Investigating the Moderating Role of Courage on the Relationship Between Individual Sports and Resilience

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Abstract

This study aimed to investigate the moderating role of the virtue of courage on the relationship between individual sports (i.e., gym participation) and resilience. It was hypothesised that gym participation positively influences resilience and that courage, and its strengths bravery, honesty, perseverance, and zest, positively moderate the relation between gym participation and resilience. An online survey was designed and distributed online and in-person among adult gym participants. The sample had a mean age of 23.58 and mainly included female gym-goers (68.9%) from Germany (84.4%). Participants filled in the Global Assessment of Character Strengths, the Brief Resilience Scale, and answered questions about their gym habits. A comparison to the norm group showed that the sample had average resilience levels but due to insignificant results, all hypotheses were rejected. Noteworthy were however the significant positive correlations between perseverance and resilience and between bravery and resilience. Bravery further showed a significant positive effect on resilience in the regression analysis. Honesty had a significant negative effect on resilience. These results could be explained by the Resilience Shield Model, defining resilience as a multi-faceted construct that is influenced by various factors, thereby fluctuating quickly. Its multi-dimensionality was verified since gym participation only had a small impact on resilience levels. This was the first study investigating the relationship between gym participation, courage, and resilience but due to the small and homogeneous sample and its cross-sectional design, the generalisability is limited. Therefore, future research is needed to get more insights into the tridimensionality of sports, character strengths, and resilience.

Keywords. Individual Sports, Gym, Character Strengths, Courage, Bravery, Honesty, Perseverance, Zest, Resilience.

Investigating the Moderating Role of Courage on the Relationship Between Individual Sports and Resilience

Nowadays, the world population has the highest risk of developing mental illnesses as ever before. In fact, a study by McGrath et al. (2023) found that about 50% of the world population will have suffered from at least one mental disorder by the age of 75. With that regard, a comparison to pre-Covid years shows a significant difference; whereas only every sixth person reported mental health issues before the pandemic, post-Covid analyses show that every second person is now affected by emotional or psychosocial problems (European Commission, 2023; European Council, 2023). Consequently, it follows that modern society shows a growing interest in finding ways and adopting lifestyles that aid the improvement of both physical and mental health to achieve a positive well-being (Curcic, 2023). Closely connected to this strive for positive well-being is the search for protective factors that help to shield against negativity. This is where resilience becomes relevant.

Resilience

Resilience is defined as the process of preserving or recovering a positive mental health after being confronted with adversity, such as trauma or excessive stress (Herrman et al., 2011; Windle, 2010). Due to its capacity for positive adaptation, it is often described as a coping ability, enabling people to cope with negative events, whereby it resembles a protection from negative impacts on well-being (Vančáková et al., 2021). Looking more closely at what factors influence the development of resilience, personal, biological, and environmental-systemic factors emerge, ranging from personality traits and genetics to social support, respectively. With an increase in these internal or external resources, an individual's ability to recover from adverse events also improves (Herrman et al., 2011; Windle, 2010), which indicates an increase in resilience.

It thus becomes apparent that, in many areas of life, resilience is a factor which helps people to withstand adversity and maintain a positive mental health (Hu & Wang, 2015; Vančáková et al., 2021). Therefore, resilience seems to have a major influence on the general health of individuals, which highlights the importance of investigating this construct further. Especially considering the increase in mental illnesses in modern-day society (McGrath et al., 2023), focusing on factors that exert a positive influence on resilience can significantly aid the improvement of people's general well-being. This could ultimately result in a decline in mental illnesses, thereby taking away some of the burden the society faces in current times. Hence, it follows that attending to the concept of resilience seems necessary since it can contribute to positive changes regarding the well-being of society.

Physical Activity

Looking more closely into what factors influence resilience and can thus help people to improve their general health, sports and physical activity emerge (Weinberg & Gould, 2019). Research found that participation in sports increases resilience. This results from an improvement in self-efficacy and acquired social resources through the practice in sports facilities, whereby positive feelings about the self are created (Jetzke & Mutz, 2019; Weinberg & Gould, 2019; Wiedenman et al., 2023). Sports engagement, especially on a regular basis, has further been proven to be beneficial for motivation, stress reduction, and self-esteem (Jetzke & Mutz, 2019; Román-Mata et al., 2020; Weinberg & Gould, 2019), thereby indicating that the positive influence of sports can be exacerbated when implementing it as a habit into daily life. This can be done by adhering to physical activity guidelines, such as those established by the World Health Organisation (WHO). Accordingly, adults in the age range of 18-64 years are expected to engage in moderate activity for at least 150 minutes and up to 300 minutes a week to experience an improvement in both physical and mental health (WHO, 2022). A study by Román-Mata et al. (2020) verified this positive effect of adhering to the guidelines. In fact, it was found that students who engage in physical activity for a minimum of 150 minutes per week showed higher levels of resilience compared to those exercising less. Correspondingly, physical activity improves an individual's emotional management (e.g., increases the occurrence of positive emotions) which leads to reduced levels of stress followed by an increase in resilience. These benefits also hold beyond the WHO's recommendation, especially when exceeding 300 minutes of physical activity per week, which is considered a healthy exercise behaviour (Román-Mata et al., 2020).

