Project Title: **Harnessing the Power of Technology to Advance Education About Child Abuse**

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ABSTRACT: (198 words)

Child abuse often causes deep and long-lasting harm. Yet, childcare providers (CCPs) are not prepared to identify at-risk children, reporting <0.5% of all substantiated cases. The online learning program, *iLook Out for Child Abuse (iLookOut)*, improves CCPs’ knowledge and attitudes about child abuse/reporting; and on August 1, 2017, a randomized controlled trial (NICHD-R01-HD088448-01) will begin recruitment to determine whether *iLookOut* also improves CCPs’ actual reporting of suspected abuse.

A perennial challenge for educational interventions is how to help students retain and translate what they have learned. A mobile technology platform integrated with the *iLookOut* intervention can deploy educational games and applied learning exercises (aka “pings”) to measure knowledge retention, reinforce learning, and sustain awareness.

Working with specialists in micro-learning platforms, gamification, and digital badging, we are poised to examine how gamified pings can be used to advance learning among CCPs. To secure NIH funding in time to systematically study pinging with “Standard” and “Control” arms during years 3&4 of the parent study, we propose to create a repository of game-based pings, develop a cognitive map linking pings with *iLookOut’s* learning objectives/content, and demonstrate proof of concept for how gamified pings can promote retention and implementation of learning content.
Innovation: (199 words)

Educational interventions to prepare childcare providers (CCPs) to protect young children from abuse are underdeveloped. The population of CCPs is diverse (ranging from family-based to highly structured, programs), and beset with barriers to effective, scalable educational interventions. Yet CCPs are strategically positioned to help prevent patterns of abuse from taking hold. This project will break new ground by using mobile technology to create an integrated, game-based pinging platform to promote retention and implementation of learning, and thereby address the society-wide problem of child abuse.

Educational games, applied learning exercises, and other interactive pings provide “spaced repetition and retrieval” of content that can enhance cognitive mapping of new information, and increase learning retention. This project will create pings to (variously): evaluate knowledge retention; provide practice opportunities to operationalize new knowledge; offer pathways to deeper competency; and create aligned digital badging opportunities for professional development credit. Additionally, we propose to develop a systematic plan for analyzing factors correlated with CCPs’ receptivity and responsiveness to pings.

Results from this project will provide a foundation for subsequent examination of how gamified pings can be used with CCPs (and related populations) to advance learning and implementation of knowledge as it applies to child abuse/protection.
Impact on Learning: (181 words)

We anticipate that this project will introduce a new modality for reinforcing learning and sustaining awareness about child abuse and child protection. Specifically, we will develop and systematically examine how best to keep childcare providers (CCPs) engaged on a subject matter that is not a natural draw for many people, but nonetheless deserves our attention and demands constant vigilance. By identifying which pinging activities are most effective, our study will help build a foundation to identify best practices for sustaining learning about child abuse and mandated reporting. These findings also may have relevance for other target populations and other topics where sustained engagement in learning/professional development is a challenge.

This project also will pioneer the use of digital badging for professional development among early childcare providers. By partnering with the National Workforce Registry Alliance (a non-profit organization of early childhood workforce registries and professional development leaders) this innovative use of pinging will garner valuable feedback from a national constituency, and also itself serve as a foundation for the Alliance’s own state and national initiatives to promote continuing education through digital badging.
**Alignment with COIL Research Priorities:** (199 words)

This project’s proposed use of online technology, interactive learning, and tailored education strongly aligns with COIL’s goal to promote innovative learning that has broad outreach. Moreover, because this proposal leverages an existing randomized control trial set to begin recruiting childcare providers (CCPs) August 1, 2017, it promises a very large return on investment. COIL funding will be used to develop an integrated strategy for developing and deploying pings, and creating digital badges to promote sustained learning, while the parent grant’s infrastructure will generate data from thousands of CCPs –which will demonstrate proof of concept. These data can then help secure additional NIH funding to study more developed pinging strategies deployed in Years 3 & 4 of the parent study (which is possible because the study’s stepped wedge design recruits a “fresh” cohort of CCPs each year to complete the *iLookOut* intervention, and then receive pings).

This proposal also aligns strongly with several other COIL priorities. It exemplifies interdisciplinary collaboration, involving faculty from different colleges, campuses, and fields of study. It is also data-driven in its methodology to demonstrate proof of concept, and its plans to use the findings for a subsequent systematic analysis of pinging as a learning tool.
SPECIFIC AIMS:
The epidemic of child abuse in the U.S. (>680,000 confirmed annually) causes massive harm to children and the adults they become. Yet despite caring for >8 million American children, childcare providers (CCPs, aka daycare providers) are not adequately prepared to identify at-risk children, and report <0.5% (~2,500) of all substantiated cases. The online learning program, iLook Out for Child Abuse (iLookOut), is the first intervention shown to improve CCPs’ knowledge and attitudes regarding child abuse and its reporting. A 5-year randomized controlled trial (NICHD, R01-HD088448-01) is now underway to determine if iLookOut also improves CCPs’ actual reporting of suspected abuse. Year 1 of this study is currently devoted to building the necessary infrastructure (filming, post-production, website construction, preparation of measures, recruitment strategy, etc.), with enrollment of participants planned to start August 1, 2017.

A perennial challenge for any educational intervention, however, is how to help individuals both retain what they have learned, and translate new knowledge so they can apply it in their lives. Countless interventions have failed or were never effectively implemented because short-term gains were not sustained. To meet this challenge, our current R01 study will use web-based, mobile technologies to create interactive educational games, applied learning exercises, and several forms of messaging –collectively called “pings.” CCPs who complete the 3-hour iLookOut learning program will receive such pings to (variously) measure knowledge retention, reinforce learning, and provide new information. Some pings will also promote skill-building, provide additional resources (e.g., handouts, vignettes for discussion, etc.), share educational opportunities (e.g., webinars), and request feedback about both the iLookOut learning program and the pings, themselves. In addition to raising awareness about child abuse, many pings will also provide opportunities for “digital badging” –whereby CCPs can earn professional development credit (needed for credentialing and/or licensing purposes).

