

1 **Postprint**

2 St-Amour, S., Bérubé, F.-A., Cailhol, L., & Le Corff, C. (2022). Are physical activity and
3 nutrition linked to personality disorders? Health habits and personality disorders: A
4 scoping review. Personality and Mental Health, 1– 10. <https://doi.org/10.1002/pmh.1568>

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6 St-Amour, S., Bérubé, F.A., Cailhol, L., & Le Corff, C. (2022). **Are physical activity
7 and nutrition linked to personality disorders? Health habits and personality
8 disorders: A scoping review.** PsyArXiv. <https://doi.org/10.31234/osf.io/xck2w>

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10 **Health habits and personality disorders: A scoping review**

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17 DOI: 10.31234/osf.io/xck2w

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ABSTRACT

Individuals with personality disorders have a decreased life expectancy compared to the general population in part due to physical illnesses. Many hypotheses have been suggested to explain those physical illnesses such as hormone imbalance, medication, lack of physical activity, and unhealthy diet. However, little is known about the relation between lifestyle, and personality disorders. The purpose of this scoping review is to regroup the available information on this topic. We searched the literature up to February 2021 using four databases and found 21 articles analyzing the relation between lifestyle and personality disorders in observational studies including 153,081 participants from diverse populations going from general population to adults in psychiatric care. Most studies used measures of lifestyle as control variables or did not use lifestyle variables at all. Moreover, the instruments used to measure lifestyle variables lacked precision at best. Two studies demonstrated a relation between early malnutrition and further development of personality disorders, but those results may be influenced by confounding variables and cannot indicate a clear link between nutrition and personality disorder. The lack of solid evidence we observed is surprising considering the multiple benefits individuals with personality disorders could get from a healthy lifestyle. More studies are needed to thoroughly analyze the impact of lifestyle on personality disorders and vice versa.

Keywords: Personality disorders; Physical activity; Nutrition; Cardiovascular health; Metabolic health.

INTRODUCTION

Personality disorders (PD) are characterized by entrenched and pervasive affective, cognitive and relational patterns that have significant functional impact or cause clinically significant distress (American Psychiatric Association, 2013). Although some disorders, especially borderline PD, have been shown to present encouraging levels of symptomatic remission, long-term functional impairment is often observed (Temes and Zanarini, 2018). PDs lead to decreased life-expectancy, to an extent comparable with other chronic mental health disorders such as schizophrenia (Fok et al., 2012). Although suicide and trauma accounts for a proportion of premature mortality, current data show that people with PD also present with more chronic life-threatening conditions than the general population (Cailhol et al., 2017). To date, PDs have been associated with more cerebral-vascular events, coronary heart diseases, hypertension, diabetes, hepatic diseases, gastrointestinal diseases, and sexually transmitted diseases (Castle, 2019; Quirk et al., 2016).

Several hypotheses try to explain the link between chronic diseases and PDs such as dysregulation of the hypothalamic-pituitary-adrenal axis, (Chen et al., 2017). , metabolic effects of second-generation antipsychotics use (Kahl et al., 2013), impact of stigma and social isolation on access to appropriate physical care (Sanatinia et al., 2015). In addition to this non-exhaustive list, unhealthy lifestyle such as lack of exercise or overeating may be related to chronic diseases found in PDs (Douzenis et al., 2012). If there is indeed a relationship between PD and such poor lifestyle choices, it is conceivable that improvement on this level could alleviate part of the premature morbidity.

Additionally, interventions promoting healthier lifestyle have been studied in many mental health disorders with good results, even on shorter term outcomes. In recent

67 guidelines for management of mood and anxiety disorders, physical exercise is recognised
68 as a monotherapy for treating mild to moderate depression (Ravindran et al., 2016).
69 Physical exercise is also known to increase positive affects and help regulate negative
70 emotions in adults with and without mental disorders (Ekkekakis et al., 2011; Mata et al.,
71 2013). Dialectical behavioral therapy (DBT) and Systems Training for Emotional
72 Predictability and Problem Solving (STEPPS), both evidence-based treatments for
73 borderline PD (Blum et al., 2008; Linehan, 2014), suggest using physical exercise to
74 tolerate acute distress and a regular eating schedule to positively modulate emotions. To
75 our knowledge, the rationale for those interventions in people with PD is based either on
76 results derived from the study of other mental disorders, on clinical experience or on
77 intuition. It is also unclear if changes toward a healthier lifestyle translate into greater rates
78 of long-term symptomatic remission in this population.

