Exploring the Role of Self-Regulation as a Mediator in the Connection of Mindfulness and Health Behaviors

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Yuval Surpin

Mentor: Professor Terry DiLorenzo, Psychology

Abstract

Given the concerning rates of poor nutrition and physical inactivity, mindfulness has been suggested as a method that could bring a positive change in health behaviors, in terms of diet and exercise. Previous studies showed a connection between mindfulness and health behaviors. However, the mechanism behind this link is still unclear. Due to previous research that found self-regulation to be related to both mindfulness and health behavior, the current study examined the potential role of self-regulation as a mediator between trait mindfulness and self-regulation. That is, mindfulness predicts self-regulation which in turn predicts health behaviors. To test this, 32 female undergraduate students completed a survey that looked at levels of mindfulness, self-regulation, physical activity, and diet quality. Correlations were computed to examine the mediation model. Contradictory to the study's hypothesis, the study did not find a connection between mindfulness, health behavior, and self-regulation, or between self-regulation and health behaviors. The study's small and homogenous sample size and the timing that the survey was given are suggested as possible reasons for the unexpected results. In addition, the fact that shortened versions of the measures were used in the survey is discussed as a potential limitation. Recommendations for future studies looking for the role of self-regulation as a mediator between mindfulness and health behaviors are provided. Increased knowledge in the field could benefit health education programs and interventions.

Keywords: mindfulness, self-regulation, health behavior, physical activity, diet

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Connection of Mindfulness and Health Behaviors

The most common causes of death and illness in the United States are chronic diseases like diabetes, cancer, and heart disease. Limited physical activity and poor eating habits are contributing risk behaviors to these conditions. A meta-review from 2021 reported that 41% of American adults ate fruit less than one time per day, ate vegetables less than one time per day, and 78% of low and middle-income families across the globe eat less than five fruits and vegetables on a daily basis. In terms of physical activity, the data is equally as grim, with 26% of Americans reportedly not involved in any physical activity and less than 23% meeting the public health guidelines for aerobic and strength training activities (Spring et al., 2021). Engaging in health-promoting behaviors, such as the maintenance of a healthy diet and regular practice of physical activity can prevent these chronic diseases and reduce the risk of early mortality in addition to improvement of physical health. Thus, identifying the predictors for engagement in health behaviors is highly important. Since engagement in different health behaviors often co-occurs, it is possible that there are shared individual difference factors that contribute to these behaviors. Identifying the common determinants of them can help understand the psychology behind health behavior and improve health (Sala et al., 2020).

A large body of research has focused on mindfulness as an important common factor that underlies health behaviors, and in turn affects health outcomes (Sala et al., 2020). Previous research suggests that mindfulness could bring a positive change in health behaviors, in terms of diet and exercise (Sala et al., 2020; Gilbert & Waltz, 2010; Neace et al., 2022). Mindfulness, commonly defined as "the ability to purposefully bring one's attention to present-moment experience with acceptance, non-judgment, and non-reactivity" (Sala et al., 2020, p. 345) is a

Buddhist-based concept that has received a large amount of attention by clinicians and researchers in the fields of psychology and medicine in recent years. When mindful, a particular way of orientation to one's internal and external experiences takes place, characterized by a self-compassionate curiosity attitude (Gilbert & Waltz, 2010). Trait, or dispositional, mindfulness refers to individual differences in the general level of mindfulness across different situations and time frames. Dispositional mindfulness is often identified by five components, which include Observe, Describe, Act with Awareness, Nonjudging, and Nonreactivity (Sala et al., 2020).

Previous studies suggested that dispositional mindfulness is associated with better health behaviors (Sala et al., 2020). Thus, interventions that increase mindfulness might also increase healthy behaviors (Gilbert & Waltz, 2010). Furthermore, emerging evidence suggests that mindfulness can enhance self-regulation (Sala et al., 2020), a quality that was linked to healthy habits as well (Hennessy et al., 2020). However, the role of self-regulation in the association of trait mindfulness and health behaviors has not been explored. Thus, previous reviews that looked at the connection between mindfulness and health behaviors suggested that future studies look at self-regulation within the connection of trait mindfulness and health behaviors. Specifically, research should investigate whether self-regulation holds a mediation model, that includes mindfulness, self-regulation, and health behaviors (Sala et al., 2020; Boyle & Mosewich, 2021). Furthermore, in addition to the identified mindfulness components (Sala et al., 2020), Peter Mezo's self-regulation scale also includes three components: self-monitoring, self-evaluating, and self-reinforcing (2009). Therefore, a second goal of the study is to conduct an exploratory analysis examining the association between specific components of mindfulness and self-regulation and their correlations with each other and health behavior. Looking closer at the role of self-regulation in the connection of mindfulness and health behaviors will provide a deeper

understanding of the relationship and help build more precise programs that target the required

skills for engagement and maintenance of health behavior and thus improve general health. It is

hypothesized that:

1. Higher trait mindfulness will be associated with a healthier diet (higher diet quality) and a

   healthier physical activity routine (higher level of weekly physical activity).

2. Higher self-regulation will be associated with a healthier diet (higher diet quality) and a

   healthier physical activity routine (higher level of weekly physical activity).

3. Higher trait mindfulness will be associated with higher self-regulation.

4. It is expected that self-regulation will mediate the connection between trait mindfulness

   and health behaviors (healthy diet and physical activity). To determine such a mediation

   model, dispositional mindfulness will be tested for its association with both self-

   regulation and health behaviors. Then, by controlling for the effects of self-regulation, the

   relation between trait mindfulness and health behaviors is expected to reduce. The

   direction of mediation will be determined by comparison of the relative changes in the

   parameter estimates.

Conceptualizing and Measuring Mindfulness

Trait Vs. State Mindfulness

   Mindfulness is seen both as a reliable individual difference (i.e., trait) and as a

momentary experience that varies within a person across different contexts and times (i.e., state).

Individuals are expected to have the trait capacity of mindfulness across contexts, while state

levels of mindfulness vary over time during different activities and situations, regardless of the

general level of dispositional mindfulness. That being said, people who are high in trait

mindfulness are expected to experience mindful states more frequently than people who are low

on that trait. Therefore, the literature often views mindfulness as a flexible target for interventions as it is suggested that people can be trained to develop the ability to pay attention in the sustained and specific way taking place in mindfulness. In fact, helping people to develop skills for developing mindful states is also expected to increase trait mindfulness over time (Yang & Conroy, 2020). In our study, we chose to take the trait perspective of mindfulness because most of the previous research that was done in the field of mindfulness and health behaviors has focused on dispositional mindfulness, while only a few included mindfulness state (Sala et al., 2020).