These ping interactions are not the primary or even secondary focus of the current R01 study. Rather, they were initially intended (and budgeted accordingly) to serve as an adjunct to the main iLookOut intervention in order to: a) promote “spaced repetition and retrieval” of content (known to enhance cognitive mapping of new information), and b) provide CCPs a safe space to practice implementing newly acquired knowledge. Over the past 9 months, however, the iLookOut research team has taken advantage of several opportunities to expand the scope and sophistication of our plans for pinging. These include 1) partnering with MLevel (an Atlanta-based firm that specializes in micro-learning platforms and gamification); 2) collaborating with the National Workforce Registry Alliance (an organization for CCP educators that is interested to develop digital badging for CCPs); and 3) working with experts David Bard (University of Oklahoma analytics psychologist who studies web-based educational interventions) and Erin Knight (founder of The Badge Alliance).

Consequently, the iLookOut study is poised to add to its original set of aims a systematic examination of how interactive, gamified pings can be used to help promote both learning and child wellbeing. To take advantage of this opportunity, a subsequent R01 application is planned. However, to secure NIH funding for such a study, preliminary data are needed—which is the goal of the present proposal. For this proposal, timing matters because the current iLookOut study uses a stepped wedge design, whereby the “standard” and “control” arms of the study will not be recruited to complete iLookOut until August of 2018 and 2019, respectively. So, collecting preliminary data during the first 6 months of the initial intervention-arm recruitment phase will provide data needed to apply for NIH funding in time to start the pinging study when intervention-naive CCPs will be recruited to complete the iLookOut intervention. As such, the specific aims for this proposal are to:

Aim 1: Systematically develop a repository of pings that: a) address the key learning objectives; b) represent a broad range of modalities and question-types; c) are engaging for the target population (CCPs); and d) are key-coded and indexed for subsequent analysis.

Aim 2: Develop a full-fledged cognitive map that identifies how individual pings are integrated with the content and objectives of the iLookOut learning program.

Aim 3: Develop a plan for analyzing which factors are correlated with CCPs’ receptivity and responsiveness to pings. This includes examining individual demographic factors, environmental factors (e.g., childcare setting –family-based vs. Center vs. Head Start), and the pinging content and various ping modalities.

Aim 4: Analyze data from the first 6 months of pings sent to CCPs in the parent study’s intervention-arm.
RESEARCH STRATEGY:

A) SIGNIFICANCE: Improving childcare providers’ awareness of child abuse, and ability to identify and report suspected abuse could improve the wellbeing of young, vulnerable children.

A.1 Incidence of Child Abuse: At least 680,000 cases of child abuse (i.e., physical, sexual, and emotional abuse, neglect, and imminent risk) are confirmed annually in the U.S.,\(^1\) with evidence that the true incidence is much higher.\(^2\) Research demonstrates the devastating and long-lasting consequences of child abuse —physical disabilities, cognitive impairment, neurological damage, mental health problems (depression, anxiety, post-traumatic stress, etc.), maladaptive behaviors (alcoholism, drug abuse, intimate partner violence), and further victimization.\(^3\) In short, abuse often has a devastating impact on a child's life and the adult s/he becomes.

Young children (0–5 years) are more vulnerable to victimization, accounting for >75% of deaths from abuse, and comprise a greater proportion of cases than older children for all categories of maltreatment except sexual abuse.\(^1\) Yet despite 8-12 million American children being under the care of childcare providers (CCPs —aka early childhood educators, daycare providers, childcare workers, early childhood professionals), CCPs identify fewer than 0.5% (2,500 of 680,000) of all substantiated cases of child abuse in the U.S.\(^1\)

A.2 Childcare Providers (CCPs): CCPs are uniquely positioned to identify and respond to child abuse. CCPs may be the only people outside of immediate family to have extended opportunities to observe children on a daily basis, and thus have the potential to help prevent patterns of abuse from taking hold, and act as key supports for children/families.\(^4\) Yet CCPs face considerable obstacles in reporting concerns about abuse, and state that “reporting possible abuse” is the most troubling ethical issue they face in their workplace.\(^5,6\)

Studies of CCPs’ reporting of child abuse are relatively few compared with the many studies undertaken on other mandated reporters (e.g., teachers, nurses, doctors). One study found CCPs less likely to have ever reported child maltreatment compared to other professionals who work with children,\(^7\) due in part to the scant education regarding the level of concern and/or circumstances that warrant reporting.\(^8\) The small body of research examining reporting experiences of CCPs\(^9\) reveals high levels of uncertainty about the decision to report, perceived “conflicts of loyalty,”\(^10\) and complexities described as “dancing on the edge.”\(^11\) Such themes encapsulate CCPs’ desire to preserve relationships with families and/or avoid causing harm, while also meeting their legal, professional, and ethical responsibilities. One consequence of such uncertainty and conflict is report latency, with one study finding an average time of 14 months between CCPs having suspicion and making a report—a situation that, if left unaddressed, risks dire outcomes for many young children.