79 Recent studies however provided indirect evidence of the benefits of a healthier
80 lifestyle in the treatment of or in alleviating symptoms of PDs, particularly borderline PD.
81 According to the biosocial pathogenesis model of borderline PD, emotion dysregulation is
82 the core of the disorder (Crowell et al., 2009). In a recent study, regular physical exercise
83 was linked to a better emotion regulation in undergraduate students (Bernstein et al., 2019).
84 Therefore, physical exercise might also help improve emotion regulation in individuals
85 with borderline PD. Moreover, a recent review described the acute and long-term effect of
86 physical exercise in individuals with attention deficit disorder with hyperactivity (Mehren
87 et al., 2020). Authors then described similarities in symptoms between attention deficit
88 disorder and borderline PD like emotion dysregulation, impulsivity, identity disturbance,
89 dissociation, self-injury, and suicidal behaviors and hypothesised the effect of physical

exercise on these symptoms in borderline PD. Finally, evidence indicate that omega-3 supplementation might help reduce borderline PD symptoms such as impulsivity, outburst of anger, self-harm and improve psychosocial functioning in adults with borderline PD (Amminger et al., 2013; Bozzatello et al., 2018). Even if these results are limited to supplementation, they indicate that some diet might reduce PD symptoms.

To this day, no systematic review or meta-analysis have been done analyzing the link between physical exercise and nutrition, and PDs. The purpose of this article is to review the available scientific literature on the relationship between PD diagnosis and physical exercise, and nutrition (designated as “lifestyle” in this article) to better understand to which extent PDs are cooccurring with poor lifestyle choices and what is the impact of PDs on lifestyle and vice versa.

METHOD

This scoping review was made following PRISMA extension for Scoping Review (Tricco et al., 2018). This review’s protocol was not registered. However, it is available upon request with the corresponding author. In February 2021, a librarian from the University Institute of Mental Health in Montreal searched the literature using Pubmed, PsychINFO, EMBASE and CINAHL databases for articles and eliminated duplicates. The descriptors and keyword algorithm used are detailed in supplementary files. No time span was specified for publication date. All types of study (experimental and observational) were included. Therefore, intervention studies aiming to increase physical exercise level or test physical exercise effect or to improve nutrition quality in individuals with PD and observational studies describing physical exercise and nutritional pattern (and by proxy

prevalence of obesity) of individuals with PD were included. Articles in English and French were included.

To be included in this review, studies must present data of lifestyle or associated conditions (e.g. obesity) among individuals with a PD diagnosis, data of PDs among individuals with (un)healthy lifestyle or associated condition, impact of lifestyle on PDs or impact of PD on the lifestyle. Studies reporting only traits or symptoms of PDs rather than diagnoses were excluded. A first selection based on the title and the abstract was conducted by SS and FAB. In case of disagreement, the two authors concerted until a consensus was reached.

Data related to PD evaluation and prevalence, and physical exercise level, nutritional quality or quantity, and obesity prevalence were extracted from the articles and reported in this review. We chose to report each study individually because of the wide variety of precision in lifestyle measures and because more than one article has been written on the same study with different focusses and results. No quality of study assessment was done since lifestyle variables were mostly used as secondary or control variable and were not the main focus of the study.

RESULTS

Articles selection

After elimination of duplicates, we found 142 articles through our main search strategy and one by unsystematized screening of the literature beyond February 2021. After reading abstracts and elimination of articles not related to our research question, 39 articles were selected but the full text of one of these was not available (Ekselius et al., 1996). A final selection was made by the two same authors after reading the 38 available full articles

for exclusion criteria. Some of these articles being reviews (Rucklidge and Mulder, 2016; Sansone and Sansone, 2013), we retrieved the original articles (10) cited in the reviews to report here. After meeting of the authors for agreement, 20 articles reporting observational studies and one reporting an interventional study were included for a total of 153,081 participants.

