

# Factor Score Disparity in the Psychopathy Checklist-Revised

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# The PCL-R

The Psychopathy Checklist Revised (PCL-R: Hare, 1991, 2003) provides three scores to be used in the assessment and diagnosis of psychopathy as well for actuarial-predictive risk applications:

- ★ a Factor 1 “interpersonal variables” score
- ★ a Factor 2 “social deviance” score
- ★ a Total score formed from the sum of all 20 items comprising the PCL-R.

## PCL-R Details

It consists of 20 cognitive-behavioural constructs or items, each assigned a **0, 1, 2** rating indicating the degree to which an individual matches the description of the item in the test manual. A **0** rating indicates that the item does not apply to the individual. A rating of **1** indicates a partial application, with **2** indicating that an item definitely applies to an individual.

## PCL-R Details

The sum score across all 20 items yields the total PCL\_R score (**0-40**). Two other scores are normally computed, the Factor 1 and 2 scores (F1 & F2) which are the summed scores respectively for the particular items ...

# PCL-R Details

**\*For confidentiality reasons, these items do not appear in the web version of the paper**

<b>PCL-R item reference ID</b>	<b>Factor 1: Interpersonal Variables</b>
1	Glibness/Superficial Charm
2	Grandiose Sense of Self Worth
4	Pathological Lying
5	Conning/Manipulative
6	Lack of Remorse or Guilt
7	Shallow Affect
8	Callous/Lack of Empathy
16	Failure to Accept Responsibility for Own Actions

# PCL-R Details

PCL-R item reference ID	Factor 2: Social Deviance
3	Need for Stimulation/Proneness to Boredom
9	Parasitic Lifestyle
10	Poor Behavioural Controls
12	Early Behavioural Problems
13	Lack of Realistic, Long-Term Goals
14	Impulsivity
15	Irresponsibility
18	Juvenile Delinquency
19	Revocation of Conditional Release
20	Criminal Versatility <i>*new in 2003 manual</i>

## The PCL-R

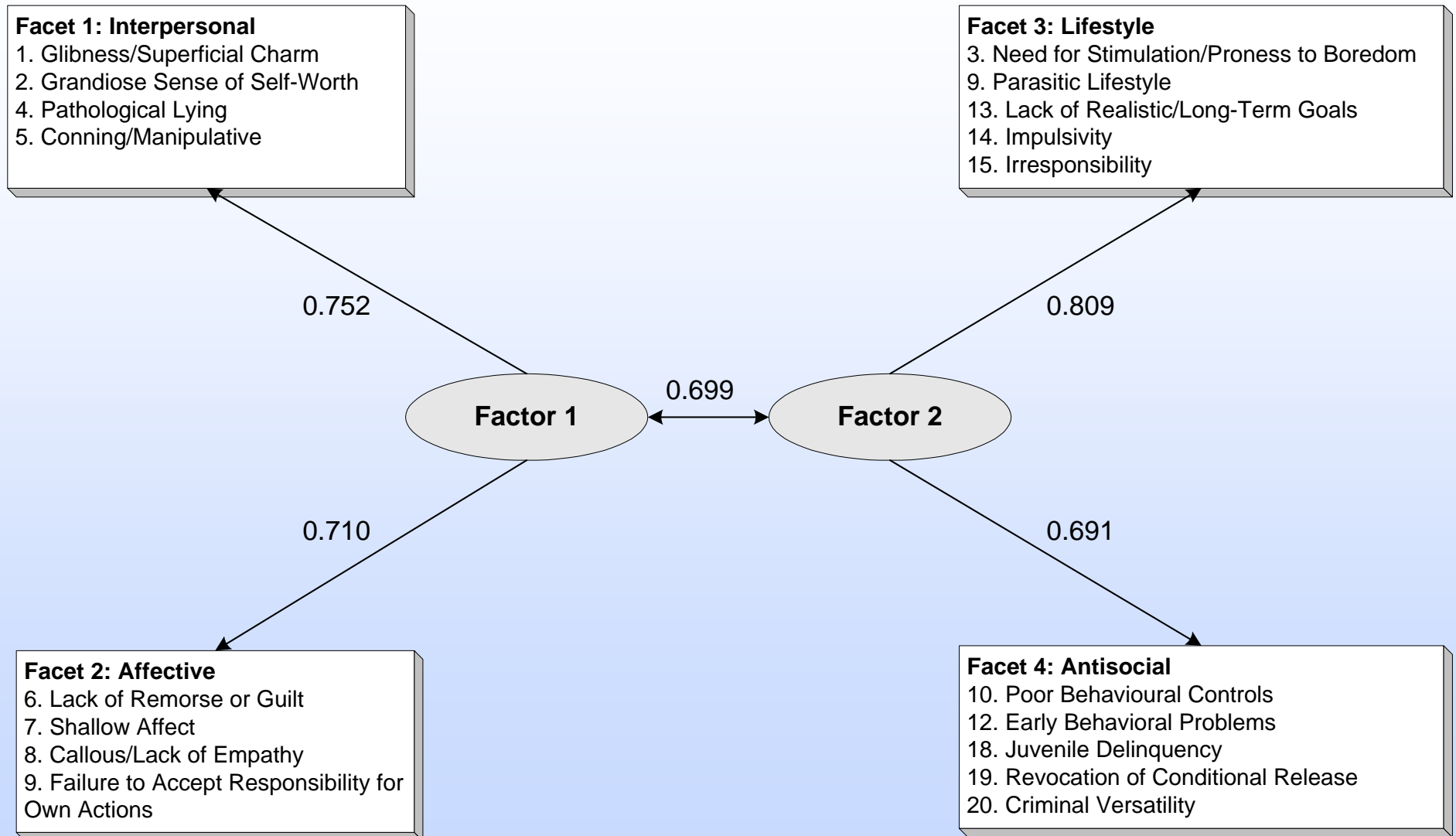
It is proposed by Hare that the factors represent two distinct but related aspects of psychopathy.

