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Recommended Citation

Richmond, T. S., Cheney, R., Soyfer, L., Kimmel, R., & Raine, A. (2013). Recruitment of Community-Residing Youth Into Studies on Aggression. *Journal of Community Psychology*, 41 (4), 425-434. <http://dx.doi.org/10.1002/jcop.21546>

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Abstract

Recruitment of community-based youth into studies is challenging. We examined access issues, minority status, and personal costs of participation for a study of children with aggressive behaviors, designed to identify which ones are at risk for future violent behaviors, to identify protective factors, and to test interventions to reduce aggression. Of 1,038 contacts, 112 declined, 239 could not be re-contacted, and 124 were ineligible. Three hundred and fifty of 563 scheduled child-parent dyads completed intake assessment. Most were recruited through targeted mailings (33%) and community flyers (22%), 12% through regional news advertisement, 8% by Craigslist, and 5% through healthcare providers/clinics. Factors contributing to enrollment rates by zip code showed the percentage of Black residents per zip code and targeted mailings positively contributed (Beta = .200 & .419, respectively) and estimated transit travel time negatively contributed (Beta = .299) to enrollment rates ($R^2 = 0.562$). Targeted mailings proved to be the most efficient strategy in successful recruitment.

Keywords

recruitment, diversity, children, aggression, community-residing, incentives

Disciplines

Medicine and Health Sciences | Nursing

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Acknowledgements: This project was funded, in part, under a grant with the Pennsylvania Department of Health. The Department specifically disclaims responsibility for any analyses, interpretations or conclusions.

Disclosure: None of the authors on this manuscript has any actual or potential conflict of interest to report.

Abstract

Recruitment of community-based youth into studies is challenging. We examined access issues, minority status, and personal costs of participation for a study of children with aggressive behaviors designed to identify which are at risk for future violent behaviors, to identify protective factors and to test interventions to reduce aggression. Of 1038 contacts, 112 declined, 239 could not be re-contacted, and 124 were ineligible. 350 of 563 scheduled child-parent dyads completed intake assessment. Most were recruited through targeted mailings (33%) and community flyers (22%), 12% through regional news advertisement, 8% by Craigslist and 5% through healthcare providers/clinics. Factors contributing to enrollment rates by zip code showed the % Black by zip code and targeted mailings positively contributed (Beta = .200 & .419 respectively) and estimated transit travel time negatively contributed (-.299) to enrollment rates ($R^2 = 0.562$). Targeted mailings proved to be the most efficient strategy in successful recruitment.

Key Words: recruitment, diversity, children, aggression, community-residing, incentives

Violence is a priority public health problem (Krug, Dahlberg, Mercy, Zwi, & Lozano, 2002). Recruiting community-residing individuals into research studies about violence or aggression is challenging, yet data-driven recommendations to improve recruitment are sparse. Inadequate recruitment significantly affects the power to test hypotheses, poses a threat to generalizability, affects reliability of the findings, and can delay introduction of effective therapies into practice (McDonald et al., 2011). Also, as Epstein (2008) reflects, there is an ‘inclusion-and-difference paradigm’ which emphasizes the need to include members of diverse racial and ethnic groups to uncover treatment effects. Researchers commiserate over the ‘drying up’ of sample sources. Why sample sources ‘dry up’ may be due overly ambitious projections or under-estimating recruitment challenges. Incentives to enhance recruitment are routinely included in proposals as are advertising costs but the budget allotment is typically a small portion of the overall grant budget. This is increasingly true in this era of constrained federal funding.

A Cochrane review of 45 trials identified strategies to improve recruitment: use telephone reminders, use an opt-out rather than opt-in procedure, set procedures for contacting potential participants, and use open designs where participants know which treatments they will receive (Treweek et al., 2011). Although data-driven and effective, these strategies do not fully address the challenges of recruiting community-residing youth. Thus, we examined recruitment strategies in a large prospective study to identify factors associated with successful recruitment of community-residing children and empirically examined three related factors: access to study information (recruitment sources, referrals, gatekeepers), minority status (race), and personal costs of participation (time, transportation).