Personality disorders in individuals with poor lifestyle or related conditions

Seven studies examined the prevalence of PDs in populations of individuals with poor lifestyle related conditions (Berman et al., 1992; Black et al., 1992, 1989; Sansone et al., 2008, 1996, 1995; Van Hanswijck De Jonge et al., 2003). The method (Table1), the borderline PD prevalence (Table 2) and the PDs prevalence (Table 3) are summarized in the designated tables. Additionally to these seven studies, Mather *et al.* (2008) analysed the odd ratios of PDs according to weight categories in a nationally representative sample.

Mather *et al.* (2008), in their study, compared the prevalence of seven PDs in five body weight categories using the data from the 2001-2002 National Epidemiological Survey on Alcohol and Related Conditions (NESARC) including 43,093 participants using normal weight individuals as reference group. Underweight individuals were more likely to have schizoid PD ($OR = 1.89$, $95\% CI = 1.13-3.19$), obese individuals were more likely to have any cluster A PD ($OR = 1.16$, $95\% CI = 1.00-1.35$), and extremely obese individuals were more likely to have antisocial PD ($OR = 1.73$, $95\% CI = 1.17-2.55$) or avoidant PD ($OR = 1.66$, $95\% CI = 1.02-2.68$). Moreover, they found different relations between PD and weight category according to the sex of the participants.

Poor lifestyle or related condition in individuals with personality disorders

Five studies examined the lifestyle of individuals with PDs (Fok et al., 2014; Greggersen et al., 2011; Mohammadi et al., 2021; Olsson and Dahl, 2012; Wallen, 1948).

In a recent community-based study, Mohammadi *et al* (2021) compared (un)healthy lifestyle in a sample of 1,538 Iranian adult women with and without PD. They evaluated the lifestyle with the Lifestyle questionnaire. Results indicate that participants with schizotypal PD had lower scores on the exercise and wellness subscale of the lifestyle questionnaire ($\beta = -.162$; $p < .001$). Similarly, individuals with schizotypal ($\beta = -.155$; $p < .001$) and borderline ($\beta = -.109$; $p = .001$) PD had lower scores on the weight management and nutrition subscale of the lifestyle questionnaire.

Fok *et al.* (2014) used the data of a community survey from the South East London Community Health study to investigate the association between PD and self-rated health in 1,698 participants in the general population. Little to no difference in distribution of BMI between participants positively and negatively screened for PD was found. More participants screening positively for PD reported not having exercised in the last month (58.0%, 95% CI = 51.3-64.4) than those screened negatively (44.3%, 95% CI = 41.3-47.3).

In their study, Olsson and Dahl (2012) used the 2000-2001 Health Survey of the Oslo City data including 1,680 participants to assess the relationship between avoidant personality problem (a composite condition of avoidant PD and generalized social phobia) and individuals' somatic and mental health, lifestyle and social network. Participants with avoidant personality problem were more likely to be physically inactive ($OR = 2.29$, 95% CI = 1.64-3.19) and obese ($OR = 1.63$, 95% CI = 1.15-2.30) than those without.

Greggersen *et al.* (2011) compared the thickness of the intima-media of the carotid in 47 women with and 28 women without borderline PD. Among the variables measured

by the researchers, physical activity was evaluated by a 6-point Likert scale. Women with borderline PD were less physically active according to this scale (3.4/6 vs 4.3/6, $p = .02$) and had a greater waist circumference (85.6cm vs 76.0cm $p = .004$) than age-matched healthy women.

In his study, Wallen (1948) interrogated 789 new Marine recruits and 227 recruits discharged for psychiatric disability with a list of 20 common food and asked to check the items they disliked to the point of not eating. He found that recruits discharged for inadequate personality or schizoid personality had a higher mean of food items they disliked and were more likely to have more than 2 food items disliked.

Effect of lifestyle on personality disorders

Two studies evaluated the effect of lifestyle on PDs are detailed in four articles (Hoek et al., 1996; Neugebauer et al., 1999; Raine et al., 2003; Venables and Raine, 2012).

