

Aggressive? from Time to Time... Uncovering the Complex Associations between Time Perspectives and Aggression

Maciej Stolarski¹ · Marcin Zajenkowski¹ · Anna Zajenkowska²

© Springer Science+Business Media New York 2016

Abstract The aim of this study was to empirically verify a series of hypotheses on the role of time perspective (TP) in predicting aggression, formulated on the basis of TP Theory and models of aggression. Three hundred participants completed the Zimbardo Time Perspective Inventory (ZTPI) and the Aggression Questionnaire (AQ). Analysis revealed numerous significant relationships between TP dimensions and aggression. In particular, individuals scoring high on Past Negative, Present Fatalistic, and Present Hedonistic were more prone to aggressive feelings, and, in consequence, aggressive behavior. These relationships were, however, strongly attenuated in individuals with high levels of two remaining TPs – Past Positive and Future. The results provide evidence that the temporal perspective people use to structure their experience into time horizons may play a significant role in the intensity and dynamics of aggression. We discuss our results from the perspectives of psychological theories of aggression and TP.

Keywords Time perspective · Aggression · Anger · Hostility

Introduction

Understanding personal factors leading to aggression is of high social importance. Much work has been devoted to

establishing which personality traits are associated with aggressive behavior (Bettencourt et al. 2006) but there may be other individual characteristics which influence aggression and aggression-related constructs. The aim of this study was to provide an insight into individual differences in one such construct, namely temporal framing, which is also referred to as time perspective (TP; Zimbardo and Boyd 1999, 2008).

Defined as “the often non-conscious process whereby the continual flows of personal and social experiences are assigned to temporal categories, or time frames, that help to give order, coherence, and meaning to those events” (Zimbardo and Boyd 1999, p. 1271), TP can be considered as a process; an online way of cognitive framing of experience, and as a trait; a stable, habitual focus on a particular temporal frame, i.e. the past, the present or the future. In their conceptual model Zimbardo and Boyd (1999) distinguished five TPs: Past Positive, Past Negative, Present Fatalism, Present Hedonism, and Future. Biases in temporal framing have far reaching consequences for cognitive processes (Zajenkowski et al. 2015), affective states (Matthews and Stolarski 2015), values and behavior in many areas (see Stolarski et al. 2015a). More specifically, recent research revealed measures of TP dimensions predict variables that have been linked to aggression, including negative mood (Stolarski et al. 2014; Apter et al. 1990), impulsive behavior (MacKillop et al. 2006; Manuck et al. 1998), relationship satisfaction (Stolarski et al. 2015b; Bookwala et al. 1994), substance use and abuse (Keough et al. 1999; Brady et al. 1998), chronotype (Stolarski et al. 2013; Schlarb et al. 2014) and affective disorders (Gruber et al. 2012; Van Praag 1986). The links between TP and behaviors which have been independently associated with aggression gives rise to a question: to what degree are the various TPs related to aggressive emotions and aggressive behavior?

✉ Maciej Stolarski
mstolarski@psych.uw.edu.pl

¹ Faculty of Psychology, University of Warsaw, Stawki Str. 5/7, 00-183 Warsaw, Poland

² Institute of Applied Psychology, Maria Grzegorzewska Academy of Special Education, Warsaw, Poland

In their seminal work on temporal framing, Zimbardo and Boyd (1999) examined simple associations between TP and general aggression as part of their research to demonstrate the validity of the new construct. They showed that trait aggression was positively associated with Past Negative, Present Fatalistic and Present Hedonistic perspectives and negatively associated with Future and Past Positive perspectives; however to date there has been no research into the mechanisms underlying these associations.

In this research we focused on the relationships between TPs and aggression. We also consider cognitive and affective responses as potential mediators of the association. We have drawn particularly on research by Buss and Perry (1992) distinguishing physical and verbal aggression (the use, respectively, of physical means or words to harm another person) and two components of aggression: trait anger and trait hostility. Trait anger captures individual differences in the propensity to experience and react to angry feelings. Angry feelings are defined as negative affective responses, varying from irritation and annoyance to rage and fury; they are associated with psychophysiological activation (Spielberger 1999). Trait hostility captures the cognitive aspect of aggression, i.e. the tendency to evaluate other people negatively. It encompasses the belief that other people are selfish, mistrust and the suspicion that others will intentionally cause harm (Buss and Perry 1992; Spielberger 1999). High levels of anger and hostility increase the likelihood of external physical and verbal aggression (Buss and Perry 1992). It has to be acknowledged that Buss and Perry (1992) paradigm is based on a self-report Aggression Questionnaire. Thus, physical and verbal aggression subscales do not indicate the real aggressive behavior but rather trait aggressiveness, that is declarative tendency to aggressive acts.

Time Perspective and Aggression

Basing on the conceptual framework of TP Theory (Zimbardo and Boyd 1999; Stolarski et al. 2015a) we elaborated a series of hypotheses regarding potential role of individual differences in tendencies to take particular temporal perspectives for aggressive thoughts and behaviors. Our theoretical analyses led us to conclusion that whereas some TPs could directly influence aggression, other dimensions from Zimbardo and Boyd's model may act as moderators of these associations. Below we present a rationale for linking particular TPs with various aspects of aggression.

People with a predominantly Past Negative TP are characterized by negative emotionality and a generally negative view of the past (Zimbardo and Boyd 1999). They show a negativity bias in recall and in anticipation of future events (Stolarski et al. 2014) and are generally more pessimistic than others (Shipp et al. 2009). They also have lower self-

esteem and higher trait anxiety (Zimbardo and Boyd 1999). All these results suggest that a Past Negative TP result in negative evaluations of self and others, and a chronic feeling of being in danger. Moreover, recent models of aggression, such as the catalyst model (see Ferguson et al. 2008), emphasize that environmental strain may act as catalyst for aggressive responses for an individual prone to stress. It is possible then, that the generally negative attitude of people with high Past Negative TP together with unpleasant past life experiences leads to increased aggression. Taking all considerations into account, we predicted that (H1) Past Negative scores would be positively related to trait hostility and anger. Moreover, given that there is a strong association between having a negative view of the past - which is typical of a Past Negative perspective - and depression, which has a strong component of passivity, we also predicted that (H2) potential relationships between Past Negative and declarative externalized aggression, would be to their covariance with internal aspects of aggression, i.e. aggressive emotions and thoughts.

