The Technical Background of the Risk, Need, Responsivity (RNR) Simulation Tool

What is the RNR Simulation Tool?

The Risk, Need, Responsivity (RNR) Simulation Tool was developed to help jurisdictions apply the RNR framework to practice. This document describes the RNR Simulation Tool and how it was developed. The RNR Simulation Tool is supported by a database of over 20,000 unique offender profiles of various risk, need, and recidivism combinations. The goal of this document is to help users understand the components of the model. The RNR Simulation Tool has three portals:

1. **The RNR Program Tool:** Assesses programs based on content, quality, dosage, and implementation. Jurisdictions input information about a specific program and the RNR tool rates the program’s overall quality as it relates to the RNR principles. The three main goals of the program tool are: 1) to classify programs to facilitate treatment matching, 2) to explore how programs currently target the risk level and criminogenic needs of their clients, and 3) to assess programs on their use of evidence-based practices. The tool can help criminal justice and service agencies improve their understanding of the treatment resources that are available to them and to foster responsivity at a system level.

2. **Assess an Individual:** This portal makes programming recommendations for individual offenders based on inputted information about their risk, criminogenic needs, and other clinically relevant factors. Included is an estimate of the percent reduction in recidivism that one may expect if institutional and community corrections or service agencies match an offender to the level of programming that is consistent with their unique needs. This portal is geared for use by front-line personnel such as case managers, counselors, officers, and others who have to make decisions and recommendations after screening and assessing individuals.

3. **Assess Jurisdiction’s Capacity:** This portal uses an underlying database of unique offender profiles to assess a jurisdiction’s capacity to address the risk and need factors of the offenders under its correctional control. It draws from information provided by the jurisdiction on offender profiles and/or programming to identify system-level gaps in the capacity to be responsive to the needs of their population. This portal is geared for use by jurisdiction administrators or front-line professionals who wish to estimate the expected recidivism reductions when programming is matched to risk and needs at the jurisdictional level.

What is the Theoretical Framework behind the RNR Simulation Tool?

The theoretical framework builds upon Andrews and Bonta’s (2010a) Risk-Need-Responsivity principles and illustrates how outcomes are a result of better assessment and matching to appropriate services and level of care/control.
**Risk Principle** – Offenders vary by level of probability of recidivism. History of involvement with the criminal justice system is a strong predictor of future involvement with the criminal justice system. Generally, the calculation of risk includes static factors such as age of first arrest, number of prior arrests, etc. which cannot decrease over time.

**Need Principle** – Criminogenic needs are dynamic factors that drive participation in criminal offending and are amenable to change. Supervision, correctional, and/or treatment staff can assess these factors and target them for reduction through treatment and controls. Targeting needs (i.e. drug dependence and criminal lifestyle) is one way to reduce individuals’ overall risk of recidivism.

**Responsivity Principle** – Responsivity refers to matching individuals to appropriate treatment programming and controls to maximize outcomes (see Figure 1).

Inherent in the RNR Framework is that:

1. Other clinically relevant factors such as age, gender, mental health status, and housing stability are important factors to consider in the matching decision;
2. The quality of programs affects outcomes; and
3. The availability of programs/controls affects outcomes.

The RNR Framework requires attention to a myriad of issues, and provides the tools to deliver feedback to a jurisdiction on each of these factors, as shown in Figure 2.

What are the Goals of the RNR Simulation Tool?

There are three goals of the RNR Simulation Tool:

1. To provide feedback on programs currently in use (RNR Program Tool);
2. To provide tools to support decision making at the staff level of a counselor, case manager, officer, or others that are working with offenders (Assess an Individual); and
3. To provide system building capability for a jurisdiction/agency to use to identify their programming needs (Assess Jurisdiction’s Capacity).

The RNR Simulation Tool can also educate practitioners on the concepts related to responsivity, illustrate how to tie decisions to program placement, and improve system capacities to address public safety and health needs.

What Data Supports the Tool?

The RNR Simulation Tool provides users with a number of estimates at the individual, program, and jurisdiction level. The tool is flexible in that it can integrate jurisdiction-specific data to inform the estimates it provides, but such data is not required for users to experience the full functionality of the tool. Users can choose from any of the...
How does the RNR Simulation Tool Classify Programs into Groups?