The Mauritius Child Health Project was used in two articles (Raine et al., 2003; Venables and Raine, 2012) to study the relation between early malnutrition and the further development of PD in 1,795 children. They measured the relation between poor nutrition in 3 years old children born in 1959 and 1960 in Mauritius and the development of schizotypal personality at age 23, mediated by the IQ at age 11. Venables and Raine (2012) found that greater stunting (boys: $\beta = -3.8, p < .001$; girls: $\beta = -2.3, p < .001$) and anemia (boys: $\beta = -0.9, p = .05$; girls: $\beta = -1.6, p < .001$) in children predicted a lower performance IQ at age 11 which in turn predicted greater interpersonal (boys: $\beta = -0.05, p = .04$; girls: $\beta = -0.05, p = .02$) and disorganized (boys: $\beta = -0.03, p = .03$; girls: $\beta = -0.03, p = .03$) types of schizotypal personality at age 23 in men and women. Raine et al. (2003) tested an enrichment program starting at age 3 and lasting for 2 years in the same sample. It consisted

in enhanced nutrition, education and physical activity. They found lower prevalence of schizotypal personality ($t = 2.07$, $df = 135$, $p < .05$, $d = 0.42$) at age 23 in individuals that were attributed to the enrichment group than in individuals who were not.

During the winter of 1944-1945, a Nazi blockade caused a famine in the population of western Holland. In their study, Hoek et al. (1996) used the Dutch military induction data. They compared the prevalence of schizoid PD in men whose mother suffered from the famine during their pregnancy, to men whose mother was not exposed to famine during pregnancy in a sample of 100,543 men. They found that men who survived until 18 years old were at greater risk of being diagnosed with schizoid PD ($OR = 2.01$, $95\% CI = 1.03-3.94$) if their mother had suffered from famine. Another study, from Neugebauer et al. (1999), used the same population to assess the prevalence of antisocial PD in men whose mother suffered from famine during pregnancy. They observed that subjects exposed to severe prenatal nutritional deficiency were more at risk to be diagnosed with antisocial PD at age 18 ($OR = 2.0$, $95\% CI = 1.2-3.3$) with an even greater risk if they were exposed to nutritional deficiency during the first ($OR = 2.9$, $95\% CI = 1.2-6.7$) and the two firsts trimesters ($OR = 3.0$, $95\% CI = 1.3-7.0$).

Effect of personality disorders on lifestyle

Two studies detailed in four articles assessed the impact of PDs on lifestyle (Chen et al., 2015; Frankenburg and Zanarini, 2004; Johnson et al., 2006; Keuroghlian et al., 2013).

The Children in Community Study was used to evaluate the relation between presence of PD at adolescence and early adulthood and later obesity among 658 children. Chen et al. (2015) found that adolescents presenting paranoid PD ($OR = 3.45$, $95\% CI =$

1.46-8.17), histrionic PD ($OR = 4.49$, 95% $CI = 1.91-10.53$), obsessive-compulsive PD ($OR = 6.80$, 95% $CI = 2.50-18.55$), or any PD ($OR = 1.84$, 95% $CI = 1.05-3.22$) were more at risk to be obese at the age of 33. Johnson *et al.* (2006) used the same study to analysed the relation between PD in early adulthood and eating problems at age 33. Among the results of this study, the authors observed that participants with any PD at age 22 were more at risk of being obese ($OR = 1.95$, 95% $CI = 1.17-3.24$) at 33 years of age.

The McLean Study of Adult Development is a longitudinal study analysing the course of borderline PD regarding physical health, health-related lifestyle choice and use of medical services in individuals remitted from and not remitted in 264 patients of the McLean hospital. At follow-up evaluation, participants not remitted from borderline PD were more at risk of lacking regular exercise ($OR = 1.35$, 95% $CI = 1.09-1.67$) than those remitted. Keuroghlian *et al.* (2013) updates these results at 16 years follow-up. They again reported a greater risk of lacking regular exercise ($OR = 1.59$, 95% $CI = 1.33-1.89$) in participants not remitted from borderline PD, compared to those remitted.

DISCUSSION

The aim of this review was to identify studies that linked lifestyle and PDs in some way. Our approach was divided in four possible relations between (un)healthy lifestyle and PDs. Our literature review highlights an increased prevalence of PD among over- or underweight adults compared to normal weight adults. Also, we found that people affected by PDs have more unhealthy habits, especially those with schizotypal PD and borderline PD. Moreover, literature supports a link between perinatal malnourishment (pregnant mother and infant) and a higher prevalence of schizoid, schizotypal, and antisocial PD in adulthood; this effect could be partially reversed by a program including sufficient

249 nutrition, education and physical activity. Lastly, literature supports a link between PD
250 remission and lifestyle. Therefore, these studies converge with some treatments in which
251 interventions at this level is part of the disorders management (Blum et al., 2008; Linehan,
252 2014).