With the increasing variety of sports opportunities, the domain of sports seems a promising area of focus for examining the fluctuations in resilience. However, this huge variety also makes it necessary to narrow the scope to specific types of sports. First, it is debatable whether one should focus on individual or team sports. Research found that people engaging in team sports show a higher level of social engagement (Khan et al., 2023), whereas individual sports members report higher intrinsic motivation and self-regulation (Moradi et al., 2020). This suggests that there are different motives for choosing to engage in team or individual sports, which need to be considered in the decision. For this study, it was chosen to focus on individual sports, as it is easier to draw conclusions and isolate effects about the impact of sports on individual sports members than a team. Besides the convenience argument, the focus on individual sports further facilitates the analysis and verification of influential factors between sports and resilience in a single person, which have been found by research. Hence, not only do

individual sports allow for more flexibility over routines, but they also contribute to the development of self-reliance, responsibility, concentration, and mental strengths. Thereby, individual sports affect resilience-related factors, such as increasing feelings of accountability and control, which ultimately help to feel positive about the self (Kajbafnezhad et al., 2011; Wiedenman et al., 2023). Thus, the focus on individual sports allows for a more thorough investigation of the general characteristics that influence and are influenced by a person's sports behaviour, which can yield promising insights for society, thereby also making it possible to extend existing research findings.

Within the broad range of types of individual sports, gym participation emerges as a salient point of focus. According to statistics, there were 56.3 million members in fitness clubs in 2022, which resembled a 2% increase compared to 2020 (Rutgers et al., 2022). Even though the Covid-pandemic led people to adopt other sports that can be done outside (e.g., running), there remains a trend towards combining those sports with gym participation since gyms remain popular due to the expert equipment for specialised practice (Rutgers et al., 2022). Additionally, a significant number of people join the gym not only to improve their physical health but also to profit from the benefits of gym participation on enhanced mental health and stress relief (Campbell, 2024). Yet, this beneficial effect on mental health has been proven for sports in general (Eather et al., 2023), so the gym is not the only sports that is used as a protection or outlet for negativity. However, due to the increase in gym memberships and the widespread number of members, it seems promising for this study to focus on the interplay between resilience and gym participation.

Character Strengths

With the aim of investigating what other factors influence the relationship between gym participation and resilience, another focus in this study has been chosen to be character strengths. In the context of sports, character strengths have been recognised to be beneficial for improving resilience through their positive effect on stress management and adaptation (Barnes & Larcus, 2015; Li et al., 2017; Vančáková et al., 2021). First, character strengths are described as positive characteristics innate to a person which influence their general well-being and performance (Ng et al., 2017). They have been shown to positively influence physical activity (Sasayama et al., 2023), as well as resilience (De La Fuente et al., 2022; Demirci et al., 2019). Vančáková et al. (2021), for instance, found a positive relation between character strengths and resilience in a sample of sports participants, where character strengths positively affected the participants' ability to adapt to stressful or new situations. This positive effect of character strengths on the improvement of performance in sports has also been verified by Tomé-Lourido

et al. (2021), who found that an increase in happiness follows when being aware of one's strengths, which resembles a trust in and reliance on the own capabilities. Connected to the coping aspect of resilience mentioned before, high levels of character strengths have been shown to contribute to the improvement in psychological adaptation to stress responses, which is an indicator of resilience (Li et al., 2017).

By deciding to take character strengths as an additional focus in this study, it is important to look more closely into what specific strengths are most suitable. For this study, the virtue of courage seems to be a promising focus since it has been shown to be of major influence in the relation to resilience (Martínez-Martí & Ruch, 2016), even though evidence about its interaction with sports participation is scarce. First, courage is a virtue of the Values in Action Inventory of Strengths (ViA-IS; Peterson & Seligman, 2004) and includes the strengths of bravery, perseverance, honesty, and zest. Bravery involves fearlessness of challenges and opposition and to some extent also physical bravery. Perseverance refers to the persistent effort to complete tasks even in the face of hindrances, where task completion ultimately gives pleasure. The strength of honesty is about being authentic, sincere, and staying true to what or whom a person represents. Lastly, zest describes vitality, namely someone who is energetic towards life and enjoys life's adventures (Peterson, 2006). Research found that the virtue of courage generally showed the strongest positive correlation to resilience compared to the other virtues. This is based on indications that being courageous is connected to overcoming fears more often, thereby making it a characteristic of advanced coping with adversities. It has also been found to positively influence the development of resilience since it increases optimism and positive affect, which are resilience-related factors (Martínez-Martí & Ruch, 2016). However, its effect gets clearer when considering the influence of its four strengths.

Generally, character strengths aid an individual to buffer themselves against negativity, which influences the development of resilience (De La Fuente et al., 2022). More specifically, zest, bravery, and perseverance have been found to positively influence resilience when being investigated on their own (De La Fuente et al., 2022; Gander et al., 2019; Harzer, 2016; Salisu et al., 2020; Vančáková et al., 2021). Bravery, for instance, has been found to benefit the tolerance of stress, which helps to stay resilient (De La Fuente et al., 2022). Furthermore, since bravery increases a person's ability to tolerate fear and be more determined, even in negativity, it has been related to a better adaptation to new or adverse situations (Martínez-Martí & Ruch, 2016). Perseverance and zest have been shown to increase an individual's ability to maintain their resilience after being confronted with adversity, which similarly applies to the virtue of courage. Additionally, perseverance has been proven to increase a person's feelings of control,

which constitutes a sub-factor of resilience (De La Fuente et al., 2022). Perseverance also had a positive influence on resilience in the sports context, namely it helped to pursue and achieve a set goal, which is not only influenced by but also increases self-efficacy, as well as resilience (Etherton et al., 2020; Giles et al., 2018). Honesty, however, has not yet been identified to have a significant influence on neither sports nor resilience. Still, it is interesting to investigate its influence in the context of gym participation because, based on its definition (Peterson, 2006), honesty seems to affect a person's self-representation and when visiting a fitness centre, there is a huge emphasis on how people are perceived by others, but also how they perceive and present themselves.