Methods

Parent Study Overview. Data are derived from a study that focused on biological, behavioral, and environmental risk and protective factors that could potentially predict which children with aggressive behaviors would continue to become violent adults. Children participated in a risk assessment day and were followed for one year (3, 6, 12 months) including blood, urine and saliva samples, surveys, a child psychiatric interview, psychophysiologic testing, bone lead levels, and functional magnetic resonance imaging. The parent^a provided perinatal history and data about their child’s nutritional status

^a We use the term parent to include biological parent, step-parent, or legal guardian

and behavior. Children meeting benchmarks for aggression were entered into a randomized clinical trial (RCT) to test the efficacy of interventions to reduce aggressive behaviors. We needed to enroll 11-12 year old children with behaviors ranging from developmentally-appropriate to aggressive (e.g. oppositional defiant disorder, conduct disorder) and excluded those with disorders that could affect study interventions. The study was approved by the University of Pennsylvania and the Philadelphia Department of Health human subjects boards. Children entering the RCT were required to commit to 12 weekly sessions of cognitive behavioral therapy (CBT), 12 weeks of nutritional supplements (omega-3 and multivitamin/mineral supplements), 12 weeks of both CBT and nutritional supplements, or usual care. One parent was required to participate in the CBT sessions. For the time required by the CBT, child and parent received an escalating incentive over 12 weeks and were compensated for travel. Sessions were held on campus, in the child's home, or at a convenient location with a private space.

The original goal was to recruit 500 youth from Philadelphia County and its contiguous zip codes (Delaware, Montgomery, Bucks counties). This area covers 240 square miles and has a population of 1.9 million, of which 70,000 were estimated to be 10-12 year olds with a racial distribution of 40% Black, 48% White, 7% Asian, and 7% other. Latino or Hispanic ethnicity was reported at 11% (US Census 2010). The plan was to work with the Philadelphia public school system which has over 154,000 students and includes approximately 35,000 children who are 10-12 years old (District of Philadelphia School, 2011). The school system did not approve access and a new recruitment plan was developed that included direct mail, material distribution via community agencies and posted flyers.

Because of these unexpected recruitment challenges and due to a reduction in award funding, a new recruitment goal of 350 was set. A primary care research network at a children's hospital, several cooperating private and charter schools, and a private company permitted us to mail study information to the parents of 11-12 year old children. Mailings were addressed to families by name. No letter or indication of support from the primary care research network was included. Information was distributed by local non-profit organizations, the City of Philadelphia Recreation Department, health fairs, public events, and community meetings. A referral incentive for current participants to share study information with family/friends enhanced recruitment. Other activities continued as initially planned and included:

posting flyers at local businesses, placing ads in local media including Philadelphia's main public transit line and Craigslist, and establishing relationships with additional organizations serving children.

Data Sources. The 2010 Census data by zip code provided the denominator and demographics of potential participants. Date, time, placement of recruitment materials and associated costs, initial contacts and how potential participants heard about the study were extracted from the study log. The number of participants who consented/assented into the study was obtained by the consent forms. Google maps were used to obtain the estimated distance/ travel time (by car and by public transit). Average travel times from each eligible zip code to the study site were based both on recorded participant addresses and on the centroid of each eligible zip code. Using zip code centroids to estimate distance traveled provides reasonable estimates of travel time (Bliss, Katz, Wright, & Losina, 2012).