253 However, after reviewing these studies, the data we have at this moment linking
254 (un)healthy lifestyle and PD are either indirect or unreliable, apart from extreme
255 malnourishment during pregnancy and infancy for schizotypal, schizoid and antisocial PD
256 and a single study in Iranian women. Yet, we need to investigate these relations to better
257 understand PDs and to provide scientific evidence for therapeutic tools already used by
258 teams treating individuals with PD. Nevertheless, some evidences show partial or indirect
259 relations between the practice of physical exercise and behaviours related to PD such as
260 antisocial behaviours (Samek et al., 2015). A recent meta-analysis also indicate an effect
261 of omega-3 fatty acid supplementation in reducing PD symptoms, particularly impulsivity
262 and affective dysregulation (Karaszewska et al., 2021). These results add weight to the
263 hypothesis of a relation between the current lifestyle of individuals and the course and
264 symptoms of PDs and reinforce the need to study this subject.

265 Furthermore, the relation between physical activity and nutrition and many other
266 mental disorders have been extensively studied. For example, a meta-meta-analysis
267 including 6 meta-analysis and a total of 270 different studies has indicated that physical
268 activity reduces depression and anxiety in a small to medium effect size (Rebar et al.,
269 2015). Another meta-analysis including 22 different studies indicated that physical activity
270 was effective in increasing abstinence and reducing withdrawal symptoms, anxiety, and
271 depression in individuals with substance use disorder (Wang et al., 2014). A recent review

also detailed the known relations between diet and depression with extensive details regarding its biological mechanisms (Marx et al., 2021). Therefore, an extensive literature already documents the effect of lifestyle intervention in several mental disorders, which are frequently comorbid with PDs (Gunderson et al., 2018), but most of these study either exclude individuals with PD or don't include information regarding these diagnoses (Stubbs and Rosenbaum, 2018).

This review however suffers from some limitations. First, there was no search in gray literature for unpublished studies and theses. Moreover, we could not capture initiatives to improve lifestyle of individuals with PD by physical exercise or nutrition in many clinics and hospitals, since the results of these are not available or no analyses were made. Finally, to increase our search results, we included obesity as a proxy for lifestyle which is at best a loose proxy since it can be attributed to a lot more factors than lifestyle only. However, this last limitation only confirms the interpretation we made from this review, being that there is a crucial need for more well-designed studies analyzing the relation between lifestyle and PDs.

CONCLUSION

In conclusion, there are numerous reasons to study the relation between lifestyle and PDs. It could help to understand and identify risk factors for PDs and could also provide alternative therapeutic tool for care providers. Moreover, it could improve our comprehension of the relation between PDs and their comorbid disorders. Finally, it is also possible that lifestyle interventions may help alleviate some symptoms of BPD, improve the quality of life of these individuals and increase their life-expectancy. However, few to no study to this day have investigated this relation in a reliable way.

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Table 1 Description of studies analyzing the presence of personality disorders in obese adults

	Population studied (n)	Comparison group (n)	PD diagnostic tool used
Berman et al., 1992	Individuals seeking dietary	No	PDQ
N = 56	treatment for obesity (56)		SCID-II Nonpatient Version
Black et al., 1992	Morbidly obese individuals	Age- and sex-matched	Structured Interview for DSM-
N = 122	consulting for a vertical	participants and their relatives	III Personality Disorders
	banded gastroplasty (46)	to another study (76)	
Black et al., 1989	Morbidly obese individuals	Age- and sex-matched	PDQ
N = 114	consulting for a bariatric	participants from a community	
	surgery (38)	survey (76)	
Sansone et al., 2008	Obese patients consulting for a	No	SHI
N = 121	gastric surgery (121)		PDQ-4
			MSI-BPD

Sansone et al., 1996	Women at least 50lbs	No	PDQ-R
N = 77	overweight (77)		DIB
Sansone et al., 1995	Women at least 50lbs	Women no more than 50lbs	PDQ
N = 194	overweight in primary-care (61)	overweight in primary-care (133)	DIB
Van Hanswijck De Jonge et al., 2003	Non-binge eating obese patients referred for gastric surgery (37)	No	IPDE
N = 37			