Considering these findings, it becomes apparent that some research has already been done, but that more specific investigations of the tridimensionality between sports, character strengths, and resilience can be beneficial. Especially by focusing on one character virtue, namely courage, this study can draw conclusions regarding its moderating role on the relationship between gym participation and resilience, thereby enabling the acquaintance of insights into its usefulness and application in the sports context. In addition, focusing on one virtue only allows a more thorough investigation, including the assessment of its four strengths. This can ultimately enhance the understanding of the virtue's benefit on resilience, as well as uncover its interplay with and influence of gym participation. Since it is evidenced that three of the strengths of courage, namely bravery, perseverance, and zest have a positive influence on resilience, investigating their influence in this context, namely gym participation, could be of significant aid to the attempt of closing this gap in research.

Present Study

This study aims to investigate the moderating role of courage on the relation between individual sports and resilience. Gym participation has been chosen as the focus of individual sports in this study. As mentioned, its prevalence makes it promising for data collection, but since it is also a popular sport that many people worldwide engage in, investigating its effect on resilience could have a social benefit for this target group (i.e., knowing how to benefit from their strengths), as well as for the gym branch itself (i.e., marketing). The focus of this study will lie on people who go to the gym at least once a week. This is to ensure that gym participation is having an impact on their daily lives and is being done regularly. Due to ethical reasons, this study will include gym-goers aged 18 or older.

Research found that resilience is influenced by two factors, namely personal factors, and the sociocultural context (Herrman et al., 2011). In this study, the virtue of courage describes the personal factors, whereas gym participation constitutes a factor from the sociocultural

context. Since the guidelines of the WHO (2022) claim that people should engage in physical activity for 150 up to 300 minutes per week and Román-Mata et al. (2020) found an increasing effect with an increase in sports engagement, this study will include a comparative analysis between different physical activity levels. In fact, considering that this study includes people who are actively engaging in fitness, a comparison between two groups of gym-goers will be made by focusing on the upper limit of the WHO (2022) guidelines. This includes comparing those who visit the gym for less than 300 minutes per week to those visiting the gym for more than 300 minutes per week. Based on the elaborated research findings, the following hypotheses (*H*) have been formulated. A schematic representation can be found in Figure 1.

H1: Adult gym participants who engage in physical activity for at least 300 minutes a week show a higher level of resilience compared to those adult gym participants who exercise less.

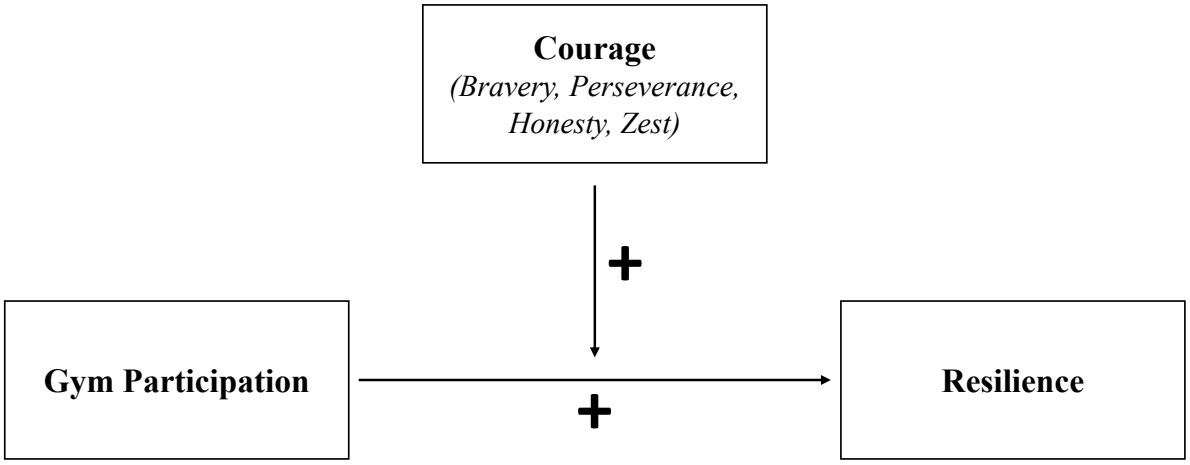
H2: Adult gym participation is positively correlated to resilience.

H3: The character virtue courage is hypothesised to positively moderate the relation between adult gym participation and resilience.

H4: The strengths of bravery, perseverance, honesty, and zest are hypothesised to positively moderate the relation between adult gym participation and resilience.

Figure 1

The Hypothesised Moderating Relationship between Adult Gym Participation, Courage, and Resilience



Methods

Study Design

This study has been conducted in cooperation with a total of four researchers. Each had their own character virtue to focus on and in pairs, they focused on either individual or team

sports. While also including questions about the virtue transcendence and mental health as part of another research, this study specifically centred on individual sports, namely gym participation, the character virtue courage, and resilience, thereby resembling a correlational study. Gym participation served as an independent ratio variable and resilience was a dependent ratio variable. The virtue of courage and its strengths (bravery, perseverance, honesty, and zest) were included in the analyses as moderator ratio variables. Furthermore, demographics were collected to be used as additional independent variables. These included gender (nominal), nationality (nominal), and age (ratio).