Professional training has been the chief mechanism for trying to improve CCPs’ awareness and reporting of child abuse —it being widely assumed that increased knowledge will promote reporting. But due to the lack of rigorously evaluated interventions, little is known about the actual effect of education on CCPs’ reporting behavior, or how to best prepare them to meet their responsibilities to protect children.\(^12\) Research does show that CCPs’ lack of education about what should be reported contributes to their reports of suspected abuse having a lower yield—with substantiation rates of just 14%, compared to 32% for other mandated reporters.\(^13\)

A.3 Need for Training: Any intervention to help CCPs meet professional, ethical, and legal responsibilities as mandated reporters must deal with well documented challenges:\(^14\) wide variability in entry level training of CCPs; variability in quality of professional development opportunities;\(^35\) logistical barriers to professional development during working hours; bureaucratic challenges to ensuring quality education across settings (from mom/pop daycares to corporate chains to church-based facilities); as well as short-staffing and 20-40% annual turnover rates. All these factors make it more difficult to establish childcare environments that are well prepared to protect young children —especially infants and toddlers— from harm.\(^15\)

That said, well designed training programs can succeed, provided they deliver standardized, high quality curricula and longitudinally reinforce learning.\(^16\) Online education has particular advantages for meeting the needs of CCPs, and overcoming key challenges: it lends itself to standardization; provides ready, low-cost access to multi-media learning; can readily employ interactive exercises for experiential learning; is as effective as in-person training at enhancing CCPs’ knowledge, skills, and professional competencies; and provides ready means for both tracking results and providing follow-up reinforcement (including gamified strategies).\(^17\)
A.4 Summary: In sum: 1) children ≤5 years-old are particularly vulnerable to being abused; 2) despite being uniquely positioned to detect and report suspected abuse in young children, CCPs currently identify and report <0.5% of substantiated cases of child abuse; 3) CCPs are not adequately prepared to identify at-risk children and protect them from abuse; 4) reports of suspected abuse from CCPs are less likely to be substantiated (compared to other mandated reporters); 5) evidence-based interventions are needed to educate CCPs so they are better prepared to fulfill their crucial role in child protection; and 6) online interventions have particular advantages for providing high quality, standardized, follow-up education, and tracking of outcomes.

B) INNOVATION: This study will break new ground by using mobile technology to create an integrated, systematic pinging platform to reinforce learning and awareness, and build CCPs’ skills for protecting children.

B.1 Overview of iLookOut study: Designed specifically for CCPs, the online learning program, iLookOut for Child Abuse (iLookOut), has been shown in a Pennsylvania-based randomized controlled trial to improve knowledge and attitudes about reporting suspected child abuse.18 A 5-year randomized controlled trial in Maine (NICHD, R01 HD088448-01) is set to begin enrollment Aug. 1, 2017 to determine if iLookOut also improves CCPs’ actual reporting of suspected abuse. Maine was chosen due to its excellent data collection and analytics, openness to collaboration, and lack of prior exposure to iLookOut. The ~1,200 childcare facilities in our study area will be randomized to 1 of 3 study arms based on facility type (family, center, Head Start), rurality (urban vs. rural), number of children (≤10, 11-25, >25), and the facility’s official quality rating. CCPs at facilities in the iLookOut arm will be recruited to complete iLookOut in all 3 implementation years (Y2-4, see Figure 1); CCPs in the Standard arm will be asked to complete Maine’s existing online training on mandated reporting during Y2, and then recruited to complete iLookOut in Y3-4; and CCPs in the Control arm will be recruited to complete iLookOut only in Y4. This “stepped wedge design” is intended to assess for accrued changes over time in CCPs’ reporting behavior. The premise of this approach is that by changing CCPs’ awareness, knowledge, and attitudes, iLookOut will change the culture within childcare facilities, fostering greater vigilance and open discussion about child protection.

B.2 Accounting for Forgetting: The forgetting curve quantified in 1885 by Hermann Ebbinghaus shows how new information is lost over time unless efforts are made to retain it.19 For topics people are not naturally drawn to, it is especially important to find ways to reinforce learning. iLookOut does this by combining an engaging video-based storyline with interactive learning exercises. CCPs learn about events that occur over 2 days in the work-life of Megan, a teacher in the 4-year old “Beach Room,” as she recounts them to Elisha, a mentor whose guidance she is seeking. At different junctures, the learner is provided resources (e.g., Facts about Abuse, Red Flags handout), posed didactic questions, and given opportunities to practice decision-making. Such immersion into real-life scenarios helps CCPs absorb and operationalize information, and develop skills to protect children from harm. But that is not enough. For learning not to fade, it must be reinforced, … and reinforced again.

B.3 Technology-Based Solutions: We propose to create an innovative, mobile technology platform to foster “spaced repetition and retrieval” of content known to enhance cognitive mapping of new information and increase learning retention. As part of iLookOut, CCPs will download a (free) “app” to their phone/tablet allowing them to receive interactive educational games, applied learning exercises, and other messaging – collectively called “pings.” This approach capitalizes on the ability of mobile apps and smartphone technology to promote both learning engagement and higher-order thinking. Pings will be used to: evaluate knowledge retention; provide practice opportunities to operationalize new knowledge; provide updates/resources; provide pathways to deeper competency development and mastery; and create aligned digital badges opportunities to earn professional development credit. Building on Erin Knight’s micro-credentials work (i.e., digital badges to motivate, assess, and promote communication), we will create badges that recognizes individuals’ achievement, guides them toward mastery, and enables CCPs to build a portfolio of the skills (that can be shared with others).
Though advanced digital technology is used in multiple settings to promote learning, it has not been used to promote learning to identify and report suspected child abuse. As such, this project has the potential to create a new, powerful, and highly generalizable modality for educating CCPs to better protect children.

**B.4 Innovative Collaborations:** The iLookOut team includes experts in gamification (Kapp), decision-making (Hamm), early childhood education (Fiene), and online learning for CCPs (Mincemoyer). The current proposal brings to the project: Erin Knight, who founded The Badge Alliance, an open badging ecosystem involving over 1,000 organizations; Dr. David Bard, Director of the Biomedical and Behavioral Methodology Core (University of Oklahoma), who has extensive experience evaluating the efficacy of web-based interventions; and the National Workforce Registry Alliance, which represents organizations that provide continuing education to CCPs, and is starting a nationwide “badging” initiative to track professional development credit.

