

KANGAROO MOTHER CARE: IMPACTS ON THE MOST FRAGILE PREMATURE INFANTS

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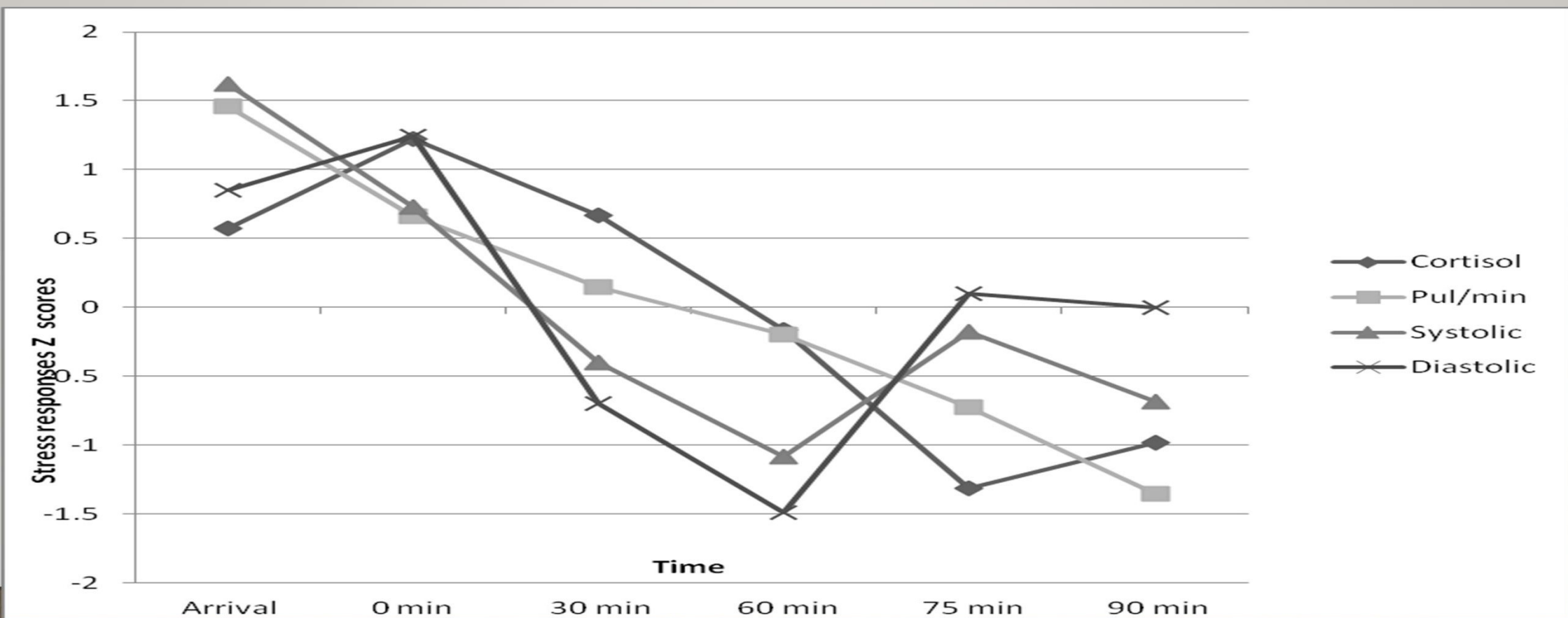
Nathalie Charpak, Bogota, Colombia

and the Colombian/Canadian collaborative longitudinal study members

Fathers' physiological reaction to the introduction of the baby on his chest.

Varela, N., Tessier, R., Tarabulsky, G.M., Pierce, T. (submitted) Acta Paediatrica

Changes to salivary cortisol happen between 15 and 20 minutes after exposure to a stressor



POPULATION AND SAMPLE



**433 Original RCT
Participants \leq 1800 g**

**412 survivors
at 1 year CA**

**293 participants
were located (71%)**

**119 participants
could not be located**

3 died

**6 living outside
Bogotá**

**20 refused to
participate**

**264
participants
(64%)**



FRAGILITY INDEX: TO ASSESS THE IMPACT OF THE SEVERITY OF SYMPTOMS BEFORE KMC INTERVENTION

Rasch Model – an analysis that assesses the severity of symptoms and their probability of being endorsed by individuals at different places along a severity continuum

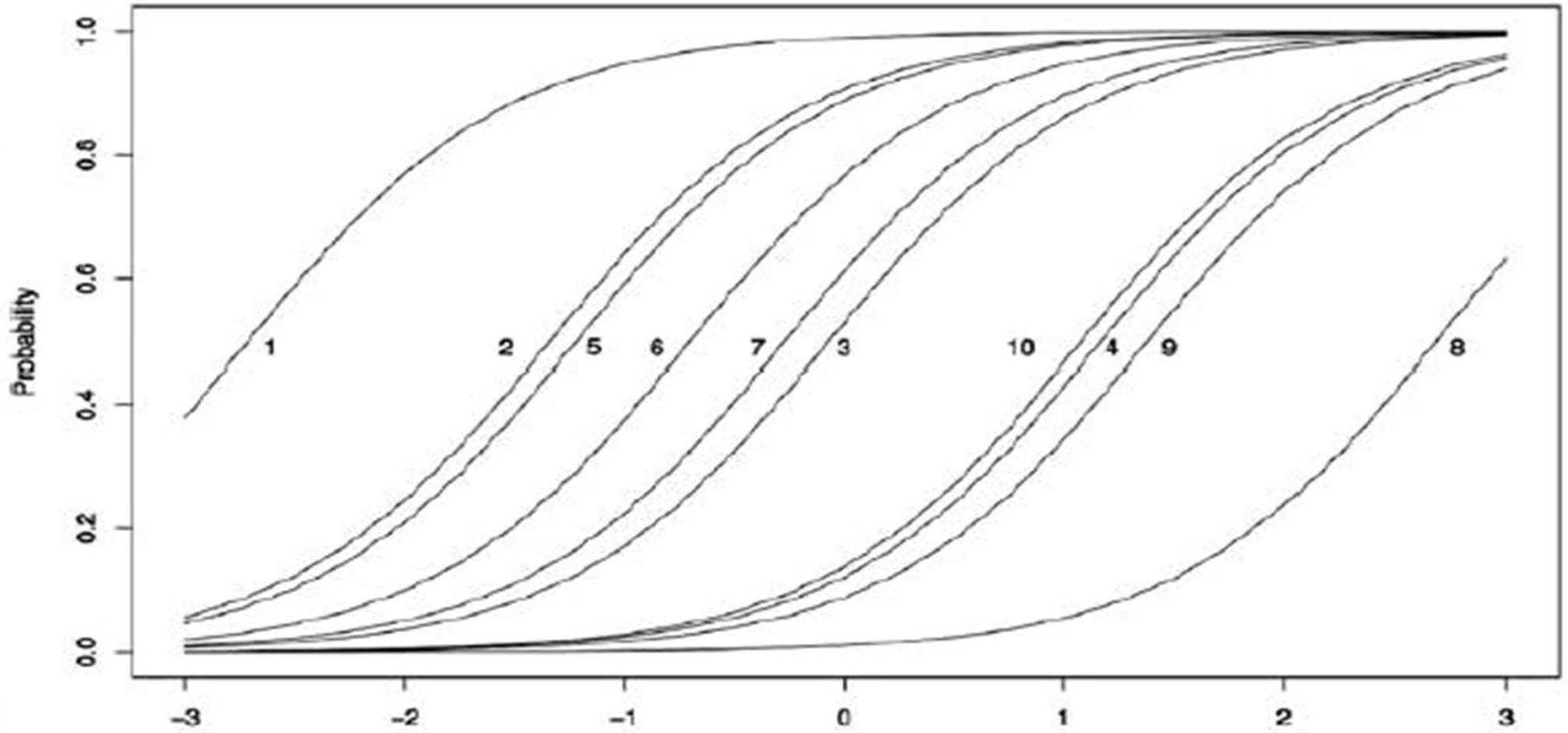
Parameters of the fragility index comprising problematic events during pregnancy, birth, or the neonatal period before randomization in the original RCT cohort