Participants

G*Power analyses (Faul et al., 2009) were conducted to estimate the required sample size for this study design. Accordingly, the sample had to include at least 32 participants to achieve a large effect size (f^2 = .35) with a power of .8 to test *H2*, *H3*, and *H4*. For the comparative analyses testing *H1*, the presumption was an unequal distribution among the group. Hence, there had to be a total of 40 participants with at least 13 and 27 participants in the respective groups to achieve an effect size of .85 and a power of .8. The sampling was performed online (e.g., WhatsApp, Instagram, Sona system of the university, Survey distribution platforms) and in person (i.e., approaching participants in their gym and hanging QR codes in various buildings). This resembled non-probability sampling, more specifically convenience and snowball sampling. The inclusion criteria were that participants had to be gym members who visit the gym at least once a week and are aged 18 or older. An exclusion criterion was established to exclude those participants engaging in different types of sports, thereby not fulfilling the requirements of the inclusion criteria.

Materials

By using the Qualtrics software, an online questionnaire was designed (see Appendix A). The questionnaire could be filled in with any technical device that was available to the participants. As mentioned, the participants in this study were gym-goers and the survey that they filled in consisted of 35 items in total.

Sports Participation

To get an overview of the participants' sports participation, several questions were formulated. First, participants were asked to indicate what type of sports they engage in, such as soccer or gym, with this study targeting participants who indicated gym participation. Next, they needed to indicate how many years they have been practising their sports, ranging from zero to 30 years. Additionally, the survey included an item enquiring at how many days the participants practise their sport during the week and how many hours per week they are

involved in it. In the case of the number of days, they were able to answer on a scale from zero to seven days, whereas the item about the hours per week spent doing their sport was answered on a scale ranging from zero to 40.

Character Strengths

For assessing the participants' character strengths, the Global Assessment of Strengths (GACS-24; McGrath, 2019) was used. It is a 24-item questionnaire adapted from the ViA-IS and encompasses a comprehensive set of 24 distinct character strengths organised into six virtues (courage, wisdom, humanity, justice, temperance, and transcendence). Participants were given a definition of each strength and then asked to indicate their agreement on a scale from 1-7. Here, one coded for 'very strongly disagree' and seven for 'very strongly agree'. In this study, the participants' scores on the virtues of courage and transcendence were covered. Hence, the scale has been reduced to eight items only. The strength zest, for instance, was measured with one item by providing the following definition 'You are enthusiastic toward life; you are highly energetic and activated; you use your energy to the fullest degree.'

Overall, the 24-item scale shows good internal reliability with a Cronbach's Alpha of .78. The Cronbach's Alpha for the individual strengths of the eight items is good (≥ .70). There is also a moderate correlation (r = .61) between the GACS-24 and a revised version of the ViA-IS, which indicates good validity (McGrath, 2019).

Resilience

For measuring resilience, the Brief Resilience Scale (BRS; Smith et al., 2008) was used. This scale includes six items, and the participants needed to indicate their agreement with the statements on a scale from 1-5, where one indicated 'strongly disagree' and five 'strongly agree'. For instance, one item in the scale was 'I tend to bounce back quickly after hard times.' Regarding its psychometric properties, the BRS shows good internal reliability with a Cronbach's Alpha of .84 in a sample of 128 undergraduate students (Smith et al., 2008). Furthermore, it has good validity when comparing it to longer resiliency scales (Smith et al., 2008).

Procedure

Before commencing data collection, the project was approved by the University of Twente's BMS ethics committee. The survey was uploaded to the University of Twente's BMS faculty Sona-System test subject pool, where students were able to earn 0.25 Sona credit points for participating in the study. Hence, participants were recruited via online platforms (e.g., SONA Systems, WhatsApp, Instagram, Survey distribution platforms) and some were approached personally in various gyms and buildings of the University of Twente. Once

deciding to participate in the study, participants were referred to the Qualtrics questionnaire, which they could fill in with any technical device (e.g., mobile phone, tablet, laptop). After reading through the study information, students needed to give their informed consent (see Appendix A). They were also informed about their right to quit the study at any point in time without the need to justify their decision. When having agreed to participate, the first set of questions asked the participant to indicate their demographics (Age, Gender, Nationality). Afterwards, the participants had to state if they engage in gym, soccer, or a different sport, where those who have indicated to engage in a different sport were immediately referred to the end of the survey. Subsequently, the items about sports participation, the GACS-24, the BRS, and the mental health questionnaire were presented separately. The survey required about ten minutes to complete, and the respondents were assured that their answers would be kept confidential. Lastly, they were thanked for their participation. Participants who entered the survey via SONA or the survey distribution platforms were additionally rewarded with the respective credits.

Data Analysis

All analyses were conducted using the R and R-Studio software (Version 4.1.1). During the analyses, the following packages were used: tidyverse, foreign, broom, ltm, psych, ggplot2, dplyr, ggpubr, haven, MASS, writexl, janitor, CTT, misty, car, matrixStats, interactions, nortest, lmtest, olsrr, jtools, moments, lmtest, cowplot, modelr, ggeffects, and forcats. First, the dataset was imported and cleared of any missing data, which included the participants who did not finish the survey. Additionally, boxplots were created to identify and subsequently exclude participants who were identified as outliers. Participants with a variance below 0.10 on the subscales of the survey were also excluded to ensure that they filled in the questionnaires seriously and not randomly selected any answers. Next, the negatively coded items of the BRS were reversed, so that consecutive analyses could be performed. These included checking the dataset of the individual scales (BRS; GACS-24) for normality and obtaining their reliability coefficients. Then, descriptive analyses were executed, and the participants' scores on the BRS were compared to norm tables by computing their standard deviations. This norm group was composed of a sample of 128 undergraduate students ($M = 3.53$, $SD = 0.68$; Smith et al., 2008). The participants' scores on the GACS-24 were not compared to any norm group since these scores are quite individual, so a comparison to norms would not yield any useful insights.

