

3558

### Do Recognition, Behavioral Intentions, and Attitudes of Adolescent Relationship Abuse (ARA) Serve as Protective Factors Against Future ARA and Cyber Dating Abuse (CDA)?

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**OBJECTIVES/SPECIFIC AIMS:** To create prevention strategies targeting ARA and CDA, it is critical to educate and mold adolescent recognition, behavioral intentions, and attitudes regarding healthy dating relationships. Thus, the purpose of this study was to examine if high school students' recognition of ARA, the students' behavioral intention to intervene during ARA episode of someone they know, and the students' attitudes about the importance of healthy relationship serve as a protective factors against experiencing ARA. Aim 1: Do baseline (T1) recognition, behavioral intentions, and attitudes serve as protective factors against experiencing ARA in high school students at 3-month follow-up (T2)? Aim 2: Do baseline (T1) recognition, behavioral intentions, and attitudes serve as protective factors against CDA in high school students at 3-month follow-up (T2)? **METHODS/STUDY POPULATION:** To examine the relationships between recognition, behavioral intentions, and attitudes of ARA and CDA, a secondary analysis using a descriptive correlational design was used to analyze electronic survey data from a large randomized controlled parent study. The parent study consisted of 1,011 high school students ages 14 to 19 years who sought health service through one of eight school-based health clinics in California. This secondary analysis consisted of 819 students, with 640 (78.1%) female, 178 (21.7%) males, and 1 (0.2%) transgender participant. There were 42 (5.1%) Caucasians, 141 (17.2%) Asians, 218 (26.7%) African Americans, 313 (38.2%) Hispanics, 42 (5.1%) American Indians/Alaskan Natives, and 63 (7.7%) students who responded multi-racial. To measure recognition of ARA, a 10-item, 5-point Likert scale was used with responses ranging from 1="not abusive" to 5="extremely abusive" (Cronbach's  $\alpha = 0.85$ ). To assess behavioral intentions to intervene, a 5-item, 5-point Likert scale was used to ask participants how likely they would be to stop the ARA behavior if they witness a peer perpetrating ARA with responses ranging from 1="very unlikely" to 5="very likely" (Cronbach's  $\alpha = 0.89$ ). A 6-item, 3-point Likert healthy relationship tool measured participants' attitudes regarding healthy relationship with responses ranging from 1="not important" to 3="very important". Both ARA and CDA were assessed using a "yes/no" response choice for the last three months. To account for the hierarchical nature of the data analysis, a binary logistic regression was used in SPSS 24. To take into account the clustering coefficients of the eight different school clinics and as well as the parent study's intervention and control groups, these clusters were examined as co-variables. Sex, race, and age were included as covariates, also. **RESULTS/ANTICIPATED RESULTS:** The relationship status of high school students consisted of 262 (32.0%) who were single, 97 (11.8%) who were going out, dating, or hooking up with more than one person, 423 (51.7%) who were seriously dating one person, and 37 (4.5%) who were not sure. At 3-month follow-up assessment, 111 (13.6%) of high school students experienced ARA, and 476 (58.1%) experienced CDA. The mean recognition of ARA score was  $3.90 \pm 0.67$ , mean behavioral intentions score was  $4.00 \pm 0.83$ , and mean attitudes score was  $2.54 \pm 0.37$ . When

examining the full ARA model including all three predictors controlling for the demographics and group assignment, none of the predictor variables were significant ( $p > 0.05$ ) in predicting ARA in high school students. Also, all three predictors were not significant in predicting ARA in the main effects model. When examining the full CDA model, with no interaction, all three predictors were significant. Recognition had 0.784 decrease odds (95% CI = 0.633-0.971,  $p = 0.026$ ) of predicting CDA. However the odds of CDA increase non-linearly up to the mean (2.537709) for the attitudes variable after which the odds then decreases non-linearly. The odds of CDA is increasing non-linearly up to 3.073913 for the behavioral intention variable after which the odds then decrease non-linearly. **DISCUSSION/SIGNIFICANCE OF IMPACT:** Adolescence is typically a time of exploration, transition, and social development. Researchers should investigate the efficacy of ARA and CDA prevention programs that focus on recognition, behavioral intentions, and attitudes to educate adolescents on healthy relationships. Results showed that behavioral intention to intervene and attitudes about healthy relationship can serve as protective factors against CDA. From our data, more students experienced CDA compared to ARA. Thus, it may be useful to recognize the use of technology as a social force within the adolescent culture in defining adolescents' experiences of healthy relationships and potential experience of CDA.

