

Dyslexia Index Factor Profiles

In the previous blog-post I identified that the factor analysis of my Dyslexia Index metric generates different cohorts of students in each factor when regarding Dyslexia Index (Dx) as the independent variable – that is, the one I’ve fixed or chosen. This is because the process of considering the aggregate of the values for each of the dimensions that together constitute a factor generates a different Dyslexia Index (when scaled up to a value out of 1000) than it might for any other factor for any specific student respondent in my datapool. In other words, Student X will have a different Dx value for each Dx factor and this may mean that the student is included or not in any of the research subgroups of interest, ND-400, DNI, and DI-600 when these are established on the basis of that factor. The table below shows sample sizes when the research subgroups are determined according to Dx factor and also the subsequent, respective sample mean Factor Dx values for the two principal research subgroups (DNI and DI-600).

SAMPLE SIZES						
research subgroup	Dx20(5) Factor 1	Dx20(5) Factor 2	Dx20(5) Factor 3	Dx20(5) Factor 4	Dx20(5) Factor 5	Dx(5) Overall
ND-400	40	59	8	28	39	44
DNI	35	16	49	40	31	18
DI-600	54	39	35	48	36	47
sample mean Dx						
DNI	743.26	693.05	720.16	778.45	758.90	684.75
DI-600	786.03	743.61	713.20	815.51	729.40	717.32
t-test t=	-1.8945	-1.8619	0.3333	-1.3317	0.9296	-1.6423
(2-tail 5%) p=	0.0614 not sig	0.0681 not sig	0.7398 not sig	0.0932 not sig	0.3560 not sig	0.1055 not sig

This is interesting not least because it demonstrates that for all of the Dyslexia Index Factors, the sample Dx means in each of the research subgroups DNI and DI-600 respectively are not significantly different from each other and that therefore it is reasonable to test differences between other parameters of these research subgroups when the datasets within them are established through this process. The matrix of results presented in the [previous blog-post](#) summarizes effect sizes and t-test results for differences in Academic Behavioural Confidence between the research subgroups when **these are generated according to Dyslexia Index FACTOR values**.

However, there remains considerable merit in exploring the **Dx factor profiles** of respondents in the original research subgroups which are sifted according to their **overall Dyslexia Index** with the boundary value set at $Dx > 592.5$. To recap, this process generates research subgroups:

- research subgroup DNI, n = 18
- research subgroup DI-600, n = 47
- research subgroup ND-400, n = 44

The **factor profile** of a respondent is shaped by the five Dyslexia Index factor values which are calculated using just the Dyslexia Index dimensions that together constitute each factor. The weighted mean dimension-score aggregation process generates a Dx value between 0 and 1000, just as it does for the **overall** Dyslexia Index.

For example, consider respondent #96408048 from research group ND who presented an overall Dyslexia Index of Dx = 604.94, hence placing this respondent just above the boundary into research subgroup: DNI – that is, students with an unreported dyslexia-like profile. The Dyslexia Index values for each of the 5 factors of Dyslexia Index for this respondents are these:

Dx overall	Student respondent	Dx Factor 1	Dx Factor 2	Dx Factor 3	Dx Factor 4	Dx Factor 5
		Reading, Writing, Spelling	Processing	Organization & Time Management	Thinking & Scoping	Working Memory
604.94	#96408048	824.11	746.99	512.26	80.00	489.51

When applying the same boundary criteria of Dx > 592.5, THIS respondent’s Dyslexia Index is greater than that value for only two of the factors. What it is interesting to note is that this respondent’s Dx values for those two factors is high, indicating that this particular individual is presenting a strongly dyslexic profile in these two (factor) areas – reading, writing, spelling, and processing – conventionally regarded throughout decades of dyslexia research with children as being key indicators of the syndrome. Exploring this has caused me to reflect on the ways in which the factor Dx values are contributing to the overall Dx value and additionally, how the factor profiles of the other respondents sifted into research subgroup DNI compare to each other.

The table below lists all 18 respondents who have been sifted from research group ND – that is, no reported dyslexia – into research subgroup DNI, the 18 respondents who present a dyslexia-like profile based on the boundary cut-off value of Dx = 592.5.

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Dx overall	Student respondent	Dx Factor 1	Dx Factor 2	Dx Factor 3	Dx Factor 4	Dx Factor 5
		Reading, Writing, Spelling	Processing	Organization & Time Management	Thinking & Scoping	Working Memory
research subgroup DNI (sifted from research group ND) n=18						
597.39	#75931558	916.77	432.65	489.60	634.84	609.76
604.94	#96408048	824.11	746.99	512.26	80.00	489.51
619.58	#61624105	505.49	549.41	706.84	812.97	1000.00
639.45	#16730769	583.02	714.22	483.05	1000.00	390.24
642.01	#20048355	567.20	718.86	568.08	852.27	500.00
642.02	#57371454	635.70	546.16	753.05	976.64	648.78
642.26	#97653577	694.09	559.57	712.99	816.33	472.93
654.84	#99268333	840.57	472.01	493.79	666.09	749.02
655.32	#63726872	570.07	771.58	500.00	466.41	800.00
656.90	#14557932	786.18	646.99	576.10	835.23	269.27
659.87	#78323952	700.81	621.80	518.70	938.91	316.10
682.51	#18801333	851.97	604.32	445.99	549.45	753.90
708.61	#21388930	878.05	613.15	755.14	336.95	1000.00
731.52	#87083069	895.96	647.76	851.19	1000.00	339.02
746.04	#10498881	903.14	527.08	705.65	933.44	1000.00
753.67	#68379308	819.43	788.45	611.81	549.53	884.63
779.07	#84526262	781.43	821.46	755.25	774.53	878.29
909.43	#28565915	980.17	874.41	1000.00	1000.00	937.32