The integrated strengths of these collaborators has enormous potential to develop and pilot a online pinging platform that A) is fully integrated with the existing iLookOut program; B) can engage (otherwise hard to reach) CCPs; C) provides professional incentives for CCPs to continue to engage; and D) will yield strong preliminary data for a subsequent grant application to expand the scope and reach of this innovative approach to education.

**C.1 Description of Pings:** Ping describes the interactive educational games, applied learning exercises, and other messaging we will create to measure knowledge retention, reinforce learning, and provide new information to CCPs. This will include matching activities; drop-and-drag games; case-based vignettes with skill-building exercises; jeopardy-type games; and links to written materials, podcasts, videos, webinars, etc.. Activities will allow CCPs to earn badges towards professional development credit (see Kor Letter of Support). We plan to develop several “levels” of pings, with “basic” pings reinforcing information already included in the iLookOut learning program, and more advanced pings introducing new material and focusing on skill-building.

The parent project is working with MLevel, which specializes in micro-learning platforms and gamification. MLevel’s platform can send pings to all CCPs who complete iLookOut, as well as subgroups –based on demographic factors, repsones within iLookOut, and/or responses to prior pings. MLevel’s back-end dashboard capabilities are advanced, however, its messaging and interactive learning exercises are quite rudimentary, and significant individualized programming will be required to meet the needs of this project. Similarly, the broad scope now planned for pinging activities and badging will require additional programming by the Center for Applied Information Technologies, the vendor that is building and will host the online iLookOut program.

The pings we create will address the learning objectives for iLookOut, and comprise a range of modalities and question-types. Because so much is unknown about how these pings will function, we plan to construct a cognitive map (see C.2) and develop a plan (see C.3) to systematically analyze CCPs’ response patterns (from preliminary data) –which will then ground our subsequent NIH application to study/optimize the use of pinging.

With the parent randomized controlled trial recruitment set to begin 8-1-17, the current proposal will allow us to leverage its power/momentum to develop an extensive repository of pings and a systematic plan of analysis.

**C.2 Cognitive Map:** The impact of pinging is maximized to the extent that it is part of a fully integrated learning experience. To effect this, we need to map-out the relationships between iLookOut’s 1) learning objectives; 2) existing content (within the storyline “script,” and the interactive learning exercises and resource files that make up...

![Figure 2: Example of Cognitive Map, showing relationship between pings and other iLookOut elements.](image-url)
the “learning modules”); 3) pre/post knowledge test; and 4) follow-up pings (including their content and modality). As an example, the first of iLookOut’s 3 major learning objectives is to Understand and recognize possible abuse. Of the various subsidiary learning objectives, the fourth (LO 1.4, see Figure 2) is to Know the signs and symptoms of abuse, one component of which is to know about bruising. A cognitive map would show how this topic is addressed in the various components (script, learning modules, knowledge test, and pings), and would catalogue the modalities to deliver information and record learner responses. Such mapping is particularly valuable for pings because it is not known which kinds of ping or types of interaction will best engage CCPs and/or result in effective learning. Consequently, knowing how pings and their modalities are related to other variables is a precondition for any effective analysis of their functionality.

C.3 Data Collection and Analysis: The combined study of iLookOut and pinging impacts can be described as an effectiveness-implementation hybrid design. Preliminarily, we will solicit feedback from CCPs about the optimal timing and modality of pings via focus groups with CCPs conducted by a research assistant who has extensive experience working with CCPs. This feedback will help with the planned architecture for pinging. CCPs will receive 1-2 pings each week, which automatically open the MLevel app the learner downloaded. The pop-up window will offer 3 options: 1) let’s get started; 2) remind me later (which reactivates the ping later); and 3) not today. This default functionality cannot be changed, but the learner can disable (and later re-enable) the pings at any point. All selections will be recorded and later codified for usage outcomes. Pings will always be accompanied by a brief assessment of knowledge or skill using the reinforcement questions/exercises.

The initial analysis will examine the relationship between learners’ responses to pings and both a) demographic characteristics (e.g., age, education, CCP role, parental status, prior training, abuse reporting history, facility type, years as a CCP); and b) learner status with regard to post-training knowledge and attitudes, and baseline interest in the topic. These factors will be examined as main effects in the analytic models proposed.

We will also examine dynamic usage factors by programming pings –for collecting/transmitting information to predict outcomes. These factors (e.g., frequency of responses, ping type, knowledge scores, badges earned, etc.) will change over time and be used as time-dependent predictors of future responses in our analyses. Relatedly, ping outcomes will be monitored for purposes of testing our engagement hypotheses –e.g., knowledge scores, attitudinal change over time, satisfaction measures, and responses to hypothetical vignettes with forced choices involving varying degrees of risk, benefit, probability of abuse, and ping usage variables (frequency of use; number of features played; duration of use; duration to ping disabling or app removal). These outcomes will all be captured from learner responses and transmitted to a back-end database for future analyses.

Regarding statistical analyses and power, all hypotheses about usage, knowledge, skill, and attitudes will be tested using generalized linear mixed modeling that accounts for the outcome distribution via an appropriate linking function and error distribution. Clustering effects for CCPs in childcare facilities and repeated outcomes for CCPs will be handled with the inclusion of nested random effects. Time to event outcomes (e.g., time to the first disabling or uninstalling) will be analyzed using random effect duration models. The study is powered to detect small effects (Cohen $d=.2$ for linear mixed models of knowledge score changes) for the main effect terms.

In the course of this preliminary examination of pinging, we also will explore the possibility of manipulating two additional factors: 1) the opportunities provided to learners to earn badges (which can both encourage and discourage learning), and 2) the use of “group feedback” (e.g., leader boards) which, like badging, might be a source of motivation for some learners, but a disincentive for others.

The overall purpose of these analyses will be to better understand the operation and utility of pinging for different groups of CCPs, and as a means for promoting knowledge retention and skill acquisition.

