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Using an Idea Prize to Spur an Invention to Increase Physical Activity

Launching "Ruckus Nation" to develop effective products that increase physical activity among middle school children

SUMMARY

From 2007 to 2012, HopeLab Foundation in Redwood City, Calif., hosted an idea prize competition and then built an interactive, digital product designed to spur physical activity in middle school students, particularly those youth who are most likely to become obese.

Key Results

- HopeLab collected 429 online entries from 37 countries and 41 states for an idea prize competition called Ruckus Nation. The entries were concepts for digital products designed to encourage physical activity in middle school students. The competition produced 56 semifinalists, 10 category winners, one special honorary mention, and one grand prize winner.
- HopeLab then created a commercial product, Zamzee that was inspired by the competition. It is a wearable activity meter coupled with a rewards website—to spur physical activity in middle school students.
- HopeLab published an online toolkit that helps define various levels of physical activity in youth—*To Move Me, First You've Got to Understand Me. A Helpful Tool for Thinking About Tween Physical Activity*.

Evaluation Findings

HopeLab announced the findings from its six-month randomized, controlled study evaluating the effects of Zamzee in a diverse sample of 448 middle school-aged adolescents in September 2012.

- Kids using the Zamzee activity meter and website showed an average increase in moderate-to-vigorous physical activity (MVPA) of 59 percent—or approximately 45 additional minutes of MVPA per week compared to the control group.

- Significant increases in physical activity were seen across a number of key groups at risk for sedentary behavior.
- Zamzee had a positive effect on key biological factors associated with diseases linked to sedentary behavior.

Funding

The Robert Wood Johnson Foundation (RWJF) supported the project with three grants totaling $4,660,540.[1]

CONTEXT

Middle school-aged youth often are less physically active than they were as young children, a reality that increases their risk of becoming obese. Authors of a 2008 article in the *Journal of the American Medical Association*,[2] noted that nine-year-old children engage in approximately three hours (or 180 minutes) of activity per day on both weekends and weekdays. However, between the ages of 9 and 15, children decrease the amount of moderate-to-vigorous physical activity they get by an average of 38 minutes per weekend per year of age and 41 minutes per year weekday per year of age. By the time they are 15, most teenagers do not get 60 minutes of moderate-to-vigorous physical activity per day—the minimum amount recommended by medical experts.

HopeLab Foundation

The Zamzee design team at the HopeLab Foundation believe middle school-aged youth would be more likely to be physically active if the activities could be made more fun and rewarding.

HopeLab has experience in this arena: its first product was a video game for teenagers and young adults with cancer. The idea was to use a video game called "Re-Mission" as a tool to improve patients' motivation to follow their medication regimens. In this PC-based game, players zap cancer cells, bacterial infections, and the side effects of cancer treatment, such as nausea, in fictional patients.

In a 2008 study published in the journal *Pediatrics*,[3] researchers from HopeLab and several academic medical centers found that patients who were given "Re-Mission" had

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[1] ID #s 61645, 64649, and 67496

[2] Nader PR, Bradley RH, Houts RM, McRitchie SL and O'Brien M. "Moderate-to-Vigorous Physical Activity From Ages 9 to 15 years." *Journal of the American Medical Association*, 300(3): 295–305, 2008. Available online.

[3] Kato PM, Cole SW, Bradlyn AS and Pollack BH. "A Video Game Improves Behavioral Outcomes in Adolescents and Young Adults With Cancer: A Randomized Trial." *Pediatrics*, 122(2): 305–317, 2008. Available online.

better rates of adherence to their medication regimens than patients who were given only a commercially available PC-based video game, "Indiana Jones and the Emperor's Tomb."

"When we finished the cancer game, we had this very unusual intervention strategy that involved harnessing play to change behavior. The digital mechanisms are the instrumentation by which we do that," said Steve W. Cole, PhD, vice president of research and development at HopeLab.

