

## SNAP<sup>®</sup> Research Outcomes

SNAP<sup>®</sup> research uses a variety of standardized measures from a variety of sources and informants and the most stringent research and evaluation designs to achieve the highest effectiveness designations. Our research has been focused on establishing measurable, positive and sustainable changes for both child and parent. With over 30 years of research and evaluation these findings are not only exemplary – they are repeatable.

**Note:** The numbers following research outcomes below correspond to studies listed in the SNAP Research & Program Evaluation Studies Summary Chart.

### Qualitative Outcomes

- Connected to positive community activities (B3)
- School success: decrease in disciplinary issues (B3)

### Random Control Trial & Quasi-Experimental Proven Outcomes

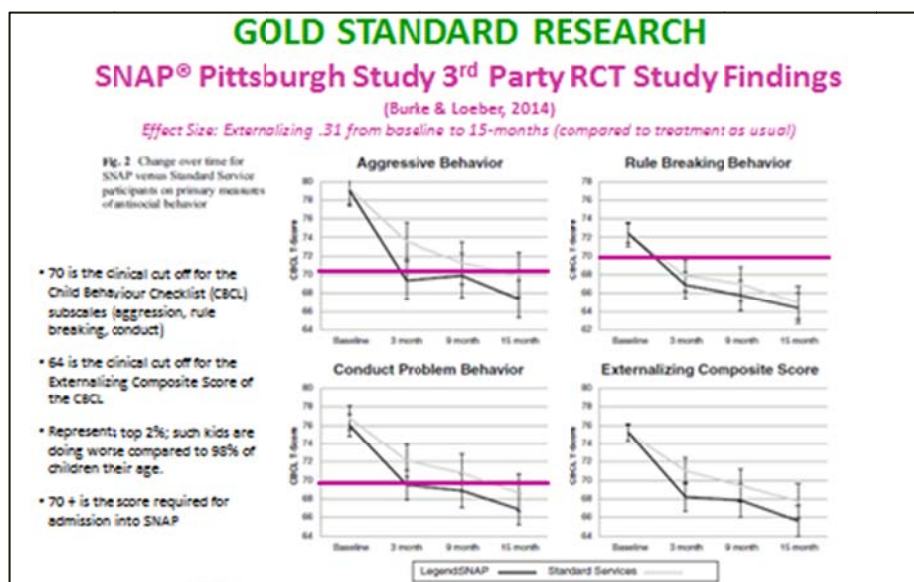
- Increased emotional regulation (B5, D4), self-control (B5), problem-solving (B5, D2), prosocial communication (A1, A4, B2, B5, C1, C6, C9, D2), remorse (B5), and executive functioning (D1, D4)
- Decreased anxiety (A1, A4, B2, B4, B5, C1, C8), police contact (A2, B4, C3, C7, C8, D5), aggression (A1, A2, A3, A4, B1, B2, B4, C1, C8, C9), rule-breaking (A1, A4, B1, B2, B4, C1, C8, C9), conduct (B2, B4, C1, C8, C9), oppositional behaviour (B2, B4, C8, C9), and depression (A1, A4, B2, B4, B5, C1, C8)
- Effective child management strategies (A4, B2, B3, B4, C6), positive support systems (B3, C6), coping abilities (D2) and communication skills (B3, D2)
- Decreased parental distress (A1, B4, B5) and increased parental competency (A4, B2, B3, C6, D2)

### Long-Term Sustained Improvements (12+ months)

- Post-group achievements have been maintained (A1, A2, B1, B4, B5, C1, C8, C9)
- Continued improvement in the parent's ability to use effective child management strategies (B4)
- No involvement with criminal justice system (C3, C7, C8, D3, D5)
- Delayed/less frequent trouble with the police, delayed entry into youth justice system (B4, C2, C3, C7, C8, D3, D5)

### Burke & Loeber, 2014

- The 2014 external, 3<sup>rd</sup> party large scale RCT showed SNAP outperformed standard treatment; significant reduction in aggression, conduct problems and overall externalizing behaviour; treatment gains were maintained at one year; significantly fewer charges against SNAP kids compared to control group.
  - Improvements above and beyond a more intensive treatment-as-usual by levels that exceeded Farrington & Koegl's (2014) upper estimate (.4); SNAP had an effect of .51



## Mechanisms of Change

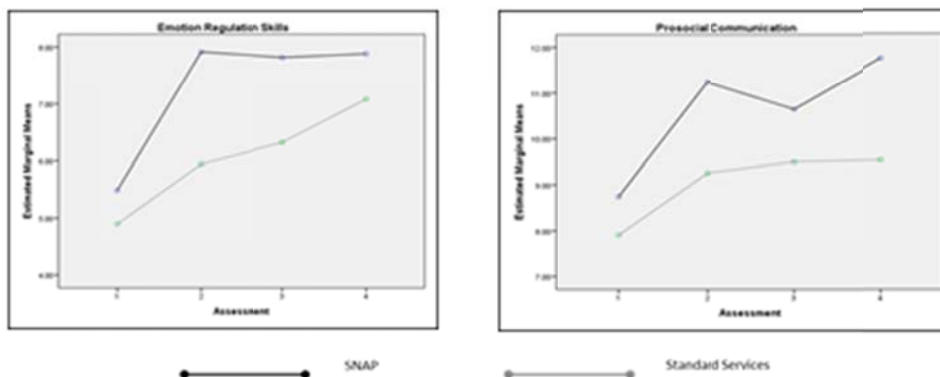
### Burke & Loeber, 2015

- As a follow-up to the 2014 external, 3<sup>rd</sup> party RCT, Burke & Loeber analyzed the mechanisms of change; an area of research that children's mental health has for the most part neglected due to the level of detail.
  - SNAP treatment condition saw improvements in social skills, emotion regulation, and reduced parenting stress associated with difficult child behaviour – all of which predicted improvements on aggression
  - Emotion regulation skills also predicted improvements in anxious/depressed scores for the children

