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THE FREE WILL AND DETERMINISM PLUS (FAD-PLUS) SCALE: THE VALIDITY AND RELIABILITY OF THE POLISH ADAPTATION

The article presents an analysis of the validity and reliability of the FAD-Plus scale by D. L. Paulhus and J. M. Carey, which is used to measure beliefs in free will, determinism, and the unpredictability of events. The results of three studies are presented. Based on the results of the first study, it was found that the tool has a consistent structure and that its 3-factor 16-item version is reliable. The second study revealed positive correlations between determinism and religious fundamentalism and belief in an unjust world as well as a positive correlation between belief in unpredictability and belief in an unjust world. The correlations of belief in free will with authoritarianism, belief in an unjust world, and religious fundamentalism were not significant. The third study revealed a positive correlation between belief in free will and positive emotions, a negative correlation between belief in determinism and positive emotions, and negative correlations of belief in determinism and belief in unpredictability with life satisfaction. The analysis of the FAD-Plus scale for the Polish sample proves that the 3-factor scale (the 16-item version) consisting of subscales measuring beliefs in free will, determinism, and unpredictability, is a parametrically satisfactory tool.

Keywords: belief in free will; determinism; unpredictability; subjective well-being; tool adaptation.

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INTRODUCTION

For more than 2,000 years philosophers have been debating the existence and definition of free will. As a result, two positions on this issue have been adopted in philosophy: according to the first one, all human actions are determined, which means free will does not exist; according to the second one, free will does exist, and an individual may believe in both free will and determinism at the same time (cf. Trzópek, 2008, 2009; Kadzikowska-Wrzosek, 2010, 2012; Bremer, 2013).

The issues of belief in free will have also been addressed in psychology, since free will concerns the subjective experience of freedom and taking responsibility for one's decisions and actions. In psychoanalysis, behaviorism, and related perspectives it is assumed that a person does not have free will, which means a person has no influence on his or her decisions because they are determined by drives, nature, and social factors. In humanistic, existential, and positive psychology it is assumed that a person has free will and is responsible for his or her decisions (Biela, 2014).

Considering the disputes between scholars representing different perspectives concerning the essence and complexity of the construct of free will, psychologists have recently concluded that a fully legitimate way of studying free will in psychology is the investigation of beliefs about free will and determinism as well as their relations to the attitudes and behaviors of individuals (Paulhus & Carey, 2011; Carey & Paulhus, 2013; Paulhus & Margesson, 1994). Nettler (1959) constructed the first dichotomous scale measuring beliefs in determinism and free will. In subsequent years, Viney, Waldman and Barchilon (1982) developed another measure of beliefs in free will and determinism, with items phrased in the language of philosophy. More recent years saw the construction three instruments measuring beliefs in free will and determinism, developed by Stroessner and Green (1990), by Rakos, Laurene, Skala and Slane (2008), and by Paulhus and Carey (2011). The scale by Stroessner and Green (1990) presupposes the independence of beliefs in free will and determinism and measures three factors: belief in libertarianism as well as beliefs in psychosocial and religious-philosophical determinism. The measure by Rakos and colleagues (2008) presupposes opposition between free will and determinism. It consists of two subscales: Personal Will (measuring belief in other people's free will) and General Will (measuring belief in other people's free will). The measure of belief in free will and belief in determinism that has been the most widely used in research is the Free Will and Determinism Plus (FAD-Plus) scale by Paulhus and Carey

(2011). It is used to assess belief in free will as well as three constructs related to determinism: beliefs in scientific and fatalistic determinism and belief in the unpredictability of events. An asset of the FAD-Plus, compared to other measures, is the authors' assumption that a person may simultaneously have a belief in free will and a deterministic attitude to life. Moreover, compared to other scales (cf. Nettler, 1959; Viney et al., 1982), the philosophical language, which makes the items rather difficult to understand, was abandoned in the FAD-Plus. What is more, the analyses of the psychometric properties of the measure performed by its authors show that it is a valid and reliable measure (cf. Paulhus & Carey, 2011; Carey & Paulhus, 2013). As far as we know, only a French adaptation of the FAD-Plus scale has been published so far (Caspar, Verdin, Rigoni, Cleeremans, & Klein, 2017). The aim of the present article, therefore, is to present a Polish adaptation of the FAD-Plus.

In the article we present an analysis of the internal validity, reliability, and criterion validity of the measure. In order to assess internal validity, we performed a confirmatory factor analysis. To assess criterion validity, we used the following instruments: the Authoritarianism Scale (Koralewicz, 2008), the Religious Fundamentalism Scale (RFS) by Altemeyer and Hunsberger (1992; adapted into Polish by Besta & Błażek, 2007), and the Belief that the World is Unjust Scale (Wojciszke, 2005).

FAD-PLUS: INFORMATION ABOUT THE MEASURE AND ITS THEORETICAL BASIS

The concept of free will in psychology

The first psychological perspective on the issue of free will was St. Augustine's; he wrote: "Will originates in the thinking soul, since no one wants that which he does not know at all, when he does not know what it is and what it is like" (translated from Polish, based on: Warchał, 2015, p. 91). In other words, free will operates in the domain of cognition. Cognition takes place thanks to free will, and a consequence of the choice made by will is knowledge. Later, the issue of free will appears in humanistic and existential psychology as well as in related perspectives (Trzópek, 2009; Frankl, 2010; Maslow, 1954/1990; May, 1995; Deci & Ryan, 1985; Kadzikowska-Wrzosek, 2012; Feldman, Wong, & Baumeister, 2016). In these approaches, great importance is attached to freedom and to a person's autonomy as the basis enabling his or her full and healthy development and the achievement of full potential. Health and development are

possible thanks to the change of circumstances effected through the human will. Recently, the study of free will has been highly popular in psychology due to the findings reported by Baumeister and colleagues (Baumeister, 2008; Baumeister, Masicampo, & DeWall, 2009; MacKenzie, Vohs, & Baumeister, 2014). It has been established that belief in having free will is associated with prosocial behaviors (i.e., helping, charity). In psychology, however, belief in free will is distinguished from related issues, such as intrinsic motivation or autonomy. Despite certain similarities, belief in free will refers to something different than autonomy or intrinsic motivation. Intrinsic motivation refers to a person's engagement in activity because of the value of this activity itself (cf. Ryan & Deci, 2000). Belief in free will refers to the sense of responsibility for one's actions (Paulhus & Carey, 2011). Autonomy concerns a person's perception of his or her own interests and values as the source of activity (cf. Ryan & Deci, 2000), but it does not include responsibility for one's actions, which is covered by belief in free will (Paulhus & Carey, 2011). What is more, the change of context may significantly affect the individual's sense of having autonomy (Feldman et al., 2016). By contrast, the environment does not have such a strong influence on the level of belief in free will. The FAD-Plus scale is based on the assumption that belief in free will means a sense of responsibility for one's own actions, deeds, and decisions. It is independent of biological (instinctual), environmental, and social determinants of choice between options or actions, whereas belief in determinism consists in seeing one's actions as determined by external causes, such as biological, environmental, and social factors (Baer, 2008; Baumeister, 2008; Paulhus & Carey, 2011; Carey & Paulhus, 2013).

Description of the questionnaire – Paulhus and Carey (2011)

The FAD-Plus by Paulhus and Carey (2011) consists of 27 items, making up four scales: Free Will, Fatalistic Determinism, Scientific Determinism, and Unpredictability. Seven items refer to belief in free will (e.g., "People have complete control over the decisions they make"). Seven other items make up the Scientific Determinism scale (e.g., "People's biological makeup determines their talents and personality"). Further five items concern fatalistic determinism (e.g., "I believe that the future has already been determined by fate"). The last scale, measuring belief in the unpredictability of events, consists of eight items (e.g., "No one can predict what will happen in this world"). Subjects respond to each item on a five-point scale (from 1 – *strongly disagree*, to 5 – *strongly agree*). The

Free Will and Determinism scales are not significantly correlated with each other, whereas the Determinism scales correlates significantly positively with Unpredictability. The research conducted by the authors of the FAD-Plus showed that the level of reliability is the highest in the case of the Fatalistic Determinism scale (α = .82). In the case of the scale measuring people's belief in the unpredictability of events, the reliability coefficient was α = .72. The Free Will scale had a reliability of α = .70. The reliability level was somewhat lower (α = .69) in the case of the Scientific Determinism scale. In the French adaptation of the FAD-Plus, just like in the original version, the same four factors are distinguished: Free Will, Scientific and Fatalistic Determinism, and Unpredictability. Also in the French adaptation of the FAD-Plus reliability was the highest for Fatalistic Determinism (α = .73) and Unpredictability (α = .71), slightly lower for Free Will (α = .69), and the lowest for Scientific Determinism (α = .58) (Caspar et al., 2017). However, while in the original version of the FAD-Plus there is no relationship between Free Will and Determinism (both Fatalistic and Scientific), in the French adaptation there is a negative relationship between Free Will and Fatalistic Determinism.

Correlates of the FAD-Plus dimensions: Belief in free will and belief in determinism

So far, researchers have analyzed the associations of belief in free will and belief in determinism with personality traits, conformism, gratitude, self-efficacy, mindfulness, prosociality, locus of control, religiosity, as well as authoritarianism, belief in a just world, attitudes concerning the justness of punishments, prejudice, and measures of well-being. Research on the relationships between the Big Five personality traits and beliefs in free will and determinism, conducted by the authors of the FAD-Plus, revealed that belief in free will was positively related to extraversion and agreeableness and that (fatalistic) determinism was positively related to agreeableness and neuroticism (Paulhus & Carey, 2011). No significant relations were found between scientific determinism or the unpredictability of events and the investigated personality traits. Similar results were obtained in the Polish sample – belief in free will was positively related to extraversion, agreeableness, and conscientiousness, and belief in determinism was positively related to neuroticism. Moreover, belief in the unpredictability of events correlated positively with conscientiousness and neuroticism (Kondratowicz-Nowak & Zawadzka, 2018). A somewhat different pattern of relationships was found in the Chinese sample, where belief in free will was positively

associated not only with extraversion, conscientiousness, and agreeableness, but also with neuroticism and openness to experience (Li, Wang, Zhao, Kong, & Li, 2017). No significant relationships were found between belief in determinism or belief in the unpredictability of events and the investigated personality traits. The study by Alquist, Ainsworth, and Baumeister (2013) showed that belief in free will correlated positively with conformism, but there was no significant relationship between belief in determinism and conformism. MacKenzie and colleagues (2014) established that belief in free will was positively associated with the feeling of gratitude, while beliefs in determinism and the unpredictability of events were not related to gratitude. Crescioni, Baumeister, Ainsworth, Ent and Lambert (2016) found that individuals who believed in free will scored high on self--efficacy and mindfulness. Baumeister and colleagues (2009) proved that belief in free will is a predictor of prosocial behaviors (i.e., that it is associated with willingness to devote time to others). Belief in determinism was not analyzed in that study. Relationships of beliefs in free will and determinism to locus of control and religiosity have also been examined. The study by Paulhus and Carey (2011) revealed positive relationships between belief in free will and internal locus of control and between (fatalistic) determinism and external locus of control, as well as a negative relationship between (fatalistic) determinism and internal locus of control.

Carey and Paulhus (2013) found that religiosity increased with the increase in belief in free will, while stronger belief in determinism was associated with correspondingly lower religiosity. Different patterns were established by researchers working with a French sample – they found no association of belief in free will with religiosity, while belief in determinism was positively related to religiosity (Caspar et al., 2017). A study of Poles revealed that religiosity and spirituality were positively related to belief in free will (Charzyńska & Wysocka, 2014). Carey and Paulhus (2013) also established that belief in free will was positively related to intrinsic religiosity and negatively to extrinsic religiosity. Intrinsic religiosity means religion as a goal – the ultimate goal in itself. Extrinsic religiosity is a way of achieving a different goal, such as social support, comfort, or self-worth (Darvyri et al., 2014). Determinism, by contrast, was positively related to extrinsic religiosity and not related to intrinsic religiosity. Belief in the unpredictability of events did not correlate significantly with any of the types of religiosity. In their study, Carey and Paulhus (2013) considered also two other personal characteristics: authoritarianism and belief in a just world. The obtained results showed that belief in free will was negatively related to authoritarianism and positively with belief in a just world; conversely, belief in deter-

minism was positively related to authoritarianism and negatively to belief in a just world. Carey and Paulhus (2013) also found that belief in free will was associated with the sense of just punishment for one's (criminal) actions and with the severity of this punishment, whereas belief in determinism did not show such associations. In a different study, Zao, Lin, Zhang, Shin and Huang (2014) proved that belief in free will led to the reduction of racial/ethnic prejudice compared to the lack of such belief.

The studies conducted to date have also revealed that belief in free will is related to life satisfaction, meaning in life, the level of stress, and positive emotions (cf. Bergner & Ramon, 2013; Crescioni et al., 2016; Li et al., 2017; Stillman et al., 2010), and that belief in determinism is related to the experience of negative emotions (cf. Li et al., 2017; Kondratowicz-Nowak & Zawadzka, 2018).

VERIFICATION OF THE STRUCTURE OF THE POLISH VERSION OF THE FAD-PLUS SCALE: THE INTERNAL VALIDITY AND RELIABILITY OF THE MEASURE

First, we performed a confirmatory factor analysis in order to establish if the structure of the FAD-Plus in the Polish sample corresponds to the original measure, developed in a study with an American sample.

METHOD

Participants

We examined a group of 417 people aged 18 to 36 (M = 21.98, SD = 2.27) – 227 women and 190 men. The subjects had secondary or higher education. They came from the Pomorskie (Pomeranian), Wielkopolskie (Greater Poland), and Mazowieckie (Mazovian) Voivodeships (administrative regions), Poland. Secondary education was reported by 8.2% of the subjects; 82% had a bachelor's degree, 3.8% had an engineer's degree, and 6% had a master's degree.

Materials and procedure

The subjects completed the Polish version of the FAD-Plus questionnaire. The original questionnaire was translated from English into Polish and then from Polish back into English; additionally, language experts were consulted about the contents of the items. These procedures allowed us to conclude that the measure

thus prepared was linguistically acceptable. We conducted the study in small groups, using the paper-and-pencil method.

RESULTS

Internal validity analysis – CFA and Cronbach's α reliabilities of the FAD-Plus

In the original FAD-Plus, consisting of 27 items, the authors (Paulhus & Carey, 2011) assumed a 4-dimensional structure of the measure. We therefore performed a CFA in order to check if the 4-factor model was well fitted to the dataset in the Polish sample. In the analysis we applied the AMOS package, version 23.00. We used the maximum likelihood method. The value of RMSEA, the most important fit index, for the tested 4-factor model was .05 (PCLOSE = .113). In the case of perfect fit this value is .05 or lower, which means in this case RMSEA value was acceptable. Also the CMIN/*df* statistic had an acceptable value of 2.21 (the acceptability threshold for this statistic is < 5, according to Marsh & Hocevar, 1985).

Further significant model fit indices are CFI and GFI, whose acceptable values should reach the level of < .900. In the tested sample, CFI = .790 and GFI = .880. While the obtained value of GFI is close to the acceptable level, the level of CFI is not fully satisfactory. The factor loadings of items on each of the four factors ranged from .14 to .80 (cf. Table 2).

Table 1

Fit Indices for the 3-Factor and 4-Factor Models of the FAD-Plus Questionnaire and Reliability Indices for FAD-Plus Subscales

Model	χ2	CMIN/*df*	CFI	GFI	RMSEA	PCLOSE	Δχ2	α FW	α (S)D	α (F)D	α UP
4-factor (27 items)	702.770 *df* = 318	2.21	.790	.880	.05	.113	485.636**	.680	.490	.750	.670
4-factor (16 items)	202.809 *df* = 98	2.07	.923	.941	.05	.439	14.32*	.693	.440	.750	.690
3-factor (16 items)	217.134 *df* = 101	2.15	.938	.914	.05	.318	–	.693	.750		.690

Note. χ2 – the value of chi-square; CMIN/*df* – the maximum value of well-fitted models; CFI – comparative fit index, GFI – goodness-of-fit index; RMSEA – root mean square error of approximation; PCLOSE – closeness--of-fit test; Δχ2 – the significance of difference between the models; α FW – reliability of the Free Will subscale; α D – reliability of the Determinism subscale; α (S)D – reliability of the Scientific Determinism subscale; α (F)D – reliability of the Fatalistic Determinism subscale; α UP – reliability for the Unpredictability subscale. Levels of significance * $p < .05$, ** $p < .01$.

Table 2

Factor Loadings in the 4-Factor and 3-Factor Models of the FAD-Plus Questionnaire

No.	Factors	Items	4-factor model 27 items	3-factor model 16 items	3-factor model 16 items
1.	FW	Decyzje ludzi zależą od nich samych.	.470	.407	.406
2.	FW	Ludzie muszą brać pełną odpowiedzialność za wszystkie złe wybory, których dokonują.	.610	.587	.585
3.	FW	Ludzie mogą przezwyciężyć wszelkie przeszkody, jeśli naprawdę tego chcą.	.310	–	–
4.	FW	Przestępcy są w pełni odpowiedzialni za złe rzeczy, które robią.	.550	.582	.582
5.	FW	Ludzie mają całkowicie wolną wolę.	.490	.452	.450
6.	FW	Ludzie zawsze ponoszą winę za swoje złe czyny.	.710	.770	.773
7.	FW	Siła umysłu może zawsze poskromić pragnienia ciała.	.230	–	–
8.	(S)D	Talenty i osobowość zależą od biologicznej natury człowieka.	.570	.514	.376
9.	(S)D	Psychologowie i psychiatrzy pewnego dnia rozpracują wszystkie ludzkie zachowania.	.250	–	–
10.	(S)D	Twoja przyszłość zależy od twoich genów.	.530	.543	.422
11.	(S)D	Nauka pokazuje, w jaki sposób środowisko, w którym wzrastałeś, ukształtowało twoją obecną inteligencję i osobowość.	.160	–	–
12.	(S)D	Zachowania ludzi są zawsze zgodne z prawami natury, tak jak zachowania zwierząt.	.330	–	–
13.	(S)D	Charakter dzieci zależy od charakteru ich rodziców.	.160	–	–
14.	(S)D	Środowisko z okresu dzieciństwa determinuje sukces człowieka w życiu dorosłym.	.260	–	–
15.	(F)D	Wierzę, że przyszłość została już zdeterminowana przez los.	.680	.681	.670
16.	(F)D	Nieważne, jak bardzo się starasz, nie możesz zmienić swojego przeznaczenia.	.650	.651	.650
17.	(F)D	Los ma już plan dla każdego.	.750	.745	.793
18.	(F)D	Co ma być, to będzie – niewiele da się z tym zrobić.	.500	.505	.507
19.	(F)D	Czy ludziom się to podoba, czy nie, ich życiem zdają się kierować tajemnicze siły.	.490	.496	.493
20.	UP	Na historię ludzkości zdają się wpływać głównie zdarzenia losowe.	.480	.467	.462
21.	UP	Nikt nie może przewidzieć tego, co stanie się na świecie.	.230	–	–
22.	UP	Życie wydaje się nieprzewidywalne – jak rzucanie kostką do gry lub monetą.	.400	.365	.368
23.	UP	Ludzie są nieprzewidywalni.	.140	–	–
24.	UP	Życie jest trudne do przewidzenia, ponieważ prawie zawsze kieruje nim przypadek.	.800	.794	.794
25.	UP	To, czy ludzie mają szczęście, czy nie, ma duży wpływ na ich życie.	.310	–	–
26.	UP	To, co dzieje się z ludźmi, jest kwestią przypadku.	.730	.762	.758
27.	UP	Przyszłości ludzi nie da się przewidzieć.	.260	–	–

Note. FW – Free Will; (S)D – (Scientific) Determinism; (F)D – (Fatalistic) Determinism; UP – Unpredictability.

To test the reliability of each of the dimensions that were distinguished, we performed a Cronbach's α reliability analysis. The analysis yielded the following reliability values for specific dimensions: Free Will (FW) α = .68, Scientific Determinism (SD) α = .49, Fatalistic Determinism (FD) α = .75, and Unpredictability (UP) α = .67. The analysis showed that the reliability of the SD dimension was inadequate – i.e., too low (cf. Table 1).

Next, we tested the 4-factor model using CFA, excluding those items that had low item-factor correlations (.30 or lower). This analysis showed a good fit of the model in the study sample. The value of RMSEA for the 16-item 4-factor model was .05 (PCLOSE = .439), and the CMIN/*df* statistic reached an acceptable value of 2.069. Further significant model fit indices are CFI and GFI; their values in the tested sample were as follows: CFI = .923, GFI = .941. Factor loadings for individual items in the 16-item 4-factor model ranged from .365 to .794 (cf. Table 2).

Next, we tested the reliability of each factor. The analysis of Cronbach's α yielded the following reliability values for the four factors: FW α = .693, SD α = .44, FD α = .75, UP α = .69. The reliabilities of FW, FD, and UP were acceptable, but the reliability of the SD factor was inadequate, as in the case of the 27-item 4-factor model (cf. Table 1). In the case of both versions of the 4-factor model (the 27- and 16-item versions), we analyzed the correlations between the factors. The results of correlation analysis showed that belief in free will correlated negatively with fatalistic determinism (in both versions) and with scientific determinism (in the shorter version), and that it did not correlate significantly with belief in the unpredictability of events (in both versions). In both the 27- and 16-item versions, both beliefs in determinism correlated positively (and strongly) with belief in the unpredictability of events (cf. Table 3).

Table 3

The 4-Factor Model – Correlations Between Factors

Correlations among the four factors	Factor loading 27 items	Factor loading 16 items
FW & FD	-.20**	-.19**
FW & UP	.10 *ns*	.108 *ns*
FW & SD	-.09 *ns*	-.178*
SD & FD	.60***	.70***
SD & UP	.46***	.493***
UP & FD	.49***	.49***

Note. Level of significance: * $p < .05$; ** $p < .01$; *** $p < .001$; FW – Free Will; SD – Scientific Determinism; FD – Fatalistic Determinism; UP – Unpredictability.

Considering the very high positive correlation found in the analysis of the 27-item 4-factor model between the SD and FD factors (which attests to their high conceptual convergence in the study sample) and the low reliability of the SD factor, we treated SD and FD as one factor – belief in determinism (D). Next, we tested the 3-factor model for the FAD-Plus (the 16-item version) in the Polish sample. The 3-factor model that we tested (i.e., one consisting of FW, D, and UP factors) turned out to be well fitted to the dataset in the Polish sample. The value of RMSEA was .05 (PCLOSE = .318), which is acceptable. The value of CMIN/*df* was acceptable too, and equaled 2.15. The values of GFI and CFI fit indices were also satisfactory: GFI = .938, CFI = .914 (cf. Table 1). Factor loadings for individual items were acceptable and ranged from .368 to .799 (cf. Table 2). The reliability of the three factors was as follows: FW α = .693, D α = .75, UP α = .690 – these values were acceptable (cf. Table 1). The analysis of correlations between the factors of the 3-factor model revealed a significant negative correlation between belief in free will and belief in determinism as well as significant positive correlations between belief in determinism and belief in the unpredictability of events. Correlation between belief in free will and belief in the unpredictability of events was not statistically significant (cf. Table 4). To sum up, based on the obtained results (i.e., fit indices and reliability coefficients of FAD-Plus subscales; cf. Table 1), we established that the 16-item 3-factor model had the best parameters of the three models tested. This model, therefore, was the object of further analyses concerning the psychometric properties of the FAD-Plus questionnaire.

Table 4

Correlations Among the Three Factors

Correlations among the three factors	Factor loading 16 items
FW & D	-.19**
FW & UP	.11, *ns*
UP & D	.51***

Note. Level of significance: * $p < .05$; ** $p < .01$; *** $p < .001$; FW – Free Will; D – Determinism; UP – Unpredictability.

Age, sex, and beliefs in free will and determinism

Women significantly differed from men in the levels of belief in free will and belief in determinism. They scored significantly higher than men on the Free Will scale ($t(415) = 3.87$, $p < .001$; Mw = 3.83, SD = 0.68; Mm = 3.57,

SD = 0.72) and lower than men on the Determinism scale ($t(415) = -4.98$, $p < .001$; *M*w = 2.24, *SD* = 0.67, *M*m = 2.57, *SD* = 0.68). It also turned out that the level of belief in free will decreased with age ($r = -.10$, $p < .05$). The relations of belief in free will and belief in determinism to age were not statistically significant.

THE EXTERNAL VALIDITY OF THE FAD-PLUS: CRITERION VALIDITY

The aim of the second study was to test the criterion validity of the Polish version of the FAD-Plus by Paulhus and Carey (2011). In this study, we administered a battery of measures inspired by instruments applied in the analysis of the criterion validity of the original FAD-Plus. We measured authoritarianism, religious fundamentalism, and belief in an unjust world. Authoritarianism is defined as submission to various kinds of authorities and conventionalism. Submission is the belief in the necessity of blindly yielding to authorities, while conventionalism is belief in having no influence on one's life and on the surrounding reality. Religious fundamentalism is defined as belief in the existence of "one and only set of religious teachings that contains the fundamental, natural, infallible truth about mankind and God" (Besta & Błażek, 2007, p. 351). Belief in an unjust world is understood as a view of the world in which virtues are not rewarded and offenses go unpunished.

Earlier studies (Carey & Paulhus, 2013) showed that belief in free will correlated with authoritarianism positively to a smaller degree, while belief in determinism correlated with it positively to a greater degree. Therefore, the first hypothesis in the second study was that belief in free will as well as deterministic approach to life would correlate positively with authoritarianism. We also hypothesized that belief in the unpredictability of events would correlate negatively with authoritarianism.

In previous studies, researchers established that religious fundamentalism correlated positively with intrinsic religiosity (Altemeyer & Hunsberger, 1992; Besta & Błażek, 2007). At the same time, they found both positive and negative associations between religious fundamentalism and religiosity. Carey and Paulhus (2013) found that belief in free will correlated positively with intrinsic religiosity while determinism correlated positively with extrinsic religiosity. They also found no relationship between belief in the unpredictability of events and the type of religiosity. Therefore, based on the results of the above studies, we

expected that belief in free will would correlate negatively and belief in determinism positively with religious fundamentalism.

The study by Carey and Paulhus (2013) reveals that belief in free will is positively and belief in determinism negatively associated with belief in a just world. The belief that the world is just presupposes the social world's positivity, whereas the belief that the world is unjust presupposes its negativity (cf. Lerner, 1980). Considering the findings of previous researchers, mentioned above, in the present study we hypothesized that belief in free will would correlate negatively and belief in determinism positively with the belief that the world is unjust

METHOD

Participants

We tested a group of 196 subjects, 112 men and 84 women, aged 20 to 49; the mean age was $M = 26.79$ ($SD = 6.17$). The subjects were full-time students of Polish universities and colleges, from the Pomorskie, Wielkopolskie, and Mazowieckie Voivodeships. Secondary education was reported by 17% of the subjects, 61.7% had a bachelor's degree, 8.3% had an engineer's degree, and 13%.had a master's degree.

Materials and procedure

The subjects were given a paper-and-pencil set of questionnaires to complete. The study was performed in small groups in order to enable the participants to complete the questionnaires individually and independently.

To measure belief in free will, as in the previous study, we used the Polish adaptation of the FAD-Plus (Paulhus & Carey, 2011). The reliabilities of its subscales were as follows: FW $\alpha = .68$, D $\alpha = .64$, and UP $\alpha = .60$.

The Authoritarianism Scale (Koralewicz, 2008) measures the authoritative conservatism orientation (the authoritarian syndrome) and consists of seven items rated on a 5-point Likert scale, from 1 – *completely disagree*, to 5 – *completely agree*. The first five items make up the dimension of submission to various kinds of authorities (e.g., "One should always show respect to those in power"). The last two items measure conventionalism (e.g., "It is wrong to do anything differently than previous generations did it") (cf. Maranowski, 2014). The Authoritarianism Scale score is the mean of all the answers. In our study, the reliability of this measure was $\alpha = .67$.

The Religious Fundamentalism Scale (RFS) by Altemeyer and Hunsberger (1992), adapted into Polish by Besta and Błażek (2007), is used to measure religious fundamentalism, understood – as mentioned before – as the belief that there is one fundamental, natural, and infallible truth about mankind and God. The questionnaire consists of 20 items, e.g., "God will punish most severely those who abandon his true religion" or "There is a religion on this earth that teaches, without error, God's truth." Respondents indicate their answers on a 9-point Likert scale, from: 1 – *strongly disagree*, to 9 – *strongly agree*. The score on the Religious Fundamentalism Scale is the sum of all the answers. In our study, the reliability of this scale was $\alpha = .90$.

The Belief that the World is Unjust Scale (Wojciszke, 2005) measures beliefs contrary to those measured by the Belief in a Just World Scale, proposed by Lerner (1980). The questionnaire consists of 25 items, rated on a scale from 1 – *disagree*, to 5 – *agree*, such as: "Many offenses are never punished" or "There is no justice in the contemporary world." The score on the Religious Fundamentalism Scale is the sum of all the answers. The reliability of the scale in our study was $\alpha = .85$.

RESULTS

Before testing the criterion validity of the FAD-Plus, in order to exclude common method bias, we performed Harman's single factor test (cf. Razmus & Mielniczuk, 2018). We performed an exploratory factor analysis with a one-factor solution on the items of all questionnaires used in the study. The result revealed no common method bias. The factor explained 11.95% of variance (the criterion for the occurrence of common method bias is <= 50% of variance).

Table 5

Correlations of FAD-Plus Dimensions with Authoritarianism, Religious Fundamentalism, and Belief in an Unjust World

FAD-Plus factors	Authoritarianism	Religious Fundamentalism	Belief in an Unjust World
Free Will (FW)	-.11	-.07	.04
Determinism (D)	.29***	.34***	.19*
Unpredictability (UP)	.25**	.11	.26***

Note. Levels of significance: * $p < .05$; ** $p < .01$; *** $p < .001$.

Belief in free will, belief in determinism, and authoritarianism

The results did not confirm the hypothesized positive correlation between belief in free will and authoritarianism. They did, by contrast, confirm the expectation that a deterministic approach to life would correlate positively with submission to authorities ($r = .29$, $p < .001$) (cf. Table 5). The study did not confirm the expected negative correlation between authoritarianism and belief in the unpredictability of events. Its results showed the opposite pattern, revealing that belief in the unpredictability of events is accompanied by a higher level of authoritarianism ($r = .25$, $p < .05$) (cf. Table 5).

Belief in free will, belief in determinism, and religious fundamentalism

The results confirmed the hypothesis that a high level of deterministic approach to life would be accompanied by a high level of religious fundamentalism ($r = .34$, $p < .001$). They did not confirm the expectation that an increase in belief in the unpredictability of events would be accompanied by an increase in religious fundamentalism and the assumption that belief in having free will would correlate negatively with religious fundamentalism (cf. Table 5).

Belief in free will, belief in determinism, and belief in an unjust world

The results did not confirm the existence of relationships between belief in having free will and belief that the world is unjust ($r = .04$, $p = ns$). They did confirm the hypothesis postulating a positive relationship between deterministic approach to life and belief in a just world ($r = .19$, $p < .05$). Moreover, as it turned out, the stronger the belief in the unpredictability of events, the stronger the belief in an unjust world ($r = .26$, $p < .001$) (cf. Table 5).

DISCUSSION AND CONCLUSIONS

The analysis of the internal validity of the FAD-Plus in the Polish sample made it possible to establish that the model with the best fit and reliability was the 3-factor model (the 16-item version), with the following factors: FW – Free Will, D – Determinism, and UP – Unpredictability. Although the 4-factor model

had acceptable fit, the very low reliability of one of the two determinism factors – Scientific Determinism – argued the psychometric weakness of the 4-factor FAD-Plus in the Polish sample. The study, therefore, shows that in the Polish sample the factor representing beliefs about determinism concerns mainly the external determinants of human fate – fatalistic determinism. An unexpected result in the Polish sample is the negative correlation between belief in free will and belief in determinism. In their study, the authors of the FAD-Plus, Paulhus and Carey (2011), hypothesized and confirmed that beliefs in free will and determinism were not related to each other. However, in a different adaptation of the FAD-Plus, in a French sample, the result was analogous to that obtained in the Polish study – belief in free will correlated negatively with determinism (cf. Caspar et al., 2017). Similar relationships found in European studies (i.e., in the Polish and French samples), which differ from those obtained in American samples, may confirm the suggestions of the authors of the FAD-Plus that the instrument is sensitive to cultural differences. American culture and European culture (in this case – Polish and French) have been shaped by different philosophical and religious systems. While American culture has been formed by Protestant ethics based on the Calvinist idea of predestination, Polish and French cultures have been shaped by Catholicism, based on the idea of every person having free will.

It should be noted that in the research reported here the reliability values obtained for FAD-Plus subscales were similar to the corresponding reliabilities obtained by the authors of the scale (cf. FW = .69, FD = .82, UP = .63; Paulhus & Carey, 2011).

The criterion validity analysis revealed, as expected, that belief in determinism was positively related to authoritarianism, religious fundamentalism, and belief in an unjust world. Thus, the results obtained here concerning the Determinism scale confirmed the assumptions made by the authors of the FAD-Plus and are consistent with the results of their research (Paulhus & Carey, 2011). The present study did not confirm the results reported by the authors of the FAD--Plus, who found positive relationships between belief in free will and authoritarianism and negative relationships between belief in free will and religious fundamentalism as well as belief in an unjust world. However, in the case of two criteria – religious fundamentalism and belief in an unjust world – it is possible to find an explanation for the obtained result which does not challenge the criterion validity of the Free Will scale. In the present study, we used religious fundamentalism instead of religiosity as the validity criterion. Researchers analyzing the concept of religious fundamentalism point out that the concept is an ambigu-

ous one (cf. Besta & Błażek, 2007). It is used to refer to the beliefs of extremist religious groups and is not synonymous with the concept of traditional religiosity. The result showing the lack of negative relationship between religious fundamentalism and belief in free will may stem from this fact. By contrast, the result obtained by the authors of the FAD-Plus showing a positive relationship between belief in a just world and belief in free will does not necessarily imply the opposite relationship – namely, negative associations between beliefs in free will and in an unjust world.

Finally, it should be noted that what also argues in favor of the presented Polish adaptation of the FAD-Plus is the results of earlier studies by the authors of the present one, concerning the associations of the FAD-Plus with personality traits and measures of well-being. These studies show that – both in the Polish version and in the original FAD-Plus – belief in free will correlates positively with extraversion and agreeableness while determinism correlates positively with neuroticism (cf. Kondratowicz-Nowak & Zawadzka, 2018; Paulhus & Carey, 2011). What is more, the study with a Polish sample reveals that belief in free will is positively related to the experience of positive emotions and that belief in determinism is positively related to the experience of negative emotions, which is confirmed by the results of studies conducted by other authors who used the FAD-Plus (cf. Li et al., 2017). In the case of the unpredictability of events, the study confirmed the hypotheses, based on the findings of previous research, postulating positive association of belief in the unpredictability of events with religious fundamentalism and belief in an unjust world (cf. Carey & Paulhus, 2013).

In further studies the measurement of the criterion validity of the FAD-Plus should be expanded to include the measurement of correlates of beliefs in free will and determinism, such as the type of religiosity, gratitude, prosociality, or self-efficacy, as well as extended to other age groups, not analyzed in the present study: young and elderly people.

Beliefs in free will determinism, and the unpredictability of events are important beliefs about the social world. The Polish adaptation of the FAD-Plus (Paulhus & Carey, 2011) makes a clear distinction between belief in free will and deterministic attitude to life. As American research shows, these two approaches to life may be of significance to many areas of human functioning. The presented research, therefore, provides an instrument for measuring beliefs in free will and determinism which, thanks to acceptable parametric properties, can be successfully used in Polish studies.

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