Supplementary Tables

Supplementary Table 1. Model fitting results for test of a single factor model of the CUDIT.

	M_2^*	df	*p*	RMSEA (90% CI)	SRMSR	TLI	CFI
All Men	45.50	4	<0.01	0.09 (0.07-0.11)	0.08	0.89	0.97
Dutch	19.32	4	<0.01	0.11 (0.06-0.16)	0.09	0.85	0.95
Asian	5.81	4	0.21	0.04 (0.00-0.11)	0.09	0.98	0.99
African	4.27	4	0.37	0.01 (0.00-0.08)	0.09	1.00	1.00
Turkish	2.79	4	0.59	0.00 (0.00-0.10)	0.09	1.04	1.00
Moroccan	23.15	4	<0.01	0.17 (0.11-0.24)	0.08	0.49	0.84

Supplementary Table 2. Tests of Item Monotonicity – Full Sample.

	S_X^2	df	RMSEA	*p*
Item 1	54.11	42	0.01	0.10
Item 2	**125.19**	**82**	**0.02**	**<0.00**
Item 3	88.10	68	0.01	0.05
Item 4	63.63	64	0.00	0.49
Item 5	80.61	65	0.01	0.09
Item 6	87.12	68	0.01	0.06
Item 7	**129.37**	**82**	**0.02**	**<0.00**
Item 8	**118.36**	**77**	**0.02**	**<0.00**
Item 10	25.55	24	0.01	0.38

Note: Bold text indicates an RMSEA value significantly different from 0.

Supplementary Table 3a. Tests of item monotonicity – Dutch origin sample.

	S_X^2	df	RMSEA	*p*
Item 1	24.46	15	0.04	0.06
Item 2	**30.98**	**14**	**0.06**	**<0.01**
Item 3	21.72	17	0.03	0.20
Item 4	14.97	10	0.04	0.13
Item 5	**22.06**	**6**	**0.09**	**<0.01**
Item 6	9.08	6	0.04	0.17
Item 7	26.20	17	0.04	0.07
Item 8	21.03	12	0.05	0.05
Item 10	16.05	12	0.03	0.19

Note: Bold text indicates an RMSEA value significantly different from 0.

Supplementary Table 3b. Tests of item monotonicity – African Surinamese sample.

	S_X^2	df	RMSEA	*p*
Item 1	22.46	22	0.01	0.43
Item 2	61.42	45	0.03	0.05
Item 3	57.25	45	0.03	0.10
Item 4	29.33	32	0.00	0.60
Item 5	33.04	27	0.02	0.20
Item 6	**52.95**	**36**	**0.03**	**0.03**
Item 7	49.12	39	0.02	0.13
Item 8	46.87	38	0.02	0.15
Item 10	22.12	20	0.02	0.33

Note: Bold text indicates an RMSEA value significantly different from 0.

Supplementary Table 3c. Tests of item monotonicity – South-Asian Surinamese sample.

	S_X^2	df	RMSEA	*p*
Item 1	9.86	16	0.00	0.87
Item 2	26.58	22	0.03	0.23
Item 3	30.77	31	0.00	0.48
Item 4	23.31	20	0.03	0.27
Item 5	13.82	14	0.00	0.46
Item 6	20.26	17	0.03	0.26
Item 7	26.86	19	0.04	0.11
Item 8	27.58	18	0.05	0.07
Item 10	9.81	18	0.00	0.94

Note: Bold text indicates an RMSEA value significantly different from 0.

Supplementary Table 3d. Tests of item monotonicity – Turkish sample.

	S_X^2	df	RMSEA	*p*
Item 1	19.70	18	0.02	0.35
Item 2	23.75	16	0.06	0.10
Item 3	24.84	19	0.05	0.17
Item 4	16.54	15	0.03	0.35
Item 5	18.56	15	0.04	0.23
Item 6	10.55	10	0.02	0.39
Item 7	20.81	20	0.02	0.41
Item 8	**27.51**	**16**	**0.07**	**0.04**
Item 10	15.73	10	0.06	0.11

Note: Bold text indicates an RMSEA value significantly different from 0.