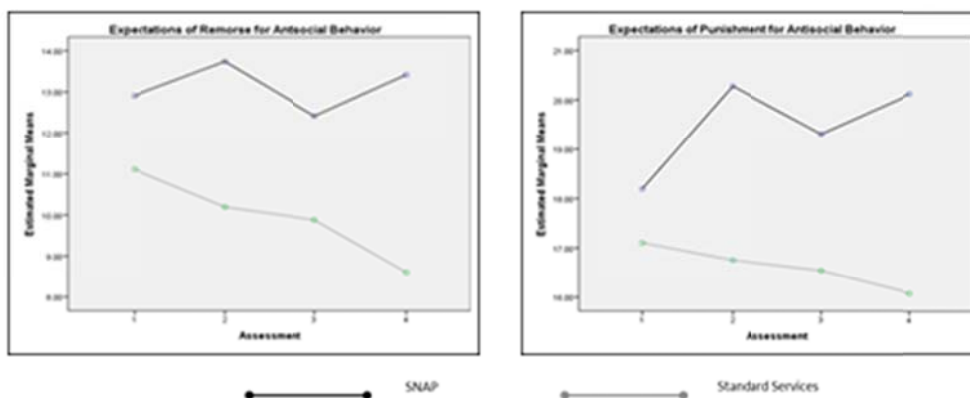
## Mechanisms of Change: Findings

(Burke & Loeber, 2015)

- SNAP Pittsburgh program participants experienced greater levels of change: significantly higher emotion regulation skills and prosocial communication skills than those in standard service



- SNAP Pittsburgh program participants experienced greater levels of change: significantly higher rates of expectancies for punishment, feelings of remorse and causing suffering for the victims of antisocial behaviour



## Cost-Benefit Analysis

Farrington & Koegl, 2015


- 33% reduction in crime: \$147,423 in criminal justice costs only per boy saved; Benefit: Cost ratio of 31.8 (or 3.8 for convictions only)
- 18% reduction in crime: \$80,412 in criminal justice costs only per boy saved; Benefit: Cost ratio of 17.3 (or 2.1 for convictions only)
  - Based upon a lower and upper estimates of typical improvements on the Externalizing scale of the CBCL associated with the initial 6 months of treatment by *comparable* interventions (.2 to .4 effect sizes)

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**CUTTING EDGE RESEARCH**  
Based on Crimes (Farrington & Koegl, 2015)

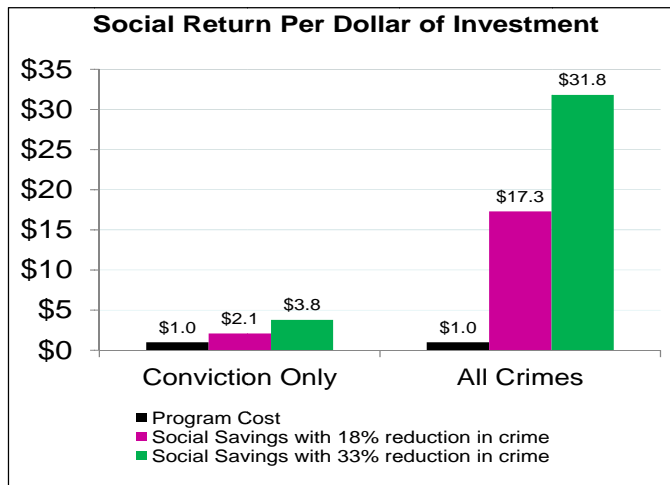
	LOW	MED	HIGH	TOTAL
COST of SNAP	\$1,729	\$4,166	\$8,503	<b>\$4,641</b>
AVG crimes / boy	5.1	6.2	106	<b>6.9</b>
HI % reduction	33%	42%	27%	<b>33%</b>
LO % reduction	18%	25%	15%	<b>18%</b>
HI savings	\$97,322	\$186,498	\$161,573	<b>\$147,423</b>
LO savings	\$53,085	\$111,011	\$89,763	<b>\$80,412</b>
HI / LO ratio	56.3 / 30.7	44.8 / 26.7	19.0 / 11.6	<b>31.8 / 17.3</b>

Note: Cost-ratio numbers were revised to account for co-offending; ratios are underestimated – only accounts for JJ costs  
HI=based on higher effect size estimate; LO=based on lower effect size estimate



POWERED BY THE MINDS AT





## Neuroscience Studies

Lewis, Granic, Woltering et al., (2008; 2011)

- SNAP increases activity in areas responsible for cognitive control and self-regulation in just 13 weeks
- Both behavioural and neural indices of self-regulation change when clinical children improved with SNAP treatment



“Over three months of treatment these kids are learning to control their impulses and to regulate their emotions in a different way. Not using this part of the brain, but using another area.” – Dr. Lewis, U of T

*All publications available upon request  
Also see attached SNAP Research Study Chart*

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## **SNAP Research & Program Evaluation Studies Summary Chart**

SNAP<sup>®</sup> Boys (formerly SNAP<sup>®</sup> Outreach Program – SNAP<sup>®</sup> ORP)  
SNAP<sup>®</sup> Girls (formerly SNAP<sup>®</sup> Girls Connection – SNAP<sup>®</sup> GC)

*Canada's longest sustained, empirically based program for children under 12 years of age in conflict with the law.*

This document provides general information about some of the research studies on SNAP<sup>®</sup> Boys and SNAP<sup>®</sup> Girls. For complete information, please reference the original reports.