* **An easy** indicator (negative value) is any observed fragility;

* **A difficult** indicator (positive value) is seen only at the most severe levels.

Parameter	Difficulty*
1. Gestational age at randomization	--2,1628490
2. Neonatal reanimation	--1,8858323
3. Weight at birth < 1501 g	--1,7757791
4. Neonatal sepsis	--1,7442807
5. Nosocomial infection before randomization	--1,7062807
6. Intrauterine growth restriction and preterm	--1,2851473
7. Gestational age at birth	--0,7523441
8. Intrauterine growth restriction	--0,5855773
9. Severe jaundice	--0,5502986
10. Toxemia during pregnancy	-0.3982621
11. Male gender	-0.2181845
12. Primiparous	-0.1997236
13. Acute suffering at birth	0,3160136
14. Preterm	2.0475712

Item Characteristic Curves



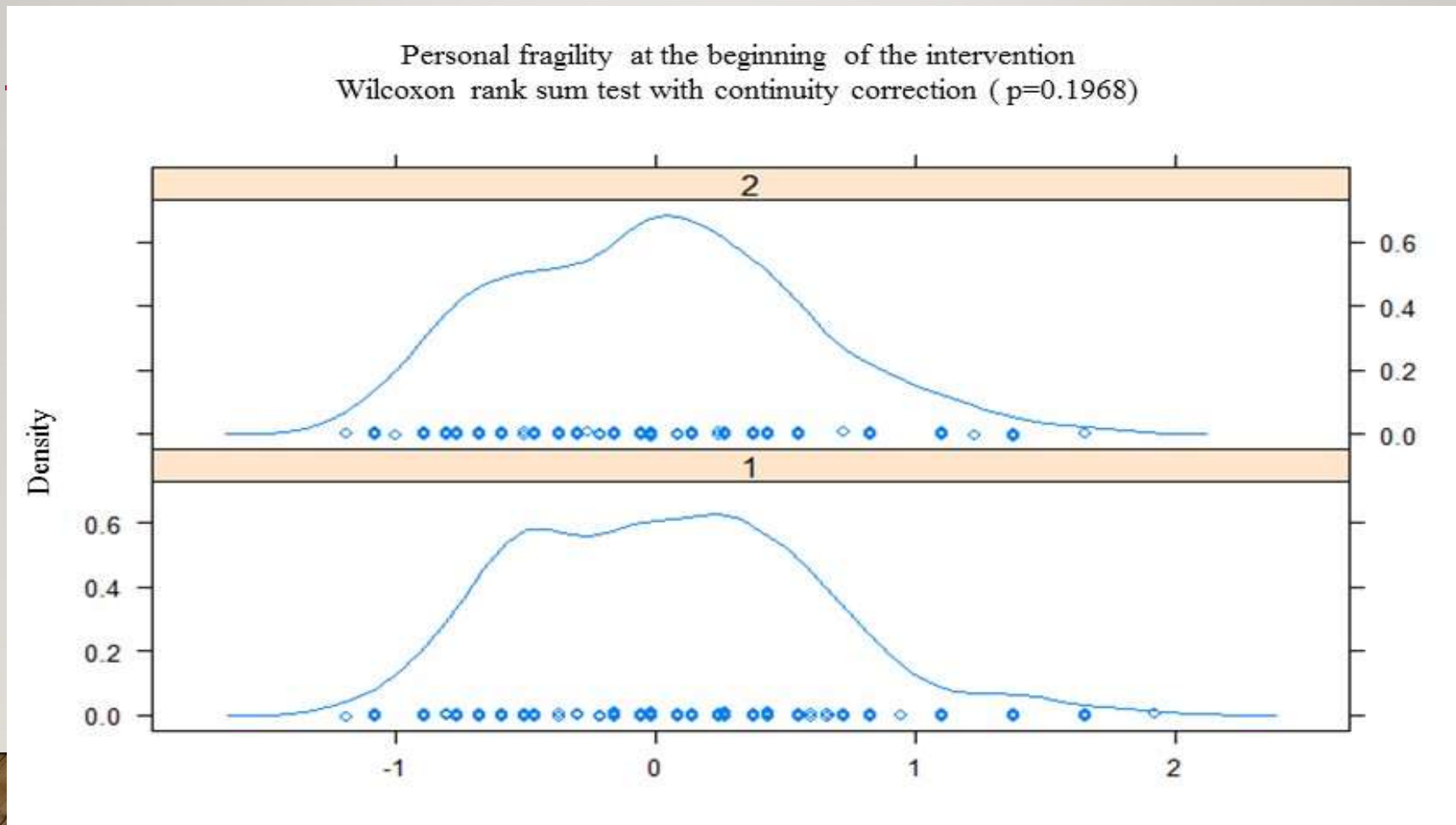
Diapositiva 6

- 4 L'item 1 est rapidement endossé dès qu'un problème de jeu commence à poindre. Si le problème s'aggrave, les joueurs vont plus probablement endosser les critères 2 et 5 avant les autres critères. Finalement, le critère 8 n'est endossé que quand le problème est extrême.