Supplementary Table 3e. Tests of item monotonicity – Moroccan sample.

	S_X^2	df	RMSEA	*p*
Item 1	20.67	19	0.02	0.36
Item 2	30.13	26	0.03	0.26
Item 3	22.72	24	0.00	0.54
Item 4	29.62	25	0.03	0.24
Item 5	20.76	17	0.04	0.24
Item 6	20.46	12	0.06	0.06
Item 7	27.04	29	0.00	0.57
Item 8	16.54	24	0.00	0.87
Item 10	10.06	15	0.00	0.82

Note: Bold text indicates an RMSEA value significantly different from 0.

Supplementary Table 4. Pairwise DIF contrasts of CUDIT items as a function of ethnic group membership in male cannabis users.

4a. Dutch vs. African Surinamese

		Omnibus Test		*a*		b_1		b_2		b_3		b_4	
Items		$\Delta\chi^2$	*p*	$\Delta\chi^2$	*p*	$\Delta\chi^2$	*p*	$\Delta\chi^2$	*p*	$\Delta\chi^2$	*p*	$\Delta\chi^2$	*p*
1	frequency of use	**13.801**	**0.008**	2.533	0.111	**4.109**	**0.043**	**8.382**	**0.004**	**4.827**	**0.028**		
2	usual hours being stoned	8.530	0.074	1.975	0.160	**6.548**	**0.010**	1.677	0.195	0.807	0.369	2.467	0.116
3	stoned for 6 or more hours	**15.954**	**0.003**	0.182	0.670	2.612	0.106	0.080	0.777	0.009	0.924	0.050	0.823
4	not able to stop	-	-	-	-	-	-	-	-	-	-	-	-
5	failed to do what expected	**14.692**	**0.005**	0.911	0.340	0.045	0.832	0.898	0.343	0.464	0.496	1.144	0.285
6	morning use	-	-	-	-	-	-	-	-	-	-	-	-
7	guilt/remorse	**41.493**	**0.000**	0.400	0.527	**5.140**	**0.023**	0.047	0.828	0.009	0.924	0.990	0.320
8	memory/concentration problems	**34.353**	**0.000**	0.592	0.442	2.378	0.123	0.018	0.893	0.243	0.622	2.444	0.118
10	concerned others	-	-	-	-	-	-						

4b. Dutch vs. South-Asian Surinamese

		Omnibus Test		*a*		b_1		b_2		b_3		b_4	
Items		$\Delta\chi^2$	*p*	$\Delta\chi^2$	*p*	$\Delta\chi^2$	*p*	$\Delta\chi^2$	*p*	$\Delta\chi^2$	*p*	$\Delta\chi^2$	*p*
1	frequency of use	**11.289**	**0.023**	1.368	0.242	0.320	0.571	3.769	0.052	2.989	0.084		
2	usual hours being stoned	4.513	0.341	1.699	0.192	2.478	0.115	0.522	0.470	0.233	0.630	0.252	0.616
3	stoned for 6 or more hours	**17.739**	**0.001**	0.230	0.631	0.380	0.538	0.522	0.470	1.390	0.238	1.860	0.173
4	not able to stop	-	-	-	-	-	-	-	-	-	-	-	-
5	failed to do what expected	**11.093**	**0.026**	1.620	0.203	0.086	0.770	1.382	0.240	0.366	0.545	2.017	0.156
6	morning use	-	-	-	-	-	-	-	-	-	-	-	-
7	guilt/remorse	**27.012**	**0.000**	-0.020	1.000	**4.704**	**0.030**	0.394	0.530	-0.017	1.000	0.734	0.391
8	memory/concentration problems	**25.778**	**0.000**	0.008	0.927	3.049	0.081	0.013	0.909	-0.005	1.000	0.599	0.439
10	concerned others	-	-	-	-	-	-						

Note: $\Delta\chi^2$ – change in chi-square statistic between models freely estimating and constraining parameters to be equal; *a* - discrimination parameter; $b_{1\text{-}4}$ - difficulty parameters for transition between response levels for each item; bold text indicates nominal significance at $p<0.05$. Items 3 and 6 were selected as anchor items, and thus were not tested for DIF.

