

# **Supplementary Material**

Article Title: Marine Omega-3 Fatty Acid Supplementation for Borderline Personality Disorder: A Meta-

Analysis

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**DOI Number:** 10.4088/JCP.20r13613

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(N=122)

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**Supplementary Figure 1.** Forest plot showing meta-analysis effects of omega-3 fatty acid supplementation on affective dysregulation symptoms<sup>a</sup> vs. control for borderline personality disorder (N=137)<sup>44-48</sup>.

<u>Model</u>	Study name	<u>Outcome</u>	<u>Comparison</u>	Time point	Statistics for each study								Std diff in means and 95% Cl		
					Std diff in means	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value				
	Hallahan 2007	Combined	EPA+DHAvsPlacebo	12,000	0,539	0,293	0,086	-0,035	1,113	1,842	0,066			-	-
	Zanarini 2003	Depression: MADRS	EPA+DHAvsPlacebo	8,000	0,294	0,410	0,168	-0,510	1,098	0,717	0,473			<del>-                                      </del>	-
	Amminger 2013	Depression: MADRS	EPA+DHAvsPlacebo	12,000	0,856	0,541	0,292	-0,204	1,915	1,583	0,113			+	
	Bellino 2014	Combined	Combined	Combined	1,391	0,398	0,158	0,611	2,171	3,495	0,000			-	-
Fixed					0,722	0,191	0,037	0,347	1,097	3,777	0,000				·
Random					0,741	0,238	0,057	0,274	1,207	3,113	0,002	I	1		<b>-</b>
												-4,00 -3	2,00	0,00	2,00

<sup>a</sup>Outcome measures of the included studies were assigned to one of these domains as applicable. Hamilton-anxiety, BPDSI Affective instability, BPDSI-Anger, Beck-Depression, Hamilton-Depression, MADRS and OAS-Irritability were assigned to affective dysregulation domain.

**Supplementary Figure 2.** Forest plot showing meta-analysis effects of omega-3 fatty acid supplementation on impulsive behavioral dyscontrol symptoms<sup>a</sup> vs. control for borderline personality disorder (N=122)<sup>44-47</sup>.

<u>Studyname</u>	<u>Outcome</u>	<u>Comparison</u>	<u>Time point</u>	-	St	a <u>tistics for</u>	each stu	ıdy				Std <u>diff in i</u>	means and 95%	<u>CI</u>	
				Std diff in means	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value					
Hallahan 2007	Contined	EPA+DHAvsPlacebo	12,000	0,448	0,291	0,085	-0,123	1,018	1,538	0,124			+=-		
Zanarini 2003	OAS	EPA+DHAvsPlacebo	8,000	0,068	0,408	0,167	-0,732	0,868	0,167	0,868			-		
Bellino 2014	Contined	Contained	Contined	0,777	0,373	0,139	0,046	1,508	2,082	0,037				<del>-</del>	
				0,451	0,200	0,040	0,059	0,843	2,255	0,024					l
											-4,00	-2,00	0,00	2,00	4,00
												Favours Control	Fa	vours Omega-3	

<sup>a</sup>Outcome measures of the included studies were assigned to one of these domains as applicable. BPDSI Parasuicidal behaviors subscale, BIS-11, BPDSI Impulsivity subscale, OAS-total, OAS-Aggression, OAS-Suicidality and Self-Harm Inventory were assigned to impulsive behavior domain.

**Supplementary Figure 3.** Forest plot showing meta-analysis effects of omega-3 fatty acid supplementation on cognitive-perceptual symptoms<sup>a</sup> vs. control for borderline personality disorder (N=58)<sup>45, 46, 48</sup>.

Model	Study name	<u>Outcome</u>	<u>Comparison</u>	Time point			Statistics fo	reach stu	ıdy					Std diff in means ar	nd 95% Cl		
					Std diff in means	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value						
	Amminger 2013	PANSS Positive	EPA+DHAvsPlacebo	12,000	0,773	0,536	0,288	-0,278	1,825	1,441	0, 150			+		- [	
	Bellino 2014	BPDSI Dissociation/paranoid ideation	EPA+DHAvsValproic acid	12,000	0,059	0,344	0,118	-0,615	0,732	0, 171	0,864			-			
Fixed					0,267	0,289	0,084	-0,301	0,834	0,922	0,357			<b>4</b>	<b>&gt;</b>		
Random					0,297	0,337	0,113	-0,363	0,957	0,882	0,378						l
												-4,00	-2,00	0,00		2,00	4,00
													Favours Con	trol	Favou	rs Omega-3	

<sup>a</sup>Outcome measures of the included studies were assigned to one of these domains as applicable. PANSS Positive and BPDSI Dissociation/Paranoid ideation subscale were assigned to cognitive-perceptual symptoms domain.

**Supplementary Figure 4.** Forest plot showing effects of omega-3 fatty acid supplementation on global functioning<sup>a</sup> vs. control for borderline personality disorder (N=58)<sup>45, 46, 48</sup>.

Model	Study name	<u>Outcome</u>	<u>Comparison</u>	Time point		Statistics for each study						Std diff	Std diff in means and 95% Cl				
					Std diff in means	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value						
	Amminger 2013	GAF	EPA+DHAvsPlacebo	12,000	1,357	0,574	0,329	0,232	2,482	2,365	0,018			I —			
	Bellino 2014	Combined	EPA+DHAvsValproic acid	12,000	0,223	0,345	0,119	-0,453	0,898	0,646	0,518			<b> ■</b>			
Fixed					0,524	0,295	0,087	-0,056	1,103	1,772	0,076				<b>-</b>		
Random					0,697	0,559	0,313	-0,399	1,794	1,246	0,213		I				
												-4,00	-2,00	0,00	2,00	4,00	
													Favours Control		Fav ours Omega-3		

<sup>a</sup>Outcome measures of the included studies were assigned to one of these domains as applicable. CGI-S, Global Assessment of Functioning and SOFAS were assigned to global functioning domain, i.e. well-being.

## **Supplementary Figure 5.** Risk of bias summary of included studies

	Random sequence generation (selection bias)	Allocation concealment (selection bias)	Blinding of participants and personnel (performance bias)	Blinding of outcome assessment (detection bias)	Incomplete outcome data (attrition bias)	Selective reporting (reporting bias)	Other bias
Amminger 2013	•	•	•	•	•	•	•
Bellino 2014	?	?	•	?	•	•	•
Bozzatello 2018	?	?	•	?	?	•	•
Hallahan 2007	•	•	•	•	•	?	•
Zanarini 2003	?	?	?	?	•	?	•

#### Appendix 1. Search (MEDLINE, Embase, PsycINFO)

- 1 Borderline Personality Disorder/
- 2 ((borderline or border-line) adj3 (state\* or personalit\*)).kf,tw.
- 3 ("Axis II" or "Cluster B" or flamboyant or "F60.3" or "F60.30" or "F60.31").kf,tw.
- 4 (idealization adj5 devaluation).kf,tw.
- 5 ((vulnerable or hyperbolic) adj3 temperament).kf,tw.
- 6 (((unstab\* or instab\* or poor or disturb\* or fail\* or weak or dysregulat\*) adj3 (self\* or impuls\* or interperson\* or identit\* or relationship\* or emotion\* or affect\*)) and (personality or character or PD)).kf,tw.
- 7 (impulsiv\* adj5 (behavio?r or character or personalit\*)).kf,tw.
- 8 (self adj3 (injur\* or damag\* or destruct\* or harm\* or hurt\* or mutilat\*)).kf,tw.
- 9 (suicidal adj3 behavio?r).kf,tw.
- 10 (feel\* adj3 (empt\* or bored\*)).kf,tw.
- 11 (anger adj5 control\*).kf,tw.
- 12 (risk-taking adj3 behavio?r).kf,tw.
- 13 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12
- 14 randomized controlled trial.pt.
- 15 controlled clinical trial.pt.
- 16 randomi#ed.ab.
- 17 placebo.ab.
- 18 randomly.ab.
- 19 trial.ab.
- 20 groups.ab.

- 21 drug therapy.fs.
- 22 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21
- 23 13 and 22
- 24 exp animals/
- 25 humans/
- 26 24 not 25
- 27 23 not 26
- 28 fish oils/
- 29 fatty acids, omega 3/30 omega-3.ab,tw.
- 31 polyunsaturated FA.ab,tw.
- 32 fish oil.tw,ab.
- 33 EPA.tw,ab.
- 34 DHA.tw,ab.
- 35 eicosapentaenoic acid.tw,ab.
- 36 docosahexaenoic acid.tw,ab.
- 37 alpha-linolenic acid.tw,ab.
- 38 cod liver oil.tw,ab.
- 39 n-3 fatty acids.tw,ab.
- 40 n3 polyunsaturated fatty acids.tw,ab.
- 41 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 42 27 and 41