

ORIGINAL ARTICLE

Functional perfectionism and healthy behaviors: the longitudinal relationships between the dimensions of perfectionism, nutrition behavior, and physical activity moderated by gender

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BACKGROUND

This study investigated the relationships between global perfectionism (its functional and dysfunctional aspects) and three types of health behaviors: fruit and vegetable intake (FVI), consumption of sweet and salty snacks, and physical activity. It was hypothesized that indices of functional perfectionism would predict engaging in healthy behavior, with gender moderating these associations.

PARTICIPANTS AND PROCEDURES

Data were collected among 845 adolescents (59.20% girls) aged 13 to 20 years old ($M = 16.52$, $SD = 0.92$). At the baseline, participants filled out the Frost Multidimensional Perfectionism Scale and measures of nutrition behavior and physical activity. The measurement of nutrition behavior and physical activity was repeated at 12-month follow-up.

RESULTS

The moderator analysis indicated that FVI as well as consumption of sweet and salty snacks measured at 12-month follow-up were explained by functional global perfection-

ism (Organization and Personal Standards dimensions), but this effect was stronger among girls. Physical activity measured at 12-month follow-up was explained by functional perfectionism (Organization and Personal Standards dimensions), but this effect was stronger among boys. The effects were found after controlling for respective behaviors assessed at the baseline. Dysfunctional dimensions of global perfectionism (Concern over Mistakes, Parental Expectations, Parental Criticism, Doubts about Actions) were unrelated to indices of behavior at follow-up.

CONCLUSIONS

Functional global perfectionism may represent an individual resource variable, facilitating uptake and maintenance of healthy diet and physical activity, and therefore foster prevention of obesity among adolescents.

KEY WORDS

adolescence; perfectionism; obesity; diet; physical activity; gender

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BACKGROUND

Adolescence is a period of increased risk of unfavorable body weight changes associated with the consumption of energy-dense snacks, such as sweets, and processed salty foods (Piernas & Popkin, 2010). The World Health Organization (WHO, 2004) states that adolescents constitute a group of particular concern: more efforts should be devoted to identifying effective interventions to change an unhealthy diet of a child/adolescent into a healthy one. Healthy nutrition among adolescents is of particular relevance: poor nutrition behaviors are closely related to adolescent obesity, which in turn has a number of adverse consequences for physical and mental health, in both the short term (for obese adolescents) and long term (for adults who were obese in childhood), including increased risk for premature mortality (Reilly & Kelly, 2011). Thus investigating psychosocial determinants of nutrition behaviors in adolescence is among the priorities of health psychology.

Physical activity (PA) is one of the crucial determinants of the key non-communicable diseases, including diabetes, cardiovascular diseases and cancer (Hallal, Victora, Azevedo, & Wells, 2006). However, the health benefits of physical activity depend on its intensity and duration (Pate et al., 2002; Warburton, Nicol, & Bredin, 2006), with more pronounced health benefits being associated with moderate-to-vigorous physical activity (MVPA). Longitudinal research assessing physical activity from early to late adolescence has indicated a decline in physical activity (e.g., Nelson, Neumark-Sztainer, Hannan, Sirard, & Story, 2006). Physical activity levels tend to remain stable from early to middle adolescence, but a substantial reduction in time spent on exercise is observed in late adolescence (Nelson et al., 2006). The observed decline in physical activity is especially marked among girls (Pate et al., 2002). Thus the determinants of physical activity among adolescents warrant further investigation.