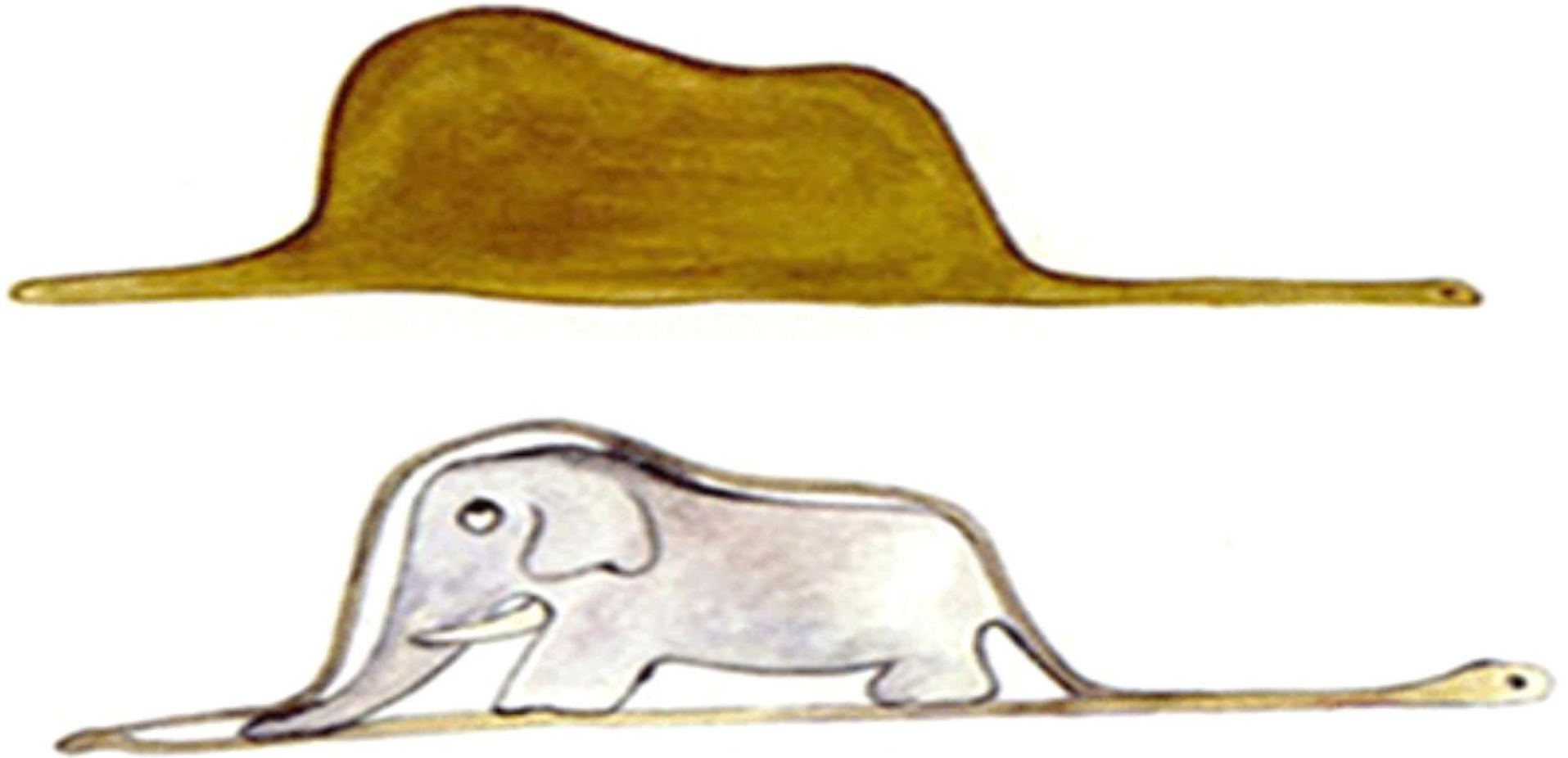
rejeantessier@gmail.com; 01/11/2016

Fragility index before randomization in the re-enrolled cohort according to each group (1 = KMC; 2 = Control)

The most fragile N = 151(61,4%) KMC = 81; Control = 70



THE BOA SWALLOWS AN ELEPHANT
THE LITTLE PRINCE (ANTOINE DE ST EXUPERY)



PSYCHOLOGICAL EVALUATION

9

A: Questionnaires

- Self reports

1. ~ on feelings or moods (*attachment, depression*)
 2. ~ on his/her behaviors (*ASR*)
 3. ~ on human environment (*Kidscreen*)
 4. ~ on life style (*life habits*)
-

- Other informant reports

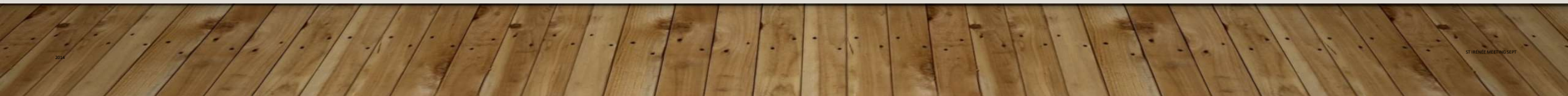
1. ~ on observation of behaviors (*ABCL Conners*)
2. ~ on observation of environment (*HOME*)

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PSYCHOLOGICAL EVALUATION

B: Observations based on young adult performances

1. ~ Cognitive (WASI) Wechsler Abbreviated Scale of Intelligence
2. ~ Neuro cognition (TAP) Test of Attentional performance
3. ~ Visuo Motor (VMI) Visuo Motor Integration
4. ~ Memory (CVLT) California Verbal Learning Test



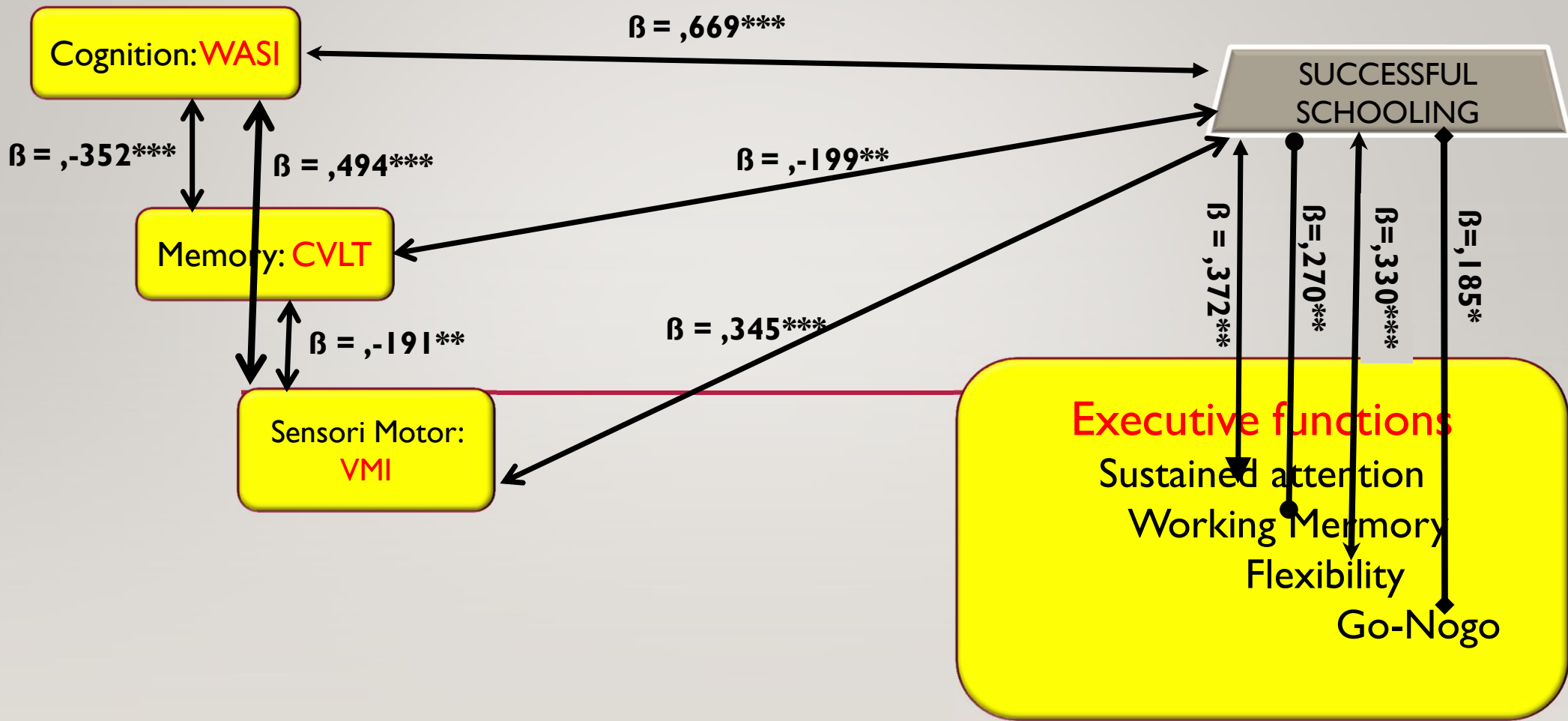
RESEARCH QUESTIONS:

I. Are the most fragile KMC young adults perform differently at school than their Control counterparts?

- **Dependent variable:** Successful schooling at 20 years
- **Independent observations:**
 1. ~ Cognitive (*WASI*) Wechsler Abbreviated Scale of Intelligence
 2. ~ Neuro cognition (*TAP*) Test of Attentional performance
 3. ~ Visuo Motor (*VMI*) Visuo Motor Integration
 4. ~ Memory (*CVLT*) California Verbal Learning Test

SCHOOLING LEVEL'S MEAN Z SCORES FOR BOTH MOST AND LESS FRAGILE. (Z scores standardized on the Colombian same age population)

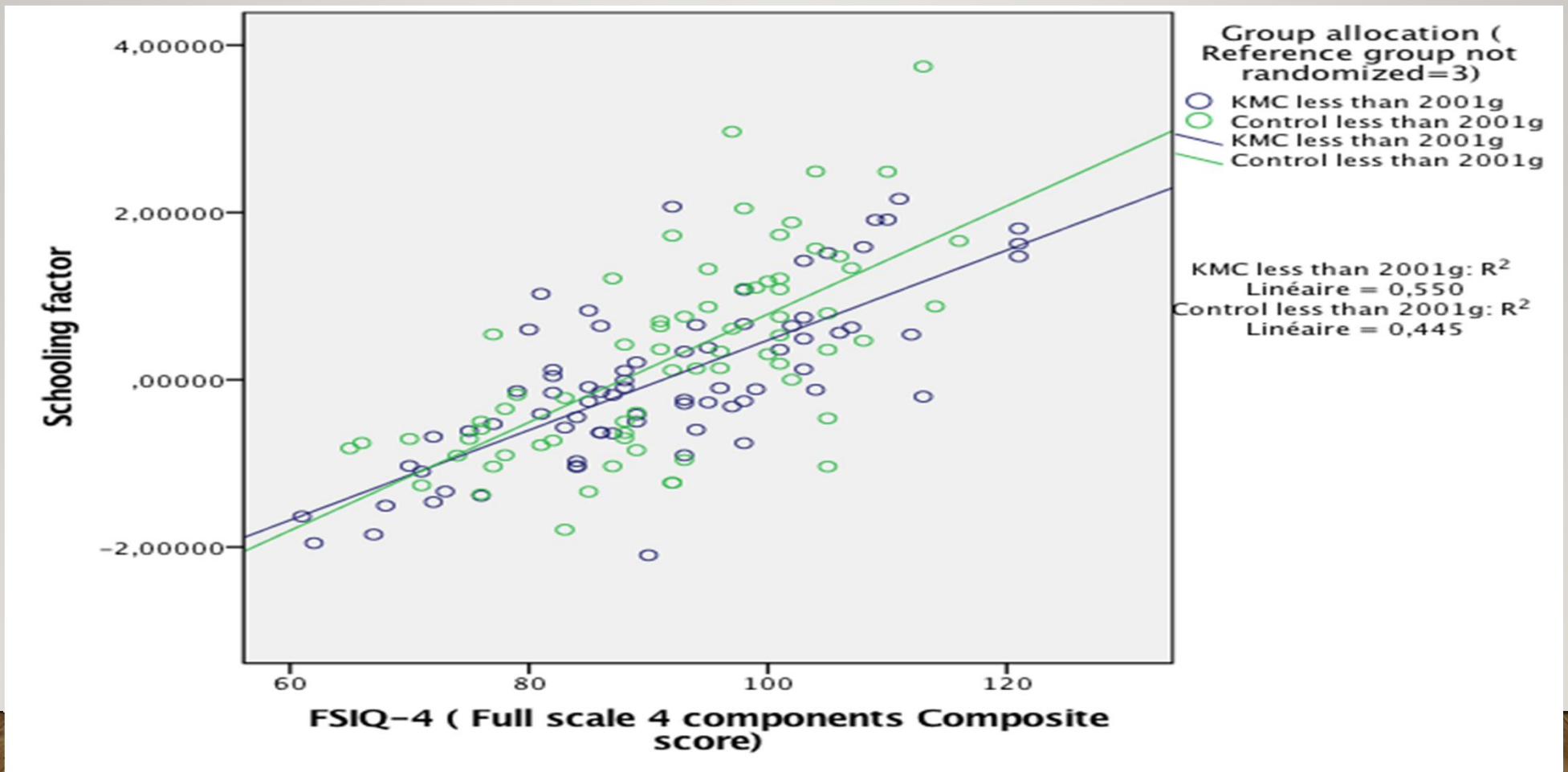
Dimensions (z scores)	KMC (Most fragile)	KMC (Less fragile)	CONTROL (Most fragile)	CONTROL (Less fragile)	p most fragile	P less fragile
Language	-,134	-,131	,194	,183	,053	,120
Mathematics	-,049	-,263	,241	,223	,130	,034
Social sciences	,130	-,167	,381	-,057	,155	,599
Philosophy	,011	-,003	,368	,150	,050	,478
Chemistry	-,052	,040	,121	,111	,376	,760
Physics	-,068	-,317	,136	,058	,271	,090
Biology	,038	-,230	,289	,026	,208	,280
Mean z score schooling	- 1,8	- 15,3	24,7	9,9	,048	,053