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**Table 1A – Internal RCT/Comparison/Waitlist Evaluation Study Designs -- SNAP® Boys AND Girls**  
**See SNAP® bibliography for a complete list of studies completed**

Citation Information	Design or Purpose of Study	Sample size	Measures	Informants	General Comments & Outcomes
<b>A1.</b> Day, D. M. & Augimeri, L. A. (1996). <i>Serving children at risk for juvenile delinquency: An evaluation of the Earls court Under 12 Outreach Project (SNAP® ORP)</i> . Submitted to the Department of Justice. Earls court Child and Family Centre.	<b>Random Control Trial; SNAP® ORP</b> To test the effectiveness of the SNAP® ORP participants were randomly assigned to either SNAP® ORP or control group condition for Phase 1 (three months). For Phase 2, the two groups switched service modalities (the control group received the SNAP® ORP and vice versa). Measures were obtained at admission (baseline), 4, 8, 13, and 17 months.	<b>32</b> (24 boys, 8 girls)	A total of eighteen measures were used to assess behavioral change and treatment moderators (see pp. 13-18).	<ul style="list-style-type: none"> <li>• Parent</li> <li>• Teacher</li> <li>• Child</li> <li>• Clinician</li> <li>• Observers (fidelity)</li> </ul>	<p>Significant effects for the SNAP® ORP treatment versus control group</p> <p>CBCL: delinquency, externalizing, and internalizing                      PSI: parent-child interaction                      PDI: Nonrestrictive Attitudes Toward Parent                      Child Self-Report of frequency of delinquent behaviour</p> <p>Effect sizes ranged from 0.13 to 1.11 (M=0.58)</p>
<b>A2.</b> Augimeri, L. K., Farrington, D. P., Koegl, C. J., & Day, D. M. (2007). The SNAP™ Under 12 Outreach Project: Effects of a community based program for children with conduct problems. <i>Journal of Child and Family Studies</i> , 16, 799-807.	<b>Random Control Trial; SNAP® ORP</b> Using the same participant pool as Study 1, this paper provides a more conservative re-analysis of the data that includes a focus on how levels of treatment intensity and fidelity explain the sustained effects of the SNAP® ORP.	<b>30</b> (22 boys, 8 girls)	CBCL (Aggression & Delinquency) and official criminal offending records up to age 18.	<ul style="list-style-type: none"> <li>• Parent</li> <li>• Criminal Records</li> </ul>	<p>-Very large positive treatment effect sizes were found for the SNAP® ORP treatment</p> <ul style="list-style-type: none"> <li>-Delinquency ES=1.18</li> <li>-Aggression ES=0.79</li> <li>-Other scales available upon request, but not reported in this publication</li> </ul> <p>-Lower treatment intensity and fidelity explained why the original control group did not improve after receiving the SNAP® ORP after Phase 2 of the study</p>
<b>A3.</b> Koegl, C. J., Farrington, D. P., Augimeri, L. K., & Day, D. M. (2008). Evaluation of a targeted cognitive-behavioural program for children with conduct problems – the SNAP™ Under 12 Outreach Project: Service intensity, age and gender effects on short and long term outcomes. <i>Clinical Child Psychology and Psychiatry</i> , 13, 441-456.	<b>Quasi-Experimental; SNAP® ORP</b> This study assessed pre to post treatment changes in relation to age, sex and treatment intensity variables. The sample included 30 cases used in the original RCT study (Studies 1, 2) plus 50 additional cases matched on age, sex and delinquency.	<b>80</b> (59 boys, 21 girls)	CBCL (Major Aggression, Minor Aggression & Delinquency – modified scales using raw scores) and official criminal offending records up to age 18.	<ul style="list-style-type: none"> <li>• Parent</li> <li>• Criminal Records</li> </ul>	<p>-Results indicated significant pre-post changes for SNAP® ORP children, but not for the non-treatment group</p> <p>-Positive relationships between the amount of individual SNAP® ORP components received and CBCL change scores were also found. In this regard, statistical associations tended to be larger for girls and older children (i.e., 10-11 years old) who may have been more cognitively advanced.</p>
<b>A4.</b> Pepler, D., Walsh, M., Yuile, A., Levene, K., Jiang, D., Vaughan, A., & Webber, J. (2010). Bridging the Gender Gap: Interventions with Aggressive Girls and Their Parents. <i>Prevention Science</i> .	<b>Random Control Trial; SNAP® GC</b> A prospective study assessed girls referred to the program between 2002 and 2004. Girls were randomly assigned to either immediate treatment or to a wait-list control group. Mixed model analysis was used to assess change in behaviours after treatment and differences between treatment and control groups.	<b>81 girls (intent to treat)</b>	CBCL, TRF, NLSCY, Social Skills Questionnaire	<ul style="list-style-type: none"> <li>• Parent</li> <li>• Teacher</li> <li>• Child</li> </ul>	<p>Overall, results indicated a significant treatment effect of the program. There were significant treatment effects (treatment vs. control) on: parents' CBCL reports of girls' aggression, rule breaking, conduct disorder, social and internalizing problems; parents' reports of parenting practices, and girls' reports of relationship quality with their parents.</p> <p>Effect Sizes (published) - based on population (SD 10)                      Ext = 0.51; CD= 0.46; Int = 0.41</p> <p>Effect Sizes (unpublished) - sample estimated SD:                      Ext = 0.82; RB = 0.59; Agg = 0.55; Att = 0.60; CD = 0.83; ADH Probs = 0.77; Opp = 0.27; Social = 0.64; Int = 0.62; Anx/Dep = 0.38; Withdrawn/Dep = 0.37; Total Probs = 0.82</p>

\*Indicates earlier versions of CBCL (prior to 2001) which included a delinquency scale



**Table 1B – External RCT/Comparison/Waitlist Evaluation Study Designs -- of the SNAP® Boys AND Girls**  
**See SNAP® bibliography for a complete list of studies completed**