3132

### Machine Learning for Prediction of Pathologic Pneumatosis Intestinalis Using CT Scans

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**OBJECTIVES/SPECIFIC AIMS:** This retrospective study aims to create and train machine learning models using a radiomic-based feature extraction method for two classification tasks: benign vs. pathologic PI and operation of benefit vs. operation not needed. The long-term goal of our study is to build a computerized model that incorporates both radiomic features and critical non-imaging clinical factors to improve current surgical decision-making when managing PI patients. **METHODS/STUDY POPULATION:** Searched radiology reports from 2010-2012 via the UPMC MARS Database for reports containing the term "pneumatosis" (subsequently accounting for negations and age restrictions). Our inclusion criteria included: patient age 18 or older, clinical data available at time of CT diagnosis, and PI visualized on manual review of imaging. Cases with intra-abdominal free air were excluded. Collected CT imaging data and an additional 149 clinical data elements per patient for a total of 75 PI cases. Data collection of an additional 225 patients is ongoing. We trained models for two clinically-relevant prediction tasks. The first (referred to as prediction task 1) classifies between benign and pathologic PI. Benign PI is defined as either lack of intra-operative visualization of transmural intestinal necrosis or successful non-operative management until discharge. Pathologic PI is defined as either intraoperative visualization of transmural PI or withdrawal of care and subsequent death during hospitalization. The distribution of data samples for prediction task 1 is 47 benign cases and 38 pathologic cases. The second (referred to as prediction task 2) classifies between whether the patient benefitted from an operation or not. "Operation of benefit" is defined as patients with PI, be it transmural or simply mucosal, who benefitted from an operation.

“Operation not needed” is defined as patients who were safely discharged without an operation or patients who had an operation, but nothing was found. The distribution of data samples for prediction task 2 is 37 operation not needed cases and 38 operation of benefit cases. An experienced surgical resident from UPMC manually segmented 3D PI ROIs from the CT scans (5 mm Axial cut) for each case. The most concerning ~10-15 cm segment of bowel for necrosis with a 1 cm margin was selected. A total of 7 slices per patient were segmented for consistency. For both prediction task 1 and prediction task 2, we independently completed the following procedure for testing and training: 1.) Extracted radiomic features from the 3D PI ROIs that resulted in 99 total features. 2.) Used LASSO feature selection to determine the subset of the original 99 features that are most significant for performance of the prediction task. 3.) Used leave-one-out cross-validation for testing and training to account for the small dataset size in our preliminary analysis. Implemented and trained several machine learning models (AdaBoost, SVM, and Naive Bayes). 4.) Evaluated the trained models in terms of AUC and Accuracy and determined the ideal model structure based on these performance metrics. RESULTS/ANTICIPATED RESULTS: Prediction Task 1: The top-performing model for this task was an SVM model trained using 19 features. This model had an AUC of 0.79 and an accuracy of 75%. Prediction Task 2: The top-performing model for this task was an SVM model trained using 28 features. This model had an AUC of 0.74 and an accuracy of 64%. DISCUSSION/SIGNIFICANCE OF IMPACT: To the best of our knowledge, this is the first study to use radiomic-based machine learning models for the prediction of tissue ischemia, specifically intestinal ischemia in the setting of PI. In this preliminary study, which serves as a proof of concept, the performance of our models has demonstrated the potential of machine learning based only on radiomic imaging features to have discriminative power for surgical decision-making problems. While many non-imaging-related clinical factors play a role in the gestalt of clinical decision making when PI presents, we have presented radiomic-based models that may augment this decision-making process, especially for more difficult cases when clinical features indicating acute abdomen are absent. It should be noted that prediction task 2, whether or not a patient presenting with PI would benefit from an operation, has lower performance than prediction task 1 and is also a more challenging task for physicians in real clinical environments. While our results are promising and demonstrate potential, we are currently working to increase our dataset to 300 patients to further train and assess our models. References DuBose, Joseph J., et al. “Pneumatosis Intestinalis Predictive Evaluation Study (PIPES): a multicenter epidemiologic study of the Eastern Association for the Surgery of Trauma.” *Journal of Trauma and Acute Care Surgery* 75.1 (2013): 15-23. Knechtle, Stuart J., Andrew M. Davidoff, and Reed P. Rice. “Pneumatosis intestinalis. Surgical management and clinical outcome.” *Annals of Surgery* 212.2 (1990): 160.