The RNR Simulation Tool classifies programs into groups based on target behaviors, as shown in Figure 3 (page 5). The content and dosage of programs then varies within each group.

Group A: Treatment focuses cognitive restructuring techniques for substance users with dependence on opioids, cocaine, amphetamines, and other harder drugs. These programs predominately target offenders (regardless of risk levels) that have dependence on drugs that tend to be “criminogenic” or lead to criminal behavior (Bennett, Holloway, & Farrington, 2008). Most of these programs should be of higher dosage and implemented with a curriculum.

Group B: Programs focus on criminal thinking using cognitive restructuring techniques, but also include interpersonal and social skills interventions. These programs predominately target high and moderate-risk offenders, have a higher dosage of clinical hours, and are implemented with a curriculum.

Group C: Programs focus on developing self-improvement and management skills including some cognitive restructuring work for those with substance abuse (marijuana or alcohol abuse) and/or mental health issues. These programs predominately target moderate-risk offenders with a modest dosage of clinical hours.

Group D: Programs focus on social skills and interpersonal skills, targeting multiple destabilizing issues. These programs target moderate and low-risk offenders, and should have a low to modest dosage of clinical hours depending on the number of needs.

Group E: These programs focus on life skills. They predominately target low-risk individuals and have a have a low dosage of clinical hours.

Group F: Few to no conditions with an emphasis on punishment; only use programming/services as needed.
## Table 1. Meta-Analytic Literature Used to Inform RNR Simulation Tool Estimates