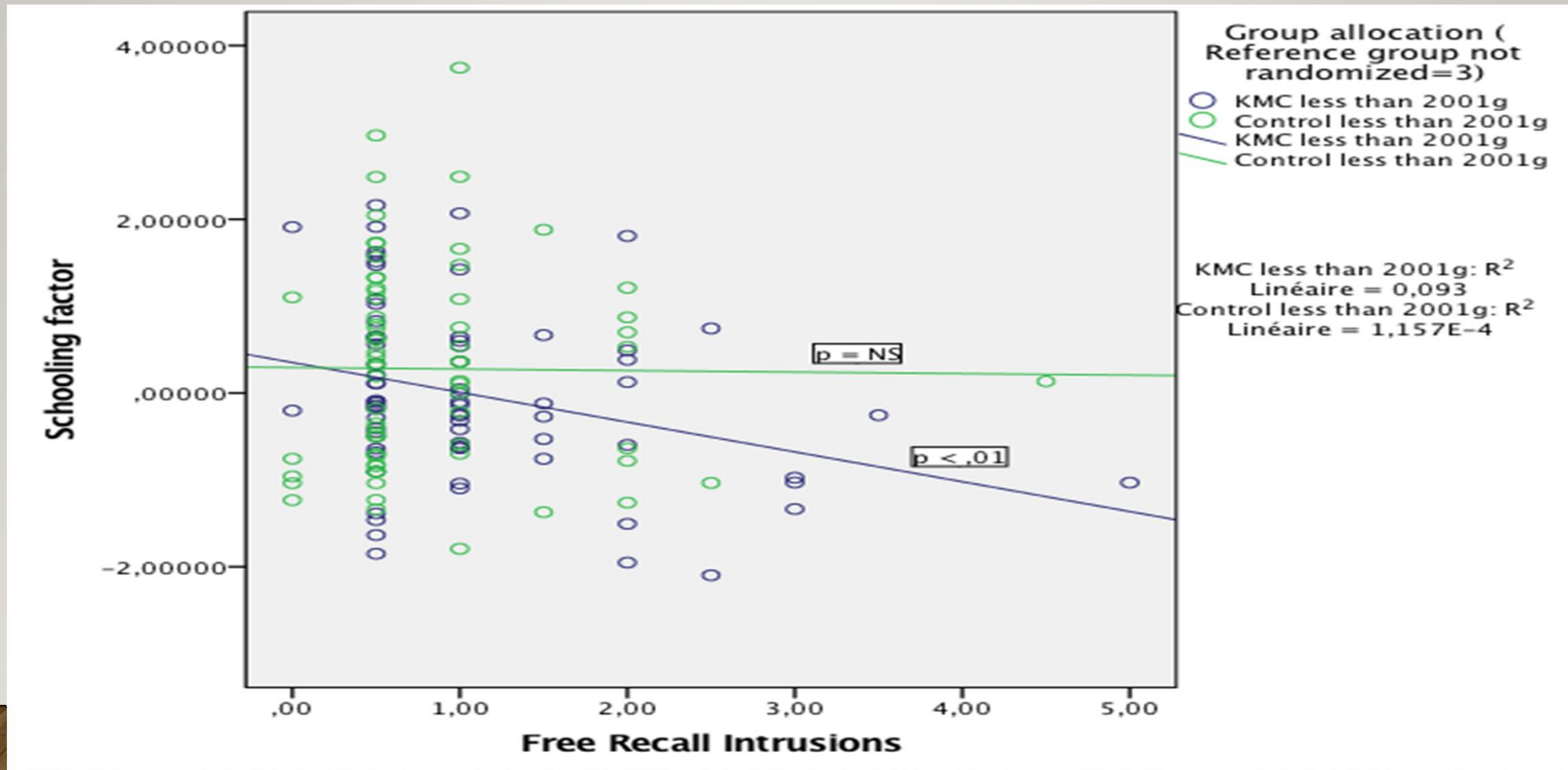
STATISTICS TO ANALYSE DIFFERENTIAL SLOPES IN A SAMPLE

- Poteat, G. M., Wuensch, K. L., & Gregg, N. B. (1988). An investigation of differential prediction with the WISC-R. *Journal of School Psychology, 26*(1), 59-68.
- Test bias area are topic of particular concern in determining the eligibility of characterized subgroups. Investigations of the correlation between IQ and neuropsychological tests and standardized achievement tests have typically not produced evidence supporting the differential validity hypothesis, and the differential prediction of academic achievement for fragile group members remains a critical issue. The relationship between schooling and grade point average was examined for a sample of 151 most fragile young adults (81 KMC and 70 control) on the ICFES Colombian standardized scores. An examination of the correlation coefficients and regression lines demonstrated evidence of differential prediction. Overall, the data suggest that the neuropsychological tests are valid specific predictors of academic achievement..

CORRELATION (SLOPE) BETWEEN IQ (WASI) AND SUCCESSFUL SCHOOLING IN THE MOST FRAGILE SUBGROUP :
MEAN IQ (WASI) SCORE: KMC = 91,4; CONTROL = 94,22; P = ,258