Facets of Mindfulness

Mindfulness has been viewed as a multifaceted construct with different operational definitions proposed. The present study focused on Baer et al. (2006) approach to mindfulness, who used factor analysis to identify five components of mindfulness: Observe, Describe, Act with Awareness, Nonjudge, and Nonreact (Baer et al., 2006). The Observe factor refers to one's ability to notice internal and external stimuli (Sala et al., 2020), reflecting awareness of bodily sensations, such as how foods and drinks impact the body, thoughts, and emotions as well as how emotions impact thoughts and behavior (Gilbert & Waltz, 2010). The Describe factor refers to the ability to give words to different experiences, such as thoughts and feelings. The Act with Awareness factor refers to the person's attendance of present-moment activities with full attention or the ability to focus awareness on one thing at a time, reflecting one's complete participation and awareness of daily activities, in contrast to distraction. The Nonjudge factor refers to the ability to take a non-evaluative approach toward one's thoughts and feelings, responding to internal experiences with acceptance instead of judgment (Sala et al., 2020; Gilbert & Waltz, 2010). People who are more nonjudgmental are usually less critical of their present

experiences. The Nonreact factor refers to one's ability to allow for thoughts and feelings to come and go without getting caught up in them (Sala et al., 2020) or automatically responding to the action urges that are associated with them (Gilbert & Waltz, 2010). Individuals who are more nonreactive are more equipped to avoid reacting to events impulsively. By using exploratory factor analyses of a combined pool of items that were taken from existing mindfulness questionnaires, these five facets were retrieved and thus provided support for the presence of the subdivision components of mindfulness (Sala et al., 2020).

Mindfulness and Health Behaviors

Higher levels of mindfulness can promote physical health by associating with health behaviors. Important parts of mindfulness, such as focusing on the present and giving attention to internal experiences can influence daily lifestyle choices, including diet and physical exercise (Murphy et al., 2012). Previous research found that both state and trait mindfulness were related to healthier eating. It was suggested that this may partly be due to increased responsiveness to physiological cues after the intake of food (Friese & Hofmann, 2016). Mindfulness was also found to be negatively associated with binge eating (Roberts & Danoff-Burg, 2010). Furthermore, in their study that investigated mindfulness and health behaviors, Gilbert and Waltz found higher levels of mindfulness to be related to fruit and vegetable intake and to dietary self-efficacy (2010). In terms of physical activity, Gilbert and Waltz found that higher levels of mindfulness were related to higher levels of moderate and vigorous physical activity and to exercise self-efficacy (2010). Trait mindfulness was also positively correlated with higher frequency and with the total volume of physical activity among college students (Gilbert & Waltz, 2010; Roberts & Danoff-Burg, 2010; Yang & Conroy, 2020). Moreover, trait mindfulness

was positively associated with the maintenance of physical activity, the achievement of exercise

goals, and with enjoyment and satisfaction from physical activity (Yang & Conroy, 2020).

Conceptualizing and Measuring Self-Regulation

Defining Self-Regulation

Self-regulation refers to "self-generated thoughts, feelings, and actions that are planned

and cyclically adapted to the attainment of personal goals." It reflects a process by which a

person seeks to achieve goals through the self-directed use of highly specific strategies and their

modification. The self-regulation process has been linked to optimal functioning in children,

adolescents, and adults in different areas, including mental and physical health (Sandars &

Cleary, 2011, p. 875).

Facets of Self-Regulation

Self-regulation is a construct that involves a particular set of abilities. It underlies self-

governing behavior change and may be organized in three core facets: self-monitoring (SM),

self-evaluation (SE), and self-reinforcement (SR) (Short et al., 2016). In the self-monitoring

phase, the person monitors the status and context of the target behavior (i.e., an action, thought,

or emotion). Next, during the self-evaluation phase, the person compares the target behavior to

their internalized standard of that behavior and identifies the discrepancies. Following that

comparison, in the final phase the person engages in self-reinforcement, which may involve

either self-reward or self-punishment and may be overt or covert (Mezo, 2009). An example of

the self-regulation process following these phases was given in Short and colleagues' article,

which looked at the role of self-regulation as a mediator in the connection of dispositional

mindfulness and well-being: think of a person who wishes to decrease their "road rage." To do

that, they may self-monitor their behaviors and emotions during the drive. Then, they would self-

evaluate their behaviors and emotions according to their internalized standards and self-reinforce themselves with self-praise in cases when they do not engage impulsively in anger with other drivers on the road. Therefore, self-regulation leans on one's ability to be aware of and identify their emotions and behavior (2016).

Self-Regulation and Health Behaviors

Self-Regulation has been associated with both healthy diet and physical activity (Ahn et al., 2016; Johnson et al., 2012; Dassen et al., 2018). In his article discussing self-regulation and health promotion, Albert Bandura argued that health habits are not changed by one's will, but instead, self-management requires the practice of motivational and self-regulatory abilities. According to Bandura, the process includes the self-monitoring of the health behavior as well as the social and cognitive conditions the person engages in, the adoption of goals that will guide the person's efforts and the strategies for accomplishing them, and self-reactive influences such as the recruitment of self-motivating incentives and social support to maintain the health behavior (Bandura, 2005). Thus, self-control skills may help an individual to better monitor and regulate their dietary intake as well as their engagement in physical activity (Gilbert & Waltz, 2010). For diet regulation to be successful, one must resist tempting foods and keep health in mind for the long term. While a lack of self-control relates to unhealthy weight (Dassen et al., 2018), the ability to regulate diet relates to a higher intake of fruit and vegetable and to a lower intake of unhealthy snacks and sugary drinks (Kliemann et al., 2018). In the physical activity aspect, a study that looked at the connection between self-regulation and physical activity behavior found that participants with self-regulation ability continued to exercise for longer duration relative to those without self-regulation ability, and that groups with greater weekly exercise frequency showed higher self-regulation capacity (Ahn et al., 2016). Furthermore,

health interventions that trained individuals in self-control showed improved adherence to physical activity behavior (Johnson et al., 2012).

Self-Regulation and Mindfulness

Mindfulness has a close link to self-regulation (Sala et al., 2020). Indeed, previous research implicated mindfulness in successful self-regulation (Friese & Hofmann, 2016). According to Bandura's Social-Cognitive Theory of Self-Regulation, self-regulation is achieved through self-observation and attention. To set realistic goals and evaluate the progress toward them, the person must first have a strong self-observation and knowledge that will then lead to control through self-regulation (Bandura, 1991). Previous research found that people with higher levels of trait mindfulness are more attuned to the present moment and more adept at regulating their emotions and behaviors (Short et al., 2016). Furthermore, in their study that looked at mindfulness, self-regulation, and emotional experience, Friese and Hofmann found that when mindful, participants made use of their self-regulatory abilities in a smart and flexible way, understanding when to stop and exercise restraint when long-term goals demand it, as well as being able to enjoy a short-term pleasure when doing so was not problematic (2016). In the Short et al. study that looked at the role of self-regulation as a mediator between dispositional mindfulness and well-being, the authors found that for participants who were high on trait mindfulness, the experiences of positive affect were promoted by self-regulation, with describing and acting with awareness being the mindfulness facets most strongly related to self-regulation (2016). The positive link between mindfulness and self-regulation was also shown in brain imaging techniques. After eight weeks of mindfulness training intervention, the hippocampus, which is responsible for self-regulation, was found to have an increase in gray matter, suggesting an enhanced performance in the functions of that area (Hölzel et al., 2011). In another study, it

was found that after a ten-hour mindfulness training intervention there was a greater brain

connectivity in the areas of the brain associated with self-regulation, suggesting that long-term

mindfulness meditation training improves self-regulation (Tang et al., 2020).