Analytic Plan. Descriptive statistics were used to present the demographic profile of the census zip codes, potential participants, actual participants, and recruitment activities. Recruitment data were linked to the census data at the zip code level. A measure of direct mail volume was compiled by zip code. Estimates of total **mailing saturation rates** were calculated as a proportion of mailings to the estimated census population ages 10-12. Success/efficiency measures for recruitment were computed in general and by specific recruitment sources. **Contact numbers** were the number of initial contacts via the study log. **Conversion rates** were the number of consented subjects/number of contacts. Bivariate correlations and linear regressions were run to ascertain the contribution of recruitment activities, distance and demographic characteristics by zip code. **Personal costs**, the formal and informal costs to attend study activities, were estimated using travel and participation time with a relevant minimal sustainable income multiplier (Stringer, Ratcliffe, Evans, & Brown, 2005). **Recruitment rates** (# of participants/estimated population ages 10-12) were used to examine enrollment by zip code and area demographics (age/race, average household income). Linear regression was used to ascertain the contribution of area demographics to recruitment. The contribution of personal costs to recruitment rate and was examined in conjunction with mean household incomes for each zip code. Incomes were dichotomized to above or below poverty level, using the Self-Sufficiency Standard (\$42,630) for a parent with a school age child in Philadelphia (Pearce, 2010). We compared participant compensation

with estimates of direct economic and personal capital costs (potential lost wages using hourly self-sufficiency wage estimate for Philadelphia of \$20.10 which incorporates potential child care costs and time spent in travel). **Recruitment efficiency** was computed for recruitment sources, by estimating fractional enrollment and fractional costs by source.

Results

There were 354 children recruited; 15 were excluded from the zip code-level analysis because they were outside the geographic recruitment frame. At initial telephone contact, potential participants were informed of the time commitment, reimbursement, schedules, and study details. If eligible and interested, the child and parent were scheduled for the risk day assessment. Specifics of contacts, recruitment and RCT assignment are shown in Figure 1. The conversion rate was 33.7% (350/1038). Fifty-four percent of initial respondents could not be re-contacted, declined to participate, or agreed to participate but did not attend the scheduled assessment. In total, 185 male and 169 female children were recruited; similar numbers tested eligible for the intervention (73% and 70% respectively, $\chi^2(1, n=349) = .48, p=.49$). The racial composition of recruited youth represented a greater proportion of Blacks than would be expected from the source population. No significant differences between those eligible for the RCT between White, Black and other youth were found (67%, 72%, 73%; $\chi^2(2, n=349) = .412, p=.81$).

Recruitment began in April 2009 and included canvassing of randomized zip codes in West Philadelphia and expanding to other areas. Field teams saturated areas with flyers at corner stores, libraries, and other public and private places. Recruitment expanded to direct mailings to parents of children seen at clinics, institutional outreach and ads in local papers/internet sites to saturate the catchment area. Consented participants were recruited through targeted mailings (33%), flyers (22%), a regional Metro newspaper ad with a “study recruitment section” (12%), free internet ads on Craigslist (8%) through healthcare providers/clinics (5%), and transit/local ads (3%). (Table 1) A 5-week moving recruitment rate average was calculated and then juxtaposed in reference to the targeted mailings. Average weekly enrollment for 6 month periods rose from 1.5 (5/2009-10/2009) to 2.2 (11/2009-4/2010) to a high of 3.6 (5/2010-10/2010) the decreased to 3.2 (11/2010-4/2011) and 3.4 (4/2011-10/2011). The average number of weekly contacts ranged from 9 to 9.5, increasing to a weekly average

of 13.5 for the final 6 month period (4/2011-10/2011). During the first year that contact data were recorded, conversion rates were fairly constant: 36.5% (11/2009-4/2010), 37.8% during the next 6 month period, 33.5 % in the following period and declined to an average of 25.5% in the final 6 months of recruitment.

Recruitment efficiency was analyzed using fractional enrollment, estimated costs/enrollment, and staff time required, by recruitment source. (Table 1) Mailings used a large portion of the study's recruitment budget, but yielded the largest number of enrolled participants resulting in a cost/enrollee that was lower than many other recruitment methods (\$55/enrollee). Community flyers yielded 22% of enrollments at a very low direct cost (\$7/enrollee), but required the addition of significant staff time.

The highest recruitment rate was from West Philadelphia (14.5/1000 10-12 year olds) followed by Lower North Central Philadelphia (7.05/1000 10-12 year olds) and Delaware County zip codes contiguous with West Philadelphia (6.83/1000 10-12 year olds). (Table 2) We examined distance to the study site and the estimated travel time by personal car or public transit. Given historically high levels of residential segregation, neighborhood racial demographics were linked to levels of household income and may also be reflected in average distance from the study site. The highest recruitment rates were from the areas with estimated travel distance less than 5 miles and commute time by personal car less than 15 minutes and by public transportation at less than 40 minutes.