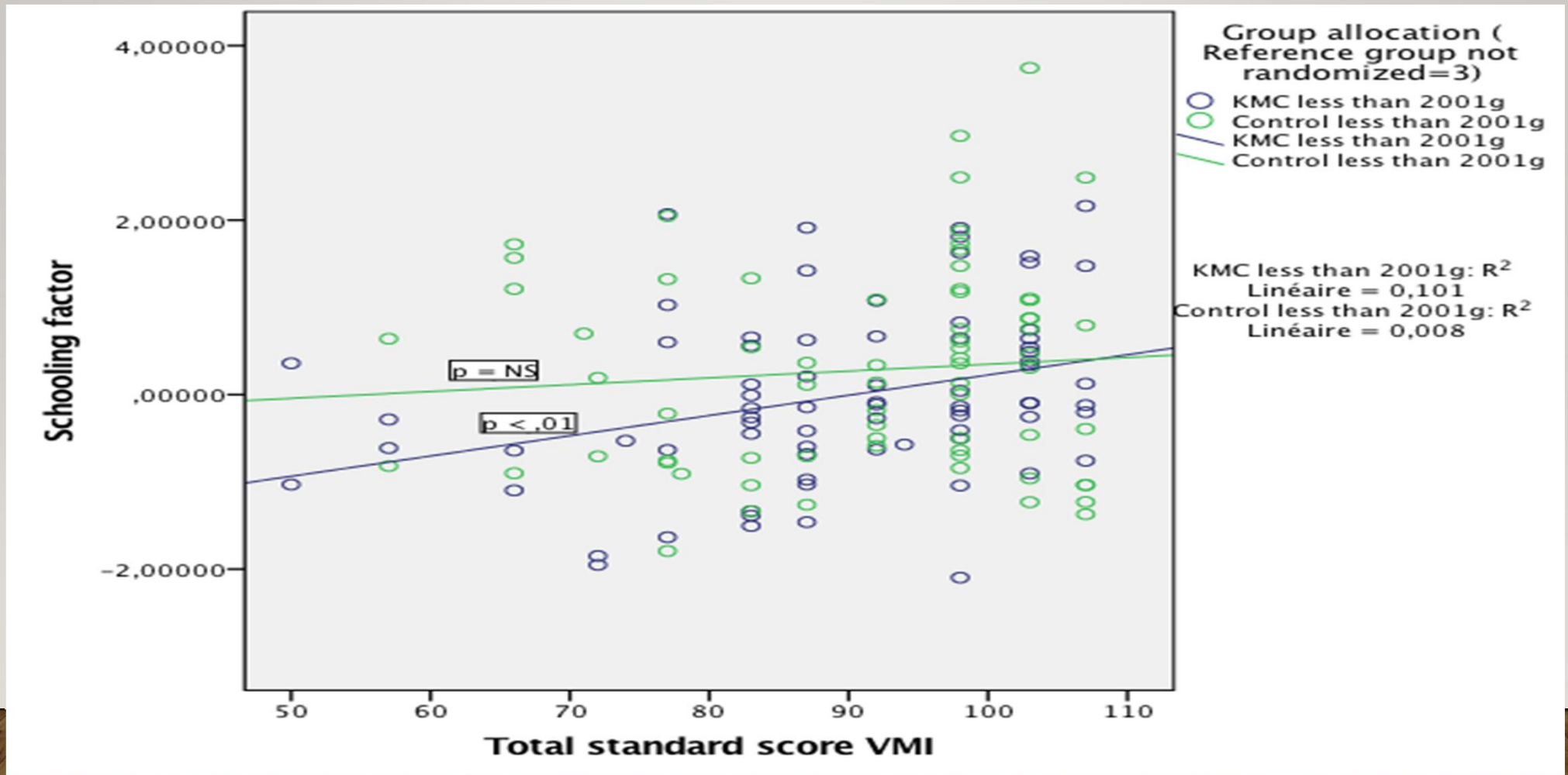


CORRELATION (SLOPE) BETWEEN VERBAL MEMORY (CVLT) AND SUCCESSFUL SCHOOLING IN THE MOST FRAGILE SUBGROUP :
MEAN VERBAL MEMORY SCORE: KMC = $-.020$; CONTROL = $.187$; P = $.778$



CORRELATION (SLOPE) BETWEEN VISUO MOTOR (VMI) AND SUCCESSFUL SCHOOLING IN THE MOST FRAGILE SUBGROUP :

MEAN VISUO MOTOR SCORE: KMC = 87,7; CONTROL = 89,5; P = ,437



TEST OF ATTENTIONAL PERFORMANCE

PETER ZIMMERMANN & BRUNO FIMM (1992)

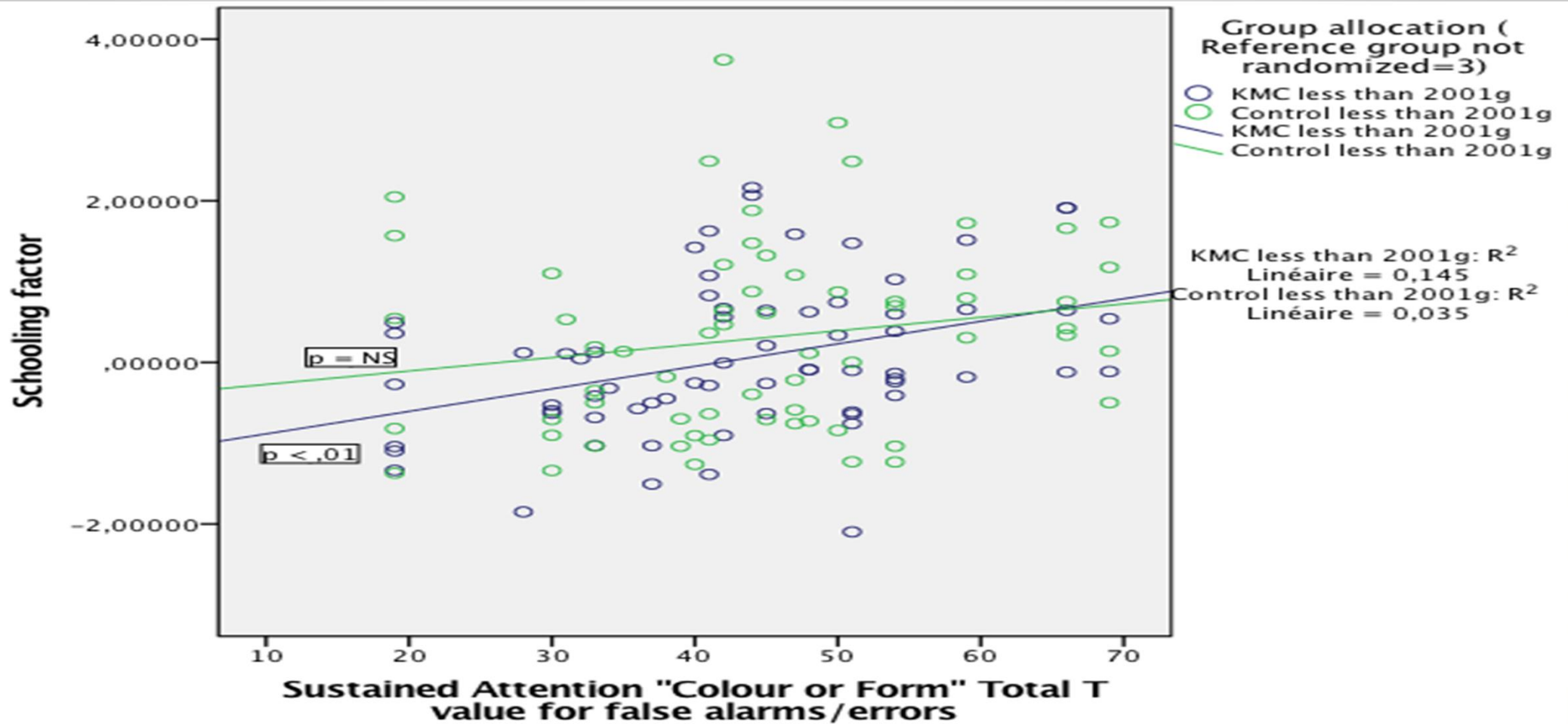
- The Test of Attentional Performance (TAP) was first published in 1992.
- ***The calculation of the normative values is done by the program automatically***

CORRELATION (SLOPE) BETWEEN WORKING MEMORY AND SUCCESSFUL SCHOOLING IN THE MOST FRAGILE SUBGROUP :
MEAN WORKING MEMORY SCORE: KMC = 50,9; CONTROL = 52,3; P = ,508



