A Public Health Approach to Preventing and Treating Child Abuse and Neglect

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The rate of child maltreatment in the United States is increasing.

Step 1 – Define and Monitor the Problem
Step 2 – Identify Risk and Protective Factors
Step 3 – Develop and Test Prevention Strategies
Step 4 – Assure Widespread Adoption
Predictive Analytics: “The practice of extracting information from data sets to determine patterns and predict outcomes and trends” (Predictive Analytics, Applications in Child Welfare, Casey Family Programs)

Predictive Risk Modeling: a specific type of predictive analytics, focused on using data patterns to identify predictors of risk and assign risk categories based on these patterns to individuals and/or families (Predictive Analytics, Applications in Child Welfare, Casey Family Programs)
Examples of Predictive Analytics

Amazon Product Recommendations

Healthcare Screenings

Facebook Ads

Fraud Detection
Predictive Analytics in Child Welfare

Gathering Data

- Identify Potential Risk and Protective Factors
- Assemble Spatial Data Sets for Each Factor
- Geocoding (locating) Spatial Data
- Assign Polygon Hierarchy (geographic areas used to organize resources)
- Kernel Density Mapping (test concentrations and correlations)
- Combine Correlated Factors into a Map
- Gather Intelligence Factors and Patterns to Target
- Design Strategies to Leverage Community Resources

Data Analysis

Geospatial Risk Modeling/Analysis
Protective Variables

- Social connections
- Parental supports
- Health
- Stable housing
- Employment
- More parental education
- Well resourced schools
- Places of worship
- Parks
- Community Centers
- Licensed child care
- Early learning centers
- Health clinics
Risk Factors

- Physical abuse
- Sexual abuse
- Emotional abuse
- Physical and emotional neglect
- Exposure to:
  - Domestic Violence
  - Substance misuse within household
  - Household mental illness
  - Parental separation or divorce
  - Incarcerated household member

Gathering Data
If violent behavior is purely a psychological characteristic of the individual, where someone lives should have no bearing on their likelihood of experiencing ACEs and child maltreatment,

We would expect it to occur randomly across geographical regions.

This is not what we see.
Geospatial risk models are built on the notion that

- Place matters and should be taken into account when estimating risk
- Physical elements of the environment contribute to or reduce the likelihood of risk

- Information on these elements can be used to improve prediction – their frequency and distance from locations where child abuse occurs
• We are interested in identifying the socio-economic and physical elements that make a neighborhood risky for children

• If features that enable or contribute to the likelihood of ACEs and child maltreatment can be identified, it is likely they can also be mitigated
Study Area -- City of Richmond:

- 62.5 square miles
- Population: 227,032
- Children: 41,000
- Under age five: 13,850
- 48% African American
- 44.7% White
- 6.5% Latino

US Census 2010

1,910 individual 1,000 ft² cells
Look For Clustering and Associated Risk or Protective Factors

Data Analysis
Founded CPS Investigations, Crime and Domestic Violence in Richmond, VA

Data Analysis
Predict High Risk Areas

Data Analysis
How does the distribution of poverty relate to maltreatment events?

These tables illustrate the relationship between poverty rate and predicted maltreatment count. The scatter plot shows that the correlation between poverty and predictive risk is marginal. This visual relationship is confirmed by a correlation coefficient of 0.29. The weak relationship persists even when the zero count grid cells are removed.
Aligning Project Components

- Asset Mapping
- Service Mapping
- Alignment and Monitoring
- Resource Alignment
- Gap Analysis
- Strategies for Community Engagement and Resource Allotment
- Capacity Needs Analysis

Community Alignment
Community Engagement

• What is the type of abuse to be targeted by the intervention?
• For each risk factor identified in the model, what is its relationship to the type of abuse?
  • What mechanisms link the risk factor to the type of abuse?
• What actions can DSS, local police, VDH, and other community partners take to mitigate the spatial influence of each risk factor?
• Given available resources and our understanding of how the risk factors are related to the type of abuse, what risk factors should be prioritized to receive attention?
Community Engagement

- Could be based on order of relative risk
- Could be based on financial cost of intervention
- Could be based on feasibility of coordinating and deploying necessary resources
- Could be based on community willingness to implement the intervention