Citation Information	Design or Purpose of Study	Sample size	Measures	Informants	General Comments & Outcomes
<p><b>B1.</b> Lipman, E., Kenny, M., Sniderman, C. (2007). <i>Banyan Community Service Under 12 Outreach Program: Final Evaluation Report</i>. January 2007. Offord Centre for Child Studies.</p> <p>Lipman, E. L., Kenny, M., Sniderman, C., O'Grady, S., Augimeri, L., Khayutin, S., &amp; Boyle, M. H. (2008). Evaluation of a community-based program for young boys at risk of antisocial behaviour: Results and issues. <i>Journal of the Canadian Academy of Child and Adolescent Psychiatry</i>, 17, 1, 12-19.</p>	<p><b>3<sup>rd</sup> Party External Waitlist; SNAP® ORP</b></p> <p>This is a multi-phase evaluation implemented in Hamilton, Ontario, Canada. The report contains findings from a three phase study which includes analysis of client demographics; pre to post changes with long-term follow-up (up to 24 months); treatment versus waitlist comparison; a process evaluation; cost-per case analysis; and criminal records search.</p>	<p><b>299 boys</b></p> <p>Note that the sample size varies depending on the phase of the study.</p>	<p>CBCL, TRF, EARL-20B, BCFPI, Court Records, Key informant interviews, satisfaction questionnaires, group observation, focus groups (see pp. 26-36).</p>	<ul style="list-style-type: none"> <li>• Parent</li> <li>• Teacher</li> <li>• Child</li> <li>• Clinicians</li> <li>• Community members</li> <li>• Police records</li> </ul>	<p>This large study provides strong support for the effectiveness of the SNAP® ORP. Large treatment effect sizes were obtained for several of the CBCL and TRF subscales, and overall, where there were positive effects, treatment gains were maintained at least up to 12 months</p> <p>Effect Sizes:            CD=0.40            Agg = 0.38            RB = 0.36            Total Probs = 0.41            Competence = 0.15</p>
<p><b>B2.</b> Lipman, E., Kenny, M., &amp; Wymouth, M. (2007). <i>Banyan Community Service Girls Connection Program: Final Evaluation Report</i>. June 2007. Offord Centre for Child Studies.</p>	<p><b>3<sup>rd</sup> Party External; SNAP® GC</b></p> <p>Implemented in Hamilton, Ontario, Canada. The report includes analysis of client demographics; pre to post changes at 6 month follow-up; a process evaluation.</p>	<p><b>213 girls</b></p> <p>Note that the sample size varies depending on the pre only or pre/post data.</p>	<p>CBCL, TRF, Key informant interviews, satisfaction questionnaires, group observation</p>	<ul style="list-style-type: none"> <li>• Parent</li> <li>• Teacher</li> <li>• Child</li> </ul>	<p>-This study provides encouraging support for the effectiveness of the SNAP® GC</p> <p>-Significant decreases were obtained for across several of the CBCL subscales, and overall, where there were positive effects for teacher and child report</p> <p>-Parents reported more consistent parenting strategies with the girls reporting more positive relationships with caregivers and siblings</p>
<p><b>B3.</b> Lipman, E., Kenny, M., Brennan, E., O'Grady, S., &amp; Augimeri, L. (2011). Helping boys at-risk of criminal: qualitative results of a multi-component intervention. <i>BMC Public Health</i>, 11, 364, doi:10.1186/1471-2458-11-364.</p>	<p><b>External Qualitative; SNAP® ORP</b></p> <p>This examines parent and child experiences of participation in an external replication of SNAP® ORP in Hamilton, Ontario, Canada. A sample of 35 families participating in the program took part in the qualitative study. Individual interviews with the boys, parents and siblings asked about changes in themselves, relationships with family and peers, and school after the group. Interviews were taped, transcribed and content analysis was used to code and interpret the data.</p>	<p><b>35 families</b> (42 parents, 39 boys and 17 siblings)</p>	<p>CBCL            TRF            Telephone interview</p>	<ul style="list-style-type: none"> <li>• Child</li> <li>• Parent</li> <li>• Siblings</li> </ul>	<p>-Parents reported improvement in parenting skills and attainment of more effective communication skills, particularly with their children</p> <p>-Parents also found the relationships they formed with other parents in the program and the advice that they gained to be beneficial</p> <p>-Boys who participated in the program also benefited, with both parents and boys reporting improvements in boys' anger management skills, social skills, impulse control, and ability to recognize potentially volatile situations</p> <p>-Both parents and boys described overall improvement in family relationships and school-related success</p>

Citation Information	Design or Purpose of Study	Sample Size	Measures	Informants	General Comments & Outcomes
<p><b>B4.</b> Burke, J. D. &amp; Loeber, R. (2014). The effectiveness of the Stop Now and Plan (SNAP) Program for boys at risk for violence and delinquency. <i>Society for Prevention Research</i>, 15, 1-12, DOI 10.1007/s11121-014-0490-2.</p>	<p><b>3<sup>rd</sup> Party External Random Control Trial; SNAP® Boys</b> The implementation of this program by two community providers is compared to standard treatment options for youth showing criterion levels of aggressive, rule-breaking or antisocial behavior in Pittsburgh, Pennsylvania, USA. The present analyses contrast change between groups during the initial 3 month group treatment component of SNAP.</p>	<p><b>252 boys</b> (130 SNAP; 122 Standard Services)</p>	<p>CBCL; CSI; Earls court Family Information Form; CASA; Inventory of Callous-Unemotional Traits; Kaufmann Brief Intelligence Test-2</p>	<ul style="list-style-type: none"> <li>• Child</li> <li>• Parent</li> </ul>	<p>-On primary behavioral outcomes of interest, both groups showed significant declines; those in the SNAP condition showed significantly greater reduction in Child Behavior Checklist measures of Aggressive Behavior, Conduct Problems and overall Externalizing Behavior, as well as on Child Symptom Inventory measures of Oppositional Defiant Disorder and Attention Deficit Hyperactivity Disorder symptoms -On average, those in the SNAP group moved out of the clinical range of behavioral problems; effect sizes for significant differences between the groups on behavioral measures ranged between small to medium -Further analyses indicated that the SNAP program was more effective among those with a higher severity of initial behavioral problems, and that significant group differences were also found for measures of depression -Those not in SNAP showed a worsening trend with respect to targeted behaviors at 15 month follow-up -SNAP parents significantly differed in experiencing lower stress related to interactions with their child and to difficult child behavior -SNAP parents were also significantly more likely to report using positive parenting practices over time -SNAP children had significantly fewer charges alleged against them in comparison with Treatment as Usual</p> <p>Effect Sizes (SNAP vs Treatment as Usual): EXT = 0.31; CP= 0.25; RB = 0.13; INT = 0.29; Anx/Dep = 0.30; With/Dep = 0.27</p>
<p><b>B5.</b> Burke, J. D. &amp; Loeber, R. (2015). Mechanisms of behavioral and affective treatment outcomes in a cognitive behavioral intervention for boys. <i>Journal of Abnormal Child Psychology</i>. DOI: 10.1007/s10802-015-9975-0.</p>	<p><b>3<sup>rd</sup> Party External Random Control Trial; Mechanisms of Change; SNAP® Boys</b> Using the same sample as Study 8, additional measures of Problem Solving Skills (Punishment, Remorse, Victim Suffering), Social Skills, Emotion Regulation, Parenting Behaviors (Harsh, Inconsistent, Positive, Clear Expectations), and Parental Stress (Difficult Child, Parental Distress, Parent-Child Dysfunctional Interaction) were evaluated and utilized to determine elements that mediated either aggressive and/or anxious/depressed change over the course of treatment.</p>	<p><b>252 Boys</b> (130 SNAP; 122 Standard Services)</p>	<p>CBCL; OEQ; Prosocial Behaviors and Emotion Regulation Skills; PPI; PSI-SF</p>	<ul style="list-style-type: none"> <li>• Child</li> <li>• Parent</li> </ul>	<p>- Social Skills and Emotion Regulation were both enhanced in the SNAP treatment condition and both predicted improvements on aggressive behavior -Emotion regulation skills also predicted improvements in anxious/depressed scores -Parenting stress associated with difficult child behavior was reduced in the SNAP treatment condition and predicted improvement on aggressive behavior -Although they did not act as mediating factors for aggressive or anxious/depressed change, all of the Problem Solving Skills (Punishment, Remorse, and Victim Suffering) improved at significantly greater rates for children in the SNAP treatment condition</p>