For testing the first hypothesis, participants' scores were distinguished between two groups based on their physical activity level. Participants who indicated to work out less than 300 minutes a week belonged to one group and those working out at least 300 minutes were

included in the second group (WHO, 2022). Since participants indicated their amount of time spent in the gym in hours, these values first had to be transformed into minutes by multiplying them by 60. Subsequently, the mean values of each group's resilience levels and their descriptives were computed and these were compared via a *z*-test to obtain group-specific differences, as well as check them for statistical significances.

Second, a correlation analysis was done to test the main effect between gym participation and resilience. Next, correlational analyses were broadened to include all variables, enabling the investigation of significantly correlated variables. Third, to prepare for the moderation analyses, it had to be checked whether the datasets met specific assumptions. Hence, checks for linearity, independence, homoscedasticity, normality, and non-multicollinearity were conducted. The checks for independence, homoscedasticity, normality, and linearity showed no disruptions (see Appendix B). The checks for non-multicollinearity did show irregularities in the Variance Inflation Factors (VIF) of the moderator variables (see Appendix B). However, the correlational analyses showed that these variables were not significantly correlated, thus a high VIF factor could be explained by the relatively small sample size. Hence, it was proceeded with the regression analyses. Afterwards, the five moderation analyses were conducted with gym participation as an independent variable, resilience as the dependent variable, and the virtue of courage with its four strengths as the moderator variables. For each moderation, a model displaying the interaction effect was created and checked for significant outcomes. Additionally, simple linear regression analyses were done to test for general effects between the variables.

Results

Participants

In total, the survey was filled in by 45 participants. The sample ranged in age from 18 to 50, with a mean age of 23.58 years (SD = 5.84). 31.1% (n = 14) of the participants were male, and 68.9% were female (n = 31). Furthermore, 6.7% (n = 3) of the respondents were Dutch, 84.4 % (n = 38) were German, and 8.9% (n = 4) were of other nationalities (Swiss, Lithuanian, Pakistani, Luxembourgish). According to the G*Power analysis (Faul et al., 2009), this sample size was sufficiently large.

The sample size calculated by the G*Power software (Faul et al., 2009) for the comparative analysis testing the difference between gym participants who visit the gym less or more than 300 minutes per week (*H1*), was achieved. 15 participants with a mean age of 25.47 (SD = 8.43) were included among those who spent less than 300 minutes per week in the gym. 73.3% (n = 11) of this group were female, and 26.7% (n = 4) were male. The second group,

namely those who spent more than 300 minutes per week in the gym, included 30 participants with a mean age of 22.63 (*SD* = 3.82). In this group, 66.7% (*n* = 20) were female, and 33.3% (*n* = 10) were male.

Descriptive Statistics

First, the Cronbach's Alpha of the GACS-24 and BRS were computed to obtain their internal reliability coefficients. The internal reliability of the BRS was good with a Cronbach's Alpha of .65. The GACS-24 showed a low internal reliability with an Alpha value of .39. This was possibly due to the small number of items in the scale. Next, the participants' scores on the BRS were compared to a norm group of 128 undergraduate students (Smith et al., 2008). With a *z*-score of -0.50 (p = .31), the resilience level of participants in this study was average compared to the norm group. Additional descriptive statistics about the variables can be found in Table 1.

Table 1

Descriptive Statistics on Resilience, Courage, and Adult Gym Participation

	M	*SD*	Range
Resilience	3.19	0.57	2.17 - 4.5
Courage	5.26	0.63	4 – 6.5
Gym Start	4.82	5.29	1 - 30
Gym Minutes	378.53	152.73	162 - 780
Gym Frequency (week)	3.56	1.20	2 - 6

Note. *N* = 45. 'Gym Start' refers to the years passed since participants started to go to the gym.

Comparison between Low and High-Frequency Gym Participants

Regarding the comparative analysis between participants who visit the gym for less or more than 300 minutes per week, both groups showed differences in their sports behaviour. Participants in the above 300-minutes group spent on average 454.20 minutes per week in the gym (*SD* = 128.13, Range = 306 - 780). On average, they started to go to the gym 4.70 years ago (*SD* = 5.01, Range = 2 - 30) and they went to the gym about 3.87 times a week (*SD* = 1.20, Range = 2 - 6). Participants in the below 300-minutes group spent on average 227.20 minutes in the gym per week (*SD* = 50.04, Range = 162 - 300). In this group, the participants started to go to the gym on average 5.07 years ago (*SD* = 5.98, Range = 1 - 25) and went to the gym about 2.93 times a week (*SD* = 0.96, Range = 2 - 5). Between these groups, a significant difference

was found regarding the number of minutes spent in the gym per week. Here, the below 300-minutes group scored significantly lower than the above 300-minutes group (z = -1.77, p = .04).