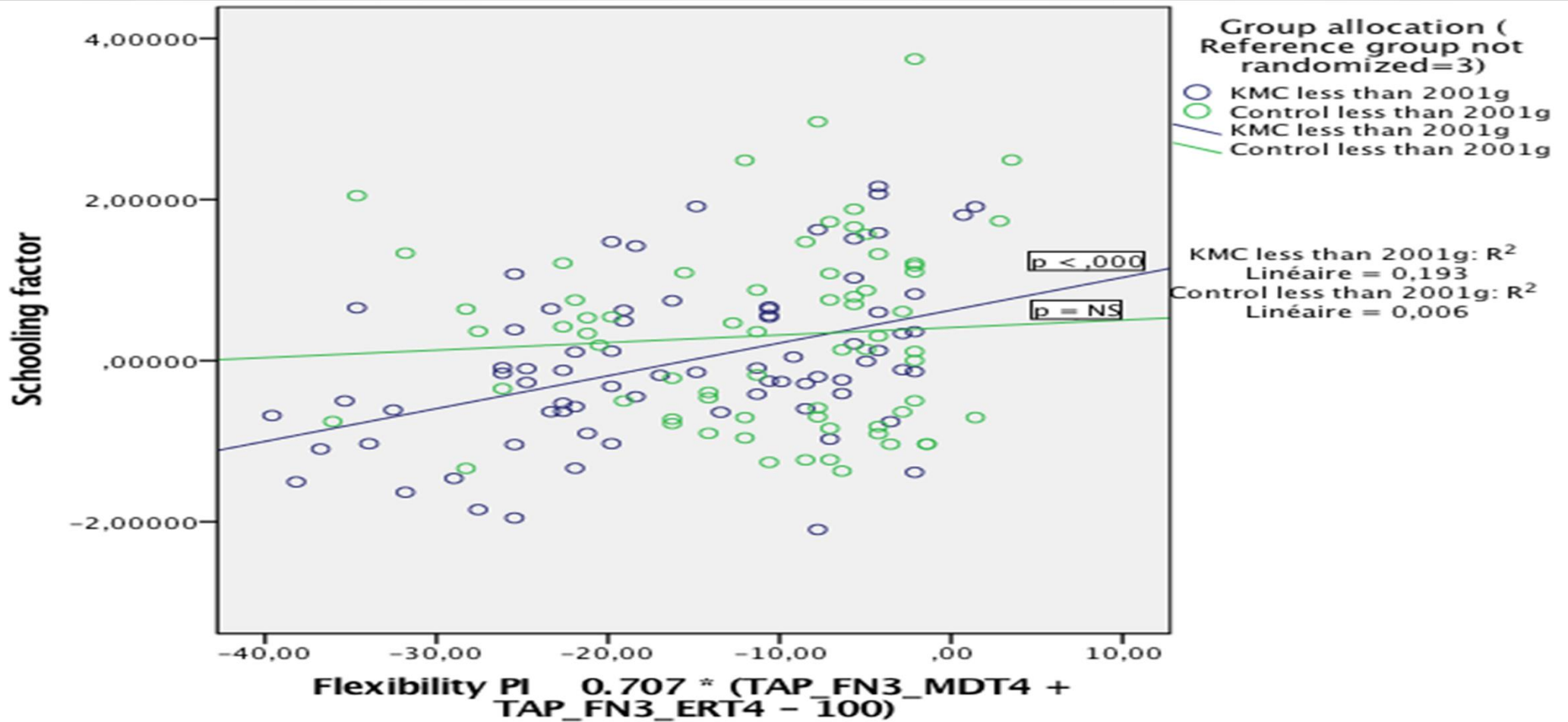
Correlation (slope) between Sustained Attention and successful schooling in the most fragile subgroup :

MEAN Sustained Attention SCORE: KMC = 42,4; Control = 44,7; $p = ,321$



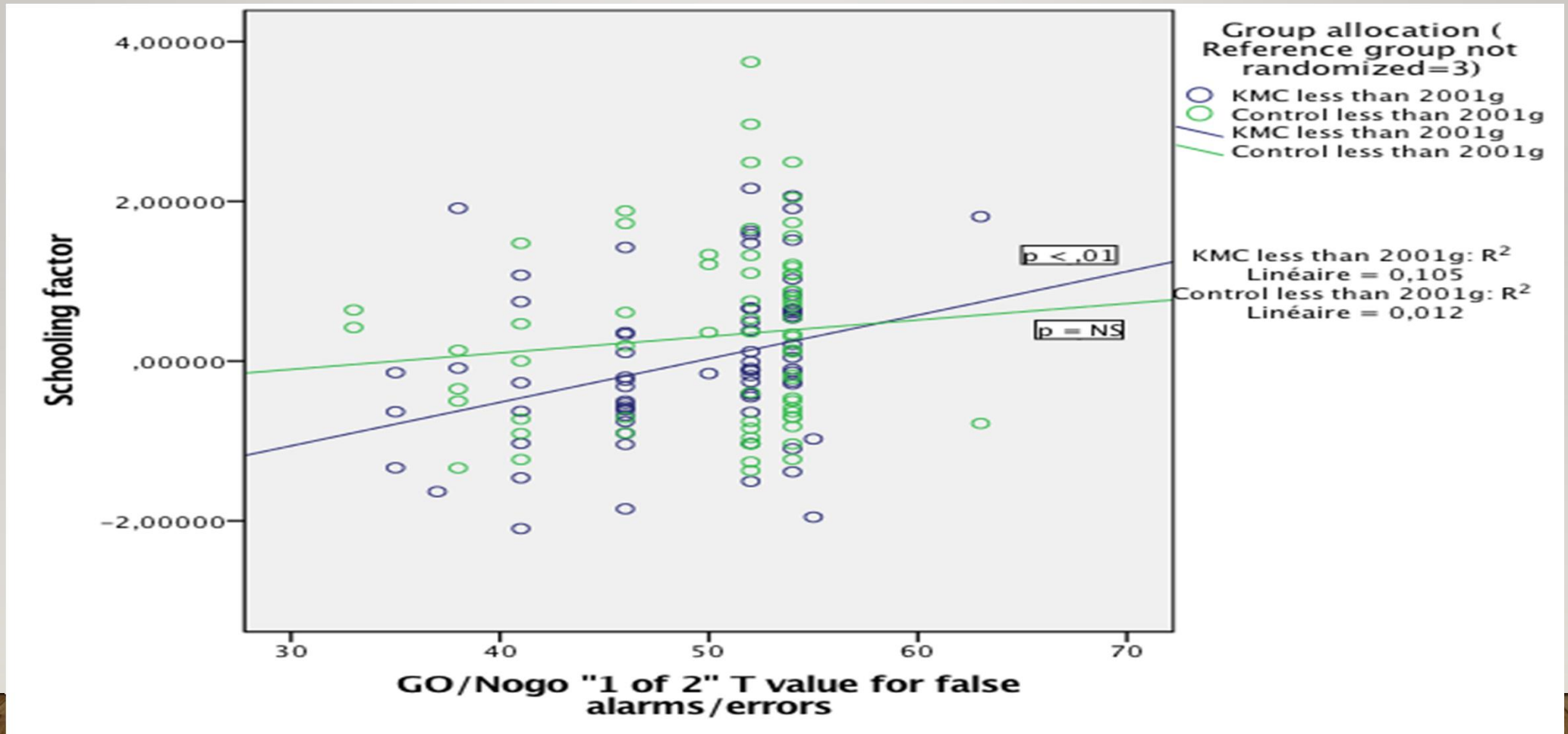
CORRELATION (SLOPE) BETWEEN FLEXIBILITY AND SUCCESSFUL SCHOOLING
IN THE MOST FRAGILE SUBGROUP :

MEAN FLEXIBILITY SCORE: KMC = 16,8; CONTROL = 12,8; P = ,021



CORRELATION (SLOPE) BETWEEN GO-NOGO AND SUCCESSFUL SCHOOLING
IN THE MOST FRAGILE SUBGROUP :

MEAN GO-NOGO SCORE: KMC = 42,7; CONTROL = 44,9; P = ,121



WHAT TO CONCLUDE?