**Table 1C--Pre/Post and Long-term Follow-up Evaluation Designs -- SNAP® Boys AND Girls**  
**See SNAP® bibliography for a complete list of studies completed**

Citation Information	Design or Purpose of Study	Sample Size	Measures	Informants	General Comments & Outcomes
<b>C1.</b> Hrynkiw-Augimeri, L., Pepler, D., & Goldberg, K. (1993). An outreach program for children having police contact. <i>Canada's Mental Health, 41</i> , 7-12.	<b>Pre/Post Evaluation; SNAP® ORP</b> Assess and compare levels of child behavior pre- (admission), post-SNAP® ORP (discharge) and at six and twelve months follow-up	<b>64</b> (54 boys, 10 girls)	CBCL; TRF	<ul style="list-style-type: none"> <li>• Parent</li> <li>• Teacher</li> </ul>	-First evaluation of the SNAP® ORP -Significant changes were found from pre to post on the CBCL (but not TRF), and these gains were maintained at follow up.
<b>C2.</b> Augimeri, L. K. (2005). Aggressive and antisocial Young Children: Risk Assessment and Management Utilizing the Early Assessment Risk List for Boys (EARL-20B). Ph.D. Dissertation, Ontario Institute for Studies in Education, University of Toronto, May, 2005.	<b>Long-term Follow-up; SNAP® ORP</b> Using a sample of SNAP boys who participated in the program between 1985 & 1991 and were eligible for youth justice contact (meaning they were now 12 years of age and older). This study examines the relationship between early childhood risk factors for future offending and violence as measured by the EARL-20B and treatment effectiveness of the SNAP® ORP.	<b>379 boys</b>	CBCL (Delinquency); official criminal offending records, EARL-20B risk scores	<ul style="list-style-type: none"> <li>• Parent</li> <li>• Clinical files</li> <li>• Independent Raters</li> </ul>	-This study examined the psychometric properties of the EARL-20B for a sample of 379 boys who had received the SNAP® ORP -Pre to post changes on CBCL measures demonstrated that the SNAP® ORP is effective -Additional analyses show that certain clusters of EARL factors are more related to positive treatment outcomes than others
<b>C3.</b> Augimeri, L. K., Jiang, D., Koegl, C. J. & Carey, J. Differential Effects of the Under 12 Outreach Project (SNAP® ORP) Associated with Client Risk & Treatment Intensity (2006). Program Evaluation Report Submitted to the Centre of Excellence for Child and Youth Mental Health at CHEO.	<b>Long-term Follow-up; SNAP® ORP</b> Using the same sample as Study 10 to assess pre to post treatment changes of the SNAP® ORP with a six month follow-up. Risk assessment scores based on the Early Assessment Risk List (EARL-20B) along with criminal offending records (obtained 8 years post admission, on average) were compared in relation to change of CBCL Delinquency scores.	<b>379 boys</b>	CBCL (Delinquency); official criminal offending records, EARL-20B risk scores	<ul style="list-style-type: none"> <li>• Parent</li> <li>• Clinical files</li> <li>• Independent Raters</li> </ul>	-Overall, the analyses show that the SNAP® ORP is effective, although more effective for children with moderate to low levels of delinquency -For the most extreme children, enhanced treatment (i.e., additional SNAP® ORP components) was shown to decrease delinquency -Measured risk factors (EARL-20B scores) were also related to initial levels of delinquency and treatment outcome
<b>C4.</b> Day, D. M. & Hunt, A. C. (1996). A multivariate assessment of a risk model for juvenile delinquency with an under 12 offender sample. <i>Journal of Emotional and Behavioral Disorders, 4</i> , 66-72.	<b>Pre/Post &amp; Follow-up Evaluation; SNAP® ORP</b> A five item Risk Assessment Instrument (RAI) was used to predict CBCL Delinquency subscale scores at admission and 6 months follow-up.	<b>85</b> (69 boys, 16 girls)	CBCL, RAI (based on referral, intake, progress notes & discharge reports)	<ul style="list-style-type: none"> <li>• Parent</li> <li>• Clinicians</li> </ul>	Based on the pre CBCL scores all 5 RAI factors correlated significantly with each other, but only 2 factors – severity of aggression and variety of antisocial behaviors – predicted delinquency.
<b>C5.</b> Day, D. M. (1998). Risk for court contact and predictors of an early age for a first contact among a sample of high risk youth: A survival analysis approach. <i>Canadian Journal of Criminology, 40</i> , 421-446.	<b>Long-term Follow-up; SNAP® ORP</b> Using court contact records as a primary outcome measure. Nine indicator/predictor variables coded from clinical files & compared to youth court records (contact)	<b>203</b> (173 boys, 30 girls)	CBCL, TRF, demographic questionnaires based on the clinical file, Youth court records	<ul style="list-style-type: none"> <li>• Parent</li> <li>• Teacher</li> <li>• Child</li> <li>• Clinician</li> <li>• Youth Court Data</li> </ul>	-48.3% of the SNAP® ORP children had at least one Youth Court Contact in the follow-up period (which ranged from 4-11 years after age 12) -Likeability and history of abuse predicted court contact for both boys and girls, respectively