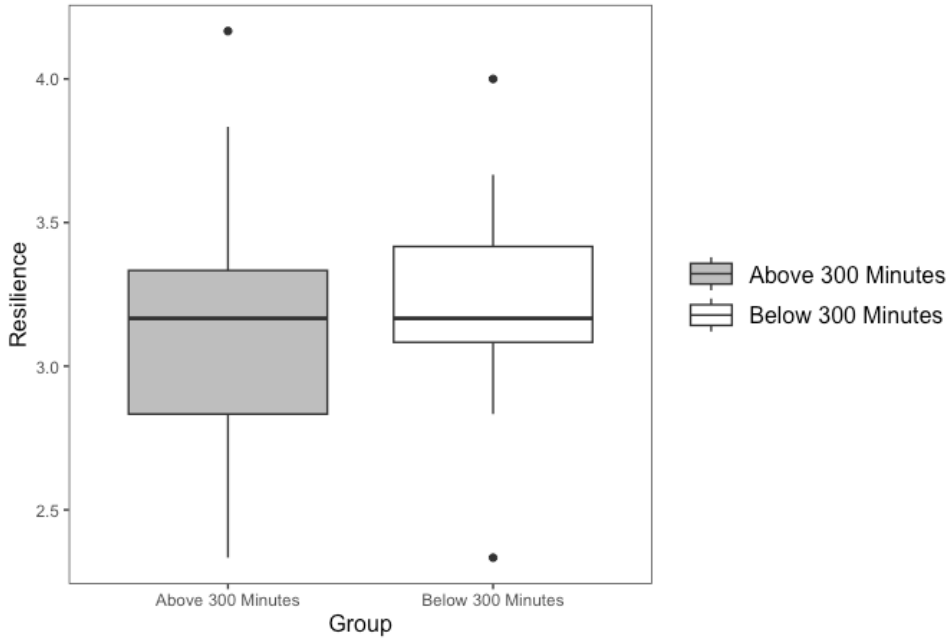
Hypothesis Testing

Hypothesis 1

To test the first hypothesis, stating that adult gym participants engaging in physical activity for at least 300 minutes a week show a higher level of resilience compared to those adult gym participants who exercise less, the mean resilience scores of both groups were compared. Both their mean scores and standard deviations showed only minor variations ($M_{>300}$ = 3.14, $SD_{>300}$ = 0.38; $M_{<300}$ = 3.22, $SD_{<300}$ = 0.39). It is noteworthy that the resilience score of those going to the gym for less than 300 minutes per week is slightly higher compared to those going more often, though not statistically significant. Figure 2 shows the distribution of the resilience scores per group. The boxplot reveals that both groups have a similar mean level of resilience. The scores of the 'Above 300 Minutes' group, however, are more spread towards the lower end of the scale. Three outliers appear in the boxplot but since they only appear as outliers here and not in the complete sample, they were not excluded from the comparative analysis. Considering that the difference regarding the resilience levels of both groups is not significant (z = -0.21, p = .42), *H1* is rejected.

Figure 2

Boxplot with the Distribution of the Groups' Resilience Scores



Hypothesis 2

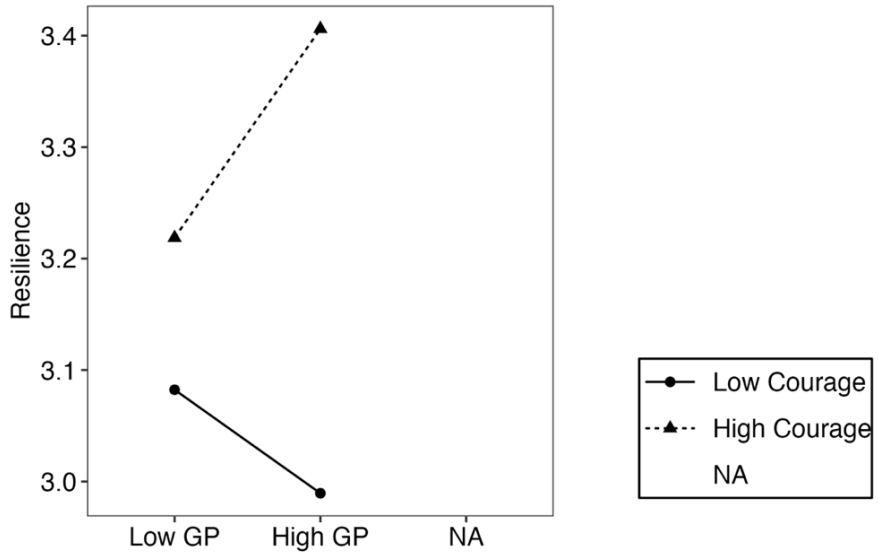
Secondly, it was expected that adult gym participation is positively correlated to resilience. The correlational analyses showed a positive but non-significant effect (r = .11, p = .47) regarding the influence of adult gym participation on resilience. Similarly, the regression analysis revealed a slightly positive but also non-significant effect (b = 0.0004, p = .45). Due to this insignificance, *H2* is rejected.

Hypothesis 3

Thirdly, it was hypothesised that courage positively moderates the relation between adult gym participation and resilience. Even though the correlational analyses showed that courage had a positive correlation with resilience (r = .27, p = .08), no significance was found. The same applies to the moderation effect (b = 0.001, p = .43). Hence, *H3* is rejected. Figure 3 shows the moderating effect of courage on the relationship between adult gym participation and resilience. The abbreviation 'GP' indicates the amount of gym participation in minutes, while the labels 'low' and 'high' indicate deviation of minus or plus one standard deviation from the mean, respectively. It is visible that there is an increase in resilience for those scoring high on the virtue of courage when spending an increasing amount of time at the gym. For low scores on the virtue of courage, there is a decrease in resilience when the time spent at the gym increases. Additionally, those scoring high on the virtue of courage show a higher initial level of resilience compared to those scoring lower. All changes and differences are insignificant, however.

Figure 3

Interaction Plot of the Moderating Effect of Courage on the Relation between Adult Gym Participation and Resilience



Note. GP = Gym Participation in Minutes. Low GP = *M* – 1 *SD* (225.8 minutes), High GP = *M* + 1 *SD* (531.3 minutes). NA = scale for possible missing values that is not applicable here.