Note. PD: Personality disorder; IPDE: International Personality Disorder Examination; PDQ: Personality Diagnostic

Questionnaire; SCID-II: Structured Clinical Interview for Diagnosis, Axis II; DIB: Diagnostic Interview for Borderline Patients

Table 2 Prevalence of borderline PD in obese adults samples using different assessment tools

Assessment tool	Black et al., 1989	Black et al., 1992	Berman et al., 1992	Sansone et al., 1995*	Sansone et al., 1996	Sansone et al., 2008	Van Hanswijck De Jonge et al., 2003	Combined prevalence
Structured Clinical Interview for DSM-III – Personality Disorders	-	30.4% (<i>N</i> = 46)	6.3% (<i>N</i> = 56)	-	-	-	-	17.6% (<i>N</i> = 102)
Personality Diagnostic Questionnaire	18.4% (<i>N</i> = 38)	-	-	24.6% (<i>N</i> = 61; obese) 12.4% (<i>N</i> = 89; control)	42.1% (<i>N</i> = 76)	14.0% (<i>N</i> = 121)	-	24.0% (<i>N</i> = 296)

Diagnostic Interview	-	-	-	6.8%	14.3%	-	-	11.0%
for Borderlines				(N = 59)	(N = 77)			(N = 136)
Self-Harm Inventory	-	-	-	-	-	14.0%	-	14.0%
						(N = 121)		(N = 121)
McLean Screening	-	-	-	-	-	7.4%	-	7.4%
Instrument for						(N = 121)		(N = 121)
Borderline Personality								
Disorder								
International	-	-	-	-	-	-	0.0%	0.0%
Personality Disorder							(N = 37)	(N = 37)
Examination								

*Note. * The prevalence of the control group from Sansone et al. (1995) are presented here and the difference is statistically significant ($p < .05$). The results for the control group in Black et al. (1989, 1992) are presented in Table 3.*

Table 3 Prevalence of DSM-III personality disorders (PD) among obese and morbidly obese patients

Authors	Any PD	PrPD	SzPD	StPD	HPD	NPD	AnPD	BPD	AvPD	DPD	OCPD	PAPD	SDPD
Black et al., 1989*	39.5%	2.6%	0.0%	34.2%	15.8%	0.0%	7.9%	18.4%	0.0%	10.5%	0%	0%	-
<i>N</i> = 38 (Obese)	13.2%	0.0%	0.0%	9.2%	5.3%	0.0%	0.0%	1.3%	0.0%	3.9%	3.9%	0.0%	-
<i>N</i> = 76 (Control)													
Black et al., 1992													
<i>N</i> = 46 (Obese)	71.7% ³	6.5%	0.0%	10.9%	32.6% ³	0.0%	8.7%	30.4% ³	15.2% ¹	13.0%	13.0%	30.4% ²	-
<i>N</i> = 76 (Control)	36.8%	1.3%	0.0%	2.6%	3.9%	0.0%	0.0%	10.6%	3.9%	3.9%	10.5%	11.8%	-
Berman et al., 1992	55.4%	10.9%	0.0%	0.0%	20.3%	4.7%	0%	6.3%	14.1%	7.8%	10.9%	9.4%	15.6%
<i>N</i> = 56													

Van Hanswijck

De Jonge et al.,

2003	-	0.0%	0.0%	0.0%	0,0%	0.0%	0.0%	0.0%	2.7%	0.0%	0.0%	-	-
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N = 37

Note. PrPD: Paranoid PD; SzPD: Schizoid PD; StPD: Schizotypal PD; HPD: Histrionic PD; NPD: Narcissitic PD; AnPD:

Antisocial PD; BPD: Borderline PD; AvPD: Avoidant PD; DPD: Dependant PD; OCPD: Obsessive-Compulsive/Compulsive PD;

*PAPD: Passive-Aggressive PD; SDPD: Self-Defeating PD. * Except for the prevalence of Any PD no statistical analysis have been*

realised to compare the PD prevalence of obese and control participants in Black et al. (1989). ¹: $p < .05$. ²: $p < .01$. ³: $p < .001$.