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Reference</th>
<th>% Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Interventions for General Offenders</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cognitive Behavioral Therapy</td>
<td>Lipsey, Landenberger &amp; Wilson, 2007</td>
<td>25%</td>
</tr>
<tr>
<td>Moral Reconation Therapy</td>
<td>Little, 2005; Wilson, Bouillard &amp; MacKenzie, 2005</td>
<td>16% - 35%</td>
</tr>
<tr>
<td>Reasoning and Rehabilitation</td>
<td>Tong &amp; Farrington, 2008; Wilson, Bouillard &amp; MacKenzie, 2005</td>
<td>14%</td>
</tr>
<tr>
<td>Restorative Justice</td>
<td>Lattimer, Dowden &amp; Muise, 2005</td>
<td>14%*</td>
</tr>
<tr>
<td>CBT for Anger Management</td>
<td>Beck &amp; Fernandez, 1998</td>
<td>51%</td>
</tr>
<tr>
<td>Intensive Supervision Probation w/ Treatment</td>
<td>Drake, Aos &amp; Miller, 2009</td>
<td>17.9%</td>
</tr>
<tr>
<td>Electronic Monitoring</td>
<td>Renzema &amp; Mayo-Wilson, 2005</td>
<td>2%*</td>
</tr>
<tr>
<td><strong>Interventions for Substance Using Offenders</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Drug Treatment</td>
<td>Holloway, Bennett &amp; Farrington, 2006; Prendergast, Podus, Chang &amp; Urrada, 2002</td>
<td>12% - 22%</td>
</tr>
<tr>
<td>Therapeutic Community</td>
<td>Lipton, Pearson, Cleland &amp; Yee, 2008; Mitchell, Wilson &amp; MacKenzie, 2007</td>
<td>16% - 27%</td>
</tr>
<tr>
<td>Therapeutic Community (Hard Drugs)</td>
<td>Holloway, Bennett &amp; Farrington, 2006</td>
<td>45%</td>
</tr>
<tr>
<td>Counseling (General)</td>
<td>Mitchell, Wilson &amp; MacKenzie, 2007</td>
<td>20%</td>
</tr>
<tr>
<td>Narcotic Maintenance</td>
<td>Holloway, Bennett &amp; Farrington, 2006</td>
<td>27%*</td>
</tr>
<tr>
<td>Boot Camp</td>
<td>Mitchell, Wilson &amp; MacKenzie, 2007</td>
<td>5%</td>
</tr>
<tr>
<td>Intensive Supervision Program</td>
<td>Perry et al., 2009</td>
<td>33%*</td>
</tr>
<tr>
<td>Post-Release Supervision</td>
<td>Dowden, Antonowicz &amp; Andrews, 2003</td>
<td>26%*</td>
</tr>
<tr>
<td>Post-Release Supervision (Hard Drugs)</td>
<td>Holloway, Bennett &amp; Farrington, 2006</td>
<td>33%*</td>
</tr>
<tr>
<td><strong>Interventions for Offenders with Mental Illness</strong></td>
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<td></td>
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<tr>
<td>Mental Health Treatment</td>
<td>Martin, Dorken, Wamboldt &amp; Wootten, 2001</td>
<td>17%*</td>
</tr>
<tr>
<td><strong>Vocational/Educational Programs</strong></td>
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<tr>
<td>General Vocation/Education</td>
<td>Wilson, Gallagher &amp; MacKenzie, 2000</td>
<td>21%</td>
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<tr>
<td>Ex-Offender Employment</td>
<td>Visher, Winterfield &amp; Coggeshall, 2005</td>
<td>3%*</td>
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<td>Academic/Educational</td>
<td>Wilson, Gallagher &amp; MacKenzie, 2000</td>
<td>18%</td>
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<tr>
<td>Post-Secondary Correctional Education</td>
<td>Wilson, Gallagher &amp; MacKenzie, 2000</td>
<td>27%</td>
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<tr>
<td>Vocational</td>
<td>Wilson, Gallagher &amp; MacKenzie, 2000</td>
<td>22%</td>
</tr>
<tr>
<td>Correctional Industries</td>
<td>Wilson, Gallagher &amp; MacKenzie, 2000</td>
<td>19%</td>
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<tr>
<td><strong>Supervision Only Interventions for General Offenders</strong></td>
<td></td>
<td></td>
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<tr>
<td>Incarceration (vs. community)</td>
<td>Smith, Goggin &amp; Gendreau, 2002</td>
<td>14% INCREASE</td>
</tr>
<tr>
<td>Intermediate Sanctions</td>
<td>Smith, Goggin &amp; Gendreau, 2002</td>
<td>2%</td>
</tr>
<tr>
<td>Boot Camp</td>
<td>Wilson, MacKenzie &amp; Mitchell, 2008</td>
<td>1%</td>
</tr>
<tr>
<td><strong>Interventions for Domestic Violence Offenders</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General DV Treatment (Police Report)</td>
<td>Babcock, Green &amp; Robie, 2004; Feder &amp; Wilson, 2005</td>
<td>16% - 32%</td>
</tr>
<tr>
<td>General DV Treatment (Partner Report)</td>
<td>Babcock, Green &amp; Robie, 2004; Feder &amp; Wilson, 2005</td>
<td>0% - 10%</td>
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<tr>
<td><strong>Interventions for Sexual Offenders</strong></td>
<td></td>
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<tr>
<td>Sex Offender Treatment (Sexual Recidivism)</td>
<td>Gallagher et al., 1999; Hansen et al., 2002; Hall, 1995; Schmucker &amp; Losel, 2008</td>
<td>16% - 37%</td>
</tr>
<tr>
<td>Sex Offender Treatment (Violent Recidivism)</td>
<td>Schmucker &amp; Losel, 2008</td>
<td>44%</td>
</tr>
<tr>
<td>Sex Offender Treatment (General Recidivism)</td>
<td>Hansen et al., 2002; Schmucker &amp; Losel, 2008</td>
<td>31% - 32%</td>
</tr>
</tbody>
</table>

a. Standardized mean difference was converted to odds ratio. Phi coefficient was converted to an odds ratio with an assumed 0.50 control recidivism. Success/failure rates for treatment and control groups were used to calculate odds ratio.
b. Insufficient information to calculate confidence interval.
c. Calculation assumed 0.50 control recidivism base rate.
d. Treatment and control group recidivism rates were converted to percent reduction.
The RNR Simulation Tool is grounded in a number of important principles that research has identified to ensure programming is implemented with optimal effectiveness (Gendreau, Goggin, French, & Smith, 2006; Smith, Gendreau, & Swartz, 2009). The responsivity components of each program group adhere to the following principles of effective interventions:

1. **Intervention Target**—Focus of the program—includes substance use, criminal thinking, mental illness, social skills, interpersonal skills, life skills, and supervision only. Andrews and Bonta (2010b) emphasize the importance of identifying intervention targets in order to increase adherence to the RNR Principles. The goal is to identify program targets and match them with individual needs to improve responsivity.