4c. Dutch vs. Turkish

		Omnibus Test		*a*		b_1		b_2		b_3		b_4	
Items		$\Delta\chi^2$	*p*	$\Delta\chi^2$	*p*	$\Delta\chi^2$	*p*	$\Delta\chi^2$	*p*	$\Delta\chi^2$	*p*	$\Delta\chi^2$	*p*
1	frequency of use	**12.649**	**0.013**	0.052	0.819	2.732	0.098	0.127	0.722	1.402	0.236		
2	usual hours being stoned	3.762	0.439	0.251	0.617	0.292	0.589	-0.007	1.000	0.438	0.508	0.246	0.620
3	stoned for 6 or more hours	5.515	0.238	0.085	0.771	1.590	0.207	0.265	0.607	0.058	0.810	0.086	0.770
4	not able to stop	-	-	-	-	-	-	-	-	-	-	-	-
5	failed to do what expected	3.241	0.518	1.453	0.228	1.608	0.205	2.662	0.103	2.752	0.097	**4.069**	**0.044**
6	morning use	-	-	-	-	-	-	-	-	-	-	-	-
7	guilt/remorse	**11.388**	**0.023**	0.589	0.443	0.009	0.926	1.860	0.173	2.592	0.107	**4.151**	**0.042**
8	memory/concentration problems	1.705	0.790	0.587	0.444	0.177	0.674	0.780	0.377	0.545	0.461	1.725	0.189
10	concerned others	-	-	-	-	-	-						

4d. Dutch vs. Moroccan

		Omnibus Test		*a*		b_1		b_2		b_3		b_4	
Items		$\Delta\chi^2$	*p*	$\Delta\chi^2$	*p*	$\Delta\chi^2$	*p*	$\Delta\chi^2$	*p*	$\Delta\chi^2$	*p*	$\Delta\chi^2$	*p*
1	frequency of use	1.679	0.794	0.037	0.848	0.784	0.376	0.160	0.689	0.300	0.584		
2	usual hours being stoned	**12.995**	**0.011**	0.011	0.917	**3.928**	**0.047**	0.256	0.613	1.435	0.231	1.504	0.220
3	stoned for 6 or more hours	**15.210**	**0.004**	-0.007	1.000	1.467	0.226	0.003	0.953	0.158	0.691	-0.004	1.000
4	not able to stop	-	-	-	-	-	-	-	-	-	-	-	-
5	failed to do what expected	3.712	0.446	-0.002	1.000	0.359	0.549	-0.010	1.000	0.002	0.964	0.417	0.519
6	morning use	-	-	-	-	-	-	-	-	-	-	-	-
7	guilt/remorse	**13.453**	**0.009**	-0.012	1.000	0.016	0.901	0.907	0.341	1.181	0.277	3.536	0.060
8	memory/concentration problems	**11.364**	**0.023**	-0.012	1.000	1.141	0.285	-0.014	1.000	0.071	0.791	1.036	0.309
10	concerned others	-	-	-	-	-	-						

Note: $\Delta\chi^2$ – change in chi-square statistic between models freely estimating and constraining parameters to be equal; *a* - discrimination parameter; $b_{1\text{-}4}$ - difficulty parameters for transition between response levels for each item; bold text indicates nominal significance at $p<0.05$. Items 3 and 6 were selected as anchor items, and thus were not tested for DIF.

Supplementary Table 5. Scale- and item-level effect size estimates for the CUDIT across ethnic groups.

