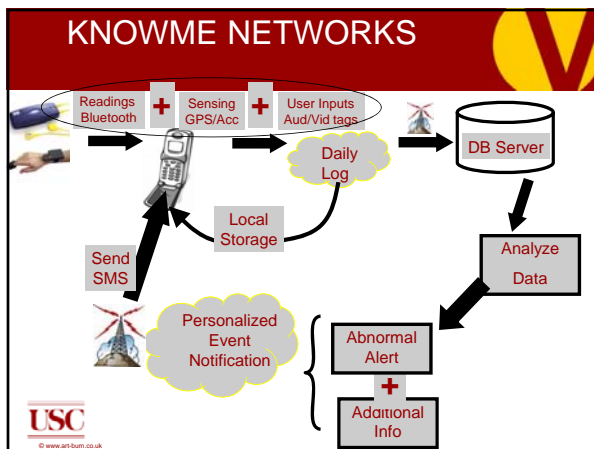
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KNOWME TRAINING VISIT

- Personalized calibration
 - Height
 - Weight
 - Heart rate
 - Fitness
- Train for motion detection




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The Challenges

- Smart Sensing
- Smart Data Transmitting
- Smart Storage
- Real-time analysis
- Real-time feedback
- Smart User Interface
- Battery life



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Case study: Smart Sensing

1. Build activity detection system separately in ECG domain and Accelerometer domain
2. Fuse systems
3. Questions:
 1. Is the ECG feature robust?
 2. How the session variability influence the performance? (different day, different time, different sensor placements, different stress factors,...)
4. Training data from multiple sessions can reduce the variability.
5. Previous research does not evaluate methods on data from multiple recordings.

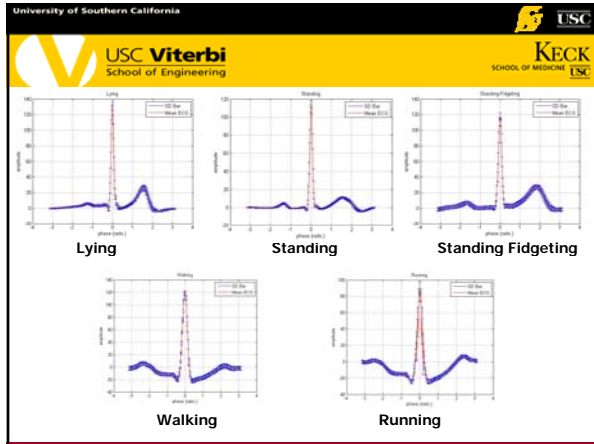
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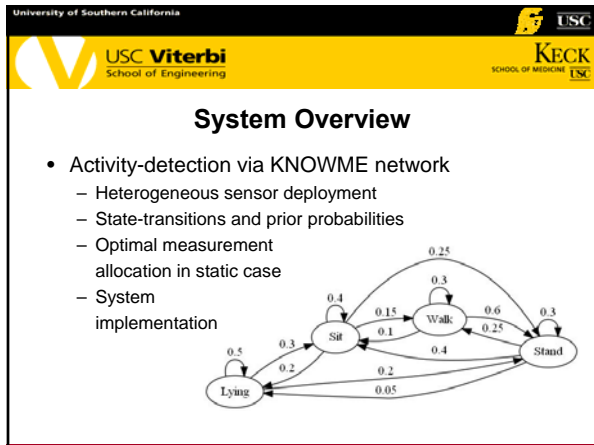
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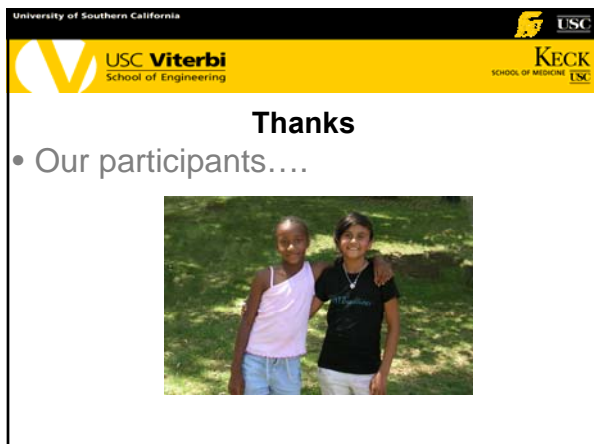
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Participants

- 8 subjects, age 20~30, 50% female
- 4 subjects recorded 4 sessions (4 visits on 4 different days at different times)
- 4 subjects recorded 2 sessions (2 visits on 2 different days at different times)
- 9 activities:
- Lying, Sitting, Sitting Fidgeting, Standing, Standing Fidgeting, Slow Walking, Brisk Walking, Running
- 7 minutes per activity.








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Our Funders

- NCI USC Center for Transdisciplinary Research on Energetics and Cancer (U54 CA 116848)
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- NIDDK K01 59293
- Baxter Foundation
- Wright Foundation
- Robert Wood Johnson Foundation

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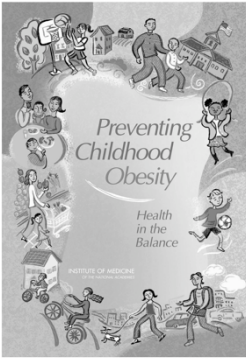
And YOU!
Questions?