2. **Content**—Features of the program designed to address behavioral targets—includes primary programming modality/philosophy, rewards, sanctions, restrictions, ratio of treatment to controls, and drug testing. This includes the mix of both treatment interventions and criminal justice controls. Programs that use cognitive learning techniques and that integrate social controls into programming have been shown to effectively reduce offending and improve offender supervision outcomes (Aos, Miller, & Drake, 2006; Drake, Aos, & Miller, 2009; Mitchell, Wilson, & MacKenzie, 2007; Lipsey, Landenberger, & Wilson, 2007; Padgett, Bales, & Blomberg, 2010; Pattavina, Miofsky-Tusinski, & Byrne, 2010; Pearson, Lipton, Cleland, & Yee, 2002; Wilson, Bouffard, & MacKenzie, 2005).

3. **Dosage**—Combination of frequency, length of sessions, duration of the intervention, and length of aftercare. The concept of dosage is that more intensive services should be devoted to moderate and higher-risk offenders with more services designated for offenders with more needs. The best estimate of needs-based dosage is derived from Bourgon & Armstrong (2006), meta-analyses on therapeutic communities (Wilson, Mitchell, & MacKenzie, 2007) and drug treatment courts (Mitchell, et al 2012), as well as consensus from experts in the field. Higher-need clients require higher levels of dosage such as over 200 hours across multiple levels of care and programming; moderate-risk should have around 200 hours across various levels of care; and lower-risk with at least one criminogenic need should have less than 100 hours. The actual amount

What Feedback does the RNR Program Tool Provide for Users?

To assess the degree to which programs adapt to EBPs, the RNR Program Tool assesses and provides feedback on six scoring areas (i.e. risk, needs, responsivity, dosage, implementation, and other integration factors). Program classification considers several key factors including:

**GROUP A**
- Dependence on Hard Drugs

**GROUP B**
- Criminal Thinking/Cognitive Restructuring

**GROUP C**
- Self Improvement & Management

**GROUP D**
- Interpersonal Skills

**GROUP E**
- Life Skills

**GROUP F**
- Punishment Only

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**Figure 3. Primary Targets of RNR Program Groups**

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- Focus on primary target behavior(s) using evidence-based interventions
- Increase severity of response based on risk level: increase controls/restrictions as risk increases
- Increase the intensity of the intervention when the number and severity of criminogenic (and non-criminogenic) needs increases
- Use Cognitive-Behavioral Therapy (CBT) and/or social learning interventions
- Embed interventions in criminal justice environments that are responsive
- Focus on building motivation to change and providing feedback reports to offenders
- Measure outcomes and evaluate programs regularly

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will depend on the individual need factors as discussed in the following section.

4. **Implementation quality**—Features of the operation of the program—includes staff credentials, quality assurance measures, communication with justice system partners, use of a manual for consistent service delivery, evaluation history, quality assurance, and technical assistance. Research indicate such features are important to insure that programs are implemented with fidelity to maximize effectiveness (Smith, Gendreau, & Swartz, 2009; Taxman & Belenko, 2012). For more information on these features, see Taxman & Belenko (2012).

**How are Individuals Assessed and Matched to a Program?**

The Assess an Individual portal allows practitioners to assess individuals for appropriate programs and controls based on their risk and needs. Also integrated into this assessment are other factors that affect recidivism such as age and gender. The tool will calculate and produce a recommended group of programming for the individual (see Groups A-F on page 3). The portal also estimates a percent reduction in recidivism that one may expect if the offender completes a program from the program group that is consistent with their unique needs.

The key components (decision criteria) of the Assess an Individual portal are:

**Criminal History Risk.** Criminal history risk refers to an individual’s static risk level as determined using a validated risk assessment instrument (for more information on static risk factors and assessment instruments see Andrews and Bonta, 2010a). The RNR Simulation Tool is equipped to accommodate multiple variations of risk levels that jurisdictions may use; it can provide output with individual recommendations whether a jurisdiction uses a 3, 4, or 5-level risk grouping. The tool uses individual risk levels to determine the recommended intensity of controls and programming. If there is no validated tool, the RNR Simulation Tool uses the compiled database to identify the offender’s profile and estimate a recidivism level.