C.4 Timeline: Because the parent study is already in process, if we are awarded this grant we will begin immediately to work with consultants Knight and Bard to design an integrated pinging strategy and plan for analysis. Graphic design and custom programming will begin by 7-15-17, focus groups by 8-15-17, and the first systematic pings deployed by 9-15-17. Ping deployment and subsequent collection of data will then be ongoing, with CCP responsivity monitored weekly, interim data analysis conducted both monthly and quarterly, and modification of pinging strategies ongoing in order to optimize CCP engagement and learning. Results will be compiled by 2-1-18 for inclusion in an R-01 application to NICHD by June 2018.
REFERENCES:


TEAM BIOS: (* see formal biosketches in Supporting Materials section)

Bard, David, PhD  Director, Biomedical and Behavioral Methodology Core. Dr. Bard is a psychologist at the University of Oklahoma at Norman who has expertise in quantitative psychology, psychometrics, biostatistics, informatics, genetics, and behavioral science.

Fiene, Rick, PhD*  Principal, Research Institute for Key Indicators. Dr. Fiene is a research psychologist and Penn State Professor Emeritus who was the founding Director of the Capital Area Early Childhood Training Institute, and creator of the Early Childhood Program Quality Indicator & Improvement Model (ECPQI2M4©), and is an independent consultant on this project.

Grable, Breanna, BA  Research Assistant. Ms. Grable is an experienced research assistant who has worked for several years doing research involving childcare professionals.

Hamm, Rob, PhD*  Director, Program in Clinical Decision Making. Dr. Hamm is a Professor of Psychology in the Department of Family and Preventive Medicine at the University of Oklahoma at Norman who is an international expert on decision-making.

Kapp, Karl, EdD*  Director, Institute for Interactive Technologies. Dr. Kapp is a Professor of Instructional Technology at Bloomsberg University who is an international expert on the use of gamification and interactive technologies for learning.

Knight, Erin, MA  CEO, Badge Labs. Ms. Knight is the founder of The Badge Alliance, an open badging ecosystem involving over 1,000 organizations, and is an independent consultant on this project.

Levi, Benjamin, MD PhD*  Director, iLook Out for Child Abuse. Dr. Levi is a Distinguished University Professor of Humanities, and Professor of Pediatrics at the Penn State College of Medicine whose research focuses on various aspects of human decision-making, and who is also a practicing pediatrician.

Mincemoyer, Claudia, PhD*  Director, Better Kid Care. Dr. Mincemoyer is Professor of Agricultural Economics, Sociology, and Education at Penn State, University Park, who has extensive expertise developing, implementing, and evaluating youth and child development programs delivered at the community level.

Panlilio, Carlo, PhD*  Assistant Professor of Education. Dr. Panlilio is an educational psychologist at Penn State, University Park, whose work focuses on conceptualizing, measuring, and analyzing static and dynamic variables related to both child maltreatment and learning.

Tomazin, Deb, BA  Graphic Designer. Ms. Tomazin is an employee of the Penn State College of Medicine, and has expertise in many aspects of graphic design, film editing, and other creative projects.

Verdiglione, Nicole, BA  Project Manager, iLook Out for Child Abuse. Ms. Verdiglione is an employee of the Penn State College of Medicine and the Penn State Hershey Medical Center, and oversees all aspects of iLookOut’s implementation.
BUDGET JUSTIFICATION:

**Graphic Design:** We plan to utilize the talents of Deb Tomazin who is a graphic designer employed by the Penn State College of Medicine. Ms. Tomazin has worked extensively with the iLook Out for Child Abuse project, and has a long-standing, strong working relationship with the project PI (Levi). Ms. Tomazin’s skill is extraordinary, and her hourly rate ($50/hour) is far less expensive than outside graphic designers, including those at either the Center for the Application of Information Technologies (who will host the iLookOut online learning program) or MLevel (who will host our pinging platform). Ms. Tomazin will work with the iLookOut team to create graphics for use in pings, including handouts and various components of interactive learning games we will design. We anticipate needing ~48 hours of her time.

**Programming:** Our current grant from NICHD provides funding to 1) create the iLookOut learning program that will be hosted by the Center for the Application of Information Technologies (aka CAIT, at Western Illinois University), and 2) contract with MLevel (an Atlanta-based micro-learning technology firm) to use their existing messaging and learning exercises. In order to realize the larger goals we have for pinging, custom programming will be needed. This will include: 1) creating real-time data transfers between CAIT and MLevel so that pinging can be individualized based on demographic factors (recorded as part of the registration for iLookOut) and also learner responses both within the iLookOut learning modules and the knowledge and attitude post-tests; and 2) custom programming to create interactive games that are integrated fully with iLookOut’s learning objectives and educational material. We anticipate 40 hours of custom programming for CAIT, and 50 hours for MLevel.

**Consultants:** In order to expand the scope and sophistication of pinging as described in this proposal, we need to consult with Ms. Erin Knight who has expertise using mobile technologies to create and implement badging initiatives. Ms. Knight founded The Badge Alliance, an open badging ecosystem involving over 1,000 organizations, and previously ran an education technology research center at the University of California-Berkeley. She has recently relocated to Maine, where she is CEO of Badge Labs, “a product, services, and implementation firm focused on catalyzing a new culture of learning.” Ms. Knight will work with the core iLookOut team and the National Workforce Registry Alliance (see Kor Letter of Support) to create a micro-credentialing process that engages CCPs, motivates them to continue receiving pings, and provides assessment needed for awarding professional development credit to CPPs. Additionally, we will consult with Dr. David Bard, who is Director of the Biomedical and Behavioral Methodology Core at the University of Oklahoma. Dr. Bard has extensive experience evaluating the efficacy of both web-based educational interventions and also programs to prevent child abuse. His research interests include prevention science, decision-making, and measurement methodologies. Dr. Bard will work with the core iLookOut team to both design an analytic plan for evaluating the use and efficacy of pings used in this study, and carry out the analysis of preliminary data.