Past Positive TP reflects a warm, sentimental attitude towards past (Zimbardo and Boyd 1999). People high on this dimension are generally friendlier, have larger social networks, develop more stable relationships and receive more social support (Holman and Zimbardo 2009) than those who are not. They are also more emotionally intelligent (Stolarski et al. 2011), empathetic (Sircova and Mitina 2008) and tend to have more positive mood (Stolarski et al. 2014, Stolarski and Matthews, in review). On the basis of these results Matthews and Stolarski (2015) suggested that Past Positive TP should be treated as an adaptive emotional regulation strategy. Although Past Negative and Past Positive appear to be opposites they share less than 6 % variance (Zimbardo and Boyd 1999) and should therefore be treated as separate dimensions. They are also conceptually distinct; Past Negative is related to life experiences and some personality features, whereas Past Positive seems to be more related to cognitive strategy, particularly reappraisal and reframing of even negative experiences (see Zimbardo and Boyd 2008; Matthews and Stolarski 2015). We therefore predicted that (H3) Past Positive would act as buffer against the unpleasant affective consequences of Past Negative, and thus weaken the relationship between Past Negative and aggressiveness.

Present Fatalism manifests as a fatalistic, helpless and hopeless attitude towards life and the future (Zimbardo and Boyd 1999). Present Fatalistic TP is associated with an external locus of control, low self-esteem, low consideration of future consequences (Zimbardo and Boyd 1999), impatience (Schnitker and Emmons 2007) and generally negative emotionality (Stolarski et al. 2014). In the context of negative affect this chronic perception of a lack of control over one's life, may result in intense frustration and the conviction that

the world and its inhabitants are hostile or at odds with one's interests. Berkowitz (1990) argued that frustration activates aggression-related cognition, emotions and behaviors, thereby increasing the likelihood of externalized aggressive behavior. We therefore predicted that (H4) present fatalists would experience high levels of anger and hostility and (H5) that these internal aspects of aggression would be manifested in physical and verbal aggression as assessed by Buss and Perry (1992) questionnaire.

Present Hedonism reflects an orientation towards present enjoyment, pleasure and excitement (Zimbardo and Boyd 1999). Individuals scoring high on this dimension do not sacrifice today's rewards for tomorrow (Zimbardo and Boyd 2008). They are more prone than average to substance use and addiction (Keough et al. 1999; Wills et al. 2001), take more risks (Zimbardo et al. 1997), are more impulsive (e.g., Lee and Song 2011), lie and steal more frequently and tend not to consider the consequences of their behavior (Zimbardo and Boyd 1999). On the other hand, Present Hedonistic TP has been shown to be positively associated with well-being (e.g., Zhang et al. 2013), positive mood (Stolarski et al. 2014), lack of shyness (Zimbardo and Boyd 1999) and having larger social networks and more support and companionship from friends or acquaintances (Holman and Zimbardo 2009). Taken together these results present somewhat ambivalent picture of present hedonists, but deeper analysis suggested that Present Hedonistic TP would be positively associated with anger (H6) because anger has been shown to be positively correlated with two core characteristics of hedonism, namely impulsivity (Barratt 1991) and an inability to wait for what one strives for (Berkowitz 1990). Present hedonists may tend to respond with increased approach tendencies (Stolarski et al. 2014) when confronted with obstacles and this may lead to external aggression. We therefore predicted that (H7) anger would mediate the relationship between Present Hedonistic TP and declarative tendency to verbal and physical aggression.

Future TP reflects a general orientation towards the future and has been linked with increased self-control and consideration of future consequences (Zimbardo and Boyd 1999; Milfont and Schwarzenhal 2014) which led directly to the hypothesis that (H8) future-oriented individuals would be more capable of controlling aggressive reactions. Theoretical analyses and empirical studies have shown that Future TP may enhance the positive consequences of Present Hedonism and attenuate the negative (e.g., Stolarski et al. 2014). From this it follows that (H9) Future TP should moderate the relationship between Present Hedonistic TP and aggression. It is, however, difficult to predict at what stage in the aggression cascade the inhibitory effect of Future TP would apply. Future TP might reduce the tendency to angry emotional reactions; alternatively it might reduce the likelihood of an angry response.

Method

Measures

Time Perspective was assessed using the Zimbardo Time Perspective Inventory (ZTPI; Zimbardo and Boyd 1999), in the Polish adaptation by Kozak and Mażewski (2007). It is made up of 5 scales: Past Negative (PN), Present Hedonistic (PH), Future (F), Past Positive (PP) and Present Fatalistic (PF). Respondents rate their endorsement of each statement relating to the various dimensions on a five-point Likert scale. The reliabilities of scales in the Polish version are very similar to those of the original; however in this study we obtained a slightly lower Cronbach's alpha for the Past Positive scale.

Aggression was measured using the Aggression Questionnaire (AQ; Buss and Perry 1992) which comprises 29 items divided into four subscales; two relating to overt aggression: physical aggression and verbal aggression, and two relating to aggressive emotions and thoughts: anger and hostility. Items are scored on a five-point Likert scale. The instrument has demonstrated adequate internal consistency ($\alpha = .85, .72, .83$ and $.77$, for physical aggression, verbal aggression, anger and hostility respectively; Buss and Perry 1992).

Participants

The sample consisted of 300 adults aged between 18 and 67 years ($M = 24.95$ years, $SD = 9.87$; 67 % women) who were recruited by a team of four pollsters. Participation was voluntary; subjects were not compensated in any way. All subjects were offered feedback on general results of the study, and all gave their informed consent for the release of their test scores for research purposes.

Results

Descriptive statistics and zero-order correlations between variables are provided in Table 1.