The Current Study

Given the link between mindfulness and health behaviors, further research into understanding

how mindfulness affects these behaviors will enrich the literature and provide practical insights

for promoting health behaviors. The strong connection of self-regulation to both mindfulness and

health behaviors offers a possible direction in the field, which will look at self-regulation as a

mediator between mindfulness and health behavior (Boyle & Mosewich, 2021; Sala et al., 2020).

If mediation is demonstrated, the focus of future interventions of mindfulness training could be

on self-regulation strategies that will promote behavior change, such as consciously bringing the

person to attention and focusing on goals as well as how they will be achieved. It could also be

by exercising self-monitoring strategies while practicing awareness and being in the present

moment, as suggested in Boyle and Mosewich's article (2021). Therefore, to better understand

the relationship between mindfulness and health behaviors and to explore the function of self-

regulation within the two, the present pilot study examines the relationships of the three variables

together and tests the role of self-regulation as a mediator between mindfulness and health

behaviors, in terms of engagement in a healthy diet and physical activity (See Figure 1).

Figure 1

Mediational Model of Mindfulness, Self-Regulation, and Health Behavior
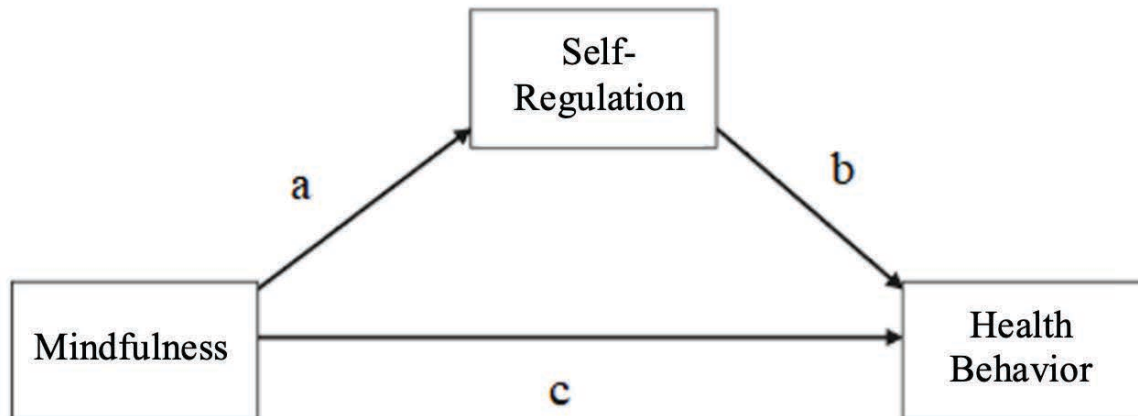
Methods

Participants

The participants in the study were 32 female undergraduate students from Stern College for Women, Yeshiva University. We reached out to the participants through social media, such as WhatsApp and Facebook, and asked for their participation. We attached the link to the survey to the message sent. The participants needed to be English speakers with access to an electronic device (mobile/computer). All the participants were above the age of 18.

Measures

15-item Five-Facet Mindfulness Questionnaire (FFMQ-15)

This measure is a short form of the 39-item FFMQ (Baer et al., 2006). It includes five facets: Observing, Describing, Acting with Awareness, Non-Judging of inner experience, and non-Reactivity to inner experience (see Appendix A for the full FFMQ-15 questionnaire from the study). The 15-item FFMQ (FFMQ-15) was developed by Baer et al. in 2012. It includes three items for each facet (Gu et al., 2016). For example, one item for the Observing subscale is:

"When I take a shower or a bath, I stay alert to the sensations of water on my body." An example for an item that measures the Describing subscale is: "I'm good at finding words to describe my feelings." For the Acting with Awareness subscale, this is one example (negatively phrased): "I do jobs or tasks automatically without being aware of what I'm doing." The Non-Judging subscale provides items such as: "I believe some of my thoughts are abnormal or bad and I shouldn't think that way" (negatively phrased). Finally, an example of an item that measures the Non-Reactivity facet is: "When I have distressing thoughts or images, I 'step back' and am aware of the thought or image without getting taken over by it" (Baer et al., 2006, pp. 34-35). Responses are based on a five-point scale, ranging from one (never or very rarely true) to five (very often or always true) (Gu et al., 2016). The scores were computed by calculating the mean of each subscale and the mean scores of the total survey to define both the average level of each mindfulness subscale as well as the general mindfulness level of the participant (Gu et al., 2020).

The factor structure and psychometric properties of the FFMQ-15 were tested by Gu et al. in 2016. The authors found that the factor structure of the FFMQ-15 was consistent with that of the FFMQ-39, and there were high correlations between the total facet scores of the short and long forms, which indicates that both versions of the FFMQ measured highly similar constructs. They also found that the two FFMQ versions did not differ significantly from each other in terms of convergent validity. Internal consistency was found to be adequate. In addition, the FFMQ-15 was found to be sensitive to change over the course of Mindfulness-Based Cognitive Therapy (Gu et al., 2016).

Self-Control Self-Management Scale (SCMS)

The SCMS is a 16-item measure of self-regulation, comprised of three subscales: self-monitoring, self-evaluation, and self-reinforcement (see Appendix B for the full SCMS

questionnaire from the study). Responses are based on a six-point Likert-type scale, ranging from zero (very undescriptive of me) to five (very descriptive of me) (Short et al., 2016). For example, one item that measures self-monitoring is: "When I work toward something, it gets all my attention." An example of an item that looks at self-evaluation is: "When I set important goals for myself, I usually do not achieve them" (negatively phrased) and an example of an item that looks at self-reinforcing is: "I congratulate myself when I make some progress." The possible total scale score range is 0–80. For the subscales, scores range from 0–30 on the self-monitoring subscale and range from 0–25 on the self-evaluating subscale and the self-reinforcing subscale. Total scores and subscale scores were calculated by adding the scores together (Mezo, 2009).

The convergent contrast validity of the measure was tested based on correlation with different types of measures. Those included specific measures of self-control self-management skills (SCMSk), which were the Self-Control Questionnaire (SCQ), the original version of the Frequency of Self-Reinforcement Questionnaire (FSRQ), and the Cognitive Self-Management test (CSM). Convergent validity was also tested based on correlation with broad measures of SCMSk, which were the Self-Control Schedule (SCS), the Self-Control Questionnaire (SCQ), and the Lifestyle Approaches Inventory (LSA). Finally, researchers looked at correlations with symptom measures of psychological distress. Those were the Beck Depression Inventory (BDI), the Clinical Anxiety Scale (CAS), the Positive and Negative Affect Schedule (PANAS), and the Dieter's Inventory of Eating Temptations (DIET). As expected, the SCMS correlated more highly with the specific measures of SCMSk than with the broad measures and correlated more strongly with the broad measures of SCMSk than with the symptom measures of psychological distress. In terms of discriminant validity, the measure did not obtain significant relationships

with any of the discriminant construct validity measures. In the reliability aspect, the SCMS and its subscales were evaluated for both internal consistency, estimated by coefficient alphas, and temporal stability, estimated by test-retest correlation coefficients. Both in terms of internal consistency and temporal stability, the SCMS obtained values that indicated acceptable reliability. The subscales of the measure also obtained adequate reliability values. Furthermore, the intercorrelations among the subscales of the SCMS were evaluated for content validity and indicated that item content is consistent with the posited three-component structure (Mezo, 2009).

International Physical Activity Questionnaire - Short Form (IPAQ-SF)

The seven-item IPAQ short form measures physical activity (see Appendix C for the full IPAQ-SF questionnaire from the study). Participants indicate how many days, hours, and minutes they spent in the last seven days on vigorous and moderate physical activity and walking for at least 10 minutes per incident, and additionally report time spent sitting (Tsafou et al., 2016). The IPAQ-SF was scored using Cheng's (2016) spreadsheet, transforming scores into metabolic equivalent task minutes per week. Based on the amount of time and the intensity of the reported activities, the physical activity level was identified as low, moderate, or high (Flora et al., 2023). In the current study, the option "Don't know/ Not sure" when asked for the time spent on one of the days doing the indicated activity was excluded from the possible answers due to the online delivery of the survey which required certain adjustments.

In terms of validity and reliability, the test-retest reliability of the measure indicated an acceptable level. In the test for concurrent (inter-method) validity, the test compared the agreement between the long and short IPAQ forms, as well as a comparison between telephone and self-administered modes of data collection. The observed concurrent validity coefficients

between the two IPAQ forms suggested that the short and long forms showed reasonable

agreement. Correlation coefficients were reasonable for both modes of administration (telephone

or self-administered). Criterion IPAQ validity was assessed against the CSA (now MTI)

accelerometer, finding fair to moderate agreement between the two measures (Craig et al., 2003).

Short Healthy Eating Index Survey (sHEI)

The sHEI is a 22-item tool that estimates overall diet quality following the Healthy

Eating Index (HEI) score guidelines (see Appendix D for the full sHEI questionnaire from the

study). The HEI score indicates the quality of the diet compared to the Dietary Guidelines for

Americans. The scores range between 0 and 100 while higher scores indicate higher diet quality.

The scoring system contains nine components that are encouraged for a healthy diet and four

components that should be consumed in moderate amounts for the maintenance of a healthy diet.

The HEI is validated using data from the National Health and Nutrition Examination Survey

(NHANES) (Colby et al., 2020).

To evaluate concurrent criterion validation and determine if the Short Healthy Eating

Index Survey (sHEI) accurately identifies participants' diet quality and individual food group

intake, the sHEI was compared to three existing validated measurements, which included the

Healthy Eating Index (HEI) scores derived from 24 hours recalls, the Dietary Screener

Questionnaires (DSQs), and dermal carotenoid levels. The subjects' dietary intake overall was

found to be similar across the measures, indicating overall consistency among the tools. A

confirmatory analysis process was also conducted to confirm the correlation of the sHEI and the

DSQ with a larger sample. The correlations in food consumption items between sHEI estimates

and the DSQ estimates of the confirmatory sample were at acceptable levels. The comparison of

the sHEI instrument and the other instruments indicates this measure can adequately provide

information for a total diet quality score that is correlated to other well-developed and validated tools (Colby et al., 2020).

Demographic Characteristics

The survey began with a demographic questionnaire with questions on the participant's age, gender, race, and college major.

Procedure

The questionnaires were completed online at the participants' convenience through the Qualtrics software. All the questionnaires were completed anonymously.

Data Analysis

First, the relations between each predictor and the outcome will be analyzed independently. Second, a series of mediation analyses, following the steps described by Baron and Kenny (1986), will be conducted to examine the relations between trait mindfulness and self-regulation in the prediction of health behavior. Specifically, results will be consistent with a mediational model if: (1) the predictor will be associated with both the hypothesized mediator and the relevant outcome; and (2) after controlling for the effects of the mediator, the relation between the predictor and the outcome will be reduced. The direction of mediation (e.g., whether self-regulation mediates the effect of trait mindfulness on health behaviors, or whether trait mindfulness mediates the effect of self-regulation on health behaviors) will be determined by comparison of the relative changes in the parameter estimates.

Results

Demographic Characteristics

A total of 32 participants completed the survey. Missing data was found in 40 participants. The 32 participants in the study identified themselves as female. The ages of the

participants ranged from 19 to 22 ($M = 21.16$; $SD = .820$). One participant did not provide her

age. In terms of race, 29 participants described themselves as "White or Caucasian," two

participants described themselves both as "White or Caucasian" and "Other," and one participant

described herself as "Other." When asked about their major, most of the respondents (71.9%)

reported psychology, which was a total of 23 participants. Other responses included two

participants who had their major in psychology and music, one participant who majored in art,

one in biology, one in biology with a concentration in neuroscience, one in marketing, one in

nursing, one in strategy and entrepreneurship, and one in studio art (See Tables 1-3).

Table 1

Descriptive Statistics for Participants' Age ($N = 32$)

Age

		Frequency	Percent
Valid	19	2	6.3
	20	2	6.3
	21	16	50.0
	22	11	34.4
	Total	31	96.9
Missing	System	1	3.1
Total		32	100.0

Table 2

Descriptive Statistics for Participants' Race ($N = 32$)

Race

		Frequency	Percent
Valid	Other	1	3.1
	White or Caucasian	29	90.6
	White or Caucasian, Other	2	6.3
	Total	32	100.0

Table 3

Descriptive Statistics for Participants' Major (N = 32)

Major

		Frequency	Percent
Valid	Art	1	3.1
	Biology	1	3.1
	Biology with concentration in neuroscience	1	3.1
	Marketing	1	3.1
	Nursing	1	3.1
	Psychology	23	71.9
	Psychology and Music	2	6.3
	Strategy and entrepreneurship	1	3.1
	Studio art	1	3.1
	Total	32	100.0

Description of Variables

The mean of total mindfulness of the sample was 3.18 ($SD = .34$, range 2.40-3.87). The mean of total self-regulation was 53.44 ($SD = 9.64$, range 35-69). The mean physical activity

level was 2.66 (*SD* = .54, range 1-3). The mean diet score was 48.24 (*SD* = 9.14, range 25.40-65.63). See Table 4.

Table 4

Descriptive Statistics for All Measures (N = 32)

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Mindfulness: Total Score	32	2.40	3.87	3.1875	.34389
Self-Regulation: Total Score	32	35	69	53.44	9.645
Physical activity	32	1	3	2.66	.545
Diet	32	25.40	65.63	48.2494	9.14294
Valid N (listwise)	32				

Mindfulness, Self-Regulation, and Health Behavior

Pearson's correlations were calculated to examine bivariate relationships among variables using SPSS. Pearson's test for correlation among mindfulness trait, self-regulation, and health behavior found all variables to be non-significant with the exception of the mindfulness subscale of self-observation and the self-regulation subscale of self-monitoring, $r(30) = .368$, p = .038 (See Table 5).

Table 5

Pearson's Correlation for Mindfulness: Self-Observation and Self-Regulation: Self-Monitoring (N = 32)

Correlations

		Mindfulness: Observation score	Self-Regulation: Self-Monitoring
Mindfulness: Observation score	Pearson Correlation	1	.368[*]
	Sig. (2-tailed)		.038
	N	32	32
Self-Regulation: Self-Monitoring	Pearson Correlation	.368[*]	1
	Sig. (2-tailed)	.038	
	N	32	32

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

Discussion

The goal of the present study was to test for the potential role of self-regulation as a mediator in the connection between trait mindfulness and health behavior. Based on previous research in the field, it was hypothesized that mindfulness would correlate with self-regulation, physical activity level, and with diet quality. It was also hypothesized that self-regulation would correlate with mindfulness, physical activity, and diet quality. The goal then was to test for a mediational model that includes mindfulness, self-regulation, and health behavior.

While there is a large amount of literature on the field that supports the connection of mindfulness and health behavior, the current study did not find a link between trait mindfulness and health behavior, both in terms of physical activity as well as a healthy diet. The study also did not find a connection between self-regulation and health behavior, in both aspects. Furthermore, contrary to our expectations, we did not find a link between levels of mindfulness

and self-regulation. We did find a correlation between the self-observation part of mindfulness and the self-monitoring part of self-regulation.

There are several reasons to explain the lack of support for our hypotheses. First of all, the sample was very small and included only 32 participants who were all females. Furthermore, since the students were all from a religious Jewish school, the sample was very homogeneous in nature and lacked diversity.

Another limitation was that many of the participants did not complete the survey and we were left out with a lot of missing data. One reason for that could be that the survey was too long. There could also be an issue of social desirability. It is possible that the students were not willing to report their healthy or unhealthy behavior. Knowing that this could be an issue, we attempted to minimize that by making the survey completely anonymous.

The time frame the survey was given to the students could also have impacted the non-significant findings of the study. The survey was given around a time of a holiday break from school and could thus impact the participants' reports regarding physical activity and diet. For example, the IPAQ is based on reports on physical activity from the last seven days (Craig et al., 2003). It could be that during the break, the participants engaged in more, or less physical activity than they normally do. In the dietary aspect, it is possible that the participants reported eating foods that are not normally part of their diet. While the sHEI asks more general questions regarding eating habits (Colby et al., 2020), it could be that responses were primed based on the participants' diet during the break and the situation they were in. In both cases, the timeframe that the survey was given could have influenced the responses and may provide an explanation for the non-significant results we found. This limitation can be easily addressed in a follow-up study.

Another potential limitation of the study was the short questionnaires that were given to the participants. To minimize the subjects' burden, we used short questionnaires wherever possible. In two questionnaires, the FFMQ and the IPAQ, we specifically looked for their short form to keep the survey at a reasonable amount of time. While we made sure that the measures chosen are reliable and valid, a deeper look at each of the variables and the use of longer questionnaires may assist in further research that explores the field. It may also be beneficial to create a reliable measure that combines some of these instruments and thus makes the research easier and faster.

Despite these limitations, given the lack of adequate diet and physical activity in society and the critical effects they have on people's health, we strongly encourage future research to look at the possible use of mindfulness in the promotion of healthy behavior as well as the mediators of the effect. The possible role of self-regulation as the mediator in the connection between mindfulness and health behavior is of large interest (Sala et al., 2020; Boyle & Mosewich, 2021). Since this study did not find support for that connection, future research should take into consideration the limitations of the current study and test the hypothesis with a larger and more diverse sample which could potentially provide more reliable results. Understanding these topics better can improve health education programs and interventions and thus is extremely significant to society's health.

References

Ahn, J., Jeon, H., & Kwon, S. (2016). Associations between self-regulation, exercise
participation, and adherence intention among Korean university students. *Perceptual and Motor Skills*, *123*(1), 324-340. 10.1177/0031512516659874

Baer, R. A., Smith, G. T., Hopkins, J., Krietemeyer, J., & Toney, L. (2006). Using self-report
assessment methods to explore facets of mindfulness. *Assessment*, *13*(1), 27-45.
https://doi.org/10.1177/1073191105283504

Bandura, A. (1991). Social cognitive theory of self-regulation. *Organizational Behavior and Human Decision Processes*, *50*(2), 248-287. https://doi.org/10.1016/0749
5978(91)90022-L

Bandura, A. (2005). The primacy of self-regulation in health promotion. *Applied Psychology: An International Review*, *54*(2), 245-254. 10.1111/j.1464-0597.2005.00208.x

Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social
psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51*(6), 1173-1182. https://doi.org/10.1037/0022-
3514.51.6.1173

Boyle, A., & Mosewich, A. (2021). Self-regulation as a mediator of mindfulness and
physical activity: A narrative review. *Spectrum*, (7).
https://doi.org/10.29173/spectrum125

Cheng, H. (2016). A simple, easy-to-use spreadsheet for automatic scoring of the International
Physical Activity Questionnaire (IPAQ) Short Form. *ResearchGate*.
10.13140/RG.2.2.21067.80165

Colby, S., Zhou, W., Allison, C., Mathews, A. E., Olfert, M. D., Morrell, J. S., Byrd-Bredbenner,

C., Greene, G., Brown, O., Kattelmann, K., & Shelnutt, K. (2020). Development and

validation of the short Healthy Eating Index survey with a college population to assess

dietary quality and intake. *Nutrients*, *12*(9), 2611. https://doi.org/10.3390/nu12092611

Craig, C. L., Marshall, A. L., Sjöström, M., Bauman, A. E., Booth, M. L., Ainsworth, B. E.,

Pratt, M., Ekelund, U., Yngve, A., Sallis, J. F., & Oja, P. (2003). International physical

activity questionnaire: 12-country reliability and validity. *Medicine and Science in Sports

and Exercise*, *35*(8), 1381–1395. https://doi.org/10.1249/01.MSS.0000078924.61453.FB

Dassen, F., Houben, K., Allom, V., & Jansen, A. (2018). Self-regulation and obesity: The

role of executive function and delay discounting in the prediction of weight loss.

Journal of Behavioral Medicine, *41*(6), 806-818. https://doi.org/10.1007/s10865-018

9940-9

Flora, S., Marques, A., Hipólito, N., Morais, N., Silva, C. G., Januário, F., Rodrigues, F.,

Carreira, B. P., & Cruz, J. (2023). Test-retest reliability, agreement and construct validity

of the International Physical Activity Questionnaire short-form (IPAQ-sf) in people with

COPD. *Respiratory Medicine*, *206*, 107087. https://doi.org/10.1016/j.rmed.2022.107087

Friese, M., & Hofmann, W. (2016). State mindfulness, self-regulation, and emotional experience

in everyday life. *Motivation Science, 2*(1), 1–14. https://doi.org/10.1037/mot0000027

Gilbert, D., & Waltz, J. (2010). Mindfulness and health behaviors. *Mindfulness, 1*(4), 227-

234. https://doi.org/10.1007/s12671-010-0032-3

Gu, J., Strauss, C., Crane, C., Barnhofer, T., Karl, A., Cavanagh, K., & Kuyken, W. (2016).