Citation Information	Design or Purpose of Study	Sample Size	Measures	Informants	General Comments & Outcomes
<b>C6.</b> Day, D. M. (2003). Addressing Antisocial Behaviour in Children: An Evaluation of the "Durham Under Twelve" Pilot Project. Kinark child and Family Services, Durham Office, Oshawa, Ontario.	<b>Pre/Post Evaluation of External Replication; SNAP® ORP</b> External evaluation of the implementation in Durham, Ontario, Canada. This study assessed pre to post treatment changes of the SNAP® ORP with a three month follow-up using a range of objective measures.	<b>32</b> (27 boys, 5 girls)	Self-report Antisocial Behavior Scale (SRA-C; SRA-P); Young Children's Social Desirability Scale; Parent Dimensions Inventory (PDI); Perceived Ineffectiveness Index (PII)	<ul style="list-style-type: none"> <li>• Parent</li> <li>• Child</li> </ul>	<ul style="list-style-type: none"> <li>-Findings revealed a significant decrease in the number of delinquent behaviors as reported by parents and children</li> <li>-There were also improvements in prosocial thinking, parenting behaviour, perceived parenting efficacy, and organization around household routines</li> </ul>
<b>C7.</b> Koegl, C. J. (2011). High-risk antisocial children: Predicting future criminal and health outcomes. Unpublished doctoral dissertation, University of Cambridge.	<b>Long-term Follow-up; SNAP® ORP</b> Using the same sample as Study 11 with the addition of 67 females this study utilized a retrospective longitudinal design to examine the relationship between early childhood and family risk factors and subsequent involvement in criminal activities, contact with the health care system, and the associated costs of these events for a clinic-referred sample of children with conduct problems.	<b>446</b> (379 males, 67 females); and between the ages of 12 and 21 for health encounters (N=234 males, 39 females)	Early Assessment Risk Lists (EARL) for Boys and Girls, and followed up to an average age of 28 for criminal offending Outcome measures using official records from provincial and federal authorities.	<ul style="list-style-type: none"> <li>• Parent</li> <li>• Clinical files</li> <li>• Independent Raters</li> </ul>	<ul style="list-style-type: none"> <li>-Results revealed that the EARL total score significantly predicted prevalence of crime for both males and females</li> <li>-For males, the total score also predicted frequency of convictions and membership within a number of high-risk offending groups based on offending onset, persistence and frequency</li> <li>-Analyses of individual risk factors revealed that poor academic performance, holding antisocial attitudes, having police contact and being unresponsive to treatment were noteworthy individual predictors of future criminality in males</li> <li>-For health outcomes, the EARL total score significantly predicted frequency of emergency room encounters for both males and females</li> <li>-The findings from the monetary cost of crime and cost of health service use analyses largely paralleled those based on count data</li> <li>-Further analyses on the costs of crime indicated that high-risk offenders cost society upwards of 1.4 million dollars per case, suggesting that crime prevention programs can benefit a small fraction of children and still produce enormous savings to society</li> </ul>
<b>C8.</b> Augimeri, L. K., Pepler, D., Walsh, M. M., Jiang, D., & Dassinger, C. R. (2009) Aggressive and Antisocial Young Children: Risk Prediction, Assessment and Clinical Risk Management  The Provincial Centre of Excellence for Child and Youth Mental Health at CHEO Program Evaluation Grant: # RG-976	<b>Long-term Follow-up; SNAP® ORP &amp; SNAP® GC</b> This study was part of a cross-sector collaboration with researchers and practitioners to further examine the predictive quality and content validity of the EARLs. Study I analyzed the construct and content validity of the EARLs by using clinician rated assessments in a prospective sample of boys and girls. Study II further examined the predictive validity of the EARLs. Analyses were conducted to assess the fit between the EARL total and subscale scores, in a sample of clinically referred high risk children.	<b>Study I 343</b> (195 boys; 148 girls) <b>Study II 1150</b> (573 boys; 380 girls)	<i>Early Assessment Risk List for Boys (EARL-20B) and Girls (EARL-21G); CBCL; Criminal Record Data</i> obtained from the Royal Canadian Mounted Police (RCMP) and the Ministry of Children and Youth Services (MCYS) through a court order under the Youth Criminal Justice Act (YCJA)	<ul style="list-style-type: none"> <li>• Parent</li> <li>• Criminal Records</li> <li>• Clinicians</li> </ul>	<p><b>Study I</b></p> <ul style="list-style-type: none"> <li>-For boys, the clinician-rated EARL sample generated a similar 3-Factor Model structure as previously reported (Augimeri, 2005)</li> <li>-For girls, the current findings did not replicate previous Confirmatory Factor Analysis (CFA) findings</li> <li>-a 3-Factor Model was produced with a new <i>Relational Disturbance</i> factor</li> </ul> <p><b>Study II</b></p> <ul style="list-style-type: none"> <li>-Criminal record data retrieved showed that 8% of boys and 5% of girls had one or more criminal offences</li> <li>-Survival Curve analysis showed that the probability of criminal offence for boys was 2.5 times that of girls</li> </ul>
<b>C9.</b> Walsh, M. M., Pepler, D. J., & Levene, K. S. (2002). A model intervention for girls with disruptive behaviour problems: The EarlsCourt Girls Connection. <i>Canadian Journal of Counselling</i> , 36, 297-311.	<b>Pre/Post/Follow-up Evaluation; SNAP® GC</b> A retrospective case file study was performed on the files of girls who participated in the SNAP® GC program from its inception in 1996 through to 2000. The analysis examined behavioural change comparing admission, six, and twelve month externalizing behaviour scores.	<b>98 girls</b>	Standardized Client Information System, a measure based on the CBCL (Offord & Boyle, 1996)	<ul style="list-style-type: none"> <li>• Clinical files</li> </ul>	<ul style="list-style-type: none"> <li>-At both follow up periods, girls showed significant improvements in terms of externalizing behaviours, which is an aggregation of conduct and oppositional problem behaviours</li> <li>-The girls also displayed a statistically significant improvement in social skills behaviour from admission to the six-month follow up</li> </ul> <p>Effect Sizes Ext = 0.42 (6 month follow-up); 0.49 (12 month follow-up) Social relations = 0.72 (6 month follow-up); 0.51 (12 month follow-up)</p>