Correlation analysis revealed that three TPs, Past Negative, Present Fatalistic, and Present Hedonistic, were positively associated with all dimensions of aggression (thus generally confirming hypotheses H1, H4 and H6); the only exception was the lack of association between Past Negative and physical aggression. The relatively strong relationship between Present Fatalistic and hostility should be noted, as well as the interesting asymmetry between hedonists and fatalists with respect to behavioral expressions of aggression. Hedonists reported a stronger tendency to verbal aggression and fatalists a stronger tendency to physical aggression. The two remaining TPs, Past Positive and Future, were only weakly associated with some aspects of aggression. Both perspectives were

Table 1 Means, standard deviations, Cronbach's alphas, and pairwise correlations for measured variables

	<i>M</i>	<i>SD</i>	α	PN	PP	PH	PF	F	Phys	Verb	Ang
<i>ZTPI</i>											
PN	2.78	.77	.83	–							
PP	3.39	.59	.69	–.14*	–						
PH	3.44	.59	.84	.17**	.02	–					
PF	2.47	.66	.76	.39***	–.04	.48***	–				
F	3.52	.59	.83	–.06	.18**	–.42***	–.49***	–			
<i>AQ</i>											
Physical	16.91	6.42	.80	.10	–.15*	.23***	.31***	–.20***	–		
Verbal	14.53	3.48	.63	.16**	–.04	.29***	.16**	–.06	.30***	–	
Anger	18.11	6.43	.81	.37***	–.03	.31***	.31***	–.09	.38***	.60***	–
Hostility	19.65	6.71	.79	.56***	–.14*	.22***	.41***	–.10	.28***	.40***	.54***

PN Past Negative, *PP* Past Positive, *PH* Present Hedonistic, *PF* Present Fatalistic, *F* Future, *Phys* physical aggression, *Verb* verbal aggression, *Ang* anger
* $p < .05$; ** $p < .01$; *** $p < .001$

negatively associated with physical aggression (partially confirming H8, i.e., a lower tendency to aggression in Future-oriented individuals) and the Past Positive TP was also negatively associated with hostility.

One should also note that the relationship between verbal aggression and Past Negative was weaker than in the case of the other TPs, although correlations between Past Negative and aggressive feelings (i.e., anger and hostility) were relatively strong. These results indicate that negative focus on the past was strongly associated with aggressive emotional states, but only marginally associated with aggressive behaviors. This pattern of associations confirmed our expectation that Past Negative would prove with emotions rather than behavior.

Next, we attempted to test the second and third hypotheses. To do that, we conducted a series of OLS regressions, predicting each of the analyzed aggression dimensions with Past Negative and Past Positive TPs and a Past Negative \times Past Positive interaction term (see Table 2). Additionally, for self-reported aggressive behaviors we added aggressive states (anger and hostility) in the fourth steps to analyze their potential mediating role in the TP-aggression dynamics. As men's and women's aggressive responses may be different (Campbell 2006) we controlled for potential gender differences.

Conducted analyses confirmed the hypothesized moderating role of Past Positive for the association between Past Negative and the predicted mediating role of aggressive states. In order to illustrate these effects in a model that would reflect dynamics of obtained associations, we used the PROCESS macro for SPSS (model 7; Hayes 2015), which tests for moderated mediation by calculating confidence intervals using bootstrapping (2000 bootstrapped samples in these analyses). Within that model Past Negative was introduced as a predictor, anger and hostility as mediators and verbal aggression as the dependent variable; Past Positive was introduced as a

moderator. Similar analyses were used to test the remaining hypotheses (see later in this section).

The moderated mediation analysis confirmed hypotheses H2 and H3, i.e., anger and hostility mediated the relationship between Past Negative and verbal aggression and both paths were significantly attenuated by Past Positive (see Fig. 1). It is worth noting that the mediation analysis revealed significant suppression of the relationship between Past Negative and verbal aggression by two aggressive emotions. This relationship, which was initially positive and significant, became significantly negative after controlling for variance in aggressive feelings. This suggests that the remaining part of Past Negative variance was negatively associated with verbal aggression. A passive component of Past Negative could be responsible for this reversal since when the analysis controlled for the effects of variation in two aggressive states a negative focus on the past was associated with a reduction in the tendency to express aggression verbally.

Further we conducted series of regressions to illustrate the role of Present Fatalism in aggression. Again we controlled for gender and added aggressive states in the final step to test for their potential mediating role (see Table 3).

The results of the analyses confirmed our initial expectations. Present Fatalism was a significant predictor of each of the aspects of aggression, and its associations with self-reported aggressive behaviors were strongly attenuated when controlling for aggressive states.

To illustrate dynamics of these associations, we attempted to assess how aggressive states mediated the associations between Present Fatalistic and self-reported aggressive behavior by running two separate mediation analyses in PROCESS.

Both mediation analyses for the association between Present Fatalism and aggressive behavior produced significant results, but in the case of physical aggression only anger was a significant mediator, and the mediation effect was partial

Table 2 OLS models predicting AQ scores with past TPs

Step	Predictors	β	p	Model R ² (ΔR^2)
Model 1. Dependent variable: Anger				
1	Sex	-.12	.038	.01
2	Sex	-.08	.146	.14 (.13)
	PN	.36	<.001	
	PP	.01	.818	
3	Sex	-.07	.217	.15 (.01)
	PN	.35	<.001	
	PP	.01	.918	
	PNxPP	-.12	.036	
Model 2. Dependent variable: Hostility				
1	Sex	-.06	.319	.00
2	Sex	.00	.948	.33 (.33)
	PN	.56	<.001	
	PP	-.06	.260	
3	Sex	.01	.076	.34 (.01)
	PN	.55	<.001	
	PP	-.06	.208	
	PNxPP	-.10	.037	
Model 3. Dependent variable: Physical aggression				
1	Sex	.30	<.001	.09
2	Sex	.30	<.001	.12 (.03)
	PN	.12	.027	
	PP	-.10	.089	
3	Sex	.30	<.001	.12 (.00)
	PN	.12	.027	
	PP	-.10	.091	
	PNxPP	.01	.935	
4	Sex	.33	<.001	.30 (.18)
	PN	-.09	.121	
	PP	-.09	.083	
	PNxPP	.06	.203	
	Anger	.39	<.001	
	Hostility	.15	.023	
Model 4. Dependent variable: Verbal aggression				
1	Sex	-.04	.461	.00
2	Sex	-.03	.647	.03 (.03)
	PN	.17	.004	
	PP	-.02	.753	
3	Sex	-.01	.807	.05 (.02)
	PN	.16	.008	
	PP	-.03	.660	
	PNxPP	-.12	.043	
4	Sex	.02	.636	.38 (.33)
	PN	-.13	.024	
	PP	-.02	.692	
	PNxPP	-.04	.436	
	Anger	.56	<.001	
	Hostility	.17	.009	