The construct of perfectionism has a long history in personality and clinical psychology. For over three decades research has stressed its multidimensional character (Frost, Marten, Lahart, & Rosenblate, 1990; Stoeber, 1998). For example, one of the early models of perfectionism (Frost et al., 1990) proposes the 6-dimensional approach to perfectionism, including such dimensions as Concern over Mistakes, Personal Standards, Parental Expectations, Parental Criticism, Doubts about Actions, and Organization. One of the most prominent features of perfectionism is setting very high standards for one's own behaviors and goals (Frost et al., 1990). These high standards may be accompanied by tendencies to form excessively critical evaluations of one's own behavior, expressed in concerns about mistakes (Frost et al., 1990). Perfectionists place considerable value on their parents'

evaluations and expectations. Finally, they overemphasize the importance of organization and order (Frost et al., 1990). In general, perfectionism is considered to represent a personality trait that plays a relevant role in cognitive, affective and behavioral functioning, and has been long considered a significant determinant of various domains of human functioning (Gotwals, Stoeber, Dunn, & Stroll, 2012).

The interest in perfectionism is fueled by existing debate and controversy concerning the character of the influence of perfectionism on behavior. The debate focuses on whether perfectionism is a maladaptive disposition (cf. Sherry, Hewitt, Sherry, Flett, & Graham, 2010) or whether it may also have some adaptive aspects (cf. Stoeber, Uphill, & Hotham, 2009). A recent systematic review of 31 studies conducted among athletes showed considerable evidence that among young people perfectionistic strivings are predominantly adaptive, occasionally neutral and rarely of maladaptive character (cf. Gotwals et al., 2012). Further, research indicated that the four dimensions of perfectionism referring to evaluation concerns (Concern over Mistakes, Parental Expectations, Parental Criticism and Doubts about Actions) may be related to a variety of problems in an individual's functioning, such as anxiety, insomnia, social phobia, symptoms of anorexia nervosa or symptoms of obsessive-compulsive disorder (for an overview see Stoeber, 1998). In contrast, the remaining two dimensions referring to Organization and Personal Standards are associated with outcomes indicating high functioning and adaptation, such as success orientation (Frost & Henderson, 1991), and goal commitment (Flett, Sawatzky, & Hewitt, 1995). Overall, research indicating divergent findings for the dimensions of perfectionism led to establishing two broader categories: one called positive or functional perfectionism, representing strivings encompassing high personal standards and striving for perfection, and another called negative or dysfunctional perfectionism, characterized by concerns over mistakes and failures to meet one's own and others' expectations (Haase, Prapacensis, & Owens, 2013).

Perfectionism is often defined and measured as a domain-specific construct which is referred to specific actions, domains of functioning, or goal behaviors (cf. Gotwals et al., 2012; Haase et al., 2013). It may be conceptualized and measured in a more general (or global) way (cf. Frost et al., 1990), as the expectations or evaluations referring to a broader range of areas of functioning. In contrast to the domain-specific approach, a general approach to perfectionism provides an opportunity to assess this construct in a parsimonious way, when researchers investigate adaptation of an individual across domains of functioning (cf. Luszczynska, Scholz, & Schwarzer, 2005).

A number of researchers found that domain-specific indices of functional perfectionism are related to high-

er levels of physical activity (cf. Gotwals et al., 2012; Longbottom, Grove, & Dimmock, 2010). Unfortunately, the vast majority of research examining perfectionism – physical activity associations were conducted applying cross-sectional design (cf. Longbottom et al., 2010). Additionally, those associations are less established for general indices of perfectionism.

A myriad of studies have investigated associations between perfectionism and symptoms of eating disorders (for a review see Franco-Paredes, Mancilla-Diaz, Vazquez-Arevalo, Lopez-Aguilar, & Alvarez-Rayon, 2005). Importantly, the functional aspects of perfectionism are often neglected in explaining links between eating disorder symptoms and perfectionism (Franco-Paredes et al., 2005). Further, much less is known about associations between perfectionism and healthy eating behaviors, such as high levels of fruit and vegetable intake or reduced consumption of sweet and salty snacks. To date, studies have tested whether global mixed indices of perfectionism (i.e., accounting for both functional and dysfunctional characteristics of perfectionism) formed negligible associations with nutrition behavior indices such as breakfast consumption (Arata, Battini, Chiorri, & Masini, 2010) or with its outcomes, such as body mass index and its changes (Stotland & Larocque, 2005). However, the associations between nutrition behaviors and global functional perfectionism remain unknown.

Research on perfectionism and gender indicated systematic differences between men and women in terms of the average levels of functional and dysfunctional perfectionism (Haase et al., 2013). For example, men showed higher levels of functional perfectionism assessed with a physical-activity domain-specific measure (Haase et al., 2013). Further, gender is an established moderator of the associations between dysfunctional perfectionism and symptoms of eating disorders, with stronger associations found for women (Shanmugam & Davies, 2015). Unfortunately, the effect of gender in the associations between functional and dysfunctional aspects of global perfectionism and healthy behaviors (such as FVI, sweet and salty snack intake, physical activity) remains unknown.

STUDY AIMS

The purpose of this study was to investigate associations between the dimensions of global perfectionism, adolescents' gender, and three health behaviors: fruit and vegetable intake, sweet and salty snack intake, and moderate-to-vigorous physical activity. Identifying predictors of long-term changes (i.e., observed over a period of at least 12 months) in healthy behaviors is the key to effective health promotion (Dombrowski et al., 2012). Therefore, our study evaluated the relationships between perfectionism and

healthy behaviors using a longitudinal design with a time gap of 12 months between the first and second measurement.

It was hypothesized that compared to the dimensions of dysfunctional perfectionism, the dimensions of functional perfectionism (Organization and Personal standards) measured at T1 would better predict adolescents health behaviors at 12-month follow-up. We expected that the effects of functional perfectionism on nutrition behaviors may be stronger among girls, whereas the effects of functional perfectionism on moderate-to-vigorous physical activity may be stronger among boys.

PARTICIPANTS AND PROCEDURE

PARTICIPANTS AND DATA COLLECTION PROCEDURES

At Time 1 (T1), 845 adolescents (59.20% girls) aged 13 to 20 years old ($M = 16.52$, $SD = 0.92$) participated in the study. Among participants 0.80% were underweight, 24.60% had overweight or obesity, and the remaining 74.60% had normal body weight, using WHO growth reference charts (De Onis et al., 2007). At Time 2 (T2; 12 months later) 537 (63.60%) adolescents provided their self-reported data.

The study was conducted in 16 public middle and high schools in Central, Eastern, and South-Western Poland. Participant and parental consent was obtained prior to the data collection. Individuals were informed about the objectives and the procedure of the study. For those who agreed and provided informed consent, personal codes were assigned to secure anonymity and identification across the measurement points. Parents of those younger than 18 years old provided their informed consent. At T1 each participant filled in questionnaires including measures of perfectionism and healthy behaviors. Afterwards, their height and weight were measured individually by experimenters in another room or in the school nurse's office. This procedure was repeated at T2. Experimenters were available for consultations after study completion. Multiple efforts were made to reduce attrition, and at T2 experimenters returned 3-5 times across a three-week period in order to gain access to participants who were willing to respond but were temporarily absent. Attrition partially related to graduating, changing or dropping out of school by participants. The study was approved by the Institutional Review Board at the first author's university.

MEASURES

Dimensions of perfectionism, sociodemographic variables, body weight and height were measured

at T1, whereas three indices of healthy behaviors (MVPA, FVI and sweet and salty snack intake) were measured at T1 and T2.

Dimensions of perfectionism (T1) were measured with six original subscales derived from the 35-item Multidimensional Perfectionism Scale (Frost et al., 1990). The responses were given on a 5-point scale ranging from 1 (*definitely not*) to 5 (*exactly true*).

The Concern over Mistakes scale consists of nine items which reflect negative reactions to mistakes, a tendency to interpret mistakes as equivalent to failure, and a tendency to believe that one will lose the respect of others following failure (e.g., “I should be upset if I make a mistake”). *The Parental Expectations scale* evaluates the tendency to believe that one’s parents set very high goals (e.g., “My parents expected excellence from me”). This scale has five items ($\alpha = .56$). *The Parental Criticism scale* (five items; $\alpha = .57$) and measures the perception that one’s parents are overly critical (e.g., “I never felt like I could meet my parents’ standards”). *The Doubting of Actions scale* consists of three items ($\alpha = .62$) reflected the extent to which people doubted their ability to accomplish tasks (e.g., “Even when I do something very carefully, I often feel that it is not quite right”). *The Organization scale* (six items; $\alpha = .71$) measures the importance placed on order (e.g., “Organization is very important to me”). *The Personal Standards scale* (six items; $\alpha = .71$) reflects the setting of very high standards for one’s own performance and its self-evaluation (e.g., “I expect higher performance in my daily tasks than most people”) and addresses high personal standards referring to goal setting (e.g., “I set higher goals than most people”).

Body weight and height (T1) were assessed with standard medically approved telescopic height measuring rods and floor scales (scale type: BF-100 or BF-25). Age- and gender-specific body mass index (BMI) percentiles were calculated with the WHO AnthroPlus macro (WHO, 2007), which is software for the global application of the WHO growth reference (De Onis et al., 2007) for children and adolescents. Thus, the BMI indicator of each participant accounts for their age and gender. Body mass index values were coded onto three weight status categories based on SD cut-offs (0 – underweight [less than or equal to 2 SD], 1 – normal weight, 2 – overweight or obesity [greater than or equal to 1 SD]) based on the WHO growth reference (De Onis et al., 2007).

Energy-dense foods intake was measured at T1 and T2 with two items, “How many sweet high-energy snacks (e.g., a portion of cookies or candies) do you eat on an average day?” and “How many salty high-energy snacks (e.g., a portion of chips or pretzels) do you eat on an average day?” (cf. Lally, Bartle, & Wardle, 2011; Luszczynska et al., 2013). The responses were given on a scale ranging from 1 (*once per day or less frequently*) to 6 (*four times or more of-*

ten). The reliability was moderate ($r = .44$ at T1 and $r = .47$ at T2).

To assess *fruit and vegetable intake* (T1 and T2), adolescents answered two questions, adopted from Lally et al. (2011): “How many portions of fresh fruit do you eat on an average day?” and “How many portions of vegetables (fresh, boiled or baked, not fried with fat) do you eat on an average day?”. The portion was defined as the amount fitting into a cupped hand. The responses were given on a six-point scale, ranging from 1 (*once a week or less*) to 6 (*four or more times a day*). The reliability was moderate ($r = .41$ at T1 and $r = .42$ at T2).

Moderate and vigorous physical activity at T1 and T2 was assessed using two items from the Godin Leisure-Time Exercise Questionnaire (Godin & Shephard, 1985). The item example is “Considering a 7-day period (a week), how many times on average do you do the following kinds of exercise for more than 15 minutes during your free time: strenuous exercise (heart beats rapidly), e.g. running, jogging, hockey, football, soccer, basketball, cross-country skiing, vigorous swimming, vigorous long distance bicycling”. The reliability was moderate ($r = .51$ at T1 and $r = .49$ at T2).

DATA ANALYSIS

Data were analyzed using SPSS version 22. To test whether the relation between the dimensions of perfectionism (the independent variables, measured at T1) and MVPA, FVI, and sweet and salty snacks intake (the dependent variables, measured at T2) was moderated by gender, we performed moderator analyses using PROCESS (model 1) with 5000 bootstraps (Hayes, 2013). PROCESS allows the moderator regression analysis to be conducted, accounting for the covariates (the index of respective behavior at T1). Results of the analyses are presented using two types of coefficients. A regression coefficient for each parameter is provided (see Table 2 in section Results). Further, PROCESS estimates the conditional effect (B) of the independent variable on the dependent variable (at respective values of moderator), accounting for respective covariates.

Missing data were imputed with multiple imputation, which is an effective way of treating data, even if up to 50% of data are missing (Pigott, 2001).

RESULTS

PRELIMINARY ANALYSIS

Attrition analysis indicated that completers and those who dropped out did not differ in gender, $\chi^2(1) = 0.02$, $p = .596$, or perfectionism dimensions, all $F_s < 1.86$, all $p_s > .173$, but older adolescents were

more likely to not participate at T2, $F(1, 843) = 45.68$, $p < .001$ (dropouts: $M = 16.48$, $SD = 0.58$; completers: $M = 16.11$, $SD = 0.96$).

The healthy behaviors remained stable over time. Repeated measures analysis of variance indicated that there was no change from T1 to T2 in the intake of sweet and salty snacks, $F(1, 843) = 1.26$, $p = .262$, FVI, $F(1, 843) = 3.58$, $p = .059$, or MVPA, $F(1, 843) = 3.16$, $p = .076$.

Correlation analysis showed that two types of perfectionism (T1) were associated with healthy behaviors at T2. In particular, higher levels of Perfectionism – Personal Standards were related to more frequent participation in physical activity (T2), higher FVI (T2) and lower intake of sweet and salty snacks (T2) (see Table 1). Similar associations were found for Perfectionism – Organization (T1). The remaining dimensions of perfectionism were not related to adolescents' healthy behaviors (Table 1), except for associations between higher Perfectionism-Parental Criticism and more frequent snacking (Time 2).

Participants with normal body weight and those with overweight/obesity did not differ in perfectionism indices, MVPA at T1 or T2, sweet and salty snack intake at T1 and T2, or FVI at T1 and T2, all F s < 1.09 , all p s $> .267$. Age was unrelated to the study variables, all r s $< .06$, all p s $> .051$. Finally, we found no differences between the three regions of data collection in terms of age, gender, BMI, perfectionism or healthy behaviors, all F s < 1.02 , all p s $> .250$. As the potential confounders were unrelated to the study variables, further analyses were conducted without controlling for age, region of data collection, or BMI.

An inspection of the effects of gender indicated that boys engaged in MVPA (T2) more frequently, $F(1, 843) = 38.12$, $p < .001$, $\eta^2 = .04$ (boys: $M = 3.12$, $SD = 1.63$; girls: $M = 2.45$, $SD = 1.44$). However, there were no gender differences in intake of sweet and salty snacks (T2), $F(1, 843) = 3.15$, $p = .076$, $\eta^2 = .004$ (boys: $M = 2.17$, $SD = 0.84$; girls: $M = 2.07$, $SD = 0.78$) or in fruit and vegetable intake (T2), $F(1, 843) = 0.32$, $p = .571$, $\eta^2 < .01$ (boys: $M = 2.54$, $SD = 0.94$; girls: $M = 2.58$, $SD = 0.98$). There were no gender differences in dimensions of perfectionism, all F s < 1.93 , all p s $> .165$.

EFFECTS OF PERFECTIONISM ON HEALTHY BEHAVIORS MODERATED BY GENDER

Results of the moderation analysis for three indices of health behaviors (MVPA, FVI, and sweet and salty snacks intake) measured at T2 are presented in Table 1. These analyses tested our hypotheses, assuming that the effects of perfectionism may be moderated by participants' gender.

Fruit and vegetable intake was explained by the interaction of Gender x Perfectionism – Organization

($\Delta r^2 = .005$, $p = .040$) and the interaction of Gender x Perfectionism – Personal Standards ($\Delta r^2 = .004$, $p = .043$). For both interactions, the analyses of conditional effects showed significant associations among girls, with stronger Organization and Personal Standards at T1 being related to higher FVI (T2), after controlling for FVI at T1 (Table 2). Respective associations were negligible among boys. There were no significant interaction effects for other types of perfectionism and gender.

Sweet and salty snack intake was also explained by the interaction of Gender x Perfectionism – Organization ($\Delta r^2 = .004$, $p = .045$) and the interaction of Gender x Perfectionism – Personal Standards ($\Delta r^2 = .005$, $p = .036$). For both interactions, the analyses of conditional effects showed significant associations among girls, with stronger Organization and Personal Standards at T1 being related to lower sweet and salty snack intake (T2), after controlling for baseline intake of sweet and salty snacks (Table 2). These associations were non-significant among boys. As in analyses conducted for FVI, no significant interaction effects for other types of perfectionism and gender were found for sweet and salty snack consumption.

The final set of analyses showed that moderate and vigorous physical activity levels at T2 were also explained by the interaction of Gender x Perfectionism – Organization ($\Delta r^2 = .004$, $p = .039$) and the interaction of Gender x Perfectionism – Personal Standards ($\Delta r^2 = .006$, $p = .009$). For both interactions, the analyses of conditional effects showed significant associations among boys, with stronger Organization and Personal Standards at T1 being associated with more frequent moderate and vigorous physical activity (T2), after controlling for baseline levels of physical activity (Table 2). These associations were non-significant among girls. Again, no significant interaction effects for other types of perfectionism and gender were observed.

DISCUSSION

The present study provides novel evidence for the role of functional perfectionism in health behavior change processes. In particular, the assessed dimensions of functional perfectionism (Personal Standards and Organization) predicted higher FVI, lower sweet and salty snack intake, and more frequent performance of physical activity at 12-month follow-up. The associations were moderated by gender: the functional perfectionism – healthy diet association was significant only among girls, whereas the functional perfectionism – physical activity relationship was significant only among boys.

The findings indicating positive associations between functional perfectionism and healthy behaviors are in line with previous research indicating

Table 1
Correlations among study variables

Variable name	2	3	4	5	7	8	9	10	11	12	13	M (SD)
1 P – Personal goal standards (T1)	.33***	.20***	.64***	.10**	.05	.21***	-.14***	.11**	.15***	-.17***	.08*	3.33 (0.55)
2 P – Concern over mistakes (T1)		.29***	.14***	.18***	.43***	.05	-.02	.02	.01	-.05	.04	2.04 (0.72)
3 P – Parental expectations (T1)			.03	.10**	.36***	-.01	-.03	.02	-.01	-.01	.05	2.23 (0.71)
4 P – organization (T1)				.07	-.01	.17***	-.22***	.10*	.14***	-.18***	.08*	3.43 (0.75)
5 P – Doubts about actions (T1)					.17***	-.02	.06	-.01	-.06	.05	-.02	2.25 (0.67)
7 P – Parental criticism (T1)						-.01	.07	.02	-.05	.08*	.01	2.27 (0.96)
8 Fruit and vegetable intake – portions per day (T1)							.01	.06	.39***	.01	.10**	2.47 (1.06)
9 Snack intake – portions per day (T1)								-.03	.02	.49***	-.03	2.14 (0.89)
10 Moderate and vigorous physical activity – sessions per week (T1)									.08	.01	.54***	2.69 (1.70)
11 Fruit and vegetable intake – portions per day (T2)										-.02	.11**	2.57 (0.96)
12 Snack intake - portions per day (T2)											-.01	2.11 (0.81)
13 Moderate and vigorous physical activity – sessions per week (T2)												2.74 (1.63)

Note. ***p < .001, **p < .01, *p < .05; P – perfectionism dimensions; T1 – time 1, T2 – time 2, 12-month follow-up.

Table 2
Results of moderation analysis

Independent variable (Perfectionism dimension at T1)	Model summary F ^a	Coefficients for: baseline behavior independent variable, moderator, and interaction terms			Conditional effect of IV on DV for boys			Conditional effect of IV on DV for girls		
		Behavior at T1: B (SE)	Gender: B (SE)	Perfectionism: B (SE)	Gender x Perfectionism Interaction B (SE)	B (SE)	95% CI	B (SE)	95% CI	
Predicting fruit and vegetable intake at T2										
Doubts about action	32.67***	.29*** (.03)	.31 (.33)	-.04 (.14)	-.02 (.09)	-.08 (.08)	-.227, .067	-.06 (.06)	-.179, .055	
Concern over mistakes	32.45***	.28*** (.02)	.30 (.29)	.16 (.13)	-.10 (.09)	-.04 (.05)	-.180, .099	.06 (.05)	-.048, .166	
Parental expectations	32.04***	.28*** (.03)	.32 (.27)	-.03 (.13)	.01 (.09)	.00 (.07)	-.135, .147	-.00 (.05)	-.118, .100	
Parental criticism	32.77***	.29*** (.04)	.30 (.29)	.04 (.12)	-.07 (.08)	-.10 (.07)	-.224, .030	-.03 (.05)	-.132, .073	
Organization	35.12***	.27*** (.03)	.30 (.28)	.26* (.12)	-.13* (.06)	.08 (.06)	-.047, .276	.08 (.05)	.060, .276	
Personal goal standards	36.80***	.28*** (.03)	.31 (.29)	.48 (17)**	-.20* (.10)	.10 (.09)	-.064, .269	.29 (.07)	.144, .239	
Predicting sweet and salty snack intake at T2										
Doubts about action	20.33***	.20*** (.02)	-.34 (.25)	.20 (.12)	-.10 (.08)	.01 (.06)	-.112, .140	.10 (.05)	.002, .205	
Concern over mistakes	20.05***	.21*** (.02)	-.32 (.29)	-.01 (.23)	-.04 (.08)	-.09 (.06)	-.210, .035	-.05 (.05)	-.141, .044	
Parental expectations	19.43***	.21*** (.01)	-.33 (.27)	-.09 (.12)	.07 (.08)	.04 (.06)	-.079, .169	-.02 (.05)	-.079, .071	
Parental criticism	20.50***	.20*** (.01)	-.33 (.27)	.10 (.11)	-.02 (.07)	.06 (.06)	-.047, .176	.08 (.05)	-.006, .172	
Organization	25.89***	.22*** (.02)	-.34 (.25)	-.33** (.10)	.11* (.05)	-.10 (.05)	-.210, .004	-.22 (.05)	-.311, -.121	
Personal standards	26.10***	.20*** (.02)	-.34 (.26)	-.54*** (.14)	.23** (.09)	-.08 (.07)	-.227, .059	-.31 (.06)	-.440, -.188	
Predicting moderate and vigorous physical activity at T2										
Doubts about action	31.58***	.26*** (.04)	-.37 (.52)	-.21 (.24)	.16 (.16)	.11 (.13)	-.138, .366	-.05 (.10)	-.250, .153	
Concern over mistakes	31.45***	.27*** (.03)	-.34 (.48)	.01 (.22)	.03 (.15)	.07 (.12)	-.165, .312	.04 (.09)	-.139, .220	
Parental expectations	32.56***	.25*** (.03)	-.37 (.51)	-.40 (.23)	.31 (.25)	.23 (.12)	-.007, .476	-.08 (.09)	-.270, .102	
Parental criticism	31.31***	.27*** (.04)	-.36 (.50)	.04 (.21)	-.02 (.14)	.01 (.11)	-.222, .221	.02 (.10)	-.154, .196	
Organization	32.71***	.26*** (.03)	-.37 (.52)	-.22 (.21)	.23* (.07)	.24 (.10)	.028, .456	.01 (.09)	-.172, .195	
Personal standards	33.16***	.27*** (.03)	-.37 (.51)	-.61 (.29)	.47** (.19)	.34 (.14)	.052, .628	-.12 (.13)	-.383, .116	

Note. ^afor all models, degrees of freedom were 4, 840; ***p < .001, **p < .01, *p < .05; significant interaction coefficients and conditional effect coefficients are marked in bold.

Functional perfectionism

positive effects of functional perfectionism on functioning and adaptations in various domains, such as success orientation (Frost & Henderson, 1991), goal commitment (Flett et al., 1995), goal attainment (Gaudreau & Antl, 2008), or performance in sport (Gotwals et al., 2012). Beyond existing evidence focusing on domain-specific perfectionism, the present study showed that functional global perfectionism predicts three distinct healthy behaviors. Therefore, the results support the notion of conceptualizing perfectionism as a global personality trait, which may help to explain an individual's action across domains. These findings have implications for psychological practice. Adolescents with lower levels of global functional perfectionism may be in need of psychological intervention promoting healthy behavior change, as they may lack some personal resources facilitating behavior change.

So far, the investigation of associations between perfectionism and eating behaviors has been dominated by studies on symptoms of eating disorders (Franco-Paredes et al., 2005). Importantly, these analyses are predominantly conducted applying cross-sectional design and with a focus on the role of dysfunctional perfectionism. The present study provides evidence for the potential beneficial and adaptive role of functional perfectionism predicting healthy eating behaviors on long-term follow-ups, even after controlling for the baseline nutrition behavior. Future research may address the synergistic effects of both functional and dysfunctional perfectionism on both healthy eating and eating disorder symptoms.

Functional global perfectionism may promote healthy behaviors through various underlying mechanisms. It may be expected that individuals with higher levels of this trait may form stronger or more ambitious behavioral intentions or more frequently engage in forming action or coping plans. Forming behavioral intentions and plans is among the best proximal predictors of the uptake and maintenance of healthy behaviors (Hagger & Luszczynska, 2014). Overall, personality variables form key personal resources prompting individuals to form intentions and plans (Hagger & Luszczynska, 2014). Future research needs to investigate the mediating mechanisms that may help to disentangle underlying processes which explain the associations between global functional perfectionism and healthy behaviors.

The moderating effects of gender, discovered in the present study, are in line with earlier observations that critical self-evaluations (e.g., of own competences) are predictive of adolescents' physical activity but only among boys (Luszczynska & Abraham, 2012). Further, previous investigations showed that gender moderates the associations between dysfunctional perfectionism and symptoms of eating disorders, with stronger associations found for wom-

en (Shanmugam & Davies, 2015). Our findings add to the existing evidence and indicate that the association between functional perfectionism and healthy nutrition behaviors is more pronounced among women. Thus, besides mere differences in average levels of functional perfectionism (Haase et al., 2013), the present study shows that the role of functional perfectionism may differ for men and women.

The present study has some limitations. The ongoing discussion on the role of global (measured as a general construct) and behavior-specific perfectionism (measured with reference to specific behaviors, such as MVPA; cf. Gotwals et al., 2012; Stoeber, 1998) indicates that the effects of global and behavior-specific perfectionism should be evaluated in one study in order to clarify their distinct effects. Future research should test whether global perfectionism explains the variance of behavioral outcomes over and above behavior-specific perfectionism. Our investigation did not test for the potential underlying mechanisms that may mediate the relationship between perfectionism and healthy behaviors, such as well-established predictors of healthy behaviors (e.g., intention, planning or self-efficacy, cf. Schwarzer et al., 2007; Szczepanska, Scholz, Liszewska, & Luszczynska, 2013). Further, functional perfectionism is one of the personality resource variables which have a direct or indirect effect on healthy behaviors; effects of other personality variables, such as impulsivity, are better established (cf. Hagger & Luszczynska, 2014). Consequently, future research needs to test for moderating and mediating mechanisms which may explain how and why perfectionism affects healthy behaviors.

CONCLUSIONS

In sum, our study offered an insight into associations between functional perfectionism and three health behaviors. The global index of functional perfectionism was associated with healthier diet (higher FVI and lower consumption of sweet and salty snacks) among adolescent girls, and it was associated with more frequent performance of physical activity among adolescent boys. Although the observed effects were small, the associations were established for behaviors measured at 12-month follow-ups, after controlling for the baseline measurement of respective behaviors.

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