Psychiatric Quarterly (2019) 90:777–792
https://doi.org/10.1007/s11126-019-09663-y

ORIGINAL PAPER

Oppositional Defiant Disorder Dimensions: Associations with Traits of the Multidimensional Personality Model among Adults

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Published online: 12 August 2019
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Abstract
The occurrence of Oppositional Defiant Disorder (ODD) behaviours among adults has been supported by a proportion of scholars. The current work examines potential ODD dimensions and their associations with the primary personality traits of Tellegen's [57] multi-dimensional conceptualization during adulthood. Two independent, general community, adult groups [Group 1: $N = 214$; mean age (SD) = 35.74 (16.60); Group 2: $N = 205$; mean age (SD) = 29.00 (12.42)] completed the Current Symptom Scale involving the eight ODD criteria. Group 2 additionally addressed the Multidimensional Personality Questionnaire –Brief Form (MPQ-BF). A series of Confirmatory Factor Analyses (CFA) were implemented. The three-dimensional ODD conceptualization of Burke and colleagues [14] referring to "Negative Affect", "Oppositional Behavior", and "Antagonistic Behavior" was confirmed. Considering personality traits, valuable associations were revealed between Oppositional Behavior and Aggression, Antagonistic Behavior and Social Potency as well as Harm Avoidance, and finally, Negative Affect and Stress Reaction, as well as Aggression. The dimensionality of ODD behaviours in adulthood and its correspondence with particular personality traits is approached in the context of psychological practice.

Keywords Oppositional defiant disorder · Adults · Dimensions · Multidimensional personality model

Oppositional Defiant Disorder (ODD), as a child-psychopathology manifestation, involves a persistently aggressive disposition combined with irritability, argumentativeness, defiance and spiteful/vindictive attitudes, which are present for more than a semester when interacting with individuals-other than siblings [5]. Although generally conceived as a childhood issue, there is growing evidence that ODD is a valid disorder in adults [29, 53, 62]. For diagnosis of ODD,

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DSM-5 entails eight criteria, which are identical with those of DSM-IV [3] and DSM-IV TR [4]. However, unlike past DSM-versions, where the eight criteria were placed in a single group (implying that ODD is unidimensional), in the current edition, these are divided into three clusters (implying that ODD is multidimensional). Until now, various different multidimensional models have been envisaged to reflect the ODD symptoms in children. Additionally, for the different ODD dimensions, studies involving children have also established links with various personality traits [11, 26, 30, 64]. However, at present, there is limited data on the ODD dimensionality, and the associations of the ODD dimensions with personality traits among adults. Attending this gap, the current study was aimed to examine the most applicable ODD dimensions, and their unique relationships with the primary personality traits of Tellegen's multidimensional personality model [57, 58].

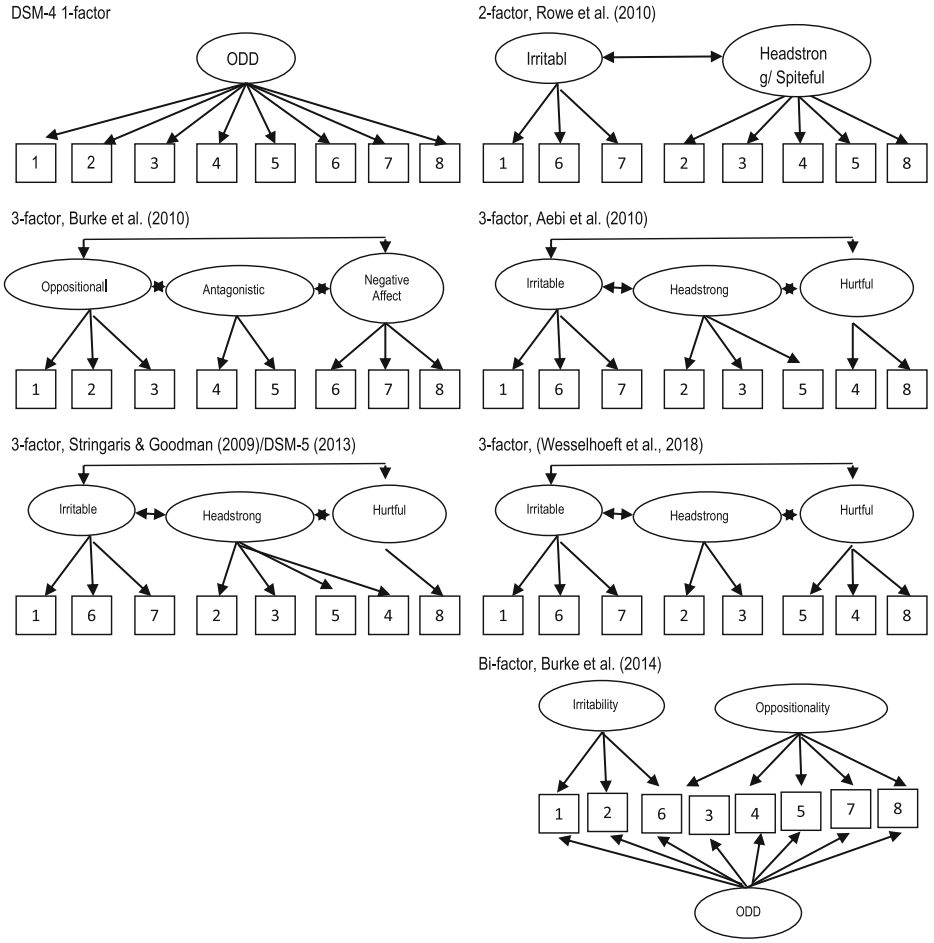
ODD Structure

The three groups for the ODD symptoms in DSM-5 [5] are aggressiveness/irritability, vindictive behaviour, and argumentativeness/defiance. The aggressiveness/irritability cluster involves behaviours such as temper/tantrums, aggression, and touchiness; the vindictive behaviour cluster refers to spiteful/vindictive attitudes, and the argumentativeness/defiance cluster refers to arguments with adults, purposefully annoying others, disobeying, and deflecting one's responsibility for his/her mistakes on other individuals.

This three-dimensional DSM-5 ODD construct is comparable to an earlier structure described earlier by Stringaris and Goodman [56]. However, in the ODD conceptualization of Stringaris & Goodman [56] the three ODD dimensions are defined as "irritable", "hurtful", and '"headstrong". Different three-dimensional (e.g., [2, 13, 14, 32, 54]), two-dimensional [54], and also bi-factor ODD structures [12] have been proposed for children and adolescents. The factor names and composition of symptoms in these different models are presented in Fig. 1 [for more details, the reader is referred to Gomez and Stavropoulos [23]]. In two studies that compared these models, most support was found for Burke and colleagues [14] three-dimensional ODD structure [22, 23]. As shown in Fig. 1, the dimensions in this structure are Negative Affect, Oppositional and Antagonistic dimension. Negative Affect entails aggressiveness, touchy and spiteful attitudes; The Oppositional dimension refers to temperamental, argumentative, and defying behaviour; and the Antagonistic dimension entails annoyance and blame towards others (see Fig. 1).

ODD and Personality

Scholars support that demystifying the ties of psychopathological behavior and personality can significantly upgrade the understanding of disordered behavior [44]. Numerous researchers have established ties between personality traits and various clinical disorders [33, 40, 41]. Given this, it is possible that there will be links between ODD and personality traits. Indeed, several studies have shown relationships between different personality and ODD dimensions [11, 26, 30, 64]. Specifically, considering the Five-Factor Model for personality (with higher order personality factors referring to Extraversion, Agreeableness, Conscientiousness, Neuroticism, and Openness to Experience; [42]), ODD behaviors were positively correlated with Neuroticism, and negatively with Agreeableness and



Note. 1 = often loses temper; 2 = often argues with authority figures or with adults; 3 = often actively defies or refuses to comply with requests from authority figures or with rules; 4 = often deliberately annoys others; 5 = often blames others for his or her mistakes or misbehavior; 6 = is often touchy or easily annoyed; 7 = is often angry and resentful; 8 = has been spiteful or vindictive at least twice within the past 6 months.

Fig. 1 Oppositional Defiant Disorder models compared in the study. *Note*. 1 = often loses temper; 2 = often argues with authority figures or with adults; 3 = often actively defies or refuses to comply with requests from authority figures or with rules; 4 = often deliberately annoys others; 5 = often blames others for his or her mistakes or misbehavior; 6 = is often touchy or easily annoyed; 7 = is often angry and resentful; 8 = has been spiteful or vindictive at least twice within the past 6 months

Conscientiousness [26]. Considering ODD sub-dimensions, Zastrow and colleagues [64] reported that all three ODD domains (as proposed by [56]) were associated positively with Neuroticism, the Angry/Irritable ODD domain was associated negatively with Agreeableness, and the Vindictiveness ODD domain was associated positively with Extraversion. Taken together there is evidence indicating the practical relevance of personality traits with ODD behaviours.

A broadly accepted model of personality that has been employed to better conceive and describe psychopathological behaviours is Tellegen's [57] multidimensional personality model

[34, 35, 50]. This model has three primary dimensions, namely Positive Emotionality, Negative Emotionality, and Constraint, and 11 secondary traits or facets. Positive Emotionality taps positive emotional and appetitive inclinations. The lower order primary traits for Positive Emotionality are Wellbeing (disposition for positive emotionality, and optimism), Achievement (working and enjoying hard and demanding work, persistence, and perfectionism), Social Potency (being forceful and persuasive, like influencing others, and wanting to be noticed by others), Social Closeness (sociable, liking being with others, warm and affectionate, and seeking comfort from other). Negative Emotionality taps emotional negativity, stress reactivity, emotional liability, and defence withdrawal. The primary traits for Negative Emotionality are Stress Reaction (disposition for negative emotionality like being nervous, worried, irritable, easily upset, moody, miserable, guilty and worthlessness), Aggression (being physically aggressive, vindictive, enjoying upsetting others, and victimizing others for own advantage), and Alienation (feeling mistreated, believing that others wish them harm, feeling like a victim of bad luck). Constraint taps disposition for behavioural restraint or low impulsivity; and its primary traits entail Control (reflective, rationale, sensible and careful attitudes), Harm Avoidance (preferring safe and familiar activities and avoiding danger), and Traditionalism (being conventional and valuing good reputation). Additionally, there is also a trait for Absorption that taps emotional propensity for new, imaginative and self-involving experiences and states. As will be noticed, together these primary traits cover a range of areas of dispositional traits, behaviour styles, interpersonal attitudes and temperament regulation [18, 57, 58]. The Multidimensional Personality Questionnaire (MPQ; [57, 58]) is usually employed to measure Tellegen's primary and secondary personality traits and facets. This is available both in a more concise (MPQ–BF; [51]), and a concurrently more concise and lay-worded edition [52]. All three versions of the MPQ have scales for measuring the three primary personality constructs/dimensions and the 11 secondary traits/facets.

Various past studies have examined how the personality traits that the MPQ measures are related to clinical disorders. For example, existing data show that antisocial personality disorder [17] and delinquent behavior [35] are positively tied with Negative Emotionality, and negatively with Constraint. Later, Krueger and colleagues [34] demonstrated that internalizing disorders (comprising mainly anxiety and mood disorders) correlated positively with Negative Emotionality, and negatively with Positive Emotionality, whereas externalizing disorders (comprising mainly alcohol abuse, drug dependence and antisocial personality disorders) correlated negatively with Constraint. Summarizing this area of research, Patrick and Kramer [50] have recently concluded that the ties of externalizing disorders with Negative Emotionality are higher regarding the facets of Aggression and Alienation than that of Stress Reaction. There are additional data showing that the interpersonal–emotional component of psychopathy (e.g., strong emotion with little or no remorse and/or empathy), is associated positively with Social Potency, and negatively with Stress Reaction; while the antisocial component of psychopathy (e.g., antisocial aggressive and impulsive tendencies and irresponsibility) is associated positively with Negative Emotionality traits, and negatively with Constraint traits. Given that psychopathy is closely linked with ODD ([8, 15, 19, 39, 61]), it can be speculated that ODD could also be associated positively with Social Potency and Negative Emotionality traits, and negatively with Stress Reaction, and Constraint traits. Indeed, Javdani, Finy, and Verona [28] found that ODD was associated positively with Aggression, and Alienation; and negatively with Harm Avoidance. Based on these findings, it can be argued that the MPQ personality traits could have relevance for understanding ODD. An added benefit of the

MPQ is that there is evidence that this measure is slightly better than other widely used personality measures for explaining/ interpreting psychopathology in general [24].

ODD in Adulthood

Although generally considered a childhood disorder, recent studies appear to demonstrate that ODD is most likely to be a valid disorder in adults [29, 53, 62] with significant evidence for adult ODD presentations [7, 38, 48]. Indeed the study by Barry and colleagues [7] reported an ODD prevalence of 28.7% in an adult clinic sample, comparable to clinic samples of children [9]. Weiss and colleagues [62] revealed that around 40% of a sample of adults with ADHD simultaneously met criteria for ODD. There are also data showing that ODD symptoms in adults are associated with measures of ADHD, personality disorders, substance abuse [53], and maladaptive coping strategies [49]. In a recent study involving two large samples of college attending adults, Johnston, Derella, and Burke [29] found that around 3 to 4% met ODD diagnostic ciriteria, and indicated positive associations for ODD severity with social impairment, on-line antagonistic behaviour, and conflict with authority figures. Weiss and colleagues [62] reported that adult subjects with ODD were more functionally impaired, and less satisfied with life. Stemming from that, the authors concluded that there was validity for ODD diagnosis in adults. Similar conclusions have been made by others [20, 53]. Conclusively, these studies indicate that ODD can be present among adults, and when present it is associated with more impairments.

Despite the demonstrated evidence of validity of ODD in adults, it is arguable that there are significant discrepancies and omissions in the accessible ODD research on adults. First, based on the current review of the literature, no past empirical research has examined the optimum ODD model for adults. Second, there is no data on how the ODD sub-dimensions in adults are related to personality traits. Knowing these are important as they could likely enhance the understanding the progression of ODD across the lifespan, improving the ODD classification criteria (in particular for adults), and understanding the precipitating and perpetuating factors and comorbidity during adulthood.

The Present Study

Provided the available knowledge restrictions mentioned above, one aim here was to assess the dimensionality and structure of ODD symptoms in a large community group of adults. Based on existing data involving children, uni-dimensional, two-dimensional, three-dimensional, and bi-factor models were studied (shown in Fig. 1) including the recently proposed three-dimensional model by Wesselhoeft et al. ([63]; see Fig. 1).

Second, it was aimed to investigate how the dimensions composing the ODD structure with the best fit could tie with personality traits/facets of Tellegen's [57] multidimensional personality model [58], as measured by the MPQ-BF. It was expected (based on findings involving children) that the three-dimensional structure proposed by Burke and colleagues [14] could be the most applicable ODD model among adults. Additionally, it was predicted that if the optimum ODD model included a dimension comparable to the

irritable/negative affect factor, then this would be associated positively with Social Potency and negatively with Stress Reaction. Also, if the optimum ODD model included a headstrong /oppositional dimension, then this may be associated positively with Aggression and Alienation, and negatively with Harm Avoidance.

Method

Participants

A pair of independent normative groups of participants were analysed for the current study. Group 1 numbered 205 adults (130 females and 75 males), 18 to 66 years of age (Mean age = 29.00, *SD* = 12.42) while group 2 numbered 214 adults (135 females and 79 males), 18 to 86 years of age (Mean age = 35.74, *SD* = 16.60). Participants in both groups were informed about the study via both off-line (i.e. posters) and online (i.e. social networking media adds) pathways. While both groups were studied considering the fit of the various ODD models, Group 2 was also used to assess the ODD dimensions links of the most applicable ODD structure with the primary personality traits presented in the MPQ-BF.

Measures

Current Symptom Scale

ODD and ADHD behavior scores were secured with the application of the Current Symptom Scale (CSS; [6]), The CSS addresses/reflects the eight DSM-IV/DSM-IV TR ODD and the 18 DSM-IV/DSM-IV TR ADHD criteria. DSM-5 involves identical (minor phrasing delivery differences) ODD and ADHD criteria. Thus, this study is relevant to the currently used DSM-5. For each symptom in the CSS, respondents indicate how often they experienced the symptom during the last 6 months on a 4-point Likert scale (0 = "never or rarely" to 3 = "very often"). Thus, for each scale, higher scores indicated more of the symptoms. The internal reliabilities (Cronbach's alphas) for the ODD and the ADHD symptoms part of the CSS in the current study were .87and .88, respectively. .

Multidimensional Personality Questionnaire –Brief (MPQ-BF; [51]) The 11 primary factors of the MPQ model were measured using the MPQ-BF. The traits were described in detail in the introduction. Derived from the longer version (MOQ; [59]), the MPQ-BF has 155 items, with 12 items each for the 11 primary traits. It also includes additional items for validity scales, measuring random responding (Variable Response Inconsistency), "yea saying" or "nay-saying" (True Response Inconsistency), and social desirability (Unlikely Virtues). Only the personality trait items were used in the current study. Each item in the MPQ-BF was rated as either true (rated 1) or false (rated 0) in terms of whether the statement applied to the respondent. Thus, for each scale, higher scores indicate higher levels of traits. In past uses of the questionnaire, Patrick et al. [51] reported Cronbach's alpha values between .75 to .84 for the MPQ-BF primary trait scales. In the current research, these varied between .72 and .86.

Procedure

This research protocol was approved by the Human Ethics Committee of Federation University, Australia. Group-participants were enrolled via various sources from the broader community (besides online methods such as social networking sites advertisements, individuals were exposed to study information through posters placed in shopping centers, and various sporting, recreational, hobby, and social cubs and associations). After explained the study and the procedure, research assistants gave interested participants a sealed envelope containing the plain language statement related to the study, the battery of questionnaires and a prepaid reply envelope. As for questionnaires, participants in Sample 1 were given the CSS [6], and participants in Sample 2 were given the CSS and the MPQ-BF [51]. Participants could return their replies either by using the prepaid envelopes or directly to the research assistants. Approximately 400 questionnaires were employed to recruit Sample 1 (retention of approximately 51%), whereas approximately 350 questionnaires were distributed to recruit Sample 2 (approximate retention rate 61%).

Statistical Analysis

M*plus* Version 7 [46] addressed all the calculations required, as well as the sequence of the Confirmatory Factor Analyses (CFA) implemented. ODD items/criteria were linked with one latent factor/dimension in the uni-dimensional ODD structure, whereas considering two-dimensional and three-dimensional ODD structures assessed, the different ODD items/criteria loaded on their suggested (by each different ODD conceptualization) dimensions, and these were correlated. Given that the Stringaris and Goodman [56] ODD conceptualization involves only one item for the suggested hurtful factor, for model identification purpose, the error variance regarding this particular item was restraint to 0.438 for group 1, and 0.707 for group 2 (these are values for the error variances for this item in the respective uni-dimensional structure). The error variances were unrestrained in all other models, and the latent variances were set to one for model identification. With regard to the bi-factor model, the relevant items loaded on their own specific factors and all items were at the same time linked/loaded on the general ODD dimension/factor. All dimensions (latent factors; general and sub-dimensions) were not correlated, and their error variances remained unrestrained.

The fit of all the CFA analyses was established using the mean and variance-adjusted weighted least squares (WLSMV) estimator, and also the approximate fit indexes of root mean squared error of approximation (RMSEA), the comparative fit index (CFI), and the Tucker Lewis Index (TLI). WLSMV is a solid estimator, recommended for ordered/categorical responses (Muthen & Muthen, 2012). Fit was inferred according to Hu and Bentler [27] recommendations (RMSEA $\leq$0.06 = sufficient fit, $\geq$ 0.07 to 0.08 = adequate fit, $\geq$ 0.08 to .10 = marginal fit, and > .10 = poor fit; CFI & TLI, close to .95 or more = sufficient fit, and close to .90 and .95 = adequate fit).

Multiple-linear regression analyses were used to establish the relationships of the factors in the optimum ODD model with the MPQ = BF primary factors. This was done separately for each ODD factor. More specifically, in each instance, the ODD latent factor was regressed on all the 11 MPQ-BF primary factors simultaneously. All the multiple regression calculations were implemented using SPSS version 20 [55]. There are indications that age, gender and ADHD symptoms may influence ODD rating ([1, 9, 36, 37, 45, 47, 60]). To account for their

effects, these variables were inserted as covariates (predictors) in the multiple regressions. In the context of a multiple regression, the standardized regression coefficient of an independent variable can be applied as an index of effect-size [31]. Therefore, the effect sizes of the correlations were interpreted using *r* effect size guidelines proposed by Cohen [16].

Results

There were no missing values for the CSS-ODD symptoms in the data of both groups.

ODD CFA Structures Assessed in Group 1

Table 1 informs about the CFA-fit values for the ODD structures sequence assessed in the study for Group 1. As shown, the Burke et al. [12] bi-factor model did not produce an admissible result. Driven by Hu and Bentler [27], the CFI and TLI revealed good fit for all the other models tested. The RMSEA indicated at least adequate fit for Burke and colleagues [14] structure, and either marginal or poor fit for all the other models. Given that the three-dimensional structures for Burke and colleagues [14], Aebi and colleagues [2], and Wesselhoeft and colleagues [63] were not nested, their fit was recomputed using robust maximum likelihood to assess the Akaike Information Index (AIC) and the Bayesian Information Index (BIC) values. These values can be used for comparisons of non-nested models, with higher rates indicating worse fit. These values for all the different ODD structures are available in Table 1. The Burke and colleagues [14] ODD structure had the lowest AIC and BIC values among all the three-dimensional structures, thereby suggesting that this applied to the data better than all the other three-dimensional structures. Additional analyses suggested that the Burke and colleagues [14] three-dimensional model had significant better fit than the one-factor model ($\Delta df = 3$; ΔWLSMV$\chi^2 = 21.42$, $p < .001$), the Rowe and colleagues [54] two-dimensional structure ($\Delta df = 2$; ΔWLSMV$\chi^2 = 20.92$, $p < .001$), and the Stringaris and Goodman [56] three-factor model ($\Delta df = 1$; ΔWLSMV$\chi^2 = 12.16$, $p < .001$). Also, for all the models tested, the Burke and colleagues [14] three-dimensional structure showed the lowest

Table 1 Fit of the factor models to the ODD symptom ratings for Sample 1

Model	WLSMVχ^2	*df*	RMSEA (90% CI)	CFI	TLI	AIC	BIC
1-factor	98.48***	20	0.1353 (0.109–0.163)	0.949	0.929	2692	2772
2-factor [54]	99.49***	19	0.141 (0.114–0.169)	0.948	0.923	2693	2777
3-factor (Aebi et al., 2010)	86.45***	17	0.138 (0.110–0.168)	0.955	0.926	2687	2778
3-factor [14]	65.21***	17	0.115 (0.086–0.145)	0.969	0.949	**2662**	**2753**
3-factor [56]	101.60***	18	0.147 (0.120–0.176)	0.953	0.922	2929	3013
3-factor [63]	92.11***	17	0.144 (0.116–0.173)	0.860	0.769	2688	2779
Bi-factor [12]	Non admisable solution						
Bi-factor [14]	Non admisable solution						

CFI comparative fit index, *CI* confidence interval, *RMSEA* root mean square error of approximation, *TLI* Tucker Lewis Index. *AIC* Akaike Information Index, *BIC* Information Index Bayesian. The AIC and BIC values are based robust maximum likelihood (MLR) extraction. As the Stringaris and Goodman [56] has only 1 symptom for one its hurtful factor, the error variance for this symptom was fixed to 0.438 (the value for the error variance for this symptom in the one-factor model) for identification purposes

***$p < .001$

AIC and BIC values. These results suggest optimum fit for Burke et al. [14] three-dimensional structure than all the other models tested.

Fit of all the CFA Models Tested in Sample 2

Table 2 provides the CFA values for all the ODD structures assessed for group 2. As shown, the Burke and colleagues [12] bi-factor structure again did not produce an admissible. In the light of Hu and Bentler [27] suggestions, both the CFI and TLI indicated sufficient fit for only the Burke and colleagues [14] three-dimensional structure. For the other models (except the [63]), the CFI was of sufficient fit, while the TFI proposed only adequate fit. The Wesselhoeft and colleagues [63] model had poor fit considering both the CFI and TLI values. As shown in Table 2, the Burke and colleagues [14] three-dimensional structure showed the smallest AIC and BIC values among all models tested, thereby suggesting that this model applied the best to the data. Given the findings for groups 1 and 2, a bi-factor model with one general ODD factor and specific factors corresponding to the factors in the Burke and colleagues [14] three-dimensional structure was then calculated. As visible in Tables 1 and 2, for both samples, this suggestion did not produce an admissible result. Consequently we adopted the Burke and colleagues [14] three-dimensional oblique structure as the one with the optimum applicability.

Table 3 addresses the factor loadings (together with their standard errors) for all the ODD items/criteria in the optimum Burke and colleagues [14] three-dimensional structure in group 2. As shown, all criteria/items had high loadings on their respective latent factors/dimensions, with loadings ranging from .92 to .64. These loadings can be interpreted as strong [21]. The correlation between the Antagonistic Behavior with the Oppositional Behavior factors/dimensions was .68 ($p < .001$). The correlation between the Negative Affect and the Oppositional Behavior dimensions was .80 ($p < .001$); and the correlation between the Antagonistic Behavior and the Negative Affect dimensions was .75 ($p < .001$). Based on guidelines proposed by Brown [10] that latent factor/dimensions inter-correlations of .80 or less strengthen discriminant validity, there is evidence advocating the discriminant validity of three latent factors/dimensions, reinforcing further the Burke and colleagues [14] three-dimensional structure.

Table 2 Fit of the factor models to the ODD symptom ratings for Sample 2

Model	WLSMVχ^2	*df*	RMSEA (90% CI)	CFI	TLI	AIC	BIC
1-factor	55.28***	20	0.093 (0.064–0.122)	0.971	0.959	2925	3005
2-factor [54]	51.25***	19	0.091 (0.061–0.121)	0.973	0.961	2913	2996
3-factor (Aebi et al., 2010)	49.87***	17	0.097 (0.967–0.129)	0.973	0.955	2916	3006
3-factor [14]	33.74***	17	0.069 (0.034–0.103)	0.986	0.977	**2901**	**2991**
3-factor [56]	43.93***	18	0.084 (0.053–0.116)	0.979	0.987	2929	3013
3-factor [63]	50.81***	17	0.099 (0.068–0.130)	0.972	0.954	3150	3233
Bi-factor [12]	Non admisable solution						
Bi-factor [14]	Non admisable solution						

CFI comparative fit index, *CI* confidence interval, *RMSEA* root mean square error of approximation, *TLI* Tucker Lewis Index. *AIC* Akaike Information Index, *BIC* Information Index Bayesian. The AIC and BIC values are based robust maximum likelihood (MLR) extraction. As the Stringaris and Goodman [56] has only 1 symptom for one its hurtful factor, the error variance for this symptom was fixed to 0.707 (the value for the error variance for this symptom in the one-factor model) for identification purposes

***$p < .001$

Table 3 Parameter estimates of the symptoms in the Burke et al. [14] three-factor model in Sample 2

Brief symptom description (symptom # in DSM-IV)	Mean	*SD*	Loading (SE)
Oppositional			
Loses temper (1)	.79	.87	.91 (.03)
Argues (2)	.95	.60	.87 (.03)
Actively defies (3)	.44	.62	.72 (.05)
Antagonistic			
Annoys others (4)	.40	.62	.74 (.08)
Blames others (5)	.35	.53	.64 (.07)
Negative Affect			
Touchy/annoyed (6)	.89	.75	.75 (.04)
Angry/resentful (7)	.45	.62	.91 (.04)
Spiteful/vindictive (8)	.18	.45	.85 (.05)

Correlation of the latent factors: Antagonistic with oppositional .68 ($p < .001$); negative affect with oppositional = .80 ($p < .001$); and antagonistic with negative affect = .75 ($p < .001$)

Relationship of Factors in the Burke and Colleagues [14] Three-Dimensional Model with the MPQ Primary Factors

Table 4 presents the partial correlations (controlling for age, gender and ADHD) of Oppositional Behavior, Antagonistic Behavior, and Nnegative Affect factors in the optimum Burke and colleagues [14] three dimensional structure with all the MPQ primary factors. The table also provides the multiple regressions outcomes, accounting for age, gender and ADHD. As shown (see Table 4) the Oppositional Behavior dimension was significantly and positively linked with Aggression (small effect size). The Antagonistic Behavior dimension was significantly and positively linked to Social Potency and Harm Avoidance (small effect sizes); and the Negative Affect dimension was significantly and positively linked to Stress Reaction and Aggression (small effect sizes). All other correlations involving the latent factors/dimensions

Table 4 Regression coefficient (and Partial Correlations) of the factors in the Burke et al. [14] 3-factor model with the primary traits in the MPQ for Sample 2

Trait	ODD Factors					
	Oppositional		Antagonistic		Negative Affect	
	β	r	β	r	β	r
Wellbeing	−0.01	(−0.04)	0.05	(−0.02)	−0.06	(−.0.20**)
Social Potency	0.04	(0.08)	0.19**	(0.16*)	−0.02	(−0.10)
Achievement	0.01	(0.02)	−0.08	(−0.05)	−0.05	(−0.03)
Social Closeness	−0.04	(−0.05)	−0.04	(−0.00)	−0.08	-(0.23**)
Stress Reaction	0.13	(0.09)	0.04	(0.09)	0.28***	(0.35***)
Alienation	−0.06	(0.06)	0.16	(0.15*)	−0.06	(O.19**)
Aggression	0.24**	(0.26**)	0.09	(0.13)	0.22**	(0.22**)
Control	−0.11	(−0.11)	−0.02	(0.04)	0.09	(0.13)
Harm avoidance	−0.07	(0.13)	0.17*	(0.11)	−0.02	(0.00)
Traditionalism	0.04	(0.02)	0.06	(0.10)	−0.02	(0.02)
Absorption	−0.11	(−0.09)	−0.03	(−0.02)	0.08	(0.12)

β standardized beta value, r partial correlation

***$p < .001$; **$p < .01$; *$p < .05$

for Oppositional Behavior, Antagonistic Behavior, and Negative Affect with the MPQ primary factors were not significant.

Discussion

The first goal of this research was to employ CFA to establish the optimum factor/dimension structure for DSM-IV/DSM-5 ODD presentations in adults. The following ODD models proposed for children were evaluated and compared: the uni dimensional structure (inspired by DSM-IV), the two-dimensional structure [54], various different three-dimensional structures ([2, 14, 56]; and [63]); and the bi-factor ODD structure [12]. The CFA calculations conducted showed most support for Burke and colleagues [14] three-dimensional conceptualization, with factors/dimensions for Negative Affect, Oppositional Behavior, and Antagonistic Behavior. For this model, all symptoms had strong loadings (all above .64) on their different sub-dimensions, and there was additional evidence for their discriminant validity. A bi-factor modification of this structure was deemed as not admissible. Thus, we adopted the Burke and colleagues [14] three-dimensional structure as the optimum ODD model. Previous studies with children that compared the models compared in this study have also indicated optimum fit for the Burke and colleagues [14] three-dimensional structure [22, 23].

A second goal was the examination of how the factors/dimensions in the optimum ODD structure were uniquely associated with the primary traits of Tellegen's [57, 58] multidimensional personality conceptualization. The findings showed that the Oppositional Behavior dimension was tied positively with Aggression; The Antagonistic Behavior dimension was tied positively with Social Potency and Harm Avoidance; and the Negative Affect dimension was tied positively with Stress Reaction and Aggression. Our findings are new and extend existing data showing that ODD (viewed as a uni-dimensional construct) is associated positively with Aggression, and Alienation; and negatively with Harm Avoidance. Based on our findings, it can be speculated that ODD is associated with behaviours reflecting high physical aggressiveness, vindictiveness, joy in upsetting others (features captured by Social Potency); victimizing others for one' own advantage; being forceful and persuasive, liking for influencing others and wanting to be noticed by others (features captured by Social Potency); preference for safe and familiar activities and avoidance of danger (features captured by Harm Avoidance); and disposition for negative emotionality, like being nervous, worried, irritable, easily upset, moody, miserable, guilty and worthlessness (features captured by Stress Reaction).

Implications for ODD Taxonomy

If it is accepted that ODD is a valid disorder for adults, as proposed by a growing group of researchers [7, 20, 29, 53, 62], then our findings have significant clinical value for clinical taxonomy, and the diagnosis of adult ODD. DSM-5 envisages the eight ODD symptoms (for children) organised in three clusters (Angry/Irritable, Vindictiveness, and Argumentative/Defiant Behavior). Our findings suggest three different criteria groupings, corresponding to Burke's and colleagues [14] three-dimensional structure. These involve the Oppositional Behavior, the Antagonistic Behavior, and the Negative Affect dimensions/clusters (for the criteria in these clusters the reader is referred to Fig. 1). It is worthy of note that it was previously argued previous that this grouping is also appropriate for children and adolescents

[22, 23]. Thus, our findings suggest that future DSM taxonomy may have to reconsider the clustering/grouping of ODD criteria/behaviours.

Implications for ODD Diagnosis

In relation to clinical assessment, although the three DSM-5 ODD clusters indicate that ODD could be multidimensional, for the purpose of diagnosis this is yet approached as uni-dimensional structure. This practice may need to be changed, so that different considerations are given to different levels of the three core domains (Oppositional Behavior, Antagonistic Behavior, and Negative Affect) identified. It would be of value for clinicians to assess the severity for each of these ODD domains, and to consider this in their clinical and treatment management plans. Knowing the severity for these domains could also provide valuable insights into what possible disorders may be comorbid in an individual. At least for children, there is evidence showing that the Negative Affect dimension is associated positively with internalising problems and disorders (such as depression and anxiety); whereas the Oppositional Behaviour dimension is associated with externalizing behaviour problems and disorders (such as aggression, conduct problems, and callous–unemotional behaviours, childhood ADHD, conduct disorder, and substance use disorder; [11, 26, 32, 43, 54, 56, 63]). It could be speculated that this could also be true for ODD in adults.

Implications for Comorbidity

The current results may additionally inform a more complex understanding of the relationship between ODD and psychopathy. At present there are data showing relationship of ODD with psychopathy in children and adolescents ([8, 19, 39, 61]). Hemphala and Tengstrom [25] have shown that the interpersonal and affective psychopathy dimensions are associated with ODD in girls, and the behavioral psychopathy dimension is associated with ODD in boys. To some degree, there are conceptual overlaps across the factors/dimensions related to psychopathy and the ODD multidimensional model supported here. The interpersonal–emotional features of psychopathy are somewhat comparable to the ODD negative affect dimension, and the antisocial deviance features of psychopathy are somewhat comparable to the oppositional behaviour and antagonistic behaviour ODD factors. This raises the possibility that ODD and psychopathy could be distally related, and that the ODD affective dimension could be a risk factor for the interpersonal–emotional features of psychopathy, and the oppositional and antagonistic behaviour ODD dimensions could be risk factors for the antisocial deviance features of psychopathy.

Conclusions & Limitations

In concluding, as far as it can be ascertained this is a pioneering research in the comprehensive examination the factor/dimension structure of the ODD behaviours among adults, and how these may correspond to personality traits. Despite this novelty, conclusions derived should be viewed in the context of this study's weaknesses. Firstly, it is assumable that self-reports of ODD symptoms may be distorted by back-ground factors not controlled in the analyses in this study, such as socio-economic status, ethnicity and comorbidity. Second, as this study used rating scales and not open questions, it cannot be certain that same conclusions would be extracted via clinical interviews. Third, the findings reported here are based on specific,

although normative, samples. Thus our findings may not be generalized and warrant further investigation and cross-validation. Fourth, as this study used community participants, the findings here may not be applicable to the clinic samples or participants with the ODD diagnosis. Fixth, it could be hypothesized that the rather small group sizes ($N = 214$ in group 1, and $N = 205$ in group 2) may have fueled the non-identification of the bi-factor ODD structure. Therefore, it cannot be excluded that, with larger samples, this model may have been better supported. Given the limitations highlighted here, there is definitely a need for further investigation and cross-validation before the findings and interpretations made here can be used with confidence. Our findings indicate this would be worthy of future research.

Compliance with Ethical Standards

Conflict of Interest The authors declare that they do not have any interests that could constitute a real, potential or apparent conflict of interest with respect to their involvement in the publication. The authors also declare that they do not have any financial or other relations (e.g. directorship, consultancy or speaker fee) with companies, trade associations, unions or groups (including civic associations and public interest groups) that may gain or lose financially from the results or conclusions in the study. Sources of funding are acknowledged.

Ethical Approval All procedures performed in this study involving human participants were in accordance with the ethical standards of University's Research Ethics Board and with the 1975 Helsinki Declaration.

Informed Consent Informed consent was obtained from all participants.

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