Hypothesis 4

Lastly, it was tested whether the strengths of the virtue of courage, thus perseverance, bravery, honesty, and zest, positively moderate the relation between adult gym participation and resilience. Two of those four strengths showed significant positive correlations with resilience, namely bravery (r = .46, p = .002), and perseverance (r = .31, p = .04). Honesty did not have a significant correlation with resilience, but it is worth noting that it showed a negative effect (r = -.28, p = .06). A significant negative effect was also found in the linear regression analysis testing the effect of honesty on resilience (b = -0.17, p = .02). The linear regression analysis of bravery on resilience showed a significant positive effect (b = 0.24, p = .005). However, no significant correlations between the strengths and adult gym participation were found (see Table 2), which also applies to the moderation analyses (see Table 3). Concludingly, *H4* is also rejected.

Table 2

Correlations between the Variables

Variable	1	2	3	4	5	6	7
1. Gym	-						
2. Courage	.16	-					
3. Perseverance	.07	.68*	-				
4. Bravery	.13	.60*	.39*	-			
5. Honesty	.05	.52*	.00007	.18	-		
6. Zest	.19	.55*	.18	.09	.08	-	
7. Resilience	.11	.27	.31*	.46*	-.28	.23	-

Note. * $p < .05$

Table 3

Results Regression Analyses

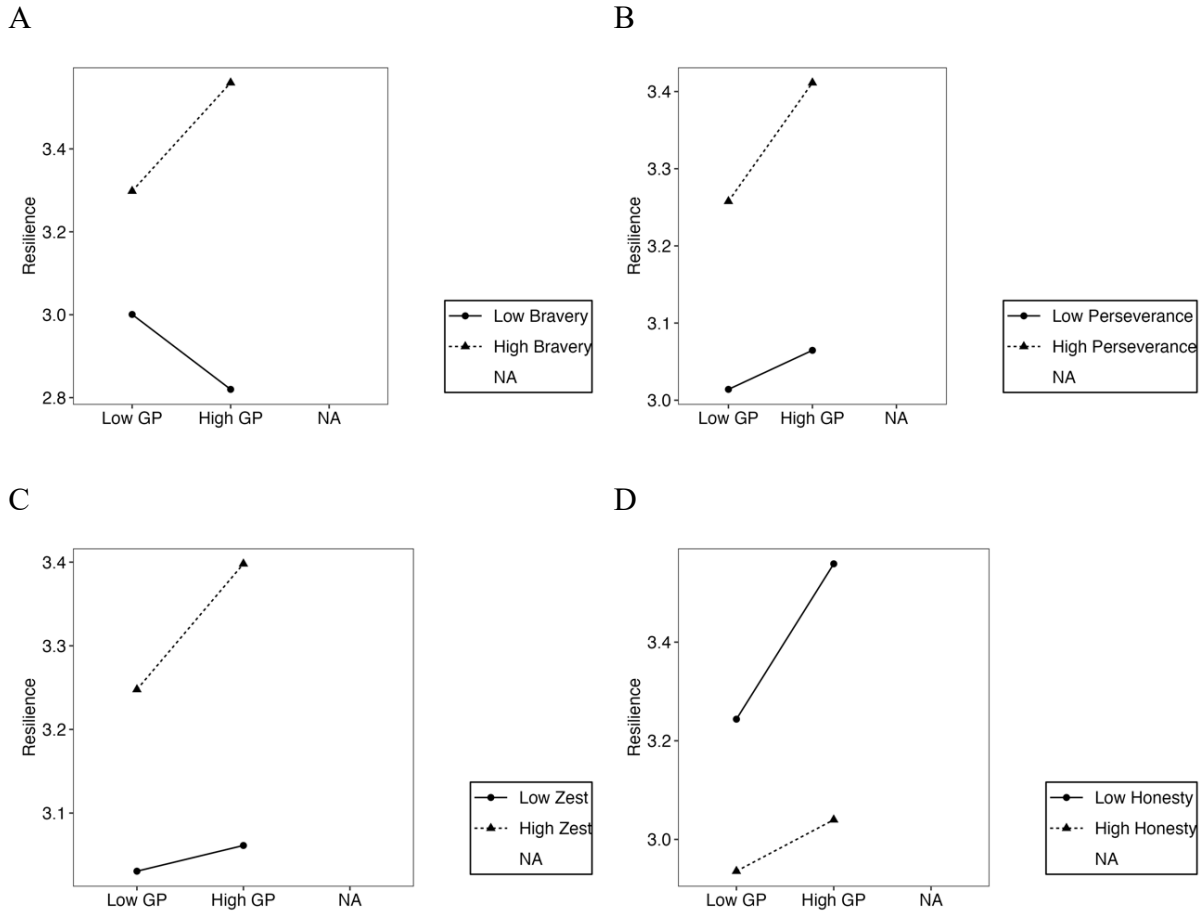
b	*SE*	*95% CI*		*p*	*t*	*df*	*F*	R^2
		LL	*UL*					
Step 1: Effect of Gym Participation on Resilience								
0.0004	0.0006	-0.001	0.002	.45	0.76	43	0.57	-.01
Step 2: Effect of Courage on Resilience								
0.21	0.13	-0.06	0.48	.13	1.54	43	2.36	.03
Step 3a: Effect of Bravery on Resilience								
0.24	0.08	0.08	0.41	.005*	2.99	43	8.92	.15*
Step 3b: Effect of Perseverance on Resilience								
0.15	0.08	-0.01	0.31	.07	1.85	43	3.41	.05
Step 3c: Effect of Honesty on Resilience								
-0.17	0.07	-0.31	-0.02	.02*	-2.37	43	5.6	.09*
Step 3d: Effect of Zest on Resilience								
0.14	0.08	-0.02	0.30	.08	1.77	43	3.13	.05
Step 4: Effect of Gym*Courage on Resilience								
0.001	0.001	-0.001	0.003	.43	0.79	41	1.04	.003
Step 5a: Effect of Gym*Bravery on Resilience								
0.001	0.0005	-0.0003	0.002	.16	1.45	41	3.17	.16*
Step 5b: Effect of Gym*Perseverance on Resilience								
0.0002	0.0006	-0.001	0.001	.79	0.27	41	1.23	.02
Step 5c: Effect of Gym*Honesty on Resilience								
-0.0003	0.0005	-0.001	0.001	.53	-0.63	41	2.35	.08
Step 5d: Effect of Gym*Zest on Resilience								
0.0002	0.0006	-0.001	0.001	.77	0.30	41	1.11	.008
Step 6a: Effect of Gym Participation on Resilience while controlling for moderation effect								
-0.004	0.005	-0.01	0.006	.47	-0.73	41	1.04	.003
Step 6b: Effect of Courage on Resilience while controlling for moderation effect								
-0.06	0.35	-0.76	0.65	.87	-0.16	41	1.04	.003