Scale-Level Effect Sizes

	African Surinamese	South-Asian Surinamese	Turkish	Moroccan
STDS	-0.43	-0.15	-0.17	-0.20
UTDS	1.22	0.94	0.69	1.09

Item-Level Effect Sizes

	African Surinamese		South-Asian Surinamese		Turkish		Moroccan	
	SIDS	UIDS	SIDS	UIDS	SIDS	UIDS	SIDS	UIDS
Item 1	0.31	0.32	0.22	0.24	-0.21	0.21	-0.10	0.10
Item 2	-0.12	0.16	0.03	0.16	-0.09	0.09	-0.30	0.30
Item 3	-0.02	0.14	0.06	0.06	-0.11	0.12	-0.14	0.14
Item 4	-	-	-	-	-	-	-	-
Item 5	-0.10	0.10	-0.11	0.12	0.10	0.10	-0.03	0.06
Item 6	-	-	-	-	-	-	-	-
Item 7	-0.28	0.28	-0.19	0.19	0.14	0.14	0.38	0.38
Item 8	-0.23	0.23	-0.17	0.18	0.01	0.03	-0.02	0.12
Item 10	-	-	-	-	-	-	-	-

Note: All effects sizes are estimated using Dutch origin participants as the reference group. STDS – Signed Test Difference in the Sample; UTDS – Unsigned Test Difference in the Sample; SIDS – Signed Item Difference in the Sample; UIDS – Unsigned Item Difference in the Sample

Supplementary Table 6. Parameter estimates for male participants in the final graded response multiple group IRT model.

4a. Dutch (*n*=344)

Item	***a***	b_1	b_2	b_3	b_4
1	2.16 (0.28)	-0.02 (0.09)	0.68 (0.10)	1.01 (0.11)	
2	1.56 (0.22)	0.63 (0.11)	2.08 (0.24)	2.85 (0.34)	3.08 (0.38)
3	2.91 (0.41)	0.78 (0.09)	1.47 (0.13)	1.80 (0.15)	2.14 (0.19)
4	3.47 (0.43)	1.34 (0.09)	1.62 (0.11)	1.73 (0.12)	1.89 (0.13)
5	2.80 (0.49)	1.53 (0.14)	2.30 (0.23)	2.42 (0.25)	3.23 (0.47)
6	3.02 (0.38)	1.69 (0.11)	1.96 (0.14)	2.08 (0.15)	2.32 (0.17)
7	2.25 (0.32)	1.06 (0.11)	1.84 (0.18)	2.26 (0.22)	2.92 (0.34)
8	2.87 (0.43)	1.06 (0.10)	1.85 (0.16)	2.17 (0.20)	2.95 (0.34)
10	1.96 (0.25)	1.99 (0.15)			

4b. African Surinamese (*n*=453)

Item	***a***	b_1	b_2	b_3	b_4
1	1.48 (0.27)	-0.59 (0.29)	0.10 (0.19)	0.79 (0.12)	
2	2.04 (0.36)	0.94 (0.11)	1.89 (0.17)	2.42 (0.24)	2.87 (0.31)
3	3.07 (0.53)	1.05 (0.10)	1.42 (0.11)	1.62 (0.13)	1.89 (0.15)
4	3.47 (0.43)	1.34 (0.09)	1.62 (0.11)	1.73 (0.12)	1.89 (0.13)
5	2.15 (0.42)	2.04 (0.19)	2.50 (0.26)	2.77 (0.31)	3.44 (0.46)
6	3.02 (0.38)	1.69 (0.11)	1.96 (0.14)	2.08 (0.15)	2.32 (0.17)
7	1.90 (0.36)	1.85 (0.17)	2.23 (0.22)	2.60 (0.28)	2.94 (0.34)
8	2.35 (0.43)	1.71 (0.14)	2.17 (0.20)	2.41 (0.23)	2.74 (0.29)
10	1.96 (0.25)	1.99 (0.15)			

4c. South-Asian Surinamese (*n*=251)

Item	***a***	b_1	b_2	b_3	b_4
1	1.53 (0.33)	-0.26 (0.27)	0.26 (0.19)	0.78 (0.15)	
2	2.01 (0.40)	0.78 (0.14)	1.76 (0.17)	2.31 (0.25)	2.51 (0.28)
3	2.42 (0.48)	1.04 (0.12)	1.41 (0.13)	1.59 (0.14)	1.87 (0.18)
4	3.47 (0.43)	1.34 (0.09)	1.62 (0.11)	1.73 (0.12)	1.89 (0.13)
5	1.92 (0.42)	2.04 (0.21)	2.62 (0.31)	3.10 (0.41)	3.51 (0.50)
6	3.02 (0.38)	1.69 (0.11)	1.96 (0.14)	2.08 (0.15)	2.32 (0.17)
7	2.11 (0.44)	1.70 (0.16)	2.13 (0.22)	2.30 (0.25)	2.60 (0.30)
8	2.62 (0.53)	1.63 (0.14)	2.02 (0.19)	2.25 (0.22)	2.70 (0.29)
10	1.96 (0.25)	1.99 (0.15)			

4d. Moroccan (*n*=175)

Item	***a***	b_1	b_2	b_3	b_4
1	2.22 (0.50)	0.18 (0.23)	0.75 (0.16)	1.12 (0.13)	
2	1.57 (0.37)	1.19 (0.15)	2.25 (0.25)	3.39 (0.49)	3.69 (0.57)
3	2.70 (0.57)	1.15 (0.12)	1.58 (0.13)	1.71 (0.15)	2.19 (0.21)
4	3.47 (0.43)	1.34 (0.09)	1.62 (0.11)	1.73 (0.12)	1.89 (0.13)
5	2.86 (0.65)	1.73 (0.15)	2.25 (0.21)	2.42 (0.24)	2.76 (0.30)
6	3.02 (0.38)	1.69 (0.11)	1.96 (0.14)	2.08 (0.15)	2.32 (0.17)
7	2.19 (0.47)	1.11 (0.13)	1.50 (0.14)	1.83 (0.17)	2.04 (0.19)
8	2.83 (0.60)	1.39 (0.12)	1.83 (0.16)	2.05 (0.18)	2.42 (0.24)
10	1.96 (0.25)	1.99 (0.15)			

4.e Turkish (*n*=157)

Item	***a***	b_1	b_2	b_3	b_4
1	2.26 (0.50)	0.36 (0.20)	0.73 (0.16)	1.29 (0.14)	
2	1.34 (0.35)	0.91 (0.18)	2.42 (0.36)	2.95 (0.48)	3.30 (0.56)
3	3.12 (0.72)	1.07 (0.13)	1.55 (0.14)	1.77 (0.16)	2.13 (0.21)
4	3.47 (0.43)	1.34 (0.09)	1.62 (0.11)	1.73 (0.12)	1.89 (0.13)
5	1.98 (0.47)	1.58 (0.17)	2.31 (0.28)	2.44 (0.30)	3.03 (0.43)
6	3.02 (0.38)	1.69 (0.11)	1.96 (0.14)	2.08 (0.15)	2.32 (0.17)
7	1.80 (0.41)	1.26 (0.15)	1.70 (0.19)	2.03 (0.23)	2.46 (0.31)
8	2.33 (0.51)	1.15 (0.14)	1.88 (0.19)	2.30 (0.25)	2.81 (0.35)
10	1.96 (0.25)	1.99 (0.15)			

Note: a - discrimination parameter; $b_{1\text{-}4}$ - difficulty parameters for transition between response levels for each item. Items 4, 6, and 10 were selected as anchor items, and thus are constrained to be equal across groups.

Supplementary Figure Captions

Supplementary Figure 1. Item characteristic curve for CUDIT Item 1 by ethnic group membership.

Supplementary Figure 2. Item characteristic curve for CUDIT Item 7 by ethnic group membership.