**Research assistant:** We have already identified a highly qualified research assistant, Breanna Grable, who has extensive experience doing research with childcare providers, and is eager to work with the iLookOut team. Ms. Grable will be supervised by the Project Manager for the parent study, and will assist with all aspects of this project. This will include conducting focus groups, coordinating details for new design elements and programming, and communication with consultants. We plan to engage Ms. Grable for a half-time position for this one-year project, and eventually bring her on full-time when our R-01 grant proposal is funded.

**Childcare provider focus groups:** We will conduct 5 one-hour focus group discussion sessions to solicit feedback from CCPs regarding the content and modalities of pings that the iLookOut team develops. We anticipate inviting 8 CCPs per session, providing a $20 gift certificate to each CCP per session, and providing refreshments (Total = $150).

The remainder of the iLookOut team has a strong track record of collaboration, and extensive expertise in online learning, early childhood education, reporting of suspected child abuse, gamification, and evaluation of mandated reporter training (see biosketches of core faculty).

Additionally, we will work with the National Workforce Registry Alliance, which has made a strong commitment to help us create badging that works for CCPs. As such, the study team is well positioned to carry
out the aims of this proposed project in coordination with the parent study. If, as expected, this intervention prepares (and motivates) CCPs to better protect young children from abuse, the result will be a powerful, readily exportable mobile technology application that promotes the well-being of children, and of society as a whole.

To provide the full scope of the iLookOut team, biosketches are included for all Co-Investigators and Consultant Dr. Bard, along with Ms. Grable’s CV (see Supporting Materials, p.27).
**DISSEMINATION PLAN:**
Dissemination of results will include presentations at professional conferences, manuscripts submitted to peer reviewed journal articles, and white papers with the *National Workforce Registry Alliance*. Findings will also be shared with the Penn State community through a COIL Conversations webinar, a seminar to the Child Maltreatment Solutions Network, and other such venues.

Additionally, the findings of this study would be manifest in future iterations of pinging that are developed and deployed through the *iLookOut* learning program. At minimum, this audience would include all (~1,800) childcare programs in Maine, with a target population of 10-15,000 individual childcare providers. But because the *iLookOut* learning program was designed to be adaptable to the laws/regulations of any U.S. state, the application of this study’s results could reach a nationwide audience of childcare providers. Depending on the effectiveness of the subsequent pinging strategies, our findings might also have interest for other continuing education initiatives (i.e., outside of early childhood education, and apart from matters of child protection) – in which case, our findings would be of interest to an even broader audience.
LETTERS OF SUPPORT:

COIL RIG Directors and Review Committee,

On behalf of the Pennsylvania State University – College of Medicine’s finance office, I am writing to express our willingness to support Dr. Benjamin Levi’s Project, entitled, “Harnessing the Power of Technology to Advance Education About Child Abuse” Research Initiation Grant submission. If awarded the RIG, our office will support the Principal Investigator’s use and management of the grant funds as detailed in the project’s budget and budget narrative.

Thank You,

Eric J. Strocko, MPH, MPP, MPA
Associate Vice President for Finance and Business
Controller, College of Medicine
May 11, 2017

COIL RIG Directors and Review Committee,

On behalf of the Penn State University – College of Medicine’s Human Resources office, I am writing to express our willingness to support Dr. Benjamin Levi’s project, entitled, “Harnessing the Power of Technology to Advance Education About child Abuse” Research Initiation Grant submission. If awarded the RIG, our office will support the Principal Investigator’s hiring and management of grant personnel as detailed in the project’s budget and budget narrative.

Thank You,

Denise L. Burkholder, MPA, SPHR
Director, HRIS, HR Solution Center & University Relations
Human Resources, Penn State Hershey Medical Center & College of Medicine
Benjamin H. Levi, MD PhD  
Departments of Humanities & Pediatrics  
Penn State College of Medicine  
500 University Drive  
Hershey, PA 17033

Letter of Support:  “Harnessing the Power of Technology to Advance Education About Child Abuse”

Dear Review Committee:

As Executive Director of the National Workforce Registry Alliance, I am writing to support Dr. Levi’s proposal to develop educational pings that will help early childhood educators be better prepared to identify and report suspected abuse.

The National Workforce Registry Alliance is an nationwide organization that promotes high-quality, coordinated, documented, and accessible career development for the early childhood and after-school workforce. Recently we have undertaken an initiative to explore how digital badging can be used to create new professional development opportunities for our constituency. We are taking this path because we are well aware that mobile technology is increasingly the preferred mode for learning—and believe this is particularly the case for those in the early childhood workforce, many of whom under the age of 30.

Accordingly, we are very interested in working with Dr. Levi and his team to see how pinging and digital badging can be designed to engage early childhood educators and provide education that can qualify for professional development credit. We have already enlisted several members of our organization to provide feedback to Dr. Levi’s team, and look forward to working with this project to promote our shared interests.

Sincerely,

Rose M. Kor, MPA  
Executive Director
To: Benjamin H. Levi, MD PhD  
Departments of Humanities & Pediatrics  
Penn State College of Medicine  
500 University Drive  
Hershey, PA 17033

May 9, 2017

RE: Consultant Letter of Support for Harnessing the Power of Technology to Advance Education About Child Abuse

Dear Review Committee:

I am writing to express both my commitment to serve as a consultant on Dr. Levi’s grant application, and my excitement to bring my expertise on badging to this thoughtful and important project.

Having discussed the project at length with Dr. Levi, and reviewed the planned use of ping-ing to reinforce knowledge and skill acquisition, I am impressed with the sophistication of both the research team and the strategic goals of the intervention. It is rare to encounter a project so carefully designed to integrate its conceptual, pedagogical, and motivational elements. So, too, it is rare to see such innovation applied to a social concern with the magnitude of child abuse.