Examining the factor structure of the 39-item and 15-item versions of the Five Facet

Mindfulness Questionnaire before and after mindfulness-based cognitive therapy for

people with recurrent depression. *Psychological Assessment*, *28*(7), 791–802.

https://doi.org/10.1037/pas0000263

Gu, J., Karl, A., Baer, R., Strauss, C., Barnhofer, T., & Crane, C. (2020). Latent profile analysis of the Five Facet Mindfulness Questionnaire in a sample with a history of recurrent depression. *Assessment*, *27*(1), 149–163. https://doi.org/10.1177/1073191117715114

Hennessy, E. A., Johnson, B. T., Acabchuk, R. L., McCloskey, K., & Stewart-James, J. (2020). Self-regulation mechanisms in health behavior change: A systematic meta-review of meta-analyses, 2006-2017. *Health Psychology Review*, *14*(1), 6–42. https://doi.org/10.1080/17437199.2019.1679654

Hölzel, B. K., Carmody, J., Vangel, M., Congleton, C., Yerramsetti, S. M., Gard, T., & Lazar, S. W. (2011). Mindfulness practice leads to increases in regional brain gray matter density. *Psychiatry Research: Neuroimaging*, *191*(1), 36-43. 10.1016/j.pscychresns.2010.08.006

Johnson, F., Pratt, M., & Wardle, J. (2012). Dietary restraint and self-regulation in eating behavior. *International Journal of Obesity*, *36*(5), 665-674. 10.1038/ijo.2011.156

Kliemann, N., Croker, H., Johnson, F., & Beeken, R. J. (2018). Starting university with high eating self-regulatory skills protects students against unhealthy dietary intake and substantial weight gain over 6 months. *Eating Behaviors*, *31*, 105–112. 10.1016/j.eatbeh.2018.09.003

Mezo, P. G. (2009). The Self-Control and Self-Management scale (SCMS): Development of an adaptive self-regulatory coping skills instrument. *Journal of Psychopathology and Behavioral Assessment, 31*(2), 83–93. https://doi.org/10.1007/s10862-008-9104-2

Murphy, M. J., Mermelstein, L. C., Edwards, K. M., & Gidycz, C. A. (2012). The benefits of dispositional mindfulness in physical health: A longitudinal study of female college

students. *Journal of American College Health*, *60*(5), 341–348.

https://doi.org/10.1080/07448481.2011.629260

Neace, S. M., Hicks, A. M., DeCaro, M. S., & Salmon, P. G. (2022). Trait mindfulness and

intrinsic exercise motivation uniquely contribute to exercise self-efficacy. *Journal of*

American College Health, *70*(1), 13-17. 10.1080/07448481.2020.1748041

Roberts, K. C., & Danoff-Burg, S. (2010). Mindfulness and health behaviors: Is paying

attention good for you?. *Journal of American College Health*, *59*(3), 165-173.

10.1080/07448481.2010.484452

Sala, M., Rochefort, C., Lui, P. P., & Baldwin, A. S. (2020). Trait mindfulness and health

behaviours: A meta-analysis. *Health Psychology Review*, *14*(3), 345-393.

10.1080/17437199.2019.1650290

Sandars, J., & Cleary, T. J. (2011). Self-regulation theory: Applications to medical education:

AMEE Guide No. 58. *Medical Teacher*, *33*(11), 875-886.

10.3109/0142159X.2011.595434

Short, M. M., Mazmanian, D., Oinonen, K., & Mushquash, C. J. (2016). Executive

function and self-regulation mediate dispositional mindfulness and well

being. *Personality and Individual Differences, 93*, 97-103.

https://doi.org/10.1016/j.paid.2015.08.007

Spring, B., Champion, K. E., Acabchuk, R., & Hennessy, E. A. (2021). Self-regulatory

behaviour change techniques in interventions to promote healthy eating, physical activity,

or weight loss: A meta-review. *Health Psychology Review*, *15*(4), 508-539.

10.1080/17437199.2020.1721310

Tang, R., Friston, K. J., & Tang, Y. Y. (2020). Brief mindfulness meditation induces gray matter

changes in a brain hub. *Neural Plasticity*, *2020*, 1-8.

https://doi.org/10.1155/2020/8830005

Tsafou, K. E., De Ridder, D. T., van Ee, R., & Lacroix, J. P. (2016). Mindfulness and

satisfaction in physical activity: A cross-sectional study in the Dutch population. *Journal*

of Health Psychology, *21*(9), 1817-1827. https://doi.org/10.1177/1359105314567207

Yang, C. H., & Conroy, D. E. (2020). Mindfulness and physical activity: A systematic review

and hierarchical model of mindfulness. *International Journal of Sport and Exercise*

Psychology, *18*(6), 794-817. https://doi.org/10.1080/1612197X.2019.1611901

Appendix A

15-item Five-Facet Mindfulness Questionnaire (FFMQ-15)

Please use the 1 ('Never or very rarely true') to 5 ('Very often or always true') scale provided to indicate how true the below statements are of you. Check the circle to the right of each statement which represents your own opinion of what is generally true for you. For example, if you think that a statement is often true of you, check 'Often true' and if you think a statement is sometimes true of you, check 'Sometimes true'.

	Never or very rarely true	Rarely true	Sometimes true	Often true	Very often or always true
When I take a shower or a bath, I stay alert to the sensations of water on my body.	○	○	○	○	○
I'm good at finding words to describe my feelings.	○	○	○	○	○
I don't pay attention to what I'm doing because I'm daydreaming, worrying, or otherwise distracted.	○	○	○	○	○
I believe some of my thoughts are abnormal or bad and I shouldn't think that way.	○	○	○	○	○
When I have distressing thoughts or images, I "step back" and am aware of the thought or image without getting taken over by it.	○	○	○	○	○
I notice how foods and drinks affect my thoughts, bodily sensations, and emotions.	○	○	○	○	○
I have trouble thinking of the right words to express how I feel about things.	○	○	○	○	○
I do jobs or tasks automatically without being aware of what I'm doing.	○	○	○	○	○
I think some of my emotions are bad or inappropriate and I shouldn't feel them.	○	○	○	○	○
When I have distressing thoughts or images I am able just to notice them without reacting.	○	○	○	○	○
I pay attention to sensations, such as the wind in my hair or sun on my face.	○	○	○	○	○
Even when I'm feeling terribly upset I can find a way to put it into words.	○	○	○	○	○
I find myself doing things without paying attention.	○	○	○	○	○
I tell myself I shouldn't be feeling the way I'm feeling.	○	○	○	○	○
When I have distressing thoughts or images I just notice them and let them go.	○	○	○	○	○

Appendix B

Self-Control Self-Management Scale (SCMS)

Please use the 0 ('Very undescriptive of me') to 5 ('Very descriptive of me') scale provided to indicate how descriptive the below statements are of you. Check the circle to the right of each statement which represents your own opinion of what is generally descriptive of you. For example, if you think that a statement is descriptive of you, check 'Descriptive of me' and if you think a statement is somewhat descriptive of you, check 'Somewhat descriptive of me'.

	Very undescriptive of me	Undescriptive of me	Somewhat undescriptive of me	Somewhat descriptive of me	Descriptive of me
When I work toward something, it gets all my attention.	O	O	O	O	O
I keep focused on tasks I need to do even if I do not like them.	O	O	O	O	O
I become very aware of what I am doing when I am working towards a goal.	O	O	O	O	O
I make sure to track my progress regularly when I am working on a goal.	O	O	O	O	O
I pay close attention to my thoughts when I am working on something hard.	O	O	O	O	O
I know I can track my behavior when working toward a goal.	O	O	O	O	O
When I set important goals for myself, I usually do not achieve them.	O	O	O	O	O
I do not seem capable of making clear plans for most problems that come up in my life.	O	O	O	O	O
The goals I achieve do not mean much to me.	O	O	O	O	O
I have learned that it is useless to make plans.	O	O	O	O	O
The standards I set for myself are unclear and make it hard for me to judge how I am doing on a task.	O	O	O	O	O
I congratulate myself when I make some progress.	O	O	O	O	O
I get myself through hard things by planning to enjoy myself afterwards.	O	O	O	O	O
I silently praise myself even when others do not praise me.	O	O	O	O	O
When I do something right, I take time to enjoy the feeling.	O	O	O	O	O
I give myself something special when I make some progress.	O	O	O	O	O

Appendix C

International Physical Activity Questionnaire - Short Form (IPAQ-SF)

We are interested in finding out about the kinds of physical activities that people do as part of their everyday lives. The questions will ask you about the time you spent being physically active in the **last 7 days**. Please answer each question even if you do not consider yourself to be an active person. Please think about the activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise or sport.

Think about all the **vigorous** activities that you did in the **last 7 days**. **Vigorous** physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. Think only about those physical activities that you did for at least 10 minutes at a time.

→

During the **last 7 days**, on how many days did you do **vigorous** physical activities like heavy lifting, digging, aerobics, or fast bicycling?

	1 day	2 says	3 days	4 days	5 days	6 days	7 days	None
During the last 7 days, on how many days did you do vigorous physical activities like heavy lifting, digging, aerobics, or fast bicycling?	◯	◯	◯	◯	◯	◯	◯	◯

How much time did you usually spend doing **vigorous** physical activities on one of those days?

	Hours per day	Minutes per day
How much time did you usually spend doing vigorous physical activities on one of those days?	☐	☐

Think about all the **moderate** activities that you did in the **last 7 days**. **Moderate** activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal. Think only about those physical activities that you did for at least 10 minutes at a time.

→

During the **last 7 days**, on how many days did you do **moderate** physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.

	1 day	2 says	3 days	4 days	5 days	6 days	7 days	None
During the last 7 days, on how many days did you do moderate physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.	○	○	○	○	○	○	○	○

How much time did you usually spend doing **moderate** physical activities on one of those days?

	Hours per day	Minutes per day
How much time did you usually spend doing moderate physical activities on one of those days?	☐	☐

How much time did you usually spend **walking** on one of those days?

	Hours per day	Minutes per day
How much time did you usually spend walking on one of those days?	☐	☐

The last question is about the time you spent **sitting** on weekdays during the **last 7 days**. Include time spent at work, at home, while doing course work and during leisure time. This may include time spent sitting at a desk, visiting friends, reading, or sitting or lying down to watch television.

→

During the **last 7 days**, how much time did you spend **sitting** on a **week day**?

	Hours per day	Minutes per day
During the last 7 days, how much time did you spend sitting on a week day?	☐	☐

Appendix D

International Physical Activity Questionnaire - Short Form (IPAQ-SF)

Q21 *

On average, how many servings of fruit (not including juice) do you eat per day? Example: 1 serving fruit = 1/2 cup cut-up fruit, 1/2 a banana, or one small piece of whole fruit (apple, orange, pear, etc.) One small piece of whole fruit is the size of a baseball. 1/2 cup cut-up fruit is the size of a computer mouse.

○ Less than 1
○ 1
○ 2
○ 3
○ 4
○ 5
○ 6 or more
○ Choose not to answer

Q22 *

On average, how many servings of 100% fruit juice do you drink per day? NOTE: Do not include fruit flavored drinks such as Hi-C, Tang, Sunny-D, etc. Example: 1 serving juice = 1/2 cup 100% fruit juice (apple, grape, orange, etc.), 1 cup of juice = juice box.

○ Less than 1
○ 1
○ 2
○ 3
○ 4
○ 5
○ 6 or more
○ Choose not to answer

Q23 *

Now, think about all of the vegetables you eat in a day. On average, how many servings of vegetables do you eat per day? NOTE: Any vegetable or 100% vegetable juice counts as a member of the vegetable group. Example: 1 serving = 1 cup raw vegetables, 1 cup of salad, 1/2 cup cooked vegetables, or 1/2 cup 100% vegetable juice. One cup raw vegetables is the size of a baseball. 1/2 cup cooked vegetables is the size of a computer mouse.

○ Less than 1
○ 1
○ 2
○ 3
○ 4
○ 5
○ 6 or more
○ Choose not to answer

Q24 ✲

Now, think about just the green vegetables you eat in a day like spinach, green beans, kale, broccoli, zucchini, or other mostly green vegetables. On average, how many servings of green vegetables do you eat per day? NOTE: Do not include starchy vegetables like green peas. Example: 1 serving = 1 cup raw vegetables or 1/2 cup cooked vegetables. 1 cup raw vegetables is the size of a baseball. 1/2 cup cooked vegetables is the size of a computer mouse.

○ Less than 1
○ 1
○ 2
○ 3
○ 4
○ 5
○ 6 or more
○ Choose not to answer

Q25 ✲

Now, think about just the starchy vegetables you eat in a day like corn, green peas, or potatoes. On average, how many servings of starchy vegetables do you eat per day? Examples: 1 serving = 1 cup raw vegetable or 1/2 cup cook vegetables. 1 cup raw vegetables is the size of a computer mouse.

○ Less than 1
○ 1
○ 2
○ 3
○ 4
○ 5
○ 6 or more
○ Choose not to answer

Q26 ✲

On average, how many servings of grains do you eat per day? Examples: 1 serving = 1 slice of bread; 1/2 cup grits, 1 cup of ready-to-eat cereal, 1/2 cup oatmeal, 1 small tortilla, 1/2 cup cooked rice, or 1/2 cup pasta. 1 cup ready-to-eat cereal is the size of a baseball.

○ Less than 1
○ 1
○ 2
○ 3
○ 4
○ 5
○ 6 or more
○ Choose not to answer

Q27 ⭐

▾ 🔁 Display this question

If On average, how many servings of grains do you eat per day? Examples: 1 serving = 1 slice of brea... Less than 1 Is Selected

On average, how often do you eat grains? Examples: 1 serving = 1 slice of bread; 1/2 cup grits, 1 cup of ready-to-eat cereal, 1/2 cup oatmeal, 1 small tortilla, 1/2 cup cooked rice, or 1/2 cup pasta.

○ A couple times per week
○ A couple times per month
○ A couple times per year
○ Almost never
○ Never
○ Choose not to answer

Q28 ⭐

Now, just think about whole grains you eat like whole wheat bread, whole grain crackers, brown rice, or oatmeal. On average, how many servings of whole grains do you eat per day? Examples: 1 serving = 1 slice whole wheat bread, 5–6 whole grain crackers, 3 cups popcorn, 1/2 cup cooked brown rice, or 1/2 cup oatmeal.

○ Less than 1
○ 1
○ 2
○ 3
○ 4
○ 5
○ 6 or more
○ Choose not to answer

Q29

▾ 🔁 Display this question

If Now, just think about whole grains you eat like whole wheat bread, whole grain crackers, brown ri... Less than 1 Is Selected

On average, how often do you eat whole grains? Examples: 1 serving = 1 slice whole wheat bread, 5–6 whole grain crackers, 3 cups popcorn, 1/2 cup cooked brown rice, or 1/2 cup oatmeal.

○ A couple times per week
○ A couple times per month
○ A couple times per year
○ Almost never
○ Never
○ Choose not to answer

Q30   ✶

On average, how many servings of milk do you eat or drink per day? Examples: 1 serving = 1 cup of milk, 1 cup of yogurt, 1.5 ounces of natural cheese, or 2 ounces of processed cheese. 1 cup of milk is the size of a carton of milk. 1 serving of cheese is the size of your index finger.

○ Less than 1

○ 1

○ 2

○ 3

○ 4

○ 5

○ 6 or more

○ Choose not to answer

Q31   ✶

▾ ⤶ Display this question

If On average, how many servings of milk do you eat or drink per day? Examples: 1 serving = 1 cup of... Less than 1 Is Selected

On average, how often do you drink or eat milk products? Examples: 1 serving = 1 cup of milk, 1 cup of yogurt, 1.5 ounces of natural cheese, or 2 ounces of processed cheese.

○ A couple times per week

○ A couple times per month

○ A couple times per year

○ Almost Never

○ Never

○ Choose not to answer

Q32   ✶

Now, just think about the milk products you eat per day. On average, how many servings of low-fat milk products do you eat per day? Examples: 1 serving = 1 cup of skim milk, 1 cup of low fat yogurt, or 1.5 ounces of low-fat cheese. 1 cup of milk is the size of a milk carton. 1 serving of cheese is the size of your index finger.

○ Less than 1

○ 1

○ 2

○ 3

○ 4

○ 5

○ 6 or more

○ Choose not to answer

Q33 ★

▾ 🔁 Display this question

If Now, just think about the milk products you eat per day. On average, how many servings of low-fat... Less than 1 Is Selected

On average, how often do you drink or eat low-fat milk products? Examples: 1 serving = 1 cup of skim milk, 1 cup of low fat yogurt, or 1.5 ounces of low-fat cheese.

○ A couple times per week

○ A couple times per month

○ A couple times per year

○ Almost never

○ Never

○ Choose not to answer

Q34 ★

On average, how many servings of beans (legumes) do you eat per day? NOTE: all foods made from dry beans, canned beans, peas, and lentils are considered part of this group. Examples: 1 serving= 1/2 cup cooked beans. 1/2 cup cooked beans is the size of a computer mouse.

○ Less than 1

○ 1

○ 2

○ 3

○ 4

○ 5

○ 6 or more

○ Choose not to answer

Q35 ★

On average, how many servings of nuts or seeds do you eat per day? NOTE: 1 serving = 1 tbsp of peanut butter; 1/2 ounces of nuts or seeds. 1 tbsp of peanut butter is the size of the tip of your thumb.

○ Less than 1

○ 1

○ 2

○ 3

○ 4

○ 5

○ 6 or more

○ Choose not to answer

Q36   ✱

On average, how many servings of seafood do you eat per day? NOTE: All foods made of fish, shrimp, crab, and shellfish are considered part of this group. Examples: 1 serving = 3 ounces of fish. 3 ounces of fish is the size of a deck of cards.

○ Less than 1

○ 1

○ 2

○ 3

○ 4

○ 5

○ 6 or more

○ Choose not to answer

Q37   ✱

▾ 🖫 Display this question

  If   On average, how many servings of seafood do you eat per day? NOTE: All foods made of fish, shrimp...   Less than 1   Is Selected

On average, how often do you eat seafood? NOTE: All foods made of fish, shrimp, crab, and shellfish are considered part of this group. Examples: 1 serving = 3 ounce of fish.

○ A couple times per week

○ A couple times per month

○ A couple times per year

○ Almost never

○ Never

○ Choose not to answer

Q38   ✱

On average, how many sugar-sweetened beverages do you drink per day? Examples: 12 oz of soft drinks/soda, fruit flavored drinks, sweetened coffee, and sweet tea. Do not include milk or 100% fruit juice. 12 oz of soda is the size of one can.

○ Less than 1

○ 1

○ 2

○ 3

○ 4

○ 5

○ 6 or more

○ Choose not to answer

Q39   ✴

▾ 🔲 Display this question

If   On average, how many sugar-sweetened beverages do you drink per day? Examples: 12 oz of soft drin...   Less than 1   Is Selected

On average, how often do you drink sugar-sweetened beverages? Examples: 12 oz of soft drinks/soda, fruit flavored drinks, sweetened coffee, and sweet tea. Do not include milk or 100% fruit juice.

○ A couple times per week

○ A couple times per month

○ A couple times per year

○ Almost never

○ Never

○ Choose not to answer

Q40   ✴

On average, how much added sugars do you consume per day? NOTE: Added sugars are often in foods such as breads, cakes, candy, sweet tea, jam, ice cream, or sugar added to food at the table. Do not include naturally occurring sugars such as lactose in milk or fructose in fruits. Examples: white sugar, brown sugar, raw sugar, corn syrup, corn-syrup solids, high-fructose corn syrup, malt syrup, maple syrup, pancake syrup, fructose sweetener, liquid fructose, honey, molasses, and dextrose.

○ None/almost none

○ Some

○ A lot

○ Choose not to answer

Q41   ✴

How many servings of saturated fat do you consume on average per day? NOTE: Saturated fats for these purposes should be considered to be solid fats. Solid fats are fats that are solid at room temperature. Examples: butter, cakes, cookies, Crisco, coconut oil, beef fat (tallow, suet), chicken fat (lard), stick margarine, and shortening.

○ None/almost none

○ Some

○ A lot

○ Choose not to answer

Q42   ✴

On average, how much water do you drink per day?

○ None/almost none

○ Some

○ A lot

○ Choose not to answer