Anticipated incentives, including incentive increases over time, may have enhanced recruitment. Parent/child initially received \$100/\$40 gift cards for the assessment with graduated incentives at the 3, 6, and 12 month visits (\$20/\$10, \$30/\$15, \$55/\$20 gift cards). A parent/child in the RCT arm with the 12 week CBT received a \$20/\$10 gift card/session. We applied an hourly minimum sustainable wage (\$20.10/hour) for the region to the estimated participation time (Pearce, 2010). For the initial 7 hour assessment, this personal cost index would be close to 1 (\$140.80/\$140); however, adding round trip travel time shifts the personal cost index upward. Incentives for the 1-hour CBT session were close to covering minimum personal costs, if travel time is not considered. For the 2-hour follow-up sessions, incentives only begin to cover the minimum personal costs. For Philadelphia County and immediate western zip codes, round-trip travel added an average 1-hour of travel by public transit. For participants

living in Montgomery County, round trip travel averaged about 30 minutes by car or 1 hour 40 minutes by public transit. Those in the furthest county had an estimated travel time of 1 hour and 20 minutes by car or 3 hours by public transit. (Table 2) As recruitment barriers arose, total follow-up incentives were increased by \$60/\$30 for parent/child. Bonuses for completing all CBT sessions were added (\$50/\$25). Parents were offered the option for having intervention sessions at home or to receive an additional bonus of \$50/\$25 to offset the travel to the site.

The relative contribution of access, minority status, and personal costs to enrollment was examined. Mailings represent the best data on recruitment by zip code. The %Black residents per zip code represented minority status. Estimates of transit (private and public) from the zip code to/from the study site and average household income/zip code were used. The model accounted for 56% of the variance. The %Black and targeted mailings positively contributed and estimated transit travel time negatively contributed to recruitment rate. (Table 3) Running two separate models for zip codes with average household incomes above and below a poverty level finds a stronger model for the poorer zip codes ($R^2 = .544$, % Black: $\beta = .253$, $p = .05$; transit time: $\beta = -.343$, $p = .01$) and targeted mailings ($\beta = .365$, $p = .01$) were significant. For zip codes above poverty level the standard, transit time and targeted mailings were significant ($\beta = -.367$, $p = .04$; $\beta = .419$, $p = .05$ respectively), showing the differing impact of travel time by public transit, for lower and higher income communities.

Discussion

Personalized mailing was the most efficient recruitment strategy. Mailing lists from a primary care research network of the local children's hospital, schools, and a private company were effective and more efficient to get study information to parents of children than media ads. Personal costs (distance and travel time) was negatively related with recruitment, indicating that consideration be given to escalated incentives or reimbursements to acknowledge distance and travel time to enhance recruitment.

Recruiting children who are healthy and living in the community is challenging and requires carefully considered strategies to overcome barriers. Our findings indicate the value of intensive information-sharing in recruitment. Gillis et al. (2001) showed that that face-to-face interaction (followed by direct referral) brought in the highest proportion of eligible participants and this finding is

somewhat comparable to the efficiency our direct mailings. Reaching out to community gatekeepers was an important supplement to direct mailing to children's homes. It is important to alleviate burdens on an organization by addressing concerns of time, cost, and privacy, specific to a site's resources and role within the community. Agencies are often initially enthusiastic, but typically lose focus on the study because of competing demands (Rugkasa & Canvin, 2011). We used a colorful quarterly newsletter that highlighted agency personnel who were involved in recruitment, provided helpful tips for services for community-residing children, and included a study ad.