3032

### MKit: Pilot Results of Primary Prevention Sexual Violence WebApp

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OBJECTIVES/SPECIFIC AIMS: Sexual violence (SV) is a public health crisis. High rates of SV are observed among college-age youth,

yet holistic interventions are currently lacking. The purpose of this study was to conduct a pilot feasibility and acceptability test of a WebApp, MKit, which translates a clinical life skills approach to influence the health and well-being of university students. METHODS/STUDY POPULATION: We randomized two residence halls at a public university in the Midwest into a control group (n=139) that received typical university programming around SV and healthy relationships, or an intervention group (n=122) receiving MKit and the usual SV programming. We used online surveys to assess acceptability, feasibility, and usability at 3- and 5-months. Focus groups were conducted with a subsample of participants at 5-months to further investigate safety. RESULTS/ANTICIPATED RESULTS: The mean number of uses of MKit was 2.84 in a 5-month period. The majority of intervention participants endorsed the acceptability and usability of MKit as easy to use, well integrated, accessible, and easy to learn quickly. There were no concerns regarding personal safety. DISCUSSION/SIGNIFICANCE OF IMPACT: MKit provides a promising resource platform to deliver messages regarding healthy relationships and SV within the university context. By delivering SV-related content through a holistic life skills approach, MKit may offer new opportunities to reach and engage a wide range of students on how to foster healthy relationships.

3086

### Virtual World-based Cardiac Rehabilitation to Promote Healthy Lifestyle Among Cardiac Patients

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OBJECTIVES/SPECIFIC AIMS: Our aim was to assess the feasibility and acceptability of a VW-based cardiac rehabilitation (CR) program (Destination Rehab) as an extension of a face-to-face conventional CR program. We hypothesized that a VW-based CR program could be successfully implemented as an extension of conventional CR and would have high acceptability among cardiac patients. METHODS/STUDY POPULATION: We recruited 30 adult cardiac patients (10/site) hospitalized at Mayo Clinic Hospitals in Rochester, MN, Jacksonville, FL or Scottsdale, AZ with a diagnosis for CR (eg, acute coronary syndrome (ACS), heart failure, elective percutaneous coronary intervention (PCI)). Other inclusion criteria included at least 1 modifiable, lifestyle risk factor target: sedentary lifestyle (< 3 hours physical activity (PA)/week), unhealthy diet (< 5 servings fruits and vegetables/day) or current smoking (>1 year). Patients participated in an 8-week, health education program using a VW platform from a prior proof-of-concept study and provided intervention usability, usefulness and satisfaction feedback. We assessed cardiovascular (CV) health behaviors (diet, PA) and risk factors (eg, blood pressure (BP), lipids) at baseline and immediate post-intervention. RESULTS/ANTICIPATED RESULTS: Among 30 patients enrolled (mean age; 59 years; 50% women; 65% <college graduate; 32% annual household income <\$50,000), 28 (98%) completed the study. The majority (64%) were enrolled in conventional CR with a high session completion rate (median 36 sessions, interquartile range 8-36). The most common CR indication was PCI (68%). There were statistically significant improvements in PA from baseline to post-intervention: vigorous PA, +10.7 (SD 11.7) minutes/day (p=0.05) and flexibility exercises +0.9 (SD 0.9) days/week for men (p=0.05). There were favorable trends in risk factors: systolic BP