**Table 1D –Studies Based on SNAP® Boys and Girls Children (Not Directly Testing Program Effectiveness)**

Citation Information	Design or Purpose of Study	Sample Size	Measures	Informants	General Comments & Outcomes
<b>D1.</b> Lewis, M.D., Granic, I., Lamm, C., Zelazo, P. D., Stieben, J. Todd, R. M., Moadab, I., & Pepler, D. (2008). Changes in the neural bases of emotion regulation associate with clinical improvement in children with behaviour problems. <i>Development and Psychopathology</i> , 20, 913–939.	<b>EEG/ERP; SNAP® Boys</b> Neurophysiological markers associated with emotion regulation were examined in children comorbid for externalizing and internalizing problems before and after treatment. It was hypothesized that treatment success would correspond with reduced ventral prefrontal activation, and increased dorsomedial prefrontal activation, at the time point of an event-related potential (ERP) associated with inhibitory control.	<b>42 boys</b> (27 clinical; 15 non-clinical)	<i>Behavioural</i> CBCL; TRF; CAFAS; Self-report rating scales  <i>EEG Data</i> Emotion-induction modification of a go/no-go task	<ul style="list-style-type: none"> <li>• Teacher</li> <li>• Parent</li> <li>• Clinician</li> <li>• Independent coders</li> </ul>	<p>-Child 'Improvers' showed an overall reduction in ventral prefrontal activation from pretreatment to post-treatment, bringing them in line with non-clinical children, whereas ventral activation remained high for child non-improvers</p> <p>-Both improvers and non-improvers showed high dorsal activation relative to non-clinical children</p> <p>-While these results are preliminary and require replication, they constitute the first record of brain changes corresponding with the successful treatment of children's behavior problems.</p>
<b>D2.</b> Granic, I., O'Hara, A., Pepler, D., & Lewis, M. (2007). A dynamic system analysis of parent-child changes associated with successful "real-world" interventions for aggressive children. <i>Journal of Abnormal Child Psychology</i> , 35 (5), 845-857. Printed On-Line: DOI 10.1007/s10802-007-9133-4.	<b>Mother/Child Interaction; SNAP® Boys &amp; Girls</b> Studies have shown that improved parenting mediates treatment outcomes for aggressive children, but empirical research lacks descriptions of how parent-child interactions change with treatment. The parent-child interactions of children who showed clinically significant improvements (IMPs) were compared to those of children who did not improve (NIMPs). At pre- and post-treatment, home visits were videotaped while parents and children discussed consecutively: a positive topic, a mutually unresolved problem, and another positive topic	<b>38</b> (34 boys, 4 girls) and their mothers	A modified version of the Issues Checklist (Robin & Weiss, 1980); CAFAS; CBCL	<ul style="list-style-type: none"> <li>• Child</li> <li>• Parent</li> <li>• Clinician</li> <li>• Trained observers (coding)</li> </ul>	<p>-Results showed that significant improvements in children's externalizing behaviour were associated with increases in parent-child emotional flexibility during the problem-solving discussion</p> <p>-Dyads who improved still expressed negative emotions, but they acquired the skills to repair conflicts, shifting out of their negative interactions to mutually positive patterns</p>
<b>D3.</b> Levene, K. S., Walsh, M. M., Augimeri, L. K. & Pepler, D. J. (2004). Linking identification and treatment of early risk factors for female delinquency. In M. M. Moretti, C. L. Odgers & M. A. Jackson (Eds.), <i>Girls and Aggression: Contributing Factors and Intervention Principles</i> . Perspectives in Law & Psychology Series, Volume 19 (pp. 41-56). New York: Kluwer Academic/ Plenum.	<b>Long-Term Follow-up; Measure Validation; SNAP® GC</b> A retrospective examination of the reliability and validity of the EARL-21G was conducted. A search of criminal records was performed in order to determine long-term involvement in crime. Intra-class correlation coefficients were calculated for total scores derived from three coders who assessed 30 common files.	<b>30 girls</b>	EARL-21G (retrospectively rated)	<ul style="list-style-type: none"> <li>• Clinical files</li> <li>• Criminal records</li> </ul>	<p>-In terms of official criminal involvement, total scores derived for 67 files were used to divide the sample at the median to compare the prevalence of offending between the bottom (mean = 12.7, range = 5-17) and top (mean = 22.3, range = 18-30) ends of the distribution</p> <p>-Official conviction data showed that, overall, only 18 out of 67 (27%) of the girls were found guilty of committing an offense at follow-up, and although higher EARL-21G scores were related to more offending (34% versus 20%) the difference between the two groups failed to reach statistical significance</p>