Hare, in the 1991 manual, p.38 states *“The items that make up the two PCL-R factors, which on average correlate about 0.5 with one another”*.

In the 2003 manual, p. 77, *“For both the PCL and PCL-R the correlation between factors 1 and 2 was about 0.5”*.

# The PCL-R

## The 2003 2<sup>nd</sup> Edition model





# The Issue

Given an expected observed correlation between the two factor scores, to what extent might disparities between the two scores exceed “permissible” values?

## **Legal Context:**

*defence* –v- *prosecution* psychologists rating the same offender – but with markedly different ratings on Factor 1 – leading to quite different total scores.

## The Solution .1

Evaluate the expected distributions of scores on each factor, *conditional* upon the scores of the respective factor using a sample of 10,000 simulated F1 and F2 scores which:

- ★ possess a correlation of 0.5
- ★ are drawn from perfectly normally distributed distributions (*bivariate normality as required for a Pearson correlation coefficient*)
- ★ possess means and SD's as per 2003 test manual.

## The Solution .2

Evaluate the expected distributions of scores on each factor, *conditional* upon the scores of the respective factor using two samples of **actual data**:

- ★ **Forensic psychiatric patients** (N=217)
- ★ **Prisoners/Offenders** (N=1358)

# The Samples

★ **Forensic psychiatric patients** (N=217) from two of the UK's High Security Forensic Psychiatric Hospitals, *Ashworth* and *The State Hospital*) and *Arnold Lodge* (a high security clinic).

★ **Prisoners/Offenders** (N=1358) from several UK prison institutions (some data donated by David Cooke).

# The Samples

The study participants were all **male adults** who had been assessed using a PCL-R within a personal interview (in addition to collateral file information) - conducted by a formally trained practitioner.

## Minor procedural points

Where missing ratings were encountered, the Factor and Total scores were prorated as per manual instructions.

All scores were created via computer from raw item data, using a custom scoring routine which handled prorating and the computation of F1, F2, and Total scores.