For models predicting self-reported aggressive behaviors, self-reported aggressive states were introduced in the 4th step to analyze their potential mediating role. The interaction term was calculated using centered Past Negative and Past Positive scores

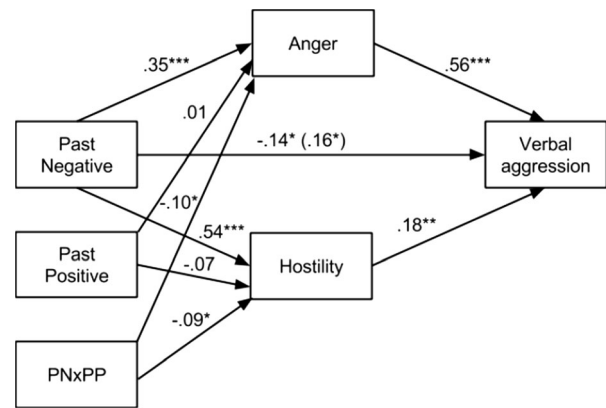


Fig. 1 Moderated mediation of the effect of Past Negative on verbal aggression. *Notes.* The indices of moderated mediation were: anger = -.0583, 95 % CI: -.1156 - -.0057; hostility = -.0164, 95 % CI: -.0540 - -.0003. * $p < .05$, ** $p < .01$, *** $p < .001$

(Fig. 2). In the case of verbal aggression the results matched our predictions: both anger and hostility were significant mediators, and the combined mediation effect was complete (Fig. 3). In summary, H4 was confirmed (the correlation analysis pointed

Table 3 OLS models predicting AQ scores with Present-Fatalistic TP

Step	Predictors	β	p	Model R ² (ΔR^2)
Model 1. Dependent variable: Anger				
1	Sex	-.12	.038	.01
2	Sex	-.11	.046	.11 (.10)
	PF	.31	<.001	
Model 2. Dependent variable: Hostility				
1	Sex	-.06	.319	.00
2	Sex	-.05	.351	.18 (.18)
	PF	.42	<.001	
Model 3. Dependent variable: Physical aggression				
1	Sex	.30	<.001	.09
2	Sex	.31	<.001	.19 (.10)
	PF	.32	<.001	
3	Sex	.35	<.001	.31 (.12)
	PF	.19	<.001	
	Anger	.34	<.001	
	Hostility	.04	.523	
Model 4. Dependent variable: Verbal aggression				
1	Sex	-.04	.461	.00
2	Sex	-.04	.506	.03 (.03)
	PF	.18	.002	
3	Sex	-.03	.494	.38 (.35)
	PF	-.05	.386	
	Anger	.56	<.001	
	Hostility	.12	.037	

For models predicting self-reported aggressive behaviors, self-reported aggressive states were introduced in the 3rd step to analyze their potential mediating role

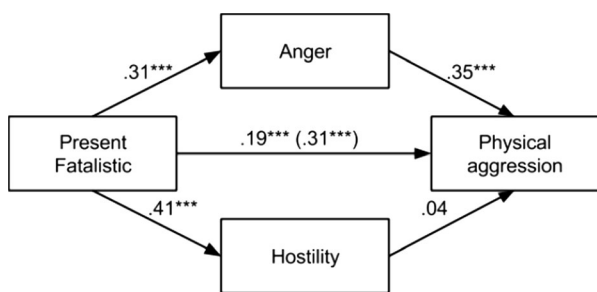


Fig. 2 Mediation of the relationship between Present Fatalistic and physical aggression by anger and hostility. *Notes.* The total indirect effect = .1063, 95 % CI: .0502 -to .1747; individual mediator effects were as follows: anger = .0929, 95 % CI: .0493-.1565; hostility = .0135, 95 % CI: -.0349-.0721. **p* < .05, ***p* < .01, ****p* < .001

towards this finding); however H5 was upheld only with respect to verbal aggression, the relationship between Present Fatalism as physical aggression was only partially mediated by aggressive emotion, and only one of the emotions investigated (anger) was a significant mediator. Overall one can conclude that aggressive states mediated the relationship between Present Fatalism and aggressive behaviors.

Finally, we attempted to analyze the hypothesized interplay between Present Hedonism and Future in predicting aggression. For that purpose we first ran a series of OLS regressions, predicting anger and both types of self-reported aggressive behaviors with Present Hedonistic, Future, and the Present Hedonistic x Future interaction term. For two models predicting self-reported aggressive behaviors we introduced anger in the final step, to initially test for its mediating role in the analyzed relationships (see Table 4).

For each of the analyzed relationships we found an evidence for a powerful role of Present Hedonism, and an attenuating role of Future TP, exhibited in significant interaction effects. However, the effects obtained for self-reported behaviors proved much weaker after controlling for anger. To illustrate these complex associations we again applied moderated mediation analyses.