A proposed business model for recruitment includes: building brand values, planning product and market, making the sale, and maintaining engagement (Francis et al., 2007; McDonald et al., 2011). We branded with a lay title, "Healthy Brains and Behavior Study," rather than the scientific one of "Biosocial Prediction and Intervention on Childhood Aggression." We focused on study barriers and market planning. Barriers included time requirements and participant concerns (e.g., genetic testing, functional MRI, stigma, randomization). The messaging used to explain the study to the public and possible recruitment site leaders was crafted to accurately present the study in the most understandable way possible and address the more threatening aspects. To 'make the sale', careful selection of staff and role playing recruitment conversations was instrumental.

Minorities are believed to be less likely to participate in research for reasons that may include distrust, privacy concerns, cultural insensitivity, and fear by parents that their child might be "treated like a guinea pig" (Corbie-Smith, Thomas, Williams, & Moody-Ayers, 1999; Shavers, Lynch, & Burmeister, 2002; Shaw, Morrell, Corbie-Smith, Goldsmith, 2009; Shwartz, Hoyte, James, Conoscenti, Johnson & Liebschutz, 2010). Black youth were our largest group of participants, out of proportion to the demographics of our geographic area. This is inconsistent with much but not all of the literature. For example, Black parents are less trusting, less likely to be exposed to research recruiting ads, and three times more likely to feel their child might be treated as a guinea pig than White parents, yet show no difference in considering enrolling their children in a study (Shaw et al., 2009). Katz et al. (2006) found no differences in willingness to participate in research between Blacks, Hispanics and Whites although Blacks reported higher fear of participation. Minority recruitment is successful when researchers

identify and systematically take steps to overcome barriers to minority recruitment (Wendler et al., 2006). Thus, training recruiters to establish rapport in a culturally sensitive manner and to garner the support of leaders in recruitment sites is essential to enhance recruitment.

Conclusion

Recruitment of community-based youth into complex studies is challenging but important to building the scientific foundation to reduce community violence. This analysis indicates that with careful planning of recruitment strategies, preparation of personal costs of study participation, and alignment of study incentives with those costs, it is possible to secure a diverse sample. Targeted mailings proved to be the most efficient strategy in successful recruitment.

Table 1: Fractional Enrollment and Estimated Costs by Recruitment Method

Source	Enrolled		Estimated Cost	Cost/Enrolled	Staff Time Requirement
	%	n			
Targeted Mailing (Clinic & Purchased)	33%	73	\$ 4,000	\$ 55	Low – medium
Metro News Ads	12%	26	\$ 2,200	\$ 85	Low
Personal Referral ^a	11%	25	\$ 625	\$ 25	Low
Community Flyer	22%	49	\$ 360	\$ 7	High
Craigslist	8%	18	\$ -	\$ 0	Low
School Targeted Mailings	3%	7	\$ 340	\$ 49	Hi
Mass Transit Ads	2%	5	\$ 830	\$ 166	Low
Healthcare Providers	5%	11	\$ -	\$ 0	Medium
Other News Ads	1%	3	\$ 410	\$ 137	Low
Other	8%	17			
Total from known sources ^b		234			

^a A strategy to increase personal referrals was implemented in April 2011, providing participants with \$25 for successful referrals

^b Of a total of 354 enrolled, 234 provided information on recruitment source

Table 2. Youth Recruitment Rates and Characteristics of Targeted Area

	Total Population	Area (Sq mi)	Density (Pop/ Sq Mi)	% Black /Total Pop	Travel Time Est. by Car (minutes)	Travel Time Est. by Transit (minutes)	Est. # of 10-12 Year Olds	Youth Recruited	Recruit Rate / 1,000
Philadelphia (all zip codes)	1,525,803	133.7	11,415	45%	17.1	42.8	54,548	285	5.22
West	272,837	24.8	10,979	77%	8.6	21.4	9,861	143	14.50
Center	52,958	2.1	25,330	10%	10.1	17.0	271	0	0.00
South	168,334	12.4	13,589	28%	12.6	37.2	4,736	29	6.12
Lower North	181,800	10.9	16,618	54%	13.9	36.8	6,100	43	7.05
Upper North	305,375	20.3	15,068	50%	18.2	45.5	14,764	41	2.78
N West	187,950	23.4	8,040	62%	19.7	47.2	5,977	15	2.51
N East	356,549	39.8	8,968	16%	26.2	64.3	12,838	14	1.09
Delaware County ^a	146,977	22.6	6,510	42%	16.0	37.4	6,298	43	6.83
Montgomery County ^a	161,017	60.3	2,670	12%	26.3	60.0	6,336	10	1.58
Bucks County ^a	81,459	26.4	3,079	7%	32.2	83.2	2,818	1	0.35
Outside Recruitment Area								15	