I am confident that I will be able to help Dr. Levi and his team develop an integrated, systematic ping-ing platform that reinforces learning and awareness, is engaging, and helps build childcare providers’ skill-set for protecting children from abuse. Moreover, I believe that the results of this project could have wide application for other interventions designed to improve the health and wellbeing of children.

Throughout the award period, I will continue to contribute my expertise to the project team on the design and implementation of digital badging. In my role as a consultant, I also will provide critical review of study methods and findings as they emerge, and will assist the research team to integrate these findings to further optimize ping-ing activities.

It will be my honor to work with this highly qualified team on such an important project, and I hope that you will give this proposal your full consideration for funding.

Sincerely,

[Signature]

Erie Knight  
CEO and Founder, Badge Labs  
erin@badgelabs.io
SUPPORTING MATERIALS:

Overview of iLookOut:

iLook Out for Child Abuse is a multi-media, online learning program that prepares childcare providers (CCPs) to meet their professional, ethical, and legal responsibilities as mandated reporters of suspected child abuse.

Using an interactive gamified storyline, iLookOut guides learners through real-life scenarios, having them take the role of an educator in a childcare center. As events unfold through video and narrative, didactic questions (with corresponding educational feedback) and branching decision points help CCPs learn and operationalize information that can help protect real children from real harm. Data show that iLookOut increases knowledge, changes attitudes, and is well accepted by CCPs.

What follows is an description of initial version of iLookOut, which is being revised for the parent study in Maine, described in the afore-going application.

The Pennsylvania version iLookOut is available online at https://demo.iLookoutForChildAbuse.com, and going through the learning module will provide reviewers with the most accurate picture of its capabilities.

Because this is a “demo” site, reviewers may encounter a message stating that the site is not secure, or “there is a problem with this website’s security certificate.” Please know that the site does not pose any actual security risk.

Feel free to register for your own account on the demo site with your own email address. An authentication email will then be sent to you—though you may need to check your spam folder. After clicking on the authentication link, you can continue with the registration process (for which you should enter “dummy” responses), and ignore the “PA Keys Registration ID” on the Registration landing page (which is not required to proceed).

If you prefer, you may use the following log-in information instead of registering with your own email.

Email address: ilookoutforchildabuse@gmail.com
Password: ilookout

Why Childcare Providers?

Childcare providers (CCPs) in the U.S. comprise a diverse target population. There is wide variability in the level of training among the ~1 million CCPs working in childcare centers and 3.7 million in other regulated and unregulated settings, and the opportunity for continuing education across different work settings (rural vs. urban, home daycare vs. childcare centers, etc.). Additionally, there are well documented challenges to providing effective professional development for CCPs: logistical barriers to providing learning interventions during working hours; bureaucratic challenges to ensuring quality education across diverse settings; as well as short-staffing and annual turnover rates of 20-40%. As such, what is needed is a systematic approach to educate CCPs that both delivers standardized, high quality curricula and includes some means for longitudinal reinforcement of learning. Online educational programs have particular advantages for meeting this need insofar as they lend themselves to standardization; provide ready, low cost access to multi-media learning that can use interactive exercises to promote experiential learning; have been shown to be as effective as in-person training at enhancing CCPs’ knowledge, skills, and professional competencies; and via web-based technologies provide ready means for both tracking results and follow-up reinforcement.

The Intervention:

iLookOut is a multi-media, online educational module that uses an interactive, video-based storyline to engage childcare providers (CCPs) emotionally and intellectually, along with a learning management system that tracks
pre- and post-test data, as well as CCPs’ responses to questions within the *iLookOut* module. *iLookOut* was created by the *Center for the Protection of Children* at the Penn State Children’s Hospital, involving a multi-disciplinary team of experts in child abuse, instructional design, early childhood education, online learning, mandated reporter training, law, ethics, and child advocacy. The overarching goal of *iLookOut* is to prepare CCPs to be responsible mandated reporters of suspected child abuse/neglect by opening their eyes to the problem, and helping them feel both empowered and responsible for contacting child protective services when there is reasonable suspicion a child is being abused/neglected. Completing *iLookOut* satisfies CCPs’ State requirements for mandated reporter training, and also awards 3 hours of Continuing Education credit – provided that the learner subsequently identifies the correct answers for any items s/he got wrong on the knowledge post-test.

*iLookOut* was programmed using responsive web design to allow for mobile access, as well as features to accommodate individuals with sensory disabilities. *iLookOut* is hosted on a secure server by the *Center for the Application of Information Technologies* (Western Illinois University), which provides tech support for up to 75,000 users annually, and stores all user data.

The premise of *iLookOut* is that CCPs will do a better job protecting children from abuse if (in addition to becoming better educated about signs, symptoms, and risk factors for abuse) they can 1) “identify” with the vulnerability of at-risk children, and 2) see themselves as part of the system that (however imperfect) is the only system there is for protecting children from abuse. Consequently, in the same frame that it educates CCPs about what and how and when to report suspected child abuse, *iLookOut* provides “experiential learning” to help CCPs connect the dots.

**Interactivity:** *iLookOut* uses an engaging storyline in which learners follow the story of a teacher in the 4-year old “Beach Room” at a childcare center. Events then unfold through video interactions, and the learner must decide how best to respond. The videos are shot in point-of-view (i.e., the camera functioning as the learner’s eyes), with the learner encountering Beach Room children and their parents, as well as co-workers (all played by actors). As the storyline plays out, various indicators and concerns emerge related to physical abuse, sexual abuse, psychological abuse, and neglect, and the learners’ co-workers demonstrate (through video and narrative) varying perspectives and levels of awareness about protecting children.