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<http://metzlab.net>

**Preventing
Childhood Obesity:
Health In the
Balance**

Institute of Medicine

Committee on
Prevention
of Obesity in Children
and Youth



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Study Background

- Congressional request for IOM study (2002)
- Sponsors: DHHS - CDC, NIH, ODPHP and RWJF
- Collaboration between FNB and HPDP Board
- Task: develop a prevention-focused action plan
- 19-member multidisciplinary committee
- 6 IOM staff
- 21 peer-reviewers through NRC
- Study duration of 24 months

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**Committee on Prevention of Obesity
in Children and Youth**

JEFFREY KOPLAN (<i>Chair</i>), Emory University	DOUGLAS KAMEROW , RTI International
DENNIS BIER , Baylor College of Medicine	SHIRIKI KUMANYIKA , University of Pennsylvania
LEANN BIRCH , Pennsylvania State University	BARBARA MOORE , Shape Up America!
ROSS BROWNSON , St. Louis University	ARIE NETTLES , University of Michigan
JOHN CAWLEY , Cornell University	RUSSELL PATE , University of South Carolina
GEORGE FLORES , The California Endowment	JOHN PETERS , Procter & Gamble Company
SIMONE FRENCH , University of Minnesota	THOMAS ROBINSON , Stanford University
SUSAN HANDY , University of California, Davis	CHARLES ROYER , University of Washington
ROBERT HORNIK , University of Pennsylvania	SHIRLEY WATKINS , SR Watkins & Associates
	ROBERT WHITAKER , Mathematica Policy Research

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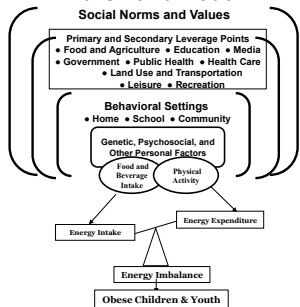
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Review of the Evidence

- The committee strongly endorsed an action plan based on the best *available* evidence instead of waiting for the best *possible* evidence
- Integrated approach to the available evidence
 - Limited obesity prevention literature upon which to base recommendations
 - Parallel evidence from other public health issues
 - Dietary and physical activity literature



Framework for Understanding Obesity in Children and Youth



Energy Balance

**Energy intake =
Energy expenditure**

For children, *maintain energy balance at a healthy weight* while protecting health, growth and development, and nutritional status



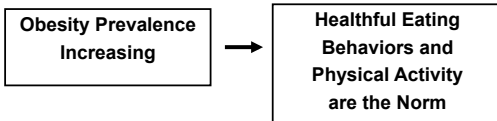
Key Conclusions

- Serious nationwide health problem requiring a population-based prevention approach
- The goal is **energy balance** – healthful eating behaviors and regular physical activity to achieve a **healthy weight** while protecting health and normal growth and development
- Societal changes at all levels are needed – multiple sectors and stakeholders



What is Needed?

- Leadership
- Evaluation
- Resources
- Efforts at all levels
- Change in societal norms



Key Stakeholders Involved

- Families
- Schools
- Communities
- Health care
- Industry
- Media
- Government





Health Care Community

- Professionals who care for children
 - Pediatricians, family physicians, nurses, etc.
- Professional organizations
 - AAP, AAFP, ANA, etc.
- Training programs and certifying entities
 - Medical schools, residencies, CME, MoC, boards
- Health plans, insurers, and accreditors
 - Kaiser, CIGNA, NCQA, etc.





Health Care Professionals

- Routinely track BMI
- Offer relevant evidence-based counseling and guidance
- Serve as role models
- Provide leadership in their communities



Professional Organizations

- Disseminate evidence-based clinical guidance
- Establish programs on obesity prevention
- Coordinate with each other to present a consistent message



Training Programs and Certifying Entities

- Include obesity prevention knowledge and skills in their curricula across the spectrum of education
 - Undergraduate, graduate, postgraduate
- Require obesity prevention knowledge and skills in their maintenance of certification examinations



Health Plans, Insurers, and Accreditors

- Provide incentives to their enrollees for maintaining healthy body weight
- Cover routine screening and counseling about body weight—diet and physical activity—as clinical preventive services
- Include these activities as benchmarks in quality assessment measures



Healthy Homes

Promote Healthful Eating and Regular Physical Activity

- Exclusive breastfeeding first 4-6 months
- Provide healthful foods - consider nutrient quality and energy density
- Encourage healthful decisions re: portion size, how often and what to eat
- Encourage and support regular physical activity
- Limit recreational screen time to < 2 hours/day
- Parents should be role models
- Discuss child's weight with health care provider



Research Priorities

- Evaluation of interventions - efficacy, effectiveness, cost-effectiveness, sustainability, scaling up
- Behavioral intervention research – factors involved in changing dietary, physical activity, and sedentary behaviors
- Community-based population-level research - high-risk populations, health disparities



“Preventing childhood obesity is a collective responsibility... The key will be to implement changes from many directions and at multiple levels.”

www.iom.edu/obesity/

