Obesity as a Perceived Social Signal

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Obesity: beyond energy in – energy out

☐ Classical interpretation of obesity: thrifty gene, thrifty phenotype.
☐ Positive energy balance: fat as energy storage organ.
☐ Adipose tissue is an active endocrine organ too, directly or indirectly affecting metabolism, immunity, sex, reproduction as well as cognitive brain function.
☐ Other Social and behavioural angles of Obesity: Obesity socially contagious (3); neuronal cross talk between food and money (5); link to aggression.
☐ Obesity may act as a social signal - revealing the past and present resourcefulness of a person .
☐ We test here whether body proportions, as influenced by fat, are perceived to reflect any traits related to the physique, nature, attitude, moral character and status of a person.

Methods:

Faceless drawings of three male body forms namely lean, muscular and slightly fat and feminine, each with and without abdominal obesity (designated as L-, L+, M-, M+, F- and F+ respectively) displayed to 222 respondents comprising 140 females and 82 males, science students of an age group between 18 and 22.

A list of 30 different adjectives or short descriptions of personality traits given.

Subjects allocate the most appropriate figure to each of them independently.

Figure 1:The six body forms used in the study:
1. Lean (L - narrow shoulders, thin torso and extremities, knee and elbow joints thicker than thy and arm diameter)
2. Muscular (M Broad shoulders, curved extremities, chest and abdominal muscles shown)
3. Slightly fat and feminine (F rounded shoulders, cylindrical arms)
Each of the three body forms was represented with (designated by +) and without (-) abdominal obesity as shown in rows.
The sequence of these figures was randomized during the test and the figures were labeled serially by alphabets.
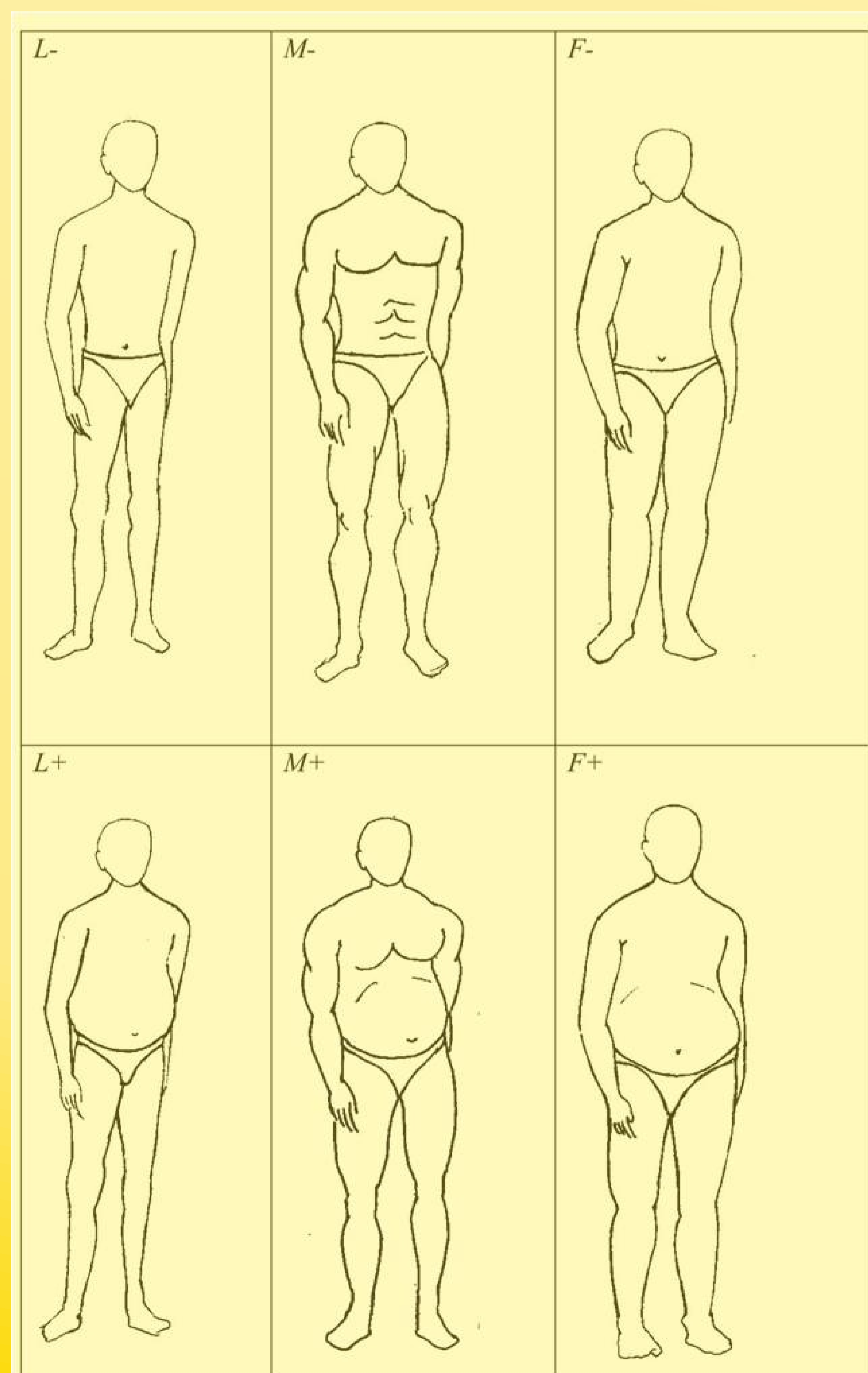