# Solution 1 Methodology

**Step 1:** Construct two variables, *Norm\_1* and *Norm\_2*, sampling 10,000 observations from a random normal population distribution with mean of 0.0 and standard deviation of 1.0.

**Step 2:** Construct a new variable, *New\_Norm\_2*, from the two variables in step 1 according to the formula ...

# Solution 1 Methodology

$$New\_Norm\_2 = \left( \frac{r}{\sqrt{(1-r^2)}} \right) \cdot Norm\_1 + Norm\_2$$

where:

*Norm\_1* and *Norm\_2* are random normally distributed sets of continuous-valued “scores”

*r* is the desired correlation between *Norm\_1* &

*New\_Norm\_2* (**0.54\***) \*allowing for integer mapping & scaling constraint attenuation which will bring the correlation back to **0.5**

*New\_Norm\_2* is the transformed *Norm\_2* variable



# Solution 1 Methodology

**Step 3:** Convert<sup>1</sup> the real-valued variables into integer “factor” scores, designed to possess the same mean and standard deviation as provided in Table 4.7 of the PCL-R manual (Hare, 2003). This was achieved separately for Offenders and Patients as their means and SDs are quite different.

<sup>1</sup>*(note: this required two kinds of rescaling adjustments, so as to allow for the constrained integer measurement range of the PCL-R).*

# Solution 1 Results

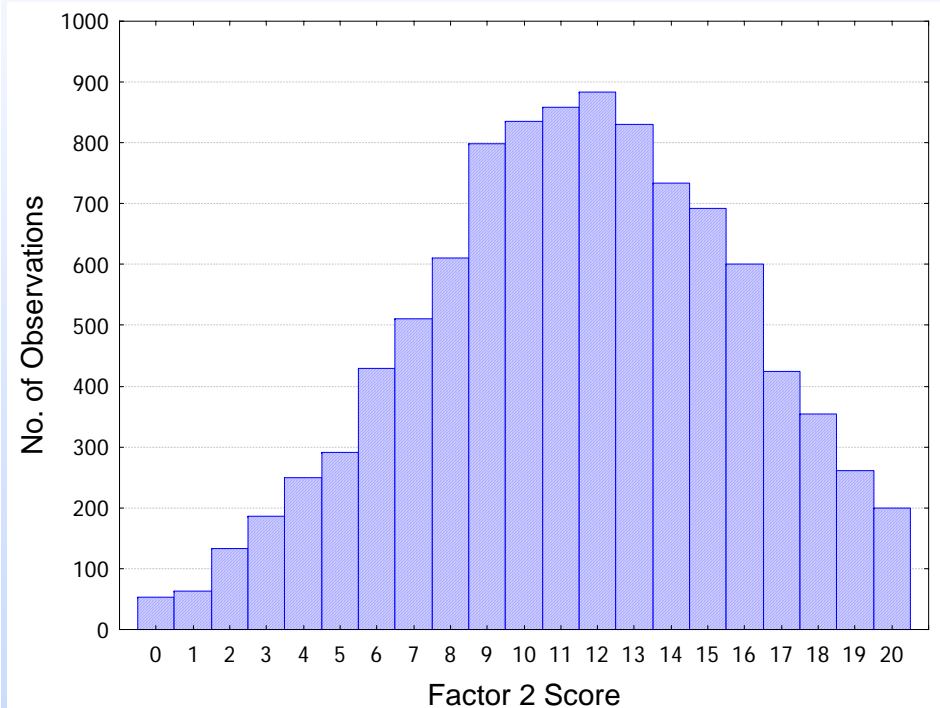
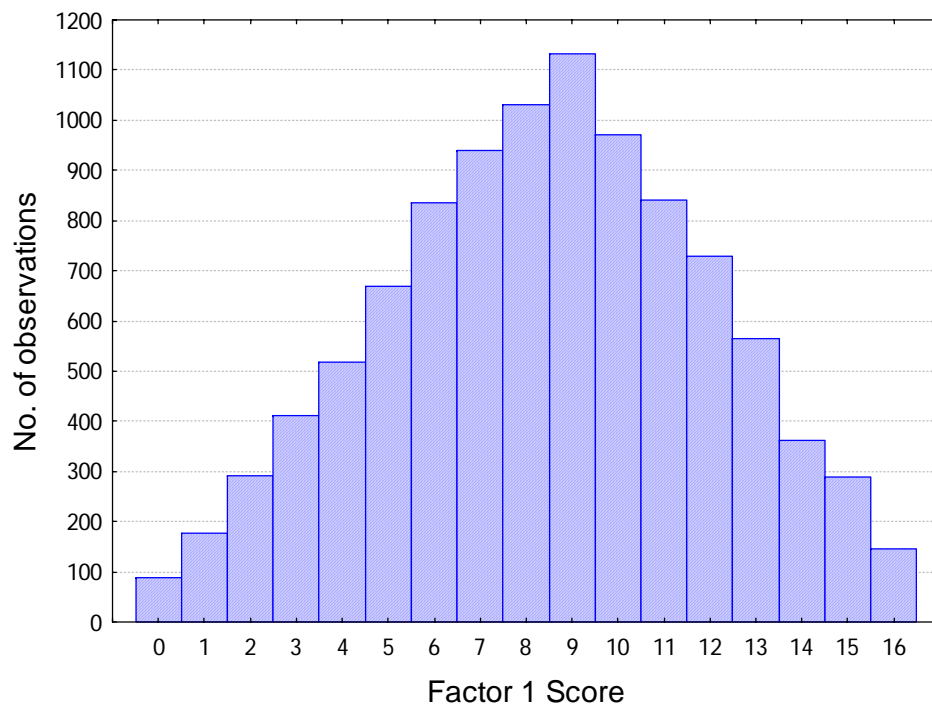
# Offender Data

<b>Factor 1 Score</b>	<b>Number of cases scoring at this level</b>	<b>Minimum Observed Factor 2 score</b>	<b>Maximum Observed Factor 2 score</b>	<b>10<sup>th</sup> Percentile Score on Factor 2</b>	<b>90<sup>th</sup> Percentile Score on Factor 2</b>
0	89	0	16	1	11
1	176	0	16	2	12
2	292	0	19	2	13
3	411	0	20	3	13
4	519	0	20	3	14
5	670	0	20	4	14
6	835	0	20	5	15
7	940	0	20	5	16
8	1031	0	20	6	16
9	1133	0	20	7	17
10	972	2	20	8	17
11	841	2	20	8	18
12	728	1	20	9	18
13	565	3	20	9	18
14	363	2	20	10	19
15	290	2	20	10	19
16	145	8	20	10	19

<b>Factor 2 Score</b>	<b>Number of cases scoring at this level</b>	<b>Minimum Observed Factor 1 score</b>	<b>Maximum Observed Factor 1 score</b>	<b>10<sup>th</sup> Percentile Score on Factor 1</b>	<b>90<sup>th</sup> Percentile Score on Factor 1</b>
0	54	0	9	0	7
1	64	0	12	0	7
2	134	0	15	1	8
3	187	0	12	1	9
4	249	0	14	1	9
5	291	0	15	1	9
6	429	0	15	2	10
7	510	0	15	2	10
8	610	0	16	3	11
9	798	0	16	3	12
10	835	0	16	4	13
11	858	0	16	4	12
12	884	0	16	5	13
13	831	1	16	5	13
14	734	0	16	5	13
15	693	2	16	6	14
16	600	0	16	7	14
17	424	4	16	7	14
18	354	2	16	7	14
19	261	2	16	7	15
20	200	3	16	7	15

# Solution 1 Results

Simulated Data, N=10,000 cases  
With F1 v F2 correlation of 0.50



# Solution 2 Methodology

***Step 1:*** Look at the data for patients and offenders – to see whether they can be sensibly combined into one sample ...

# Solution 2 Methodology

		Male	Offenders N = 1358	
	Factor 1	Factor 2 2003	<i>Old Factor 2</i>	Total
Mean	5.3	8.9	<i>8.0</i>	15.7
Median	5	9	<i>8</i>	15
SD	3.7	4.9	<i>4.4</i>	8.1
Minimum	0	0	<i>0</i>	0
Maximum	16	20	<i>18</i>	40
Factor <i>r</i>		0.50	<i>0.50</i>	

# Solution 2 Methodology

		Male	Patients N = 217	
	Factor 1	Factor 2	<i>Old Factor 2</i>	Total Score
Mean	7.4	10.8	<i>9.9</i>	19.7
Median	7	11	<i>11</i>	20
SD	4.0	4.3	<i>3.8</i>	6.9
Minimum	0	0	<i>0</i>	1
Maximum	16	19	<i>17</i>	35
Factor <i>r</i>		0.28	<i>0.31</i>	

**Conclusion:** Patients and Offenders to be analysed separately

# Solution 2 Methodology

***Step 2:*** Use resampling analysis to provide “population” estimates of F1 and F2 conditional score distributions.



## Solution 2 Methodology

**Step 3:** Construct 17 datasets of ~1000 randomized scores constructed in line with the observed proportions of each F2 score at each F1 score point (0-16 range -F1 scores).

**Step 4:** sample N (=total dataset) cases at random (*uniform sampling*) “*with replacement*” from F1 scores in the same dataset from which the F2 conditional score distributions have been calculated.

## Solution 2 Methodology

**Step 5:** For each resampled F1 score, sample an F2 score at random from the proportionate conditional F2 score distribution associated with a particular F1 score magnitude (*a secondary conditional resampling*)

**Step 6:** Take 1000 complete resamples of the F1 dataset (1000 x 217 cases in respect of the patients, and 1000 x 1358 cases in respect of the offender data).

## Solution 2 Methodology

***Step 7:*** Compute the overall conditional distributions of F2 scores conditional upon each F1 score, and F1 scores conditional upon each F2 score, using all 1000 samples

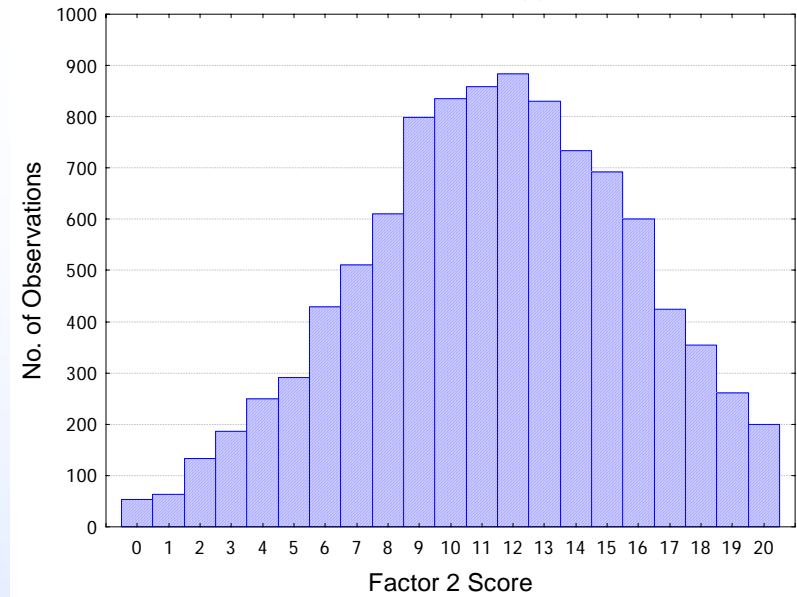
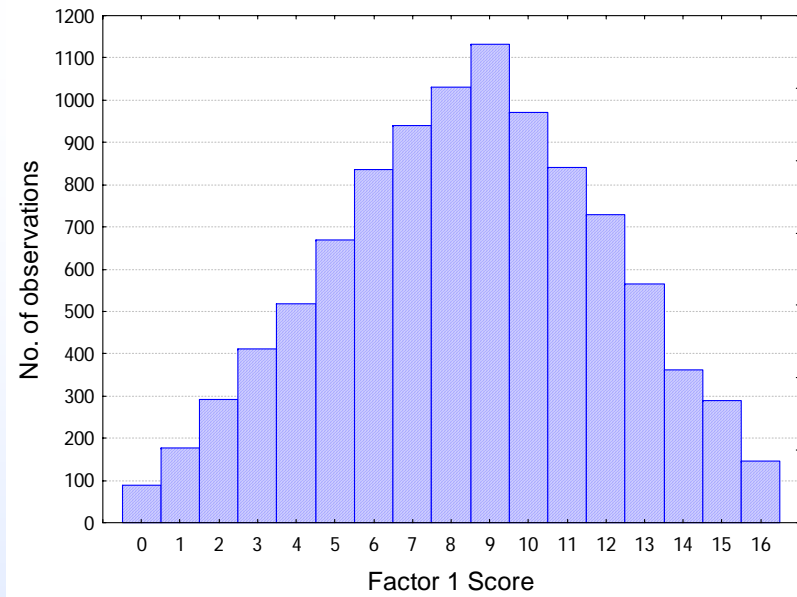
# Solution 2 Results

# Offender Data *Resample*

<b>Factor 1 Score</b>	<b>Number of cases scoring at this level</b>	<b>Minimum Observed Factor 2 score</b>	<b>Maximum Observed Factor 2 score</b>	<b>10<sup>th</sup> Percentile Score on Factor 2</b>	<b>90<sup>th</sup> Percentile Score on Factor 2</b>
0	89296	0	17	0	9
1	106939	0	15	0	11
2	137055	0	17	1	12
3	176513	0	18	1	12
4	139966	0	18	3	14
5	140002	0	17	2	14
6	112227	0	18	4	14
7	107716	1	20	3	15
8	78550	1	20	4	16
9	68033	0	20	3	17
10	54738	0	18	5	17
11	49748	1	20	7	17
12	33105	2	18	5	17
13	28248	4	17	6	16
14	16851	6	20	8	19
15	11972	5	19	5	18
16	7041	10	18	10	18

<b>Factor 2 Score</b>	<b>Number of cases scoring at this level</b>	<b>Minimum Observed Factor 1 score</b>	<b>Maximum Observed Factor 1 score</b>	<b>10<sup>th</sup> Percentile Score on Factor 1</b>	<b>90<sup>th</sup> Percentile Score on Factor 1</b>
<b>0</b>	39046	0	<b>10</b>	0	<b>10</b>
<b>1</b>	56328	0	<b>11</b>	0	<b>6</b>
<b>2</b>	75853	0	<b>12</b>	0	<b>7</b>
<b>3</b>	61187	0	<b>11</b>	0	<b>7</b>
<b>4</b>	75077	0	<b>13</b>	0	<b>7</b>
<b>5</b>	62085	0	<b>15</b>	0	<b>8</b>
<b>6</b>	87267	0	<b>14</b>	0	<b>9</b>
<b>7</b>	89518	0	<b>15</b>	1	<b>8</b>
<b>8</b>	78070	0	<b>15</b>	1	<b>9</b>
<b>9</b>	88652	0	<b>12</b>	1	<b>9</b>
<b>10</b>	106271	1	<b>16</b>	2	<b>10</b>
<b>11</b>	103763	0	<b>13</b>	1	<b>9</b>
<b>12</b>	92790	0	<b>14</b>	2	<b>9</b>
<b>13</b>	78783	1	<b>16</b>	3	<b>10</b>
<b>14</b>	77409	0	<b>16</b>	3	<b>12</b>
<b>15</b>	46066	1	<b>14</b>	4	<b>12</b>
<b>16</b>	58227	0	<b>16</b>	3	<b>13</b>
<b>17</b>	39615	0	<b>16</b>	3	<b>14</b>
<b>18</b>	26015	3	<b>16</b>	4	<b>14</b>
<b>19</b>	8880	8	<b>15</b>	8	<b>14</b>
<b>20</b>	7098	7	<b>14</b>	7	<b>14</b>

# Simulated Datasets – Normative (manual) Offender Specifications



## UK offenders (N=1358) actual data