- 1. – Both groups are equally fragile before randomization;
- 2. – In both fragile groups we observed **no significant mean difference** in the neurocognitive functions (EF);
- 3.- However, in the KMC most fragile group, the successful **schooling is more strongly linked to a better EF**: Sustained Attention, Working Memory, Flexibility and GO-NOGO tasks as well as Verbal Memory and Visuo Motor coordination.
- 4.- We suggest that these neurocognitive functions have been manipulated (modified) earlier by the KMC intervention at different levels favoring successful schooling at adult age.

INTERPRETATIONS AND CONCLUSIONS

- 1.- The moment at which KMC is administered is considered decisive since it is during the third trimester, a critical period for the development of the central nervous system, that interventions are most likely to have a significant and durable effect on cognitive functioning (Als et al, 2012; Kaffashi, Ludington-hoe et al, 2013).
- 2.- It is also during this period that several biological processes involved in the integrity of cognitive functions at a later age take place.
- 3.- The structural and functional integrity of some cortical and subcortical structures and the stabilization of neuronal circuits, particularly fronto-thalamo-striatal circuits involved in attentional functioning, are therefore compromised by premature birth during this period (de Kievet et al., 2012).

INTERPRETATION ...

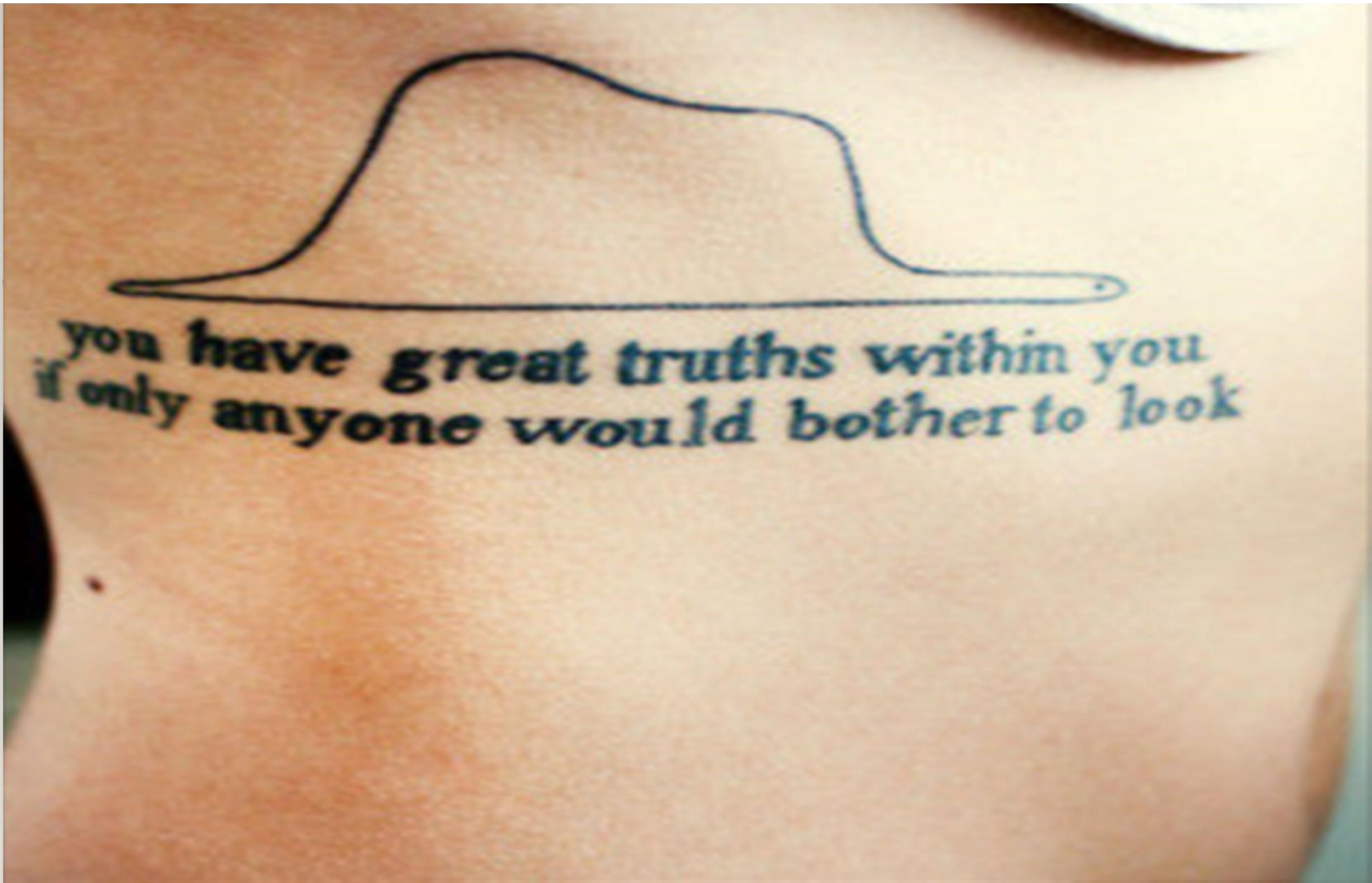
- 4.- Moreover, perinatal care depriving infants from physical proximity with their mothers could also cause other types of biophysiological alterations contributing to the emergence of cognitive difficulties:
- 5.- First, maternal separation could increase apoptosis (e.g. programmed cell death), a phenomenon to which neurons are particularly vulnerable during the post-natal period (Bhutta et al. 2002).
- 6.- Second, the experience of painful events (e.g. medical interventions, high exposure to lights and noises) could cause an excessive release of excitatory amino acids in premature infants leading to neuronal damage (Anand & Scalzo, 2000)
- 7.- Finally, at the behavioral level, these events can lead to a disruption of the physiological activation cycle, to altered functioning of the hypothalamic-pituitary-adrenal (HPA) and to difficulties in self-regulation.

CONCLUSION

- 1.- We therefore suggest that the KMC intervention has an effect on the neurocognitive function since skin to skin contact with the parent (mother) after birth is known to favor a better regulation of the physiological activation cycle in the child.
- 2.- An idea widely accepted is that by activating neuro-psycho-biological processes, the KMC could favor the quality and speed of responses to the needs of the infant, therefore accelerating his or her physiological maturation and preventing the emergence of cognitive deficits (Cochrane database systematic review, 2011; 2014)

FINAL CONCLUSION

- These results suggest that KMC is an effective treatment to promote neurocognitive maturation in low birth weight infants with neurological vulnerabilities, and that these benefits can still be observed at adulthood.



Thanks to..

- Thanks to these young adults participants;
- Thanks to the interviewers, the observers in Bogota;
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- Thanks to dr Line Nadeau (psy) for her input in the final design of this paper;
- Thank to dr Stephanie Ropars (psy) for her invaluable help in the interpretations and discussion.
- Thanks for your questions and comments