^a Selected county zip codes contiguous to Philadelphia County

Table 3. Stepwise Multivariate Regression for Zip Code-level Enrollment Rates

Included in Model:	R²	B	Beta	Sig
Enrollment Rate	.562			
Targeted Mailing		.015	.419	.001
Travel Time - Transit		-.087	-.299	.002
% Black		3.516	.200	.048

Excluded from Model:

Avg. Household Income			.062	.543
Travel time - Car			-.153	.426

N=69 Zip codes

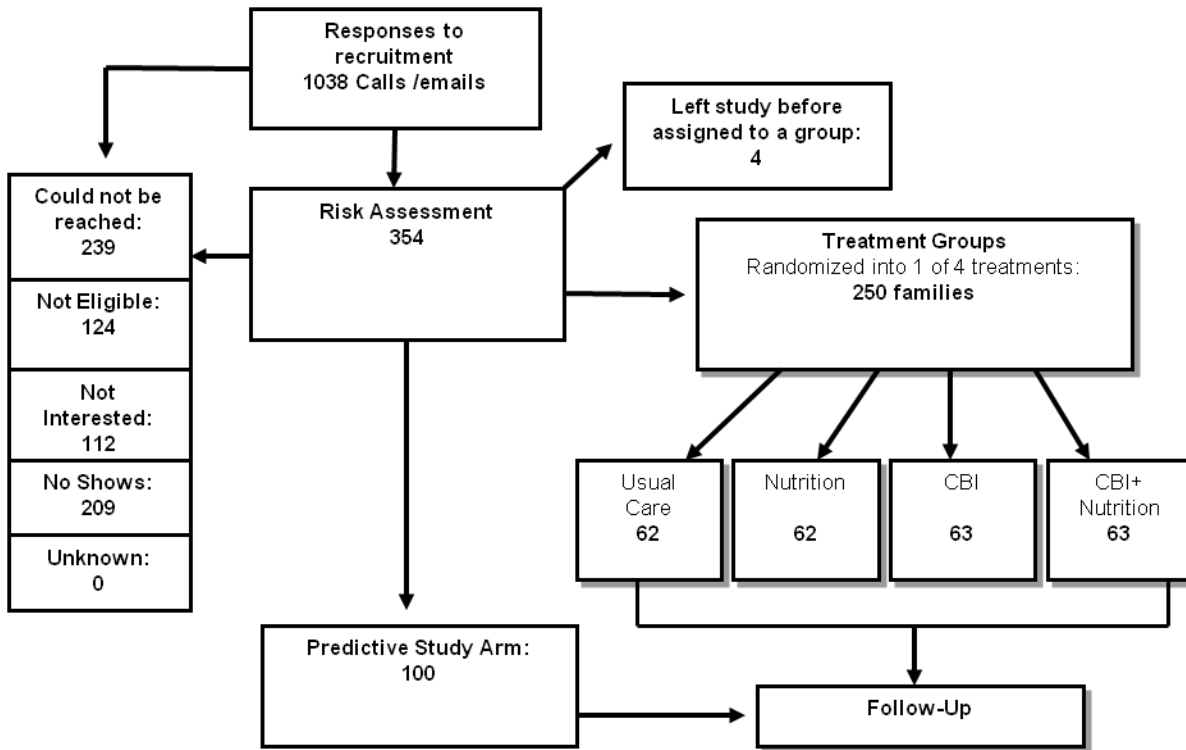


Figure 1. Participant Flow Chart

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