Following some of the videos, learners are posed questions, and then (based on their selection) provided didactic responses that educate them about various aspects of child abuse (legal definitions, incidence, risk factors, requirements for reporting abuse, etc.). Other videos are followed by “judgment” questions where the learner must make choices about what (if any) action is warranted based on what they’ve seen or learned to that point in the storyline – with different choices resulting in different pathways through the storyline. At various junctures, resource files (e.g., Facts about Abuse, Red Flags for Abuse, Legal Requirements, etc.) become available to the learner, as does additional information (text and video) about the children they have encountered (e.g., back-stories about the child’s family life, brief interactions with the child if the learner chooses to explore a concern, etc.). As in real life, the more the learner seeks out useful information, the better informed his/her choices will be.

By requiring CCPs to think about real-life scenarios, *iLookOut* helps them both learn and operationalize information and perspectives that can help protect real children from real harm. Additionally, *iLookOut* reinforces learning by:

1) showing learners their post-test results, and requiring them to identify the correct answer for any question they got wrong;

2) concluding the learning module with a video in which the narrators discuss observations and/or information that could (or should) have raised or lowered concern about abuse for each of the children they encountered in the story;

3) requesting that learners sign a pledge that they will fulfill their responsibilities as mandated reporters; and
4) providing learners with follow-up materials (e.g., case scenarios for discussion, handouts, etc.) to use and share with others in their work setting.

**Conceptual Model:** *iLookOut* is grounded in an Experiential Learning conceptual model, which is a key feature of adult learning theory. Drawing on the work of Knowles, Billington, and Kolb,6,8 *iLookOut’s* design recognizes that adults learn best when 1) they know why they need to learn the material, 2) the learning process is experiential, 3) learning is framed as problem-solving, and 4) the material learned has immediate value. In keeping with Billington’s key factors for promoting adult development, *iLookOut* a) challenges childcare providers (CCPs) just beyond their present level of ability — so they are pushed to grow, but not pushed so far that they give up; b) uses exercises to reinforce facts and frameworks (here, regarding suspected child abuse); and c) allows learners to proceed (and therefore digest information) at their own pace. Because *iLookOut* is accessible 24/7 and can be paused/resumed as desired (including across multiple sessions), it also leverages CCPs’ preference for “flexibility” in professional development.9 Additionally, *iLookOut*’s online platform provides an emotionally safe environment for experiential learning, which has been shown to improve knowledge acquisition and implementation among CCPs.9,10

By interweaving an interactive storyline with didactic information, decision-points, and critical feedback to learners’ responses, *iLookOut* reflects best practices for adult learning, and thus manifests the key elements of Kolb’s experiential model.11 In the context of helping CCPs become responsible mandated reporters of child abuse, these key elements are applied as follows: 1) “Concrete Experience” — helping CCPs reinterpret experiences they have previously encountered; 2) “Reflective Observation” — helping CCPs consider and problem-solve any tension/conflict between the lived experience of being a CCP and their responsibilities to protect children; 3) “Abstract Conceptualization” — promoting reflection about the meaning/implications of concepts such as abuse and suspicion; and 4) “Active Experimentation” — providing practice opportunities to apply new information/understanding. In particular, *iLookOut*’s interactive storyline, pairing of questions with immediate critical feedback, post-test reinforcement, reflective debriefing, and follow-up engagement capitalize on Kolb’s observation that critical thinking skills develop best when learners transform their own experience into knowledge by acting on their learning.

**Effectiveness of learning Strategy:**

*iLookOut* includes a validated pre- and post-test that measures learners’ knowledge about child abuse and their responsibilities as mandated reporters (23-items) along with attitudes about reporting suspected child abuse (13-items), followed by a questionnaire for individuals to evaluate the learning module (15-items). In both a previous randomized control trial and an ongoing open study, *iLookOut* has demonstrated significant improvements in both knowledge and attitudes, and received very high satisfaction scores from CCPs. The current version of *iLookOut* uses Pennsylvania’s legal definitions and requirements regarding child abuse and mandated reporting, however, future versions will accommodate other states’ laws and regulations as well.

In July, 2014, we conducted a randomized, control trial involving 735 Pennsylvania childcare providers (CCPs) using a Test/Re-test design. Measures included validated instruments for 1) Knowledge (n=23), which evaluated participant understanding of legal definitions and responsibilities with regard to child abuse, manifestations of child abuse, thresholds for reporting suspected abuse, and penalties for failing to report suspected abuse; and 2) Attitudes (n=13), which measured how CCPs regarded the duty to report suspected abuse, the utility of reporting, difficulties associated with reporting, as well as potential adverse effects of reporting.

There were no significant demographic differences between those in the Control group and the remainder of participants. There were also no changes in knowledge or attitudes in the Control group between Pre-Test and Re-Test results. Comparison of Pre-Test to Post-Test results (n=735), however, demonstrated significant increases in knowledge (p<.001, from 64% correct pre-test to 78% correct post-test), as well as significant changes on all 13 attitudinal items (p<.001) in the desired direction. Participants expressed high satisfaction overall with the learning module (8.7, where 10=Highly Satisfied), and reported that they found that *iLookOut* provided useful information (86% Agree, 13% Neutral, 1% Disagree) in a way that helped them learn (86% Agree, 13% Neutral, 1% Disagree) and kept their interest (75% Agree, 24% Neutral, 1% Disagree).
Additionally, 99% of participants reported greater self-efficacy (in terms of understanding their legal responsibilities, recognizing warning signs, and knowing how to report suspected child abuse); 85% expressed that they would recommend iLookOut to others; and 99% had accessed iLookOut’s resource files.

Follow-up testing of participants four months later demonstrated the persistence of significant changes for both knowledge and attitudes, though the knowledge score had declined by 7% from its post-test peak.

Since January, 2015, iLookOut has been available free-of-charge to CCPs throughout Pennsylvania; ~9,000 CCPs have completed it; and all outcomes (Pre- and Post-Test scores, as well as evaluations) are virtually identical to those from the initial randomized control trial.
Citations