Note. *LL* = Lower Limit of the Confidence Interval, *UL* = Upper Limit of the Confidence Interval, * As indicator for $p < .05$, $N = 45$.

Figure 4 shows the moderating effect of all strengths on the relationship between adult gym participation and resilience. The abbreviation ‘GP’ in the figure displays the gym participation in minutes and the labels ‘low’ and ‘high’ refer to deviations from the mean by minus or plus one standard deviation. First, bravery (see Figure 4, Panel A), shows a similar pattern as courage. Hence, those scoring high on bravery have higher initial levels of resilience compared to those scoring lower. Furthermore, the resilience levels of those scoring high on bravery increase when the time spent at the gym is also increasing, whereas those scoring low on bravery show a decline in resilience the more time is spent at the gym. These changes and differences, however, are insignificant. For Perseverance (see Figure 4, Panel B), there is an increase for both low and high perseverance levels when the time spent at the gym is increasing. This increase for higher levels of perseverance, however, is steeper compared to lower levels, but both are insignificant. Again, the resilience levels of those scoring high on perseverance are higher than those scoring low on this strength, but this difference is insignificant. Similar to the pattern for perseverance, the plot of the strength zest (see Figure 4, Panel C) indicates an increase in resilience for both high and low scores on the strength when the time spent in the gym is increasing. While both changes are insignificant, there is a steeper increase for those who score high on zest. Here again, it is visible that participants with high scores on zest have higher initial resilience levels, but this difference is insignificant. Lastly, honesty (see Figure 4, Panel D) shows a reversed effect. While the resilience levels of both groups (i.e., low and high scores on the strength) are increasing with an increase in time spent at the gym, those scoring lower on honesty have insignificantly higher resilience levels. Furthermore, those scoring lower on honesty also show a steeper incline in resilience when the time spent at the gym is increasing compared to those scoring higher on the strength, which again is insignificant.

Figure 4

Interaction Plots of the Moderation Effect of the Four Strengths on the Relation between Adult Gym Participation and Resilience



Note. GP = Gym Participation in Minutes. Low GP = *M* - 1 *SD* (225.8 minutes), High GP = *M* + 1 *SD* (531.3 minutes). NA = scale for possible missing values that is not applicable here. Panel A: Bravery as moderator between adult gym participation and resilience. Panel B: Perseverance as moderator between adult gym participation and resilience. Panel C: Zest as moderator between adult gym participation and resilience. Panel D: Honesty as moderator between adult gym participation and resilience.

General Findings

Generally, it is worth noting that the effect sizes in the regression analyses were quite small, as were the R^2 values, indicating that little data was explained by the regression models. Regarding the correlational analyses, there were no major dependencies despite an expected high correlation between courage and its corresponding strengths (see Table 2). Additionally,

some of the relations in both the regressions, as well as the correlations were negative, namely in steps 3c, 5c, 6a, and 6b (see Table 3).

Discussion

This study aimed to investigate the moderating role of courage on the relationship between adult gym participation and resilience. It was hypothesised that adult gym participation is positively associated with resilience, especially when there is an increase in the time spent at the gym. Additionally, it was expected that the character virtue courage and its strengths of bravery, honesty, perseverance, and zest moderate the relation between adult gym participation and resilience. The results revealed that all four hypotheses need to be rejected.

First, no significant difference was found between the resilience levels of participants going to the gym more or less than 300 minutes per week. This result contradicts research findings, namely that the positive effect of sports on resilience rises with an increase in physical activity (Román-Mata et al., 2020). Considering that Román-Mata et al. (2020) focused on physical activity in general, different results can be explained by the specified focus in this study, namely gym participation. Accordingly, gym participation differs from other, more traditional individual sports, since it is not done at fixed times, except when joining classes at the gym. Hence, while going to sports clubs at fixed times encourages habit formation, gym participation demands more active effort to take time to go to the gym independently, thereby resembling a possible explanation for why other studies found significant effects of sports on resilience, which could not be verified for gym participation (Mayo Clinic, 2023; WHO, 2022). Furthermore, by focusing on people already engaging in healthy physical activity and adhering to the WHO (2022) guidelines, similar resilience levels could be explained by a smaller increase in resilience beyond a certain threshold of physical activity and, following the results of this study, this threshold seems to lie at 300 minutes. Hence, while resilience levels might increase with more sports engagement, this positive effect might reach saturation or a plateau when exceeding 300 minutes per week, resulting in resilience levels remaining unaffected beyