A NOVEL PERSPECTIVE: EXPLORING THE RELATIONSHIP BETWEEN SELF-CONTROL AND GOAL-DIRECTED BEHAVIOR

A sequential mediation model.

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Abstract

This research is done as an extension of Gillebaart & Kroese's research about self-control, behavioral resistance and goal-directed behavior (2020). Their research concluded that people with high self-control feel less resistance to performing goal-directed behavior. This means that they are not necessarily better at inhibiting impulses or effortfully initiating unpleasant activities, but they appraise them in a different way. The current research introduces the regulatory focus theory as a potential mediator in this relationship. The expectation is that experienced behavioral resistance in high/low trait self-control individuals when performing goal-directed behaviors, such as healthy eating and exercise behavior, can be explained by having a promotion focused orientation. A cross-sectional study was conducted in which participants reported their level of self-control, regulatory focus, behavioral and actual healthy eating and exercise behavior. A double mediation analysis was performed in PROCESS (Hayes, 2012). Surprisingly, findings show that both for healthy eating and exercise behavior, the relationship between self-control and goal-directed behavior is not mediated by promotion focused orientation. Furthermore, a negative relationship between self-control and promotion focused orientation and behavioral resistance and both goal-directed behaviors exists. The lack of significant results may be attributed to limitations such as inadequate reliability of the RFQ and the assessment methodology employed. The predominance of students within the sample might have also influenced the outcomes warranting caution in generalizing the findings. Future research should replicate these findings to gain more knowledge about the relationship between self-control and behavioral resistance with promotion focused orientation as a potential mediator.

Key words: self-control, behavioral resistance, promotion focused orientation, goal-directed behavior

Introduction

Caught yourself sitting in front of the television with a bag of crisps when you actually set a goal to lose weight? Many people have trouble with translating a certain intention into actual desired behavior (Gillebaart & Kroese, 2020). When people are confronted with dilemmas and temptations, self-control is required. Self-control can be defined as the capacity to alter dominant response tendencies and to regulate behavior, thoughts and emotions (De Ridder et al., 2012). Another definition is as follows: Self-control can be defined as the ability to override or change one's inner responses, as well as to interrupt undesired behavioral tendencies and refrain from acting on them (Hofmann et al., 2014). In fact, people's daily lives are filled with instances in which they need to exert self-control to overcome temptations in order to perform behavior in line with long-term goals. (Gillebaart & Kroese, 2020). This behavior can also be called 'goal-directed behavior' and refers to behavior that is aimed at achieving a particular end or goal, often involving the use of cognitive and motivational processes to guide and sustain the behavior (Gillebaart & Kroese, 2020).

Having high levels of self-control is associated with a lot of positive outcomes. For example, individuals with high self-control are better able to control their thoughts, regulate their emotions, inhibit their impulses and exert goal-directed behavior, as compared to those who possess lower levels of self-control. Furthermore, higher scores on self-control correlated with less binge eating, less alcohol consumption and more optimal emotion regulation (Tice et al., 2001). People with high self-control also have a greater psychological well-being, more academic success, and better interpersonal relationships compared to people with low self-control (De Ridder et al., 2012). Some people are much more able than others to manage their lives, hold their tempers, keep their diets, fulfill their promises, stop after a couple of drinks, save money, persevere at work and keep secrets for example (Gillebaart & de Ridder, 2015). Besides this distinction between low and high self-control, one could also distinguish between state and trait self-control. This will be further elaborated on in the next paragraph.

State & trait self-control

Literature distinguishes between state self-control and trait self-control (Tangney et al., 2004). State self-control varies a lot across situations and time. An individual's capacity to exert self-control may be susceptible to situational influences, such as mood, working memory capacity and motivation (De Ridder, 2012). In contrast, trait self-control is relatively stable across situations and over time and is considered a part of personality (Gillebaart et al., 2016). It's actually trait, rather than state self-control, that predicts behavioral outcomes such

as health and well-being. People who benefit from high trait self-control are able to exert self-control at more than one subsequent moment in time, whereas low trait self-control predicts a number of negative outcomes such as substance abuse (Gillebaart et al., 2016). Moreover, high trait self-control relates to effortless rather than effortful strategies of dealing with self-control dilemmas. Therefore, the goal-directed behaviors are performed relatively more automatic, which means they are being executed without effort or awareness (Bargh, 1994). People high in trait self-control make the desired choice without much effort which suggests that trait self-control does not so much involve effortful resistance of temptations in single occasions, but involves the ability to not being tempted or distracted by such temptations at all. Individuals high in trait self-control don't feel like they draw from their self-control resource, because they don't experience the goal-directed behaviors as self-control demanding. In this current research, the focus will be on trait self-control and the process by which it influences goal-directed behaviors, which will be explained and elaborated on in the following paragraphs.

Behavioral resistance

People with high and low self-control may have the same or similar goals, but some might experience the behaviors which are required to reach a goal as less automatic, more effortful and therefore more self-control demanding than others (Gillebaart & Kroese, 2020). However, it's not as simple as that.

Research by Gillebaart & Kroese (2020) sheds light on the relation between trait self-control, goal-directed behavior and 'behavioral resistance'. Behavioral resistance can be defined as the extent to which people perceive the behaviors they need to perform in order to reach their goal as unpleasant and feel a sense of resistance to that behavior (Gillebaart & Kroese, 2020). Behavioral resistance goes beyond the self-control capacity by demonstrating how people experience the actions they need to perform to get closer to their goal. Interestingly, they concluded that people with high self-control feel less resistance to behavior in the first place, so they are not necessarily better at inhibiting impulses or effortfully initiating unpleasant activities, but they appraise them in a different way. Therefore, people with lower self-control levels experience high behavioral resistance, which they would need to overcome in order to perform the desired goal directed behaviors. People may both strive for a healthier, fitter body, but one person may feel more resistance toward the idea of going to the gym over the other (Gillebaart & Kroese, 2020). In other words, people with low self-control will have a harder time than people with high self-control to get over their 'behavioral

resistance' to perform the actual goal-directed behavior that's required to reach the goal. This is an interesting finding, which introduces a new approach in viewing self-control and performing goal-directed behavior. The current research aims to make a contribution to the extant literature in this field by introducing the concept of regulatory focus theory into the already existing relationship between self-control, behavioral resistance and goal-directed behavior. The next paragraph will outline the regulatory focus theory and explain the influence which it may have on experiencing behavioral resistance while performing goal-directed behaviors.

Regulatory Focus Theory

Apparently, the relationship between self-control and goal-directed behavior is not as simple as initially assumed. Research concludes the factor behavioral resistance plays a role in the performance of goal-directed behavior (Gillebaart & Kroese, 2020). Another study found that individuals with high self-control are more ‘’promotion focused’’ compared to people with lower self-control (Cheung et al., 2014). This state is part of the regulatory focus theory, which goes beyond the basic, widely accepted principle that people approach pleasure and avoid pain (Higgins & Spiegel, 2004). Rather, it examines people's strategic choices and manner of pursuing their goals. The theory proposes that differences in judgmental processes and goal pursuit can occur depending on regulatory focus (Higgins & Spiegel, 2004). Having a promotion focused orientation means that one is focused on advancement, growth, and accomplishment (Higgins,1998). For example, when someone sets goals regarding exercise behavior, the individual is focused on gaining muscle. Contrastingly, an individual with a prevention focused orientation is oriented to security, safety and responsibility (Higgins, 1998). It seeks to avoid failure and mistakes in achievement situations by being careful and precise. For example, when an individual sets goals regarding exercise behavior, the focus will be on avoiding illness or an injury.

Consequently, having a promotion or prevention focused orientation may affect the amount of resistance individuals experience toward certain behaviors or tasks (Joireman et al., 2012). It seems beneficial to adopt a promotion focused orientation, because individuals who adopt a promotion focused orientation have more favorable attitudes toward, and stronger intentions to engage in goal-directed behaviors. (Joireman et al., 2012). Contrastingly, individuals with lower levels of self-control may have more of a prevention focused orientation and may experience high behavioral resistance, which they would need to overcome if they want to perform goal-directed behaviors (Gillebaart & Kroese, 2020).

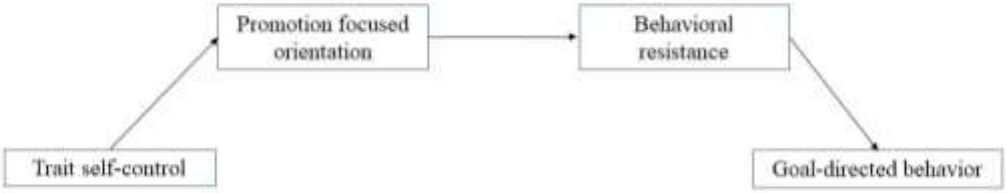
Because regulatory focus is a state which can be momentarily primed by the situation, it seems relevant to investigate whether having either a promotion or prevention focused orientation could be a predictor of the experienced behavioral resistance in performing goal-directed behavior (Cheung et al., 2014; Cesario et al., 2004).

Within this research, the focus will be on the goal directed behaviors eating healthy and engaging in exercise. To investigate whether having a promotion focused orientation has an influence on experienced behavioral resistance and performing successful goal-directed behavior, the following hypotheses will be tested (see Figure 1):

Based on the literature, the expectation is that experienced behavioral resistance in high/low trait self-control individuals when performing goal-directed behaviors, such as healthy eating and exercise behavior, can be explained by having a promotion focused orientation.

Figure 1.

Hypothesized mediation model based on the literature.



Methods

Participants

The present study conducted a power analysis prior to recruitment of participants to ensure that an adequate sample size was obtained. The analysis indicated that a minimum of 115 participants was required in order to achieve a power from 0.80.

The participants were recruited for an online survey through various online social media platforms, such as WhatsApp, email, Instagram, Facebook, LinkedIn, etc. Besides that, snowball sampling was applied by asking participants to send the questionnaire to other potential participants.

In total, the sample consisted of 122 participants after excluding five participants who did not provide informed consent or were below 18 years of age. The number of participants in the final sample was in line with the required sample size (N = 115) to detect a small/medium effect in the mediation study with a power of 0.8 (Fritz & MacKinnon, 2007).

The participant sample had a mean age of 24.55 (SD = 6.28) and the sample included 78 females, 43 males, and one person who identified as 'other'. Regarding education level, 32 participants had completed high school, two participants had completed an apprenticeship, 66 participants obtained a Bachelor's degree, 21 participants obtained a Master's degree and one participant completed a PhD or higher.

In terms of employment status, 32 are employed full-time, 37 participants are employed part-time, 32 participants are unemployed, 10 are self-employed and 11 selected 'other, please specify'.

Additionally, participants rated their English proficiency level, with two participants rating their proficiency as 3, 15 participants gave a score of 4, 41 rated themselves as 5, 48 participants scored a 6 and 16 participants scored a 7. Finally, the sample consisted of 59 international participants and 63 Dutch citizens. Details regarding the administration of the socio-demographic characteristics can be found in appendix A, section 2.

Design

The study consisted of a cross-sectional design, with trait self-control as the independent variable, healthy eating and exercise behavior as the dependent variable and behavioral resistance and promotion focused orientation as mediators.

Measures

Demographic variables

First, questions pertaining demographic variables were asked. Starting off with the question with which gender the participant identifies, with the answering options 'male', 'female', 'other' and 'not prefer to answer'. The next question contained the age in years with an open question box.

After that, the highest achieved education level was asked with the choice options 'high school', 'apprenticeship', 'Bachelor's degree', 'Master's degree', 'PhD or higher' or 'other, please specify'.

Employment status was asked next where participants could choose between 'employed full-time, 'employed part-time', 'unemployed', 'self-employed' and 'other, please specify'.

The following questions considered the level of proficiency of the English language people would rate themselves on a scale from 0 (no knowledge) to 7 (native speaker). The last demographic question was about whether the participant was an international or a Dutch citizen.

Goal-directed behavior

The questionnaire started off with an assessment of behavior. Participants were asked to report how many times they ate a healthy meal in the past seven days. The answering options ranged from 0 to 7 times.

A 'healthy meal' was defined as a meal which is a combination of protein, carbohydrates, healthy fats, and fruits and vegetables and uses minimal saturated fat or added sugar. This question was followed by the question about how many times the participant exercised in the past seven days (0-2, 3-5, 6, or more than 6 times).

'Exercise' was defined as any physical activity that involves movement and increases the heart rate and breathing rate, thereby improving overall physical fitness and health. For example, running, riding a bike, weightlifting or pilates.

Brief Self-Control Scale

Self-control was then measured using the Brief Self-Control Scale. (13 items; Tangney et al., 2004). Example items of this scale are ''I am good at resisting temptation'' and ''I refuse things that are bad for me''. The items were answered on a five-point Likert scale (1 = not at all, 5 = very much). Six items were reversed in order to ensure that a higher score on

the scale indicated a higher amount of self-control. For more details about which items were reverse coded, see appendix A, section 4. The Cronbach's alfa indicated a value of α =.380 which is considered as a low level of internal consistency (Field, 2013). After three items were removed, the Cronbach's alpha increased to α = .710 which can be considered as an acceptable reliability.

Regulatory Focus Questionnaire

To assess whether people have either a promotion or prevention focused orientation, the regulatory focus questionnaire (RFQ) was used (Brockner & Higgins, 2001). This questionnaire consists of 11 questions on how frequently specific events actually occur or have occurred in life. The questionnaire can be divided into two parts, with half of the questions focusing on items regarding promotion focused orientation and the remaining half involves items regarding prevention focused orientation. Example items of this scale are 'compared to most people, are you typically able to get what you want out of life?' or 'do you often do well at different things that you try?' The first question is changed from 'compared to most people, are you typically *unable* to get what you want out of life?' to 'compared to most people, are you typically *able* to get what you want out of life?' Answers from item 2, 4, 5, 6 and 8 were reverse coded, since higher scores on these items indicate having more of a prevention focus. For more details about which items are reverse coded, see appendix A, section 7. Answers were recorded on a 5-point Likert scale ranging from 1 (never or seldom) to 5 (very often). The scales provided a Cronbach's alpha of α = .432, which can be considered as a low reliability.

Behavioral resistance

Behavioral resistance was assessed separately for healthy eating behavior and exercise behavior. For each area of behavior, 10 items assessed how aversive participants felt toward the goal-directed behavior (Gillebaart & Kroese, 2020). Example items of this scale are ''I tend to delay exercising or ''I experience eating healthy as unpleasant''. Per scale, three items were reverse coded, namely the item 'I like eating healthy/exercising', 'I look forward to eating healthy/exercise' and I eat healthy/exercise, even if I'm low on energy'. Answers were recorded on a 7-point Likert scale ranging from 1 (not at all applicable to me) to 7 (very much applicable to me). All items can be found in the appendix. The scales provided a Cronbach's alpha of α = .860 for healthy eating and α = .903 for exercise behavior, which can be considered as highly reliable.

Procedure

The questionnaire used for the current study was submitted and approved by the institution's ethics committee. Participants were not compensated for the study.

In the recruitment text, participants were invited to fill in an online survey through social media. In order to prevent the purpose of the research from being recognized by participants, the recruitment text refers to the general concept of self-regulation, which is the umbrella term for all self-control domains.

Before the participant could start with the questionnaire, the individual first had to give permission for the anonymous use of his/her data. If the participant would not give permission for this, the individual was redirected to a closing screen and thus, the questionnaire was ended. If the participant did give consent, the questionnaire started.

First, demographic questions were asked. Questions about the actual behavior (healthy eating and exercise) followed. After that, participants filled in the Brief Self-Control Scale, the behavioral resistance scale (for healthy eating and exercise behavior separately) and the RFQ[1]. Finally, participants were debriefed.

Data-analysis

The present study utilizes various statistical techniques to examine the data obtained from the questionnaire. Specifically, descriptive statistics were performed on the demographic data of participants. Furthermore, a bivariate correlation analysis was performed to get insight in the relationship between the two distinct goal-directed behaviors. Additionally, reliability analyses were utilized to determine the reliability of the measurement scales. The presence of outliers was identified and adjusted to improve the accuracy of the statistical analysis.

To test the hypotheses, mediation analyses were conducted using the Hayes (2012) PROCESS bootstrapping macro which is a widely accepted technique for estimating indirect effects. The guidelines for estimating indirect effects recommended the use of 1000 bootstrap samples per analysis to ensure the reliability and validity of the results (Gillebaart & Kroese, 2020). Model 6 was used to perform the sequential mediation analysis in SPSS.

[1] Other measures were also included in the questionnaire because of a collaborative effort with related research projects.

Results

Demographics

Sociodemographic characteristics of participants are presented in Table 1. The sample consisted mostly of part-time working Dutch female students.

Table 1

Sociodemographic characteristics of participants.

Baseline characteristic	N	%
Gender		
Female	*78*	*63.9*
Male	*43*	*35.2*
Other	*1*	*.8*
Highest educational level		
High school	*32*	*26.2*
Apprenticeship	*2*	*1.6*
Bachelor's degree	*66*	*54.1*
Master's degree	*21*	*17.2*
PhD or higher	*1*	*.8*
Employment status		
Employed full-time	*32*	*26.2*
Employed part-time	*37*	*30.3*
Unemployed	*32*	*26.2*
Self-employed	*10*	*8.2*
Other, please specify	*11*	*9.0*
Nationality		
Dutch	*63*	*51.6*
International	*59*	*48.4*

Descriptive statistics and correlations are shown in Table 2. The mean of the Behavioural Self Control scale is *M* = 3.22 (SD = .38). This scale contained 6 answering options, ranging from 0 (not at all) to 5 (very much). The mean from the RFQ is *M* = 3.40 (SD = .38), answering options on a scale from 0 (never or seldom) to 5 (very often).
The mean for the amount of healthy meals eaten in the past seven days is *M* = 4.49 days (SD = 1.55) on a scale from 0 to 7 times per week. The mean for the frequency of exercise behavior in the past seven days is *M* = 1.75 (SD = .82). The answering scale ranged from 0-2, 3-5, 6, or more than 6 times. The mean on the experienced behavioral resistance whilst performing exercise related behavior is *M* = 3.37 (SD = 1.23). The mean of the experienced behavioral resistance during healthy eating is *M* = 3.10 (SD = .99). This scale ranges from 0 (not at all applicable to me) to 7 (very much applicable to me) as answering options.

Table 2

Descriptive statistics and correlations for all the key variables.

	Variable	*N*	*Mean*	*SD*	*1*	*2*	*3*	*4*	*5*	*6*
1.	*MeanBSCS*	122	3.22	.38	-	-.46**	-.16	-.15	.17	.06
2.	*MeanRFQ*	122	3.40	.38	-.46	-	.23*	.13	-.23**	-.01
3.	*mBRSeat*	122	3.10	.99	-.16	.23*	-	-	-.51**	-
4.	*mBRSex*	122	3.37	1.23	-.15	.13	-	-	-	-.43**
5.	*Frequency of healthy meals?*	122	4.49	1.55	.17	-.23**	-.51**		-	.30*
6.	*Frequency of exercising*	122	1.75	.82	.06	-.01	-.43**		.30*	-

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Reliability

Brief Self Control Scale

To indicate the internal consistency of the Brief Self Control Scale, a reliability test was performed in SPSS. The Cronbach's alpha is estimated to be α = .380, which is considered very low. An item analysis was conducted. The item-total statistics table indicated that if item 7 (I wish I had more self-discipline), 9 (pleasure and fun keep me from getting work done) and 10 (I have trouble concentrating) were deleted, the Cronbach's alpha would increase. After these items were removed, the Cronbach's alpha is α = .710 which can be considered as sufficiently reliable.

Behavioural Resistance Scale

The reliability analysis regarding the exercise behavior was performed in SPSS, indicating a Cronbach's alpha of α = .90. This can be considered as a high reliability (Field, 2013). Concerning the healthy eating domain, the reliability analysis that was performed showed a Cronbach's alpha of α = .86, which is also a high reliability (Field, 2013).

Regulatory Focus Questionnaire

The initial reliability analysis that was performed indicated a Cronbach's alpha of α = .43. Only after removing question three ('how often have you accomplished things that got you 'psyched' to work even harder?'), five ('how often did you obey rules and regulations that were established by your parents?'), seven ('do you often do well at different things that you try?', nine ('when it comes to achieving things that are important to me, I find that I don't perform as well as I ideally would like to do'), 10 ('I feel like I have made progress toward being successful in my life') and 11 ('I have found very few hobbies or activities in my life that capture my interest or motivate me to put effort into them'), the Cronbach's alpha increased to α = .72, which can be considered as sufficiently reliable.

Correlations

Healthy eating x exercise behavior

To test the hypotheses, correlations between relevant variables were calculated. A correlation analysis was performed on the two types of goal directed behavior included in this research, namely healthy eating and exercise behavior (See table 2). Correlations demonstrated that healthy eating is positively correlated to exercise behavior ($r = .30$, $p < .001$). This association can be interpreted as a moderate correlation, but on the low side, so therefore these variables will be analysed separately in the mediation analysis (Field, 2013).

Healthy eating

Table 2 displays the correlations between self-control level, promotion focused orientation, behavioral resistance, and the self-reported healthy eating behavior. The correlation between self-control and promotion focused orientation show that there's a negative association (r = -.46, p = < .001).

Correlation between self-control and behavioral resistance show that there is no self-control significant relationship with behavioral resistance (r = -.16, p = .09). The correlation between self-control and exercise behavior show that there is no relationship found between self-control and frequency of healthy meals eaten in a week (r = .17, p = .06).

Exercise behavior

Table 4 displays the correlations between promotion focused orientation, self-control level, behavioral resistance, and the self-reported exercise behavior.
Correlations between self-control and behavioral resistance show that self-control is not correlated to behavioral resistance (r = -.15, p = .09)

Correlations between self-control and exercise behavior showed that there is no relationship found between self-control level and the reported amount of exercise behavior (r = .06, p = .53). Trait self-control is negatively correlated to having a promotion focused orientation (r =.-.46, p < .001)

Mediation analysis

Mediation analyses were conducted using Hayes (2012) PROCESS macro with 1,000 bootstrap samples per analysis. Model 6 was used to perform the sequential mediation analysis in PROCESS. Mediation pathways are displayed in figures 1 and 2.

Healthy eating

Using the PROCESS macro (Hayes), indirect effects were estimated, with 1.000 bootstrap samples per analysis. Mediation pathways are displayed in Figure 2.
Trait self-control is negatively significantly related to promotion focused orientation (b = -.88, p < .001). Behavioral resistance is negatively significantly related to eating behavior (b = -.74, p < .001). For an overview of all the coefficients for associations within this mediation analysis, see figure 2.

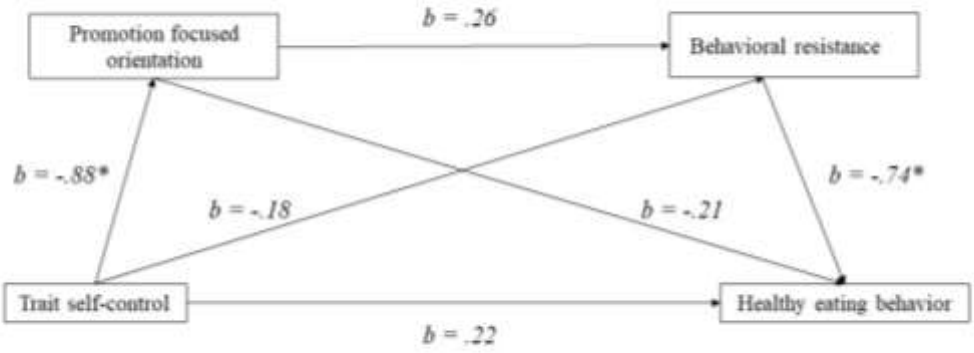
The total effect of self-control on eating behavior is b = .71 (p = .06).

The indirect effect of motivational orientation on behavioral resistance toward eating healthy in the association between trait self-control and reported frequency of healthy meals was estimated at b = .49 (95% CI [-.0314 – 1.0511]).

The confidence interval does include zero, indicating insignificant mediation by behavioral resistance. To conclude, the relationship between self-control and healthy eating behavior cannot be explained having a promotion focused orientation.

Figure 2

*Mediation pathways including PROCESS macro (Hayes, 2012) unstandardized coefficients for associations between self-control, promotion focused orientation, behavioral resistance and healthy eating behavior. * means: significant effect.*



Exercise behavior

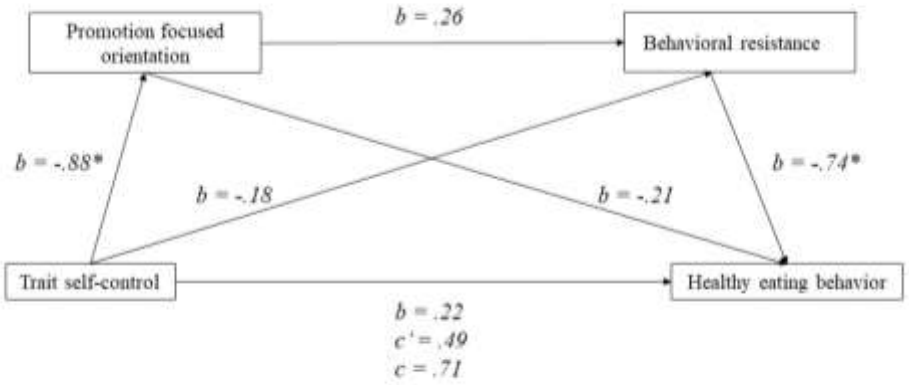
Using the PROCESS macro (Hayes), indirect effects were estimated. Trait self-control is significantly negatively related to promotion focused orientation (b = -.88, p < .001). Behavioral resistance is negatively significantly related to exercise behavior (b = -.29, p < .001). For an overview of all the coefficients for associations within this mediation analysis, see figure 3.

The total effect between self-control and exercise behavior is b = .13 (p = .53). The indirect effect of motivational orientation on behavioral resistance toward exercise behavior in the association between trait self-control and reported frequency of exercise behavior was estimated at b = .09 (95% CI [-.1593 - .3233]).

The confidence interval does include zero, indicating insignificant mediation by promotion focused orientation and behavioral resistance. To conclude, the relationship between self-control and exercise behavior cannot be explained by promotion focused orientation.

Figure 3

*Mediation pathways including PROCESS macro (Hayes, 2012) unstandardized coefficients for associations between self-control, promotion focused orientation, behavioral resistance and exercise behavior. * means: significant effect.*



Discussion

Findings

This research aimed to provide insight into the underlying mechanisms of successful self-control and has been done as an extension of Gillebaart & Kroese's (2020) study. The relevance of this research lies in the application of the current findings in order to support people with lower levels of self-control. Low self-control is associated with a range of negative effects, for example obesity and substance abuse (Tangney et al., 2004, De Ridder et al., 2012). Gillebaart & Kroese (2020) found that behavioral resistance serves as a mediator in the relationship between self-control and goal-directed behavior. Therefore, the current research aimed to examine the potential mediating role of having a promotion focused orientation and added this to the already existing mediation model from Gillebaart & Kroese (2020). The expectation was that experienced behavioral resistance in high/low trait self-control individuals when performing goal-directed behaviors can be explained by having a promotion focused orientation.

To begin with, a correlation analysis was performed between the two goal-directed behaviors. Results indicate a positive, moderate correlation between the two goal-directed behaviors healthy eating and exercise. Therefore, separate mediation analyses were performed for each behavior. After that, two correlation analyses were performed between the four different variables: self-control, promotion focused orientation, behavioral resistance and either healthy eating or exercise behavior. The correlation analysis showed a moderate negative relation between self-control and promotion focused orientation and a strong negative relation between behavioral resistance and both healthy eating and exercise behavior (Field, 2013). This means that having more self-control is related to having more of a prevention focus, which is not in line with the literature. The negative relationship between behavioral resistance and both goal-directed behaviors means that experiencing more behavioral resistance is related to lower frequencies of goal-directed behaviors. This is in line with the literature by Gillebaart & Kroese (2020).

Surprisingly, the significant data from the mediation analyses indicate a negative relationship between trait self-control and promotion focused orientation. Since having a higher score on the RFQ indicates having more of a promotion focus, this means that having high self-control is associated with having more of a prevention focus (Higgins, 1998). This is not in line with the existing literature which suggests that individuals with high self-control are more promotion focused compared to people with lower self-control (Cheung et al.,

2014). According to literature regulatory focus is dependent on the specific circumstances involved (Higgins, 1998). Situations that offer potential for gains may be associated with a situational promotion focus, while situations that require avoiding losses are associated with a prevention focus (Fellner et al., 2007) Besides, individuals with a dispositional promotion focus and individuals with a dispositional prevention focus can deliver an equally good performance. The difference lies in the manner in which the goals are to be achieved and in the goals themselves (Fellner et al., 2007). This may indicate that it's not necessarily advantageous to have a promotion focus and disadvantageous to have a prevention focus concerning the relationship between self-control and goal-directed behavior. It may be dependent on the situation. It might explain the negative relationship between self-control and promotion focused orientation.

The mediation analysis also showed a negative significant relationship between behavioral resistance and both of the goal-directed behaviors which is in line with literature concluding that experiencing lower levels of resistance is associated with higher frequencies of goal-directed behavior (Gillebaart & Kroese, 2020). However, both mediation analyses show insignificant relationships between self-control and the goal-directed behavior. There is no significant relationship found between promotion focused orientation and behavioral resistance. Besides that, confidence intervals regarding total and indirect effects regarding both analyses include zero. To conclude, no evidence is found for the expected sequential mediational effect.

Alternative explanations

Reliability RFQ

Several methodological limitations might explain the non-significant findings of this study. In the current research, the questionnaire by Higgins & colleagues (2001) was used to measure dispositional regulatory focus. However, the reliability analysis that was performed on the RFQ showed a Cronbach's alfa of $\alpha = .432$. Only after removing six questions (three regarding promotion focus, three regarding prevention focus), the reliability increased to a Cronbach's alfa of $\alpha = .716$. An explanation may be that the RFQ items relate to situations experienced in the past, mostly in childhood, in which success or failure were experienced in promotion or prevention contexts. This questionnaire is based on research which found that when one faces a new task, feelings develop which are linked to past tasks. Each new task elicits a feeling of pride in individuals with a subjective history of success. This should

activate energy which allows the individual to pursue the new objective. A new task can also trigger feelings of shame in individuals with a subjective history of failure, who then seek to deflect the new task. By focusing on events that occurred many years ago, the intention was to reduce the tendency to give socially desirable responses. However, it needs to be considered that answers can be less precise due to aging (Fellner et al., 2007).

Self-reports

Another limitation that needs to be taken into account relates to the drawbacks that come along with using self-reports to gauge self-control, promotion focused orientation, behavioral resistance and goal-directed behavior. As can be concluded from the correlation analysis, the variables didn't correlate with the two goal-directed behaviors. The questions regarding exercise and healthy eating are highly susceptible to social desirability influences. Additionally, the assessment of goal-directed behavior relied on one single question, whereas Gillebaart & Kroese (2020) measured healthy eating and exercise behavior by asking three questions. Participants may possess their own standards, norms and expectations regarding goal-directed behaviors. which can influence their perception and reporting on their past performance of these behaviors (Corder et al., 2010). When the definition of goal-directed behaviors is abstract, it may be subject to interpretation of what exercise is (Gillebaart & Kroese, 2020). Even more, people may lack awareness of their health behavior, or they overestimate or underestimate their exercise behavior. For example, many students are active but do not perceive the activity as aerobic exercise, such as games they play with friends, running for the bus or dash up the stairs (Corder et al., 2010). Thresholds between healthy and unhealthy behavior may be unclear (Corder et al., 2010). Although definitions for healthy eating and exercise were provided, only assessing the behavior by asking one question limits the generalizability of the results across behavioral domains.

The sample's mean age

Another explanation for the findings could be attributed to the significantly lower mean age of the participants in the current study compared to the study conducted by Gillebaart & Kroese (2020). Existing literature suggests that people between 30 and 35 years of age show the highest levels of self-control (Oliva et al., 2019). In the current research, the sample had a mean age of 24.5 years, whereas Gillebaart en Kroese (2020) reported a mean age of 30 years and most of the participants were students. Casey & colleagues (2008) suggest that cognitive development through adolescent years is associated with progressively greater

efficiency of self-control capacities. Goal-directed behavior requires the control of impulses to delay gratification for optimization of outcomes and this ability appears to mature across childhood and adolescence (Casey et al., 2008). Students' brains are still in development and their lifestyles differ ca lot from those aged 30 years or above (Oliva et al., 2019). According to Deliens & colleagues (2014), university is a critical period regarding unhealthy changes in eating behaviors in students. Students report to be influenced in their healthy eating and exercise behavior by individual factors, such as time, convenience and having exams.

Cross-sectional design

Finally, the cross-sectional nature of the designs prevents causal conclusions from being drawn regarding the associations between self-control, motivational orientation, resistance and behavior. According to literature, regulatory focus may guide goal selection and goal-pursuit strategy (Fellner et al., 2007). This assumes that it cannot be ruled out that the supposed causality between motivational orientation and goal-directed behavior is reverse.

Future recommendations

Other scales to measure regulatory focus

Fellner & colleagues state that because the RFQ by Higgins (1998) is outdated, it may be necessary to use a more recently developed questionnaire to measure regulatory focus. Fortunately, several new instruments have been developed to determine dispositional regulatory focus. For example, the Two-Factor Consideration of Future Consequences-14 Scale by Joireman & colleagues (2012). Consideration of Future Consequences (CFC) is the extent to which people consider the potential distant outcomes of their current behaviors and are influenced by those potential outcomes. Joireman & colleagues (2012) suggest that the goal-directed strategies involved in a promotion focused orientation are likely to arise out of a broader tendency to focus on the future consequences of one's actions, whereas goal-directed strategies inherent in a prevention focus are likely to arise out of a broader tendency to focus on immediate consequences of one's actions. Theoretical considerations suggest that people scoring high on the CFC-Future scale will tend to adopt a promotion focused orientation, whereas those scoring high on the CFC-Immediate scale will tend to adopt a prevention orientation.

Lockwood & colleagues (2002) developed a questionnaire for measuring regulatory focus which possesses strong face validity. It contains two subscales assessing the strength of a promotion focused orientation (''I frequently imagine how I will achieve my hopes and

aspirations'') and a prevention orientation (''In general, I am focused on preventing negative events in my life''). In total there are 18 items to answer on a 9-point scale ranging from not at all true to very true of me. In contrast to the items in the RFQ, the items in this questionnaire relate to current attitudes, actions and habits. The Cronbach's alfa of this scale is $\alpha = .80$, which can be considered as a high reliability (Lockwood et al., 2002). Future research should consider including one of the above discussed measures to assess whether participants have a promotion or a prevention focus.

Other ways of assessment for goal-directed behaviros

Since people have their own standards, norms and expectations regarding goal-directed behaviors, other assessments than self-report should be considered in future research to acquire a higher reliability and validity of the goal-directed behaviors. For example, consideration of behavioral observations, implement diary-keeping protocols for participants or investigate implicit measures of how people experience self-control. In order to achieve valid and reliable results, more clear-cut and concrete questions regarding the behaviors should be employed (Gillebaart & Kroese, 2020).

Cross-sectional design

To address the limitation regarding the cross-sectional design, future research should investigate the causal chain, for example by conducting longitudinal studies. Gaining a more comprehensive understanding on the underlying mechanisms of the concept of behavioral resistance and regulatory focus is crucial for developing interventions in the future that could reduce the experience of behavioral resistance and help people reach their goals.

Conclusion

Due to insignificant results within both mediation analyses, it cannot be concluded that promotion focused orientation has a mediating role in this relationship between self-control and goal-directed behavior. Future research should use another scale to measure regulatory focus since the regulatory focus scale is outdated and more recently developed scales indicate high reliability and validity. Furthermore, future research should use other ways than self-report to measure goal-directed behaviors, such as asking participants to keep a food diary or investigate implicit measures. Finally, a longitudinal research design should be done in future research in order to draw conclusions about causality between the variables. It may hold critical importance to focus on adaptation of motivation orientation, given its malleability.

Due to lack of significant results, conclusions should be very carefully made, highlighting the necessity for more research to enhance knowledge in this area.

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Appendix A: Questionnaire

Section 1: Informed consent

Information letter

Information for individuals invited to participate in (social) scientific research on self-control in performing goal-directed behaviors.

19th of February, 2023

Introduction

Dear participant,

By means of this letter, we would like to invite you to participate in the research project on self-control. The purpose of this study is to gain more insight into the role of self-control in performing goal-directed behaviors because self-control is a key component of achieving long-term goals. Understanding how self-control works could have implications for areas such as health and education.

Design/execution of the study

The online survey in Qualtrics will first ask for demographic data such as your gender, age and education level. We will then ask you to complete a number of questions. The survey concludes with a debriefing section in which the study goals and expectations are communicated.

Background of the study

The data resulting from the questionnaires are input for three master's theses that focus on self-regulation. With our studies, we want to contribute to broadening scientific knowledge on this topic and replicate results.

What is expected from you as a participant

The questionnaire will consume 15 minutes of your time. You can complete the questionnaire online via Qualtrics. We would like to ask you to answer the questions truthfully and at your own discretion. We have kept the questionnaire as short as possible to burden you as little as possible.

Possible advantages and disadvantages of the study

You will not benefit directly from participating in this study. The research may provide useful data for the future scientific research. For example, research into self-control can provide fundamental insights into goal-directed behaviour.The questionnaire will take approximately

15 minutes to complete. There are a number of questions about eating behaviour and exercise. These may be sensitive topics for some people and could be triggering. Please keep in mind that you do not have to answer any questions you do not wish to complete, and you can exit the survey at any point.

Confidentiality of data processing

This study requires us to collect some of your personal data. We need this data in order to be able to answer the research question properly. The computer on which your personal details is stored is secured with a security code and only researchers involved will have access to this data. Your data will be stored for at least 10 years. This is in accordance with the guidelines provided by the VSNU Association of Universities in the Netherlands.
Please refer to the website of the Authority for Personal Data: https://autoriteitpersoonsgegevens.nl/nl/onderwerpen/avg-europese-privacywetgeving, for more information about privacy.

Voluntary participation

Participation in this study is voluntary. You can end your participation in the study at any time, without any explanation and without any negative consequences. If you end your participation, we will use the data collected up to that point, unless you explicitly inform us otherwise.

Independent contact and complaints officer

If you have any questions or comments about the study, please contact Marieke Vermue (m.vermue@uu.nl).
If you have an official complaint about the study, you can send an email to the complaints officer at klachtenfunctionaris-fetcsocwet@uu.nl.
If, after reading this information letter, you decide to take part in the research, we would kindly ask you to give your informed consent.

With kind regards,

Lisa Pap, Mila Arsenijević and Britt van der Matten

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Informed consent. I hereby declare that I have read the information letter about the self-control study and agree to participate in the study.

- ○ I give consent. (1)
- ○ I do not give consent. (2)

Section 2: Socio-demographic characteristics

Firstly, we would like to ask you to complete these demographic questions.

Q1 – Gender. What gender do you identify with?

- ○ Male (1)
- ○ Female (2)
- ○ Other (3)
- ○ Prefer not to answer (4)

Q2 – Age. What is your age in years?

_____

Q3 – Education. What is the highest level of education you have completed?

- ○ High school (1)
- ○ Apprenticeship (2)
- ○ Bachelor's degree (3)
- ○ Master's degree (4)
- ○ PhD or higher (5)
- ○ Other, please specify: (6)

_____

Q4 – Employment. What is your employment status?

- ○ Employed full-time (1)
- ○ Employed part-time (2)
- ○ Unemployed (3)
- ○ Self-employed (4)
- ○ Other, please specify: (5) _____

Q5 – English. How would you rate your level of English? (0=no knowledge, 7=native speaker)

	0 1 2 3 4 5 6 7
()	

Q6 – Nationality. Are you an international citizen or Dutch citizen?

- ○ International (1)
- ○ Dutch (2)

Section 3: Goal-directed behavior

Information block

In the next section, we will ask you some questions regarding eating, exercise and study behaviour.

Q7 - SC_behavior1 A *'healthy meal'* is a meal which is a combination of protein, carbohydrates, healthy fats, and fruits and vegetables and uses minimal saturated fat or added

sugar.

1. How often did you eat a healthy evening meal in the past seven days?

	0 1 2 3 4 5 6 7
()	

Q8 - SC_behavior2 '*Exercise*' is any physical activity that involves movement and increases the heart rate and breathing rate, thereby improving overall physical fitness and health. For example, running, riding a bike, weight lifting or pilates.

2. How many times have you exercised in the past seven days?

- ○ 0-2 (1)
- ○ 3-5 (2)
- ○ 6 (3)
- ○ More than 6 times (4)

Q9 - SC_behavior3 If you are not a student, you can skip this question.

'*Studying*' can be defined as the process of learning or acquiring knowledge through reading, researching, practicing, or memorizing information. For example, studying for a course at the university.

3. How many hours have you spent on your studies in the past seven days?

- ○ 0-10 (1)
- ○ 11-20 (2)
- ○ 21-30 (3)
- ○ 31-40 (4)
- ○ More than 40 hours (5)

Q35 If you are not working, you can skip this question.

4. How many hours have you spent working (part-time or full-time job) in the past seven days?

- ○ 0-10 (1)
- ○ 11-20 (2)
- ○ 21-30 (3)
- ○ 31-40 (4)
- ○ More than 40 hours (5)

Section 4: Self-control

Information block In the next section, we ask you to indicate whether you agree with the following statements about yourself. You can indicate your answers on a scale from 1 (not at

all) to 5 (very much).

Q10 - BSCS How much do you agree with the following statements?

	1 (not at all) (1)	2 (2)	3 (3)	4 (4)	5 (very much) (5)
1. I am good at resisting temptation (1)	○	○	○	○	○
2. I have a hard time breaking bad habits. (2)*	○	○	○	○	○
3. I am lazy. (3)*	○	○	○	○	○
4. I say inappropriate things (4)*	○	○	○	○	○
5. I do certain things that are bad for me, if they are fun. (5)*	○	○	○	○	○
6. I refuse things that are bad for me (6)	○	○	○	○	○
7. I wish I had more self-discipline. (7)	○	○	○	○	○
8. People would say that I have iron self-discipline. (8)	○	○	○	○	○
9. Pleasure and fun sometimes keep me from getting work done. (9)	○	○	○	○	○
10. I have trouble concentrating. (10)	○	○	○	○	○

11. I am able to work effectively toward long-term goals. (11)	○	○	○	○	○
12. Sometimes I can't stop myself from doing something, even if I know it is wrong. (12)*	○	○	○	○	○
13. I often act without thinking through all the alternatives. (13)*	○	○	○	○	○

*Item is reverse coded.

Section 5: Behavioral Resistance Scale (Exercise Behavior)

Information block Now, we would like to ask you to indicate whether these statements regarding exercise behaviour apply to you. You can indicate your answers on a scale from 1 (not at all) to 7 (very much applicable to me).

Q11 - BRS_exercise To what extent do the following statements apply to you?

	1 (not at all) (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 (very much applicable to me) (7)
1. Sometimes I don't have the energy to exercise. (1)	○	○	○	○	○	○	○
2. Just the thought of exercising makes me want to not do it. (2)	○	○	○	○	○	○	○
3. I tend to delay exercising. (3)	○	○	○	○	○	○	○
4. Sometimes I just do something easier than exercising because I don't feel like doing it. (4)	○	○	○	○	○	○	○
5. Sometimes I allow myself to not exercise. (5)*	○	○	○	○	○	○	○
6. I experience exercising as unpleasant. (6)*	○	○	○	○	○	○	○

7. Sometimes I delay exercising because I don't feel like doing it. (7)*	○	○	○	○	○	○	○
8. I like exercising. (8)	○	○	○	○	○	○	○
9. I look forward to exercising. (9)	○	○	○	○	○	○	○
10. I do exercise even if I am low on energy. (10)	○	○	○	○	○	○	○

*Item is reverse coded.

Section 6: Behavioral Resistance Scale (Healthy Eating)

Information block We would also like to ask you to indicate whether these statements regarding eating behaviour apply to you. You can indicate your answers on a scale from 1

(not at all) to 7 (very much applicable to me).

Q12 - BRS_eating To what extent do the following statements apply to you?

	1 (not at all applicable to me) (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 (very much applicable to me) (7)
1. Sometimes I don't have the energy to eat healthily (1)	○	○	○	○	○	○	○
2. Just the thought of eating healthy makes me want to not do it. (2)	○	○	○	○	○	○	○
3. I tend to delay eating healthy. (3)	○	○	○	○	○	○	○
4. Sometimes I just do something easier than eating healthy because I don't feel like doing it. (4)	○	○	○	○	○	○	○
5. Sometimes I allow myself to not eat healthily. (5)*	○	○	○	○	○	○	○

6. I experience eating healthy as unpleasant. (6)*	○	○	○	○	○	○	○
7. Sometimes I delay eating healthy because I don't feel like doing it. (7)*	○	○	○	○	○	○	○
8. I like eating healthy (8)	○	○	○	○	○	○	○
9. I look forward to eating healthy. (9)	○	○	○	○	○	○	○
10. I do eat healthily even if I am low on energy. (10)	○	○	○	○	○	○	○

*Item is reverse coded.

Section 7: Regulatory Focus Questionnaire

Q14 - RFQ This set of questions asks you how frequently specific events actually occur or have occured in your life. Please indicate which option applies the most to you.

	1. Never or seldom (1)	2. (2)	3. Sometimes (3)	4. (4)	5. Very often (5)
1. Compared to most people, are you typically able to get what you want out of life? (1)	○	○	○	○	○
2. Growing up, would you ever "cross the line" by doing things that your parents would not tolerate? (2)	○	○	○	○	○
3. How often have you accomplished things that got you "psyched" to work even harder? (3)	○	○	○	○	○
4. Did you get on your parents' nerves often when you were growing up? (4)	○	○	○	○	○
5. How often did you obey rules and regulations that were established by your parents? (5)	○	○	○	○	○

6. Growing up, did you ever act in ways that your parents thought were objectionable? (6)	○	○	○	○	○
7. Do you often do well at different things that you try? (7)	○	○	○	○	○
8. Not being careful enough has gotten me into trouble at times. (8)	○	○	○	○	○
9. When it comes to achieving things that are important to me, I find that I don't perform as well as I ideally would like to do. (9)	○	○	○	○	○
10. I feel like I have made progress toward being succesful in my life. (10)	○	○	○	○	○
11. I have found very few hobbies or activities in my life that capture my interest or motivate me to put effort into them. (11)	○	○	○	○	○

Section 8: Debriefing

You have reached the end of the questionnaire, thank you for your time! On the next page, you will find the debriefing letter, which includes more information about the study.

Debriefing letter

Dear participant,

Thank you for taking part in our study on self-control in performing goal-directed behaviors. Your participation has contributed to our understanding of this important topic, and we greatly appreciate your time and effort.

As we explained in the information letter, the purpose of the study was to gain insight into the role of self-control in performing goal-directed behaviors. To do this, we asked you to complete a number of questionnaires on self-control, mindset, self-esteem, behavioural resistance, regulatory focus, and eating study or exercise behaviours.

We would like to take this opportunity to provide you with some additional information about the study, and to answer any questions you may have.

Firstly, we can assure you that your data will be kept confidential and secure. All data will be stored on a password-protected computer, and only authorized members of the research team will have access to it.

Secondly, we want to emphasise that your participation was entirely voluntary and we are grateful that you chose to participate, and hope that you found the experience informative and engaging.

Finally, we want to thank you again for your participation, and to remind you that the data collected in this study will be used to contribute to scientific knowledge about self-control in goal-directed behavior. We hope that the insights gained from this research will be useful for developing interventions to improve self-control and goal achievement in the future.

If you have any questions or concerns about the study, please do not hesitate to contact us. Our contact information is included in the information letter.

Thank you again for your participation, and we wish you all the best.

Sincerely,

Lisa Pap, Mila Arsenijević and Britt van der Matten