**Primary Criminogenic Needs.** The second set of criterion relates to offenders’ primary criminogenic needs. Primary criminogenic needs are those needs which research indicates are directly related to offending behavior: criminal thinking (Andrews and Bonta, 2010a & 2010b; Walters, 2006 & 2012) and substance dependence on a hard drug (i.e. heroin, crack, cocaine, amphetamines, and other opiates) (Bennett, Holloway & Farrington, 2008). Criminal thinking includes behavior patterns such as antisocial personality and low self-control and should be assessed using a validated risk and needs instrument (subscale) or an instrument specific to criminal thinking/cognitions.

**Self-Improvement & Management.** After considering individuals’ primary needs, the model’s next group of decision criteria includes factors related to substance abuse and mental health. The RNR Simulation Tool defines substance abuse as abuse of a hard drug, or abuse or dependence of any other substance, including marijuana and alcohol. It is again strongly encouraged that users consult a validated assessment instrument specific to substance use disorders such as the DSM-IV.

![Assess an Individual Model Decision Tree](image)

**Figure 4. Assess an Individual Decision Tree**
The tool recommends individuals who have a primary need and have either a mental illness or substance abuse disorder for programming that aims to stabilize their mental illness or abuse while targeting their primary need. For individuals who do not have a primary need but have either a mental illness or substance abuse disorder, the tool recommends programming that directly targets either their mental illness or substance abuse.

**Lifestyle Stabilizers and Destabilizers.** The next level of decision criteria involves consideration of lifestyle stabilizers and destabilizers. There are seven potential factors for consideration: emotional support, education, employment, housing, financial, associates, and environment. Each of these factors alone has the potential to act as either a stabilizing or destabilizing influence on an individual. The more stabilizers an individual has, the more stable their lifestyle will be. The reverse is true for destabilizers. These factors are the direct target of recommended programming for individuals who do not have a primary criminogenic need, mental illness, or substance abuse disorder.

**Age, Gender & Specific Offender Type.** The RNR Simulation Tool considers each individual factor as well as recidivism estimations for individuals of different demographic groups. For example, younger offenders and males tend to exhibit higher recidivism rates than older individuals or females (Langan & Levin, 2002). It also allows the model to recommend gender-specific programming. Finally, if an individual is identified as a particular type of offender (sexual, violent, drug, etc.), the model can make population-specific recommendations for applicable programming that will further target the offender’s needs (when available).

**Dosage.** The recommended dosage of programming for individuals is dependent upon a combination of each of the components of the RNR Simulation Tool. Dosage includes the frequency and duration of recommended programming. For individuals who are high-risk and dependent on opioids, cocaine, and other “harder drugs,” for example, the tool will recommend higher dosage programming than for individuals who abuse alcohol or marijuana.

**How is the Capacity of a Jurisdiction Assessed?**

The Assess Jurisdiction’s Capacity portal allows users to enter the aggregate characteristics of the jurisdiction’s client population to identify program recommendations at the jurisdiction level. The RNR Simulation Tool provides the type of programming that is in place in a jurisdiction (based on information entered into the Program Tool portal) and the type of programming that should be in existence (based on the existing distribution of offenders). This portal identifies system-level gaps in the programming offered versus what the RNR Simulation Tool recommends to meet the needs of the population (see Figure 5).

This portal can provide jurisdiction estimates with or without integrating information for that jurisdiction from the Program Tool portal. This portal requires users to enter only minimal data from their jurisdiction and relies on the tool’s underlying database to fill in when information is missing. This portal uses the same decision criteria as the Assess an Individual portal to determine the proportion of the jurisdiction’s population that it recommends for programming in each of the six program groups.

![Figure 5. Example of System-Level Gap Analysis](image-url)
References


The RNR Simulation Tool was developed by the Center for Advancing Correctional Excellence (ACE!) (www.gmuace.org) at George Mason University. The RNR Simulation Tool was developed by ACE! with collaborators at the University of Massachusetts, Lowell; Maxarth, LLC; and Slonky, LLC under grant BJA 2010 DG-BX-K026, with additional funding from SAMHSA (SAM69755) and the Public Welfare Foundation.