Both analyses of relationships between Present Hedonism and aggressive behavior confirmed H7, which posited that

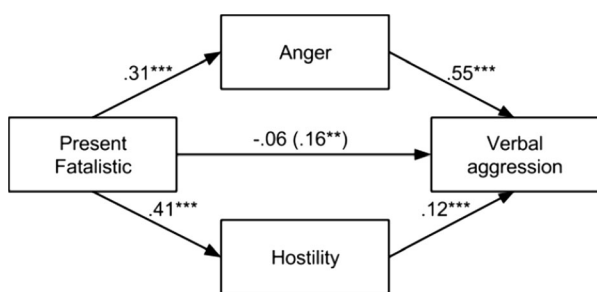


Fig. 3 Mediation of the association between Present Fatalistic and verbal aggression by anger and hostility. *Notes.* The total indirect effect = .2209, 95 % CI: .1469-.3043; individual mediator effects were as follows: anger = .1702, 95 % CI: .1096-.2467; hostility = .0507, 95 % CI: .0015-.1023. **p* < .05, ***p* < .01, ****p* < .001

Table 4 OLS models predicting AQ scores with Present-Hedonistic and future TPs

Step	Predictors	β	p	Model R ² (ΔR^2)
Model 1. Dependent variable: Anger				
1	Sex	-.12	.038	.02
2	Sex	-.10	.081	.10 (.08)
	PH	.31	<.001	
	F	.05	.411	
3	Sex	-.12	.036	.12 (.02)
	PH	.31	<.001	
	F	.07	.265	
	PHxF	-.15	.008	
Model 2. Dependent variable: Physical aggression				
1	Sex	.30	<.001	.09
2	Sex	.32	<.001	.16 (.07)
	PH	.20	.001	
	F	-.09	.117	
3	Sex	.31	<.001	.18 (.02)
	PH	.20	.001	
	F	-.08	.196	
	PHxF	-.14	.010	
4	Sex	.35	<.001	.30 (.12)
	PH	.09	.128	
	F	-.10	.063	
	PHxF	.09	.093	
	Anger	.37	<.001	
Model 3. Dependent variable: Verbal aggression				
1	Sex	-.04	.461	.00
2	Sex	.00	.962	.08 (.08)
	PH	.31	<.001	
	F	.07	.291	
3	Sex	-.02	.736	.10 (.02)
	PH	.31	<.001	
	F	.08	.195	
	PHxF	-.13	.028	
4	Sex	.05	.324	.38 (.28)
	PH	.14	.012	
	F	.04	.418	
	PHxF	-.04	.398	
	Anger	.56	<.001	

For models predicting self-reported aggressive behaviors, self-reported anger was introduced in the 4th step to analyze its potential mediating role. The interaction term was calculated using centered Present Hedonistic and Future scores

anger is an intermediate link between this TP and both verbal and physical aggression. When we extended the models to include hostility, this second aggressive emotion did not have a significant mediation effect. This result provides evidence that hedonists' increased behavioral aggression is related to anger rather than hostility which seems consistent with the

strong impulsivity loading of Present Hedonism. Furthermore, Future TP attenuated the association between Present Hedonism and anger. We also tested other models, assessing the moderating effect of Future at various stages in the aggression cascade (e.g., on the association between anger and aggressive behavior, or on both Present Hedonism-anger and anger-behavior paths in parallel); however only the presented model (Figs. 4 and 5) proved significant. In summary, H9 was also confirmed, providing further evidence that a Future orientation protects against the adverse effects of Present Hedonism (see also Stolarski et al. 2014).

Discussion

This study provides an in-depth analysis of how individual differences in TP are related to aggression. Analyses revealed that various temporal orientations and attitudes may shape aggression-related affective states and behaviors. It is important to note, however, that we measured only self-report aggression and the generalizability of the conclusions formulated below is therefore limited.

Interestingly, the study showed that each TP dimension has specific associations with various aspects of aggression. As expected, Past Negative was strongly related to hostility and anger. It appears that having a negative view of the past results in a hostile attitude towards other people as well as irritability, which is related to anger. Subsequent analysis of the relationship between Past Negative and self-reported tendency to externalized aggression revealed a suppression effect. Specifically, controlling for hostility and anger changed the valence of the association between Past Negative and verbal aggression from positive to negative. Internal aspects of aggression, such as anger, have been shown to be associated with approach behavior (Carver and Harmon-Jones 2009), which raises the question of whether controlling for them uncovers the passive aspect of Past Negative, namely its association with depression (Zimbardo and Boyd 1999), which in

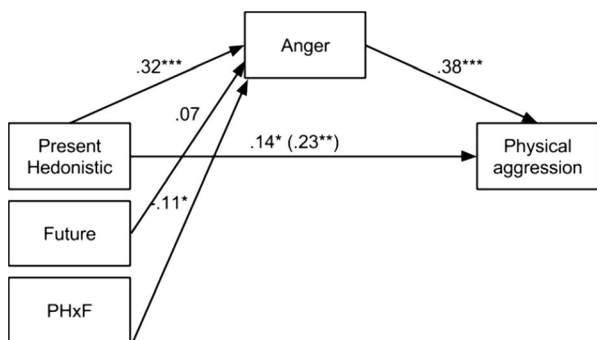


Fig. 4 Moderated mediation of the association between Present Hedonistic and physical aggression. *Notes.* The index of moderated mediation for anger = $-.0899$, 95 % CI: $-.1819 - -.0066$. * $p < .05$, ** $p < .01$, *** $p < .001$

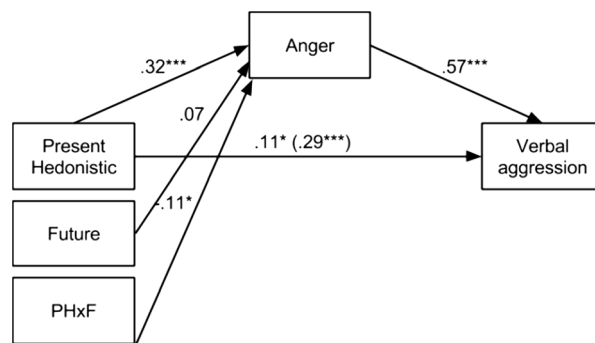


Fig. 5 Moderated mediation of the association between Present Hedonistic and verbal aggression. *Notes.* The index of moderated mediation for anger = $-.0329$, 95 % CI: $-.0716 - -.0038$. * $p < .05$, ** $p < .01$, *** $p < .001$

turn inhibits aggressive behavior. It seems that Past Negative may in fact be associated with two contrasting behavioral tendencies, resulting from different aspects of negative emotionality; however the active, approach-oriented tendency seems to dominate, rather than the passive, withdrawing tendency.

Past Positive was shown to moderate the associations between Past Negative and aggressiveness; in other words it appears that having a warm, positive view of one’s past significantly weakens the aggressive tendencies of individuals scoring high on the Past Negative dimension. This finding once again highlights the regulatory role of Past Positive. As Stolarski et al. (2011) argued, taking a Past Positive perspective may be an effective method of affective self-regulation. Zimbardo and Boyd (2008) described Past Positive in terms of reappraisal skills (see Gross and John 2003). Individuals scoring high on Past Positive seem to have an increased capability to reinterpret emotion-eliciting memories, particularly negative memories (which dominate the recollections of individuals with a Past Negative perspective), and thus modify their emotional impact (see Matthews and Stolarski 2015). Past Positive is not the polar opposite of Past Negative as it is essentially a strategic perspective, whereas Past Negative is more closely related to experience. Their ability to reframe painful experiences seems to enable individuals who score high on the Past Positive dimension to deal with negative impulses or affect resulting from concomitant high Past Negative.

Both present orientations were strongly positively associated with declarative tendency toward affective and behavioral aggressive responses. These results are consistent with those of Joireman et al. (2003) who showed that a tendency to focus on the immediate consequences of behavior predicts increased aggression. If we consider the nature of present perspectives this finding appears intuitive: if one tends to be focused on the here and now external stimuli are likely to induce automatic, unreflective and hence uncontrolled responses, including aggressive responses (e.g. in response to

provocation or frustration). Interestingly, each present TP seems to be associated with a specific pattern of. Present Hedonism seems to be associated with a proneness to anger, which is a rather externally driven emotion (Carver and Harmon-Jones 2009). Anger has sometimes been defined as a negatively valenced affective state which arises when an individual is prevented from moving towards a desired goal (e.g. Berkowitz 1993; Depue and Zald 1993). Present Hedonists are characterized by 1) high internal motivation to satisfy their hedonic needs immediately and 2) increased impulsivity with respect to external stimuli (Zimbardo and Boyd 1999). Thus, if a Present Hedonist encounters a tough obstacle whilst striving to satisfy a powerful need he or she is likely to react impulsively, with the aim of overcoming the obstacle regardless of the later consequences (Joireman et al. 2003). In fact the relationships obtained for Present Hedonism may even be biologically based; individual differences in both impulsivity and aggression are related to variance in basic features of the central serotonergic system function (Manuck et al. 1998). It is also worth noting that hostility did not link Present Hedonism with aggressive behaviors. This result seems plausible, since hedonists, their impulsive tendencies notwithstanding, are generally highly sociable and positive about other people (Zimbardo and Boyd 1999, 2008). The observed relationship between Present Hedonism and aggression may seem paradoxical because although aggression may be considered an aversive state (Carver and Harmon-Jones 2009), hedonists are more prone to feel and express aggression than less hedonistic individuals in spite of their general drive to maximize pleasure. The results presented by Tamir et al. (2008) are relevant here. These authors showed that individuals may choose to experience emotions that are instrumental (e.g., anger may be useful in a confrontational task), in spite of the short-term hedonic penalty; this implies that the association between Present Hedonism and aggression is simply a manifestation of their increased motivation to satisfy their desires regardless of the consequences.

The pattern of relationships between Present Fatalism and aggression proved quite different. As expected a fatalistic perspective was associated with both hostility and anger, and both mediated the association between Present Fatalism and verbal aggression (in the case of physical aggression only anger was a significant mediator). This pattern of results suggests that a Present Fatalist perspective may imply a tendency to both impulsive anger and hostility. The tendency to hostility may be the consequence of negative experiences which resulted in fatalists developing learned helplessness (Seligman 1972). Traumatic life events may influence one's TP profile (Sword et al. 2014), for instance leading to development of a generally hostile attitude towards others.

Zimbardo and Boyd (2008) claimed that we are all born Present Hedonists (although some individual differences in temperament emerge already in the earliest phase of life)

although we may go on to become future oriented. This study has highlighted the importance of promoting development of Future TP in individuals who are prone to the destructive elements of hedonism. The finding that a Future perspective moderates the impact of Present Hedonism indicates that Present Hedonism is not invariably linked with increased aggression. It indicated that if one considers the future consequences of one's actions then hedonistic drives may be channeled appropriately and prudently, avoiding excessive aggression. Future TP does not, however, seem to be protective against the harmful effects of Present Fatalism; this may be a reflection of the differences between the two present-oriented TPs. The consequences of Present Hedonism are mixed (e.g., potentially detrimental to health, yet also associated with higher well-being, Zimbardo and Boyd 1999), but there is no evidence that fatalism has any positive effects. Developing a greater capacity for taking a Future perspective may enable individuals to maximize the benefits of a predominantly Present Hedonistic perspective, but it will not protect them from maladaptive effects associated with Present Fatalism.

Taken together the results suggest that individuals with Past Negative, Present Fatalistic or Present Hedonistic perspectives have a tendency to aggression at both the affective and behavioral levels. The two remaining TPs, Past Positive and Future, appear to attenuate this tendency to aggression. It is worth mentioning that high levels of Past Positive and Future comprise a 'Time Expansive' TP profile (Webster 2011), which is considered to be the most adaptive of the various TP clusters. Such a regulative character of positive past and future foci is also in line with the statement made years ago by Lewin, who claimed that "any type of behavior depends upon the total field, including the time perspective at that time" (1943, p. 303). TP has a range, and this range (both in the past and the future directions) is a basic aspect of psychological field. Fundamental assumptions of field theory (e.g. Lewin 1939) suggest that breadth in psychological fields –such as TP - is adaptive. Having positive recollections and expectations to extend one's perspective on the present may promote rationality and self-control thus ensuring that a 'Time Expansive' individual is at least partially insulated from the impact of certain personality traits (Stolarski, in press) or maladaptive biases in their TP profile (e.g. a high level of Past Negative).

These results allow us to make some recommendations for psychological practice. TP theory has been used as a framework for various types of clinical interventions, e.g., for suicidal patients (van Beek et al. 2009) and for PTSD (Sword et al. 2014). Our study provides some evidence that TP-based interventions could be used to manage aggressive behavior. There appears to be an association between depression and anger which could be interpreted as depression giving rise to anger and aggression (Berkowitz 1990). Our finding related to the Past Negative TP could be used in personality disorder

therapy. Future research could include evaluation of such interventions, focusing on whether an intervention-related shift in TP produced a reduction in aggression.

Our study has all the limitations characteristic of cross-sectional designs and self-report data. The causal reasoning we have presented is based solely on the theoretical assumption that TP is a relatively stable trait; naturally other interpretations are possible. For instance, both Present Hedonism and aggression may be consequences of impulsivity, which has a well-established biological basis (Manuck et al. 1998). Experimental or longitudinal research is needed to confirm our main conclusions. Moreover, it should be mentioned here that the methods of testing for mediation and moderated mediation that we have used here, are not fully optimal and have been criticized (Rucker et al. 2011). However we decided to apply these methods as this was necessary to illustrate not only simple associations between measured variables, but also hypothesized complex aggression dynamics. Furthermore, as we measured only self-reported physical and verbal aggression further research using objective measures of aggressive behavior would be valuable. Future research building upon the present findings could also analyze the role of TP for such aggression-related aspects of psychological functioning as expectancy violation (Burgoon and Hale 1988), perceived threat or authoritarianism (Feldman and Stenner 1997). Finally, an investigation of TP profiles in extremely aggressive groups (e.g., prisoners convicted of physical assault) might provide further into the relationship between aggression and temporal framing processes.

Acknowledgments The work of Maciej Stolarski was supported by the grant no 2014/13/D/HS6/02951 from the National Science Centre in Poland; the work of Marcin Zajenkowski was supported by the grant no 2014/13/B/HS6/04083 from the National Science Centre in Poland.

Compliance with Ethical Standards All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all individual participants included in the study. This article does not contain any studies with animals performed by any of the authors.

Conflict of Interest The authors declare that there are no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

References

- Apter, A., Van Praag, H. M., Plutchik, R., Sevy, S., Korn, M., & Brown, S. L. (1990). Interrelationships among anxiety, aggression, impulsivity, and mood: a serotonergically linked cluster? *Psychiatry Research*, *32*(2), 191–199.
- Barratt, E. S. (1991). Measuring and predicting aggression within the context of a personality theory. *Journal of Neuropsychiatry and Clinical Neurosciences*, *3*, 35–39.
- Berkowitz, L. (1990). On the formation and regulation of anger and aggression: A cognitive neoassociationistic analysis. *American Journal of Psychology*, *45*, 494–503.
- Berkowitz, L. (1993). *Aggression: Its causes, consequences, and control*. New York: McGraw-Hill.
- Bettencourt, B. A., Talley, A., Benjamin, A. J., & Valentine, J. (2006). Personality and aggressive behavior under provoking and neutral conditions: A meta-analytic review. *Psychological Bulletin*, *132*(5), 751–777.
- Bookwala, J., Frieze, I. H., & Grote, N. K. (1994). Love, aggression and satisfaction in dating relationships. *Journal of Social and Personal Relationships*, *11*(4), 625–632.
- Brady, K. T., Myrick, H., & McElroy, S. (1998). The relationship between substance use disorders, impulse control disorders, and pathological aggression. *American Journal on Addictions*, *7*(3), 221–230.
- Burgoon, J. K. & Hale, J. L. (1988). Nonverbal expectancy violations: model elaboration and application to immediacy behaviors. *Communication Monographs*, *55*(1), 58–79.
- Buss, A. H. & Perry, M. (1992). The aggression questionnaire. *Journal of Personality and Social Psychology*, *63*, 452–459.
- Campbell, A. (2006). Sex differences in direct aggression: What are the psychological mediators? *Aggression and Violent Behavior*, *11*(3), 237–264.
- Carver, C. S. & Harmon-Jones, E. (2009). Anger is an approach-related affect: evidence and implications. *Psychological Bulletin*, *135*(2), 183–204.
- Depue, R. A. & Zald, D. H. (1993). Biological and environmental processes in nonpsychotic psychopathology: A neurobehavioral perspective. In C. G. Costello (Ed.), *Basic issues in psychopathology* (pp. 127–237). New York: Guilford Press.
- Feldman, S. & Stenner, K. (1997). Perceived threat and authoritarianism. *Political Psychology*, *18*(4), 741–770.
- Ferguson, C. J., Rueda, S. M., Cruz, A. M., Ferguson, D., Fritz, S., & Smith, S. M. (2008). Violent video games and aggression. causal relationship or byproduct of Family Violence and intrinsic violence motivation? *Criminal Justice and Behavior*, *35*, 311–332.
- Gross, J. J. & John, O. P. (2003). Individual differences in two emotion regulation processes: implications for affect, relationships, and well-being. *Journal of Personality and Social Psychology*, *85*(2), 348–362.
- Gruber, J., Cunningham, W. A., Kirkland, T., & Hay, A. C. (2012). Feeling stuck in the present? mania proneness and history associated with present-oriented time perspective. *Emotion*, *12*(1), 13–17.
- Hayes, A. F. (2015). An index and test of linear moderated mediation. *Multivariate Behavioral Research*, *50*, 1–22.
- Holman, E. A. & Zimbardo, P. G. (2009). The social language of time: the time perspective–social network connection. *Basic and Applied Social Psychology*, *31*(2), 136–147.
- Joireman, J., Anderson, J., & Strathman, A. (2003). The aggression paradox: understanding links among aggression, sensation seeking, and the consideration of future consequences. *Journal of Personality and Social Psychology*, *84*(6), 1287.
- Keough, K. A., Zimbardo, P. G., & Boyd, J. N. (1999). Who's smoking, drinking, and using drugs? time perspective as a predictor of substance use. *Basic and Applied Social Psychology*, *21*(2), 149–164.
- Kozak, B. & Mażewski, M. (2007). Past or future? Functional meaning of time perspective. *Kolokwia Psychologiczne [Psychological Colloquia]*, *16*, 225–233.
- Lee, S. & Song, E. (2011). Influences of time perspective on impulsive purchase tendency. *Journal of Global Scholars of Marketing Science*, *21*(4), 210–217.
- Lewin, K. (1939). Field theory and experiment in social psychology. *American Journal of Sociology*, *44*(6), 868–896.
- Lewin, K. (1943). Defining the 'field at a given time'. *Psychological Review*, *50*(3), 292–310.

- MacKillop, J., Anderson, E. J., Castelda, B. A., Mattson, R. E., & Donovick, P. J. (2006). Convergent validity of measures of cognitive distortions, impulsivity, and time perspective with pathological gambling. *Psychology of Addictive Behaviors*, *20*(1), 75–79.
- Manuck, S. B., Flory, J. D., McCaffery, J. M., Matthews, K. A., Mann, J. J., & Muldoon, M. F. (1998). Aggression, impulsivity, and central nervous system serotonergic responsivity in a nonpatient sample. *Neuropsychopharmacology*, *19*(4), 287–299.
- Matthews, G., & Stolarski, M. (2015). Emotional processes in development and dynamics of individual time perspective. In M. Stolarski, W. van Beek, & N. Fieulaine (Eds.), *Time perspective theory; review, research and applications* (pp. 269–286). Switzerland: Springer International Publishing.
- Milfont, T. L., & Schwarzenthal, M. (2014). Explaining why larks are future-oriented and owls are present-oriented: self-control mediates the chronotype–time perspective relationships. *Chronobiology International*, *31*(4), 581–588.
- Rucker, D. D., Preacher, K. J., Tormala, Z. L., & Petty, R. E. (2011). Mediation analysis in social psychology: current practices and new recommendations. *Social and Personality Psychology Compass*, *5*(6), 359–371.
- Schlarb, A. A., Sopp, R., Ambiel, D., & Grünwald, J. (2014). Chronotype-related differences in childhood and adolescent aggression and antisocial behavior—A review of the literature. *Chronobiology International*, *31*(1), 1–16.
- Schnitker, S. A., & Emmons, R. A. (2007). Patience as a virtue: religious and psychological perspectives. *Research in the Social Scientific Study of Religion*, *18*, 177–207.
- Seligman, M. E. (1972). Learned helplessness. *Annual Review of Medicine*, *23*(1), 407–412.
- Shipp, A. J., Edwards, J. R., & Lambert, L. S. (2009). Conceptualization and measurement of temporal focus: the subjective experience of the past, present, and future. *Organizational Behavior and Human Decision Processes*, *110*(1), 1–22.
- Sircova, A., & Mitina, O. V. (2008). Vozrastnaya dinamika vremennykh orientatsii lichnosti [Age dynamic of a person's time orientations]. *Voprosy Psichologii [Issues of Psychology]*, *2*, 41–54.
- Spielberger, C. D. (1999). *Professional manual for the State-Trait Anger Expression Inventory-2 (STAXI-2)*. Odessa: Psychological Assessment Resources.
- Stolarski, M., Bitner, J., & Zimbardo, P. G. (2011). Time perspective, emotional intelligence and discounting of delayed awards. *Time & Society*, *20*(3), 346–363.
- Stolarski, M., Ledzińska, M., & Matthews, G. (2013). Morning is tomorrow, evening is today: relationships between chronotype and time perspective. *Biological Rhythm Research*, *44*(2), 181–196.
- Stolarski, M., Matthews, G., Postek, S., Zimbardo, P. G., & Bitner, J. (2014). How we feel is a matter of time: relationships between time perspectives and mood. *Journal of Happiness Studies*, *15*(4), 809–827.
- Stolarski, M., Fieulaine, N., & van Beek, W. (Eds.) (2015a). *Time perspective theory; review, research and applications*. Switzerland: Springer International Publishing.
- Stolarski, M., Wojtkowska, K., & Kwiecińska, M. (2015b). Time for love: partners' time perspectives predict relationship satisfaction in romantic heterosexual couples. *Time & Society*. doi:10.1177/0961463X15596703.
- Sword, R. M., Sword, R. K., Brunskill, S. R., & Zimbardo, P. G. (2014). Time perspective therapy: A new time-based metaphor therapy for PTSD. *Journal of Loss and Trauma*, *19*(3), 197–201.
- Tamir, M., Mitchell, C., & Gross, J. J. (2008). Hedonic and instrumental motives in anger regulation. *Psychological Science*, *19*(4), 324–328.
- van Beek, W., Kerkhof, A., & Beekman, A. (2009). Future oriented group training for suicidal patients: a randomized clinical trial. *BMC Psychiatry*, *9*(1), 65.
- Van Praag, H. M. (1986). Affective disorders and aggression disorders: evidence for a common biological mechanism. *Suicide and Life-Threatening Behavior*, *16*(2), 103–132.
- Webster, J. D. (2011). A new measure of time perspective: initial psychometric findings for the balanced time perspective scale (BTSPS). *Canadian Journal of Behavioural Science*, *43*(2), 111–118.
- Wills, T. A., Sandy, J. M., & Yaeger, A. M. (2001). Time perspective and early-onset substance use: A model based on stress–coping theory. *Psychology of Addictive Behaviors*, *15*(2), 118–125.
- Zajenkowski, M., Carelli, M. G., & Ledzińska, M. (2015). Cognitive processes in time perspective. In I. M. Stolarski, W. van Beek, & N. Fieulaine (Eds.), *Time perspective theory; review, research and applications* (pp. 243–255). Switzerland: Springer International Publishing.
- Zhang, J. W., Howell, R. T., & Stolarski, M. (2013). Comparing three methods to measure a balanced time perspective: the relationship between balanced time perspective and subjective well-being. *Journal of Happiness Studies*, *14*, 169–184.
- Zimbardo, P. G., & Boyd, J. (1999). Putting time in perspective: A valid, reliable, individual differences metric. *Journal of Personality and Social Psychology*, *77*, 1271–1288.
- Zimbardo, P. G., & Boyd, J. N. (2008). *The time paradox*. New York: Free Press.
- Zimbardo, P. G., Keough, K. A., & Boyd, J. N. (1997). Present time perspective as a predictor of risky driving. *Personality and Individual Differences*, *23*(6), 1007–1023.