Tackling Obesity

"We looked around the world of health risks," Cole continued, "and asked, 'Where else is there a great need for effective interventions in which the power of play may be both distinctly untapped and have a plausible impact on the disease process itself in terms of literal physical health outcomes?'"

HopeLab officials chose obesity. They concluded that their formula—fun and positive motivation powered with digital gaming technology—was ideally suited to creating a product designed to encourage middle school students to be physically active.

RWJF's Interest in This Area

Pioneer Portfolio

RWJF's Pioneer Portfolio, which funds projects that may lead to breakthroughs in health and health care, has supported a number of prize competitions to spur idea creation. For example, see the Program Results[4] on a competition sponsored by the X PRIZE Foundation.

RWJF also supported competitions sponsored by Changemakers, an online community for social entrepreneurs. See the Program Results[5] on a Changemakers' competition to find innovative solutions to problems such as gang violence that confront young men at risk, as well as a Programs Results[6] on three other Changemakers' competitions.

The Pioneer Portfolio also has been a major supporter of Games for Health, a project to encourage the use of video games to improve health and health care. RWJF's national program, *Health Games Research*, focuses on the scientific basis for designing digital game technologies that motivate people to take better care themselves. The Progress Report on *Health Games Research* discusses the results and challenges in this program.

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[4] ID # 57761

[5] ID # 63280

[6] ID # 57515

Childhood Obesity

RWJF's Childhood Obesity team supports projects to combat childhood obesity, particularly initiatives directed at children and youth living in lower-income neighborhoods and communities lacking access to safe places to walk, bike and play. The team funds projects designed to create environments more conducive to physical activity and healthy eating among children, youth and teens, with a special focus on lower income and racial/ethnic minority populations and communities at greatest risk for childhood obesity and its lifelong health tolls.

In the arena of physical activity, RWJF funds projects to increase the time, intensity, and duration of physical activity during the school day and in after-school programs. For example, RWJF supports:

- Save the Children's Campaign for Healthier Kids, which advocates for state policies to encourage healthier eating and increased physical activity
- The YMCA's Pioneering Healthier Communities, which works to improve opportunities for physical activity in after-school programs run by the YMCA and other organizations. See Program Results Progress Report for more information.
- The Bikes Belong Foundation has received three RWJF grants[7] totaling $5,106,966 to leverage resources to maximize the investment in the Safe Routes to School program and other physical activity opportunities.[8]
- Playworks, which provides safe, healthy and inclusive play and physical activity to low-income schools at recess and throughout the entire school day. It runs programs in more than 300 schools in 23 U.S. cities, and serves more than 130,000 elementary school students every day.

THE PROJECT

With three grants from August 2007 through March 2012, HopeLab Foundation hosted an idea prize competition and built and evaluated an innovative interactive, digital product inspired by the competition. It is designed to spur physical activity in middle school-aged youth and particularly in those youth who are most likely to become obese. HopeLab also conducted eight pilot studies and a rigorous, controlled six-month evaluation to determine the product's impact on youth activity levels and health–related biomarkers.

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[7] ID #s 58126, 66261 and 69063 from December 2006 through December 2014

[8] In addition RWJF has supported research and evaluations of the implementation and funding of the Safe Routes to School program conducted mainly by researchers in the *Active Living Research* program. As of September 2012, the six grants total $645,112. The ID #s are 65699, 65701, 67110, 67297, 68490 and 68493.

Ruckus Nation

The first phase of the project was an online competition, Ruckus Nation, in which the public submitted ideas for new digital products to encourage middle school-aged youth to be physically active. HopeLab launched the competition on September 18, 2007. The deadline for entries was November 20, 2007, and HopeLab officials announced the winners at a reception on March 17, 2008.

The competition "was really an effort to cast our net as broadly as possible for potential solutions," Cole said.

HopeLab officials recruited entrants and judges through an outreach strategy that included meetings, phone calls, and presentations as well as emails, blogs, online postings, and paid advertisements in university newspapers. They also distributed thousands of media kits.

HopeLab also hired Daylight Design, San Francisco, to interview 27 middle school students in four states. The goal was to identify and develop common prototypes or categories reflecting the distinct physical activity patterns, preferences, barriers and opportunities of a diverse sample of middle-school students. These categories then guided the design of interventions able to capitalize on this population's diverse intrinsic motivations, and interests, and their resources and social-environmental supports for sufficient levels of feasible and sustainable everyday physical activity.

Zamzee: From Prototype to Commercial Product to Evaluation

From February 2009 through September 2010, HopeLab worked to develop a product inspired by the games submitted to the Ruckus Nation contest. After the contest, HopeLab hired Daylight Design to build rudimentary prototypes of several ideas and test them with youth. HopeLab and RWJF officials decided to move forward with one idea: Zamzee, a wearable digital device with an accelerometer that is coupled with a rewards website.

HopeLab then launched a series of focus groups, tests and studies to assess both the usability of the product and its impact on physical activity levels in middle school-aged youth. "There is a lot of iterative tweaking to get to that best idea or to get to that best product," said Marjorie A. Paloma, MPH, senior policy advisor at RWJF who served as the program officer for the middle grant.

From January 2011 through March 2012, the organization conducted eight pilot studies to evaluate Zamzee's impact on motivating movement; 361 students logged more than 10,000 hours of Zamzee use during these studies. In a six-month, randomized controlled trial, 448 middle school students helped determine Zamzee's impact on both users' level

of physical activity and biomarkers that are associated with increased risk for chronic diseases such as type 2 diabetes and hypertension.

For more information on HopeLab's approach to testing and research, see Appendix 1.

RESULTS

The project directors reported the following results to RWJF:

Results for Ruckus Nation

- **HopeLab collected 429 online entries from 37 countries and 41 states, including:**
  - Some 11.2 percent from middle school students
  - Some 8.4 percent from high school students
  - Some 35.7 percent from college and university students
  - Some 44.8 percent from others—adults who were not students
- **Harnessing "the wisdom of crowds," HopeLab recruited 346 online judges, who selected 56 semifinalists; 36 in-person judges, who selected 10 category finalists; and 14 in-person judges, who selected a grand-prize winner and a special honorary mention.** The judges at each level included HopeLab staff, RWJF program officers, students, and experts in diverse fields such as psychology, physical activity, medicine, and education. HopeLab wanted a diverse group of judges to ensure that the winning ideas had broad appeal.
- **The judges selected 56 semifinalists, 10 category winners, a grand-prize winner and special honorary mention, which HopeLab announced at an awards event on March 17, 2008 in San Francisco.**

  Category winners each won $25,000, while the grand-prize winner earned another $25,000 and the honorary mention winner earned another $5,000; semifinalists won $250. For a description of all of the winners, see Appendix 2.
- **HopeLab staff created a website, Ruckus Nation, to house contest rules and judging information, results, newsletters, press releases, and several videos.**
- **Project staff created a toolkit, available online, that divides middle school students into categories based on their experiences, motivations, opportunities and preferences for physical activity**.[9] The toolkit is based on research by Daylight Design, San Francisco, which conducted interviews with 27 middle school students in four states.

[9] *To Move Me, First You've Got to Understand Me. A Helpful Tool for Thinking About Tween Physical Activity.* Redwood City, CA: HopeLab 2009. Available online.

For a description of the categories of middle school students discussed in the toolkit, see the Evaluation Results section of this report.

Results for Zamzee

- **HopeLab built a commercial product, Zamzee.** Originally named gDitty, Zamzee combines an activity meter with a motivational website designed to increase daily levels of moderate-to-vigorous physical activity (MVPA) though a system that combines individualized feedback, progress monitoring, goal setting and intrinsic motivation features to promote long-term increases in MVPA by linking daily MVPA measures recorded by a small wearable 3-axis accelerometer to a central feedback and rewards database. Users track their set personal activity goals, track their progress and and play online games through their individually-tailored motivational Zamzee website.

  Using this website, Zamzee wearers earn rewards based on their activity levels. The rewards include gift cards and donations to charities, which parents purchase for their children. There also are online awards, such as unlocking clothing for an avatar, which do not impose costs on children or their families.

  The devices and website are marketed to all youth, but are designed specifically to appeal to middle school-aged youth who are most at risk for becoming obese.

  With digital gaming technology, "we can make these easily customizable or flexible intervention strategies that then address kids as individuals as opposed to assuming that they are all one undifferentiated consumer," Cole said.

  The device is a customized version of a digital sensor pack created by Firefly Design, Los Altos, Calif. The idea was created internally at HopeLab Foundation but is similar to some of the ideas submitted to the Ruckus Nationa prize competition.

- **HopeLab launched Zamzee Co. to manufacture and market the product.** Zamzee is a for-profit social enterprise—a type of organization with a goal of solving a societal problem as part of its corporate mission. Through its website, the company markets and sells the Zamzee product for $29.95 each, with no monthly fee to track activity and earn online rewards. However, some of the rewards, such as gift cards to popular retailers, must be paid for separately by parents or through the company's fundraising and sponsorship efforts.

  HopeLab officials also recruited Lance Henderson, Zamzee's chief executive officer, and raised money for startup capital. Pat Christen, HopeLab's president and chief executive officer, is the chair of Zamzee's board of directors.

EVALUATION RESULTS

HopeLab conducted a six-month randomized, controlled study evaluating the effects of Zamzee in a diverse sample of 448 middle school-aged adolescents enrolled from urban,

suburban, and rural environments across the United States. Half the study participants used Zamzee, and half (the control group) did not. HopeLab announced the findings in September 2012.

- **Kids using the Zamzee activity meter and website showed an average increase in MVPA of 59 percent—or approximately 45 additional minutes of MVPA per week compared to the control group**. This impact persisted throughout the six-month study period.
- **Significant increases in physical activity were seen across a number of key groups at risk for sedentary behavior**, including a 27 percent increase in MVPA among overweight participants with a BMI greater than 25 and a 103 percent increase in MVPA among girls.
- **Zamzee had a positive effect on key biological factors associated with diseases linked to sedentary behavior.** Over six months, participants who used Zamzee showed reduced gains in LDL (bad) cholesterol, which is a risk factor for heart disease. Participants who consistently used Zamzee also showed improved blood sugar control (HbA1c), a risk factor for type-2 diabetes.

OTHER FINDINGS

Other findings from the pilot study and toolkit include:

- **Regular use of Zamzee could overcome about one-third of the energy imbalance—between 110–165 kilocalories per day—responsible for excess weight gain in children**, based on calculations of the energy imbalance estimated in an RWJF-funded analysis reported in a 2006 *Pediatrics* article.[10] (Pilot Research)
- **Middle school students can be divided into eight archetypal activity categories, based on their approach to physical activity** (toolkit):
  - *Born to Run*. They are natural athletes who love sports.
  - *Busy Bees*. They run from one after-school activity to the next, including some sports.
  - *Out and About*. They love biking and skateboarding but not team sports.
  - *Saved by Sports*. They are not star athletes but have found a sport, like football, that fits their heftier body types.
  - *Saved by Support*. They are active because someone, such as a parent, encourages them.

[10] Wang YC, Gortmaker SL, Sobol AM and Kunz KM. "Estimating the Energy Gap Among US Children: A Counterfactual Approach." *Pediatrics*, 118(6): 1721–1733, 2006. Available online.

— *Opting Out*. They are not interested in physical activity. They are often girls who do not want to mess up their hair or are self conscious about their bodies.

— *Missing Out*. They do not have the opportunity to be active, often because they care for younger siblings after school or live in unsafe neighborhoods.

— *Gone Gaming*. They spend a lot of time online or playing video games. They are often boys who are uncomfortable with social interaction.

SIGNIFICANCE OF THE PROJECT

"This is an exciting and possibly a game-changing intervention, particularly for the highest risk children—those in lower income families or who live in neighborhoods that do not facilitate physical activity. The additional steps to earn Zamzee rewards could be obtained by jumping on the bed," said C. Tracy Orleans, PhD, senior program officer and senior scientist at RWJF.

"One of the stories HopeLab told, which stuck with me, was about a family with a little brother and big sister," Orleans added. "To get extra points on the way home from school, the little brother, literally would run circles around the big sister. That kind of physical-activity expenditure would not take place without something like the Zamzee."

"This study shows that technology is not just part of the problem; it can also be part of the solution in helping kids be more physically active," said Steve W. Cole, PhD, vice president of research and development at HopeLab and professor of medicine at the University of California, Los Angeles. "The [evaluation] results also show that Zamzee can increase physical activity enough to improve some of the key biological processes that underlie the long-term disease risks associated with a sedentary lifestyle."

Lance Henderson, CEO of Zamzee, adds, "These new data show that Zamzee is also an effective way to improve health, which is inspiring to us and our partners as we work to put Zamzee into the hands of kids and families across the United States."

In 2009, HopeLab was one of four organizations recognized by President Barack Obama at an event to launch the White House Office of Social Innovation and Civic Participation. Christen, HopeLab's president and CEO, and an early beta user of Zamzee, spoke at the event.

LESSONS LEARNED

1. **A sequence of studies—each one building on the one before it—is an effective way to continually refine a product or service.** "The biggest lesson is not creating a giant study but a series of small tests that allow you to learn from each design decision that you make. That is something that can be applied across anything—whether it is designing a program or putting together a campaign. It is really about

seeing how your intended audience reacts—and changing based on that," said Paloma, RWJF senior policy advisor.

2. **Prize competitions work best when the rules governing them are thorough.** "The process has to be really clear and transparent to the entrants. You also have to make sure people cannot game the rules," said Chinwe R. Onyekere, former program officer at RWJF.

   For example, HopeLab hired a law firm to create rules and a legal agreement governing the transfer of intellectual property rights from contest winners to HopeLab. This was important to HopeLab's project team because they wanted the legal authority to turn a good idea into a viable product.

3. **Make useful research information available to judges of a competition.** HopeLab paid for a qualitative study to classify middle school-aged youth based on their varied physical activity-related preferences/motivations, resources, barriers and opportunities. In hindsight, the project directors wished the study had been completed in time to help with judging of the Ruckus Nation ideas competition. "Having those insights into what kids find fun, and what the barriers and drivers to movement are in their lives would have further enriched the discussions about which ideas held the most promise," Project Director Ellen LaPointe said.

4. **Marketing an idea prize competition to a broad range of demographic groups ensures that the winning entries appeal to lots of people.** HopeLab Foundation contacted organizations known to have a diverse network for help finding judges and entrants. Examples include: the Boys & Girls Clubs of America, YMCA, and Kaboom—a nonprofit that works with community leaders to build playgrounds. (Program Officer/Onyekere and Final Narrative Report)

AFTERWARD

The Zamzee product, along with access to related tracking activities and rewards, continues to be available on the Zamzee website.

When reviewed in 2011, the Zamzee social enterprise company did not meet RWJF's criteria for an RWJF-funded program-related investment. But it does earn money by selling the Zamzee meter for slightly more than it costs to produce it.

Since the evaluation results were announced, the Huffington Post did a story on the Zamzee in September 2012. KRON 4 News did an interview and story that appears on You Tube and Zamzee was reviewed on About.com.

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APPENDIX 1

Research Methodology for Zamzee

HopeLab conducted several rounds and types of testing to assess both the usability and impact of Zamzee.

Measuring Zamzee's Ease of Use

HopeLab conducted numerous focus groups and beta tests with more than 200 students and parents. This usability research, conducted from February 2009 through September 2010, focused on such areas as Zamzee's product design, customer support, website, and user manual. HopeLab's project staff also tested the impact of various types of rewards, including gift cards, charitable donations, and online rewards such as clothing for an avatar.

Measuring Zamzee's Impact

The second and third phases of research were designed to test the impact of Zamzee—the device and its reward structure—on multiple standard measures of users' levels of physical activity and health. In eight pilot studies, 361 students logged more than 10,000 hours of Zamzee use. A separate six-month, randomized controlled trial involved 448 middle school students; about half of the study participants, or 235, consented to the collection of blood samples, which were used to assess biologic indicators of risk for chronic diseases such as high blood pressure or type 2 diabetes.

The studies compared the activity levels of youths provided with the Zamzee meter alone with those who were provided with both the meter and access to an activity-driven rewards website. HopeLab's project directors structured the study this way to control for activity level increases driven by use of, and feedback from, the meter alone.

Data collection for the pilot studies was completed in summer 2011, while data collection and analysis for the larger controlled study was completed in summer 2012. The controlled study was conducted at six sites, specifically chosen to include a racially/ethnically and economically diverse mix of rural, urban, and suburban youth:

- West Virginia University, Morgantown, W.Va.
- Vista Academy of Visual and Performing Arts, Vista, Calif.
- Judkins Middle School, Pismo Beach, Calif.
- Los Osos Middle School, Los Osos, Calif.
- E.C. Reems Academy of Technology and Arts, Oakland, Calif.
- Berkley Maynard Academy, Oakland, Calif.

APPENDIX 2

Winners of the Ruckus Nation Competition

(Current as of the time of the grant; provided by the grantee organization; not verified by RWJF.)

Grand Prize: *Dancing Craze*
Submitted by Stacy Cho
Seattle, Wash.
An interactive game in which players' live dance moves are recorded via wearable motion sensors. Online characters mimic the players' dances.

Special Honorary Mention: *iBlob*
Submitted by Sarah Tranum
Chicago, Ill.
A fun-to-squish blob that that incorporates interactive lights and music.

Category Winners

Middle School
Dynamic Drums
Submitted by Thomas Freeman and Wesley Zeng
Presque Isle, Maine
Players create music by stomping, tapping, and dancing on interactive floor mat.

Go! Watch!
Submitted by Landon Pauls
Chattanooga, Tenn.
Players earn online rewards for movement, which is tracked via a wristwatch with built-in pedometer.

Txt It!
Submitted by Molly Casey
Denver, Colo.
Players use their feet to type text messages on an interactive floor mat emblazoned with a telephone keypad. Messages can be uploaded to a cell phone.

High School
Ionic Motion
Submitted Sophia Hibbs and Erving Otero
Hollywood, Fla.
Players dance while wearing wireless sensors and their moves are uploaded to a video game.

MoovDisk
Submitted by Anthony Bakshi, Moyukh Chatterjee, Jeff Hart, Lahiru Mudalige, and Matthew Warshauer
Morganville, N.J.
Players chase LED-lit disks in a real-world playing field.

College/University
Rhythm Rope
Bryson Lovett
Los Angeles, Calif.
An interactive jump rope that lights up and plays music.

Scoot
David Ngo
Palo Alto, Calif.
Plays music and projects colored lights.

Other
Honeycomb
Ben Stewart
Maroubra, Australia
Players move on a force-sensitive floor mat while wearing a heart-rate sensor. The speed of the game adjusts to players' heart rate.

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www.zamzee.com. Official website of Zamzee. It includes access to personal Web pages of Zamzee wearers and their parents. It also houses information, such as press clips, on Zamzee Co., the for-profit social enterprise created to manufacture and market Zamzee. Redwood City, CA: Zamzee Co.