Citation Information	Design or Purpose of Study	Sample Size	Measures	Informants	General Comments & Outcomes
<b>D4.</b> Woltering, S., Granic, I., Lamm C., & Lewis, M. D. (2011). Neural Changes Associated with Treatment Outcome in Children with Externalizing Problems. <i>Biological Psychiatry</i> . 70(9), 873-879.	<b>EEG/ERP; SNAP® Boys &amp; Girls</b> This study directly investigated whether changes in the neural correlates of <i>self-regulation (SR)</i> are associated with the effectiveness of treatment for the externalizing problems of children. Electroencephalogram correlates of SR were evaluated before and after treatment with a go/no-go task requiring inhibitory control.	<b>95;</b> 71 SNAP group (51 boys, 20 girls); 24 Non-Clinical Control group (17 boys, 7 girls)	<i>Behavioural</i> CBCL; CAFAS; Self-report rating scales  <i>EEG Data</i> Emotion-induction modification of a go/no-go task	<ul style="list-style-type: none"> <li>• Child</li> <li>• Parent</li> <li>• Other significant adults in child's life (i.e., grandparents, teachers)</li> </ul>	<p>-Results showed that neural markers of SR, such as the N2 and frontal P3 event-related potential magnitudes, differed between the clinical sample and a matched comparison group before treatment: the clinical sample had larger N2 magnitudes and smaller frontal P3 magnitudes</p> <p>-Children who improved with treatment demonstrated a marked decrease in the magnitude of the N2 in comparison with children who did not improve</p> <p>-For improvers only, source analyses during the time period of the N2 estimated activation decreases in medial and ventral prefrontal cortex as well as the anterior medial temporal lobe</p> <p>-A decrease in N2 magnitudes and corresponding source activation in children who improved with treatment might reflect improved efficiency in the neural mechanisms of SR</p>
<b>D5.</b> Farrington, D. P. & Koegl, C. J. (2015). Monetary benefits and costs of the Stop Now And Plan Program for boys aged 6-11, based on the prevention of later offending. <i>Journal of Quantitative Criminology</i> . 31:263–287; DOI 10.1007/s10940-014-9240-7	<b>Cost Benefit Analysis; SNAP® ORP</b> The monetary benefits and costs of the SNAP-ORP generated by preventing later offending by boys. Lower and Upper estimates are established based on comparable programs and used to translate change from baseline to post-SNAP groups on the Externalizing scale of the CBCL. Using the available literature both a top-down and bottom-up method of calculating juvenile justice costs are evaluated to create the most stringent estimates possible while taking into account co-offending.	<b>376 boys</b>	CBCL; EARL-20B (retrospectively rated)	<ul style="list-style-type: none"> <li>• Parent</li> <li>• Clinical files</li> <li>• Criminal records</li> </ul>	<p>-Based on convictions, it is estimated that between \$2.05 and \$3.75 are saved for every \$1 spent on the program</p> <p>-The benefit-to-cost ratio was largest for the low-risk boys and smallest for the high-risk boys. However, there were indications that the program was particularly effective for high risk boys who received intensive treatment</p> <p>-Scaling up to include all crimes committed, it is estimated that between \$17.33 and \$31.77 are saved for every \$1 spent on the program</p> <p>-An estimated decrease on the externalizing composite scale of the CBCL between T1 and T2 (4-6 months) yielding an effect size of 0.2 (lower range) translates to an 18% reduction in crime and an effect size of 0.4 (upper range) translates to a 33% reduction in crime.</p>
<b>D6.</b> Woltering, S., Liao, V., Liu, Zhong-Xu, & Granic, I. (2015). Neural rhythms of change: Long-term improvement after successful treatment in children with disruptive behavior problems. <i>Neural Plasticity</i> , 2015, 873197, 1-11. <a href="http://dx.doi.org/10.1155/2015/873197">http://dx.doi.org/10.1155/2015/873197</a>	<b>EEG/ERP; Long-term Follow-up; SNAP® Boys &amp; Girls</b> This study directly investigated whether changes in the neural correlates of <i>self-regulation (SR)</i> are associated with the effectiveness of treatment for the externalizing problems of children. Electroencephalogram correlates of SR were evaluated before and after treatment as well as a year after with a go/no-go task requiring inhibitory control.	<b>N=78 (62 boys, 16 girls)</b>	<i>Behavioural</i> CBCL  <i>EEG Data</i> Emotion-induction modification of a go/no-go task	<ul style="list-style-type: none"> <li>• Parent</li> </ul>	<p>-Participants were grouped into either Externalizers or Internalizers, and then subdivided into improvers and non-improvers</p> <p>-Results showed preliminary evidence that theta power is a useful neural measure to trace behavioral change linked to improved self-regulation even up to a year after treatment ended.</p>

<p><b>D7.</b> Woltering, S., Lishak, V., Hodgson, N., Granic, I. &amp; Zelazo, P.D. (2015). Executive function in children with externalizing and comorbid internalizing behavior problems. <i>Journal of Child Psychology and Psychiatry</i>, 56(11), doi: 10.1111/jcpp.12428</p>	<p><b>EEG/ERP; SNAP® Boys &amp; Girls</b>  This study directly investigated whether changes in the neural correlates of <i>self-regulation (SR)</i> are associated with the effectiveness of treatment for the externalizing problems of children. Electroencephalogram correlates of SR were evaluated before and after treatment as well as a year after with a go/no-go task requiring inhibitory control.</p>	<p><b>153;</b> 90 DBT group (72 boys, 18 girls); 63 Non-Clinical Control group ( 41 boys, 22 girls)</p>	<p><i>Behavioural</i>  CBCL; EATQ;  Self-report rating scales</p> <p><i>Executive functions</i>  Iowa Gambling Task; Stroop Color-word Test; Delay Discounting; Digit Span; The Go-Nogo Task</p> <p><i>EEG Data</i>  Emotion-induction modification of a go/no-go task</p>	<ul style="list-style-type: none"> <li>• Parent; Child</li> </ul>	<p>-Participants were grouped into either Externalizers, Internalizers, or normally developing individuals  -Results suggest that difficulties in emotion regulation underlie externalizing problem behaviors in middle childhood.</p>
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