RESEARCH GROUP ND (SUBGROUP DNI) SUMMARY

717.32	<-sample mean->	763.01	647.60	635.53	734.64	668.82
	sample SD	141.87	123.49	152.28	257.97	253.89
	95% CI for pop'n mean	696 < μ < 830	589 < μ < 706	563 < μ < 708	612 < μ < 857	548 < μ < 790

view this data as a chart:



The table below summarizes results for the other two research subgroups. The complete datasets are not presented due to the respective sample sizes (n=47, n=44) but links to these are provided.

Also shown are effect size and t-test outcomes

summary for research subgroup DI-600 n = 47 (sifted from research group DI) – full dataset and chart [here](#)

Dx overall	Student respondent	Dx Factor 1	Dx Factor 2	Dx Factor 3	Dx Factor 4	Dx Factor 5
		Reading, Writing, Spelling	Processing	Organization & Time Management	Thinking & Scoping	Working Memory
684.75	<-sample mean->	794.50	700.42	615.74	772.72	589.20
	sample SD	106.33	131.07	145.72	165.11	227.14
	95% CI for pop'n mean	764 < μ < 825	663 < μ < 738	574 < μ < 658	725 < μ < 820	524 < μ < 655
Hedges' g effect size and t-test, one-tail @5% level between sample means research group ND(DNI) and DI-600						
0.4552	<- g ->	0.2692	0.4092	0.1341	0.1957	0.3393

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Dx overall	Student respondent	Dx Factor 1	Dx Factor 2	Dx Factor 3	Dx Factor 4	Dx Factor 5
304.00	<- sample mean ->	276.43	214.38	586.78	458.02	377.68
	sample SD	118.78	103.08	151.32	218.03	206.19
	95% CI for pop'n mean	241 < μ < 312	184 < μ < 245	542 < μ < 632	393 < μ < 523	316 < μ < 419
Hedges' g effect size and t-test, one-tail @5% level between sample means research group ND(ND-400) and DI-600						
6.030	<- g ->	4.604	4.106	0.1951	1.62	0.974
$t=1.642$ $p=0.0527$; not significant	<- $t=$, $p=$, sig? ->	$t=0.971$ $p=0.168$; not significant	$t=1.476$ $p=0.072$; not significant	$t=0.484$ $p=0.315$; not significant	$t=0.706$ $p=0.241$; not significant	$t=1.224$ $p=0.113$; not significant
$t=28.72$ $p<0.00001$; significant	<- $t=$, $p=$, sig? ->	$t=21.95$ $p<0.00001$; significant	$t=19.57$ $p<0.00001$; significant	$t=0.9301$ $p=0.1774$; not significant	$t=7.793$ $p<0.00001$; significant	$t=4.641$ $p<0.00001$; significant

This is interesting and looking at the summaries first of all, there appear to be a number of key points that emerge:

- Looking at the mean Dx value for subgroups DNI and DI-600: the t-test returns a p-value that is not significant albeit only just, although there is an effect size of 0.46 which is 'medium'. As outlined in the [previous post](#), the original boundary value of Dx = 600 that has been used to sift out respondents from research group ND into research subgroup DNI has since been adjusted downwards to Dx = 592.5 in order to 'engineer' a t-test p-value for the difference between the sample means to be not significant.
- It is important to note that for all Dx factors, the t-test reports no significant differences between the samples means for each factor between subgroups DNI and the control subgroup DI-600 which adds to my argument that respondents in the subgroup of particular interest (DNI) and the control subgroup are presenting on average, similar Dx

values and that the Dyslexia Index metric is successfully identifying students with dyslexia-like profiles from the research group of students with no reported dyslexia. On this basis it is felt that comparing the Academic Behavioural Confidence between the two subgroups is valid.

- Both subgroup DNI and subgroup DI-600 presented significantly higher Dx values compared with the 'strongly' non-dyslexic subgroup (ND-400) as would be expected, although there is an exception for Dx Factor 3: ORGANIZATION & TIME MANAGEMENT where a small effect size of 0.1951 is reported together with a t-test result of $t=0.9031$, $p=0.1774$ which is not significant. This is very interesting as it may be implying that on the basis of this metric's results and analysis, students who are strongly non-dyslexic may be just as weak in organizational and time management skills at university as students with dyslexia. Or to put this another way, most students tend to be disorganized and find time-management challenging. An implication of this might be that universities need to be spending time during new-student inductions periods presenting tips and skills that can help this core skill in being academically productive and successful. A deeper discussion will be presented in the final thesis that attempts to explain this.

The complete data tables of Dyslexia Index Factors are available on the project webpages [here](#), where additional discussion points are presented about the emerging interrelationships between Academic Behavioural Confidence and Dyslexia Index.

TO BE CONTINUED...