Table 1:
Predominant positive and negative associations of personality traits with different body forms:

Trait	Predominant positive association	Predominant negative association	χ^2 for random responses	χ^2 for body form alone	χ^2 for abdominal obesity alone	χ^2 for independence	χ^2 for sex difference	% respondents assigning with reason
Physically aggressive	M-	L+, F+, L-	536.22 *	259.16 *	104.07 *	14.87	8.67	56.76
Strong	M-	L-, L+, F+	726.65 *	319.16 *	159.21 *	6.73	8.48	65.77
Lethargic	F+	M-, L-	244 *	89.21 *	93.40 *	10.12	24.53	45.95
Disease prone	L-, F+, L+	F-, M-	183.73 *	121.97 *	8.72	62.60 *		57.21
Swift	L-	F+, M+	61.94 *	13	48.72 *	2.04	9.35	32.43
Rough and tough	M-	L+, F+, L-	560.54 *	250.29 *	127.13 *	9.23	6.62	58.11
Confident	M-, F-	F+, L+	208.81 *	37.48 *	133.26 *	12.99	36.30 *	46.40
Conscious about looks	M-	F+, M+, L+	215.73 *	67.81 *	73.80 *	21.14 *	5.02	52.25
Money minded	F+	M-	46.59 *	15.11	23.35 *	10.25	8.01	27.48
Physical risk avoider	L-, F+	M+, F-, L+	50.70 *	2.78	4.05	43.69 *	7.04	49.55
Business risk avoider	F-	M-	21.02	11.05	2.59	11.94	14.22	22.97
Depressed	L+	M-, F-	161.89 *	137.92 *	18.45 *	29.88 *	9.27	38.74
Rich	F+	L-, L+	225.35 *	131.38 *	52.54 *	1.33	17.34	42.34
Influential	M-	F+, L+	98.65 *	30.35 *	50.61 *	7.76	24.14	33.33
Dominating	M-	L+, L-	147.40 *	107.86 *	22.07 *	1.74	12.79	37.84
Successful	F-	L+, F+	171.62 *	50.19 *	83.31 *	10.90	22.37	34.23
Status conscious	M-	L+, L-	48.97 *	34.89 *	11.26	0.22	18.53	30.63
Modern	M-	L+, F+	385.46 *	125.11 *	162.61 *	1.52	10.31	45.05
Brave	M-	L+, F+	294.65 *	103.89 *	142.72 *	4.95	14.34	46.40
Friendly	F-	M-, M+	178.22 *	44.35 *	56.50 *	56.05 *	18.56	33.33
Talkative	L-, F-	M-, F+	68.49 *	14.38	22.07 *	30.04 *	19.34	23.42
Intelligent	F-	F+, M+	189.57 *	39.35 *	106.83 *	19.62 *	22.02	28.38
Stupid	F+, L+	M-	89.94 *	18.92 *	64.86 *	4.51	3.41	20.27
Methodical	F-	F+	91.51 *	10.24	54.50 *	21.28 *	24.33	26.13
Loving	F-	L+, F+, M+	170.38 *	52.73 *	64.86 *	14.36	32.83 *	22.07
Greedy	F+	L-, M-	295.89 *	117.51 *	98.67 *	5.33	7.72	37.84
Selfish	F+	M-, F-, L-	67.03 *	7.24	56.50 *	5.54	15.76	19.37
Honest	F-	F+, M+, M-	154.32 *	38.19 *	64.86 *	23.61 *	30.41 *	27.03
Kind	F-	M-	123.45 *	54.51 *	28.83 *	22.84 *	16.53	25.23
Political	F+	L-, M-	95.84 *	43.97 *	45.04 *	3.49	17.16	31.53

Traits related to-
physique [strong, physically aggressive, lethargic, disease prone, swift, rough and tough]
nature [brave, friendly, talkative, intelligent, stupid, methodical]
attitude [confident, conscious about looks, money minded, physical risk avoider, business risk avoider, depressed]
moral character [greedy, selfish, political, kind, loving, honest]
social status [status conscious, rich, influential, dominating, successful, modern].

Why a tummy?

Central obesity is more strongly associated with metabolic syndrome. Visceral fat is metabolically and endocrinologically more active than subcutaneous fat. But we have no explanation so far as to why it evolved that way.
Signal value- a possible answer?
Subcutaneous fat is difficult to differentiate from muscle mass and therefore can be of little signal value.
Abdominal fat, on the other hand, changes the body proportions substantially and therefore stands out quickly. For a person approaching from a distance, body proportions can be perceived much before facial expressions. Further the theory of honest signaling or the handicap principle states that only costly signals can be evolutionary-stable honest signals. Fat has a high energy cost and therefore signaling by fat can evolve to be honest.
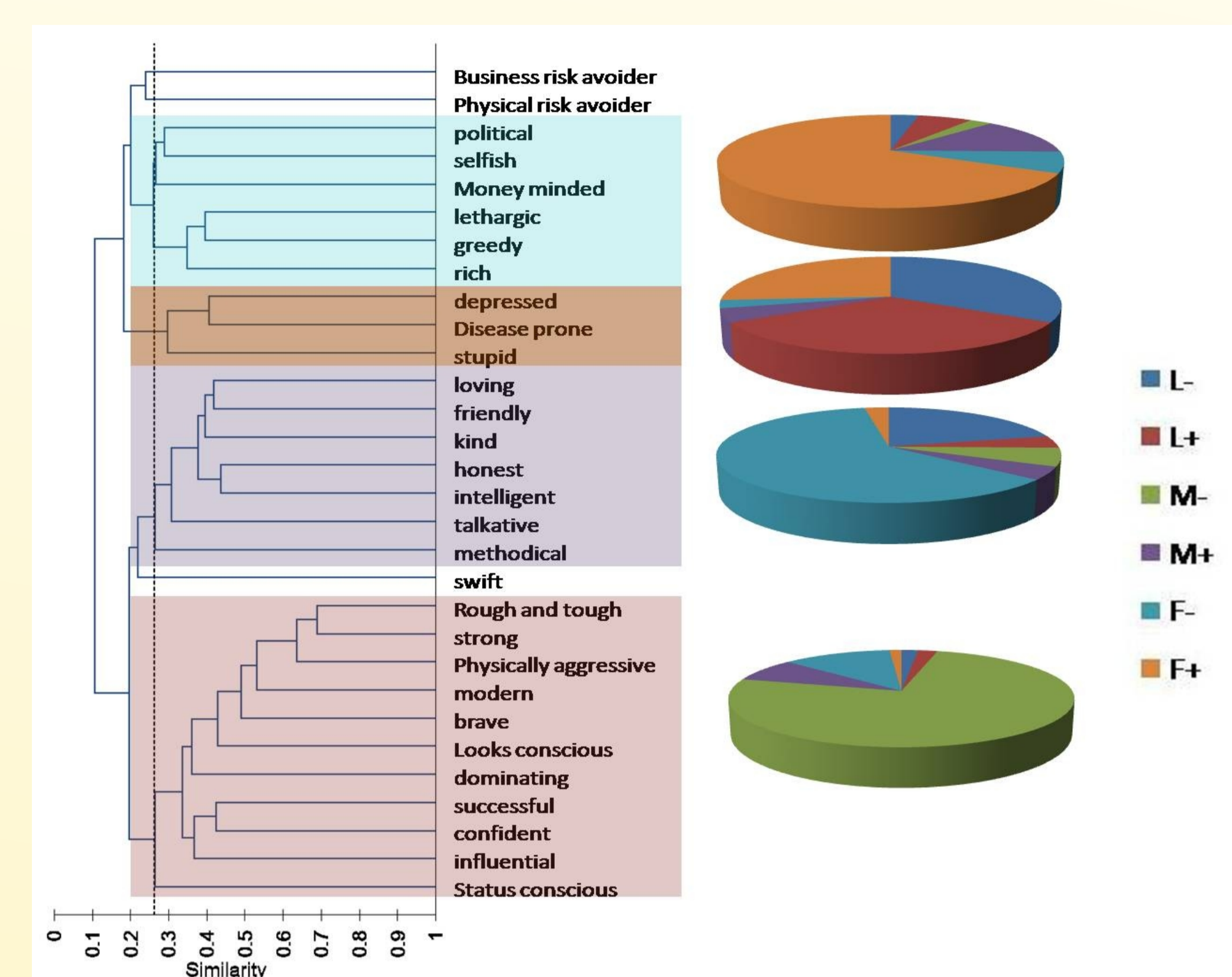

Figure 2:
Clustering of personality traits based on the similarity matrix (table 2): Four distinct clusters emerged using the significance level of individual pair (alpha = 0.05) as the cut-off. The four clusters were dominated by different body forms as shown in the pie-charts.

Results:

☐ Response to all except one trait highly non-random (table 1).
☐ Not only physique but traits reflecting nature, attitude, moral character and social status also strongly associated.
☐ Gender and BMI of the respondent did not influence choices with a few exceptions.
☐ Most choices without obvious reasons.
☐ Clusters of traits defining 'personalities' clearly associated with specific body forms (fig 2)
☐ A centrally obese figure most commonly read as "greedy, lethargic, rich, political, selfish, money minded"

Conclusions:

In support of the Watve and Yajnik (2007) hypothesis that obesity, central obesity in particular works as a social signal and that central obesity is a "diplomat" trait.

Abdominal obesity, in particular, may have evolved for its signal value.

Most responses at subconscious level: inability to give reasons except for characters directly related to physique.

Cross cultural studies will reveal the relative contributions of cultural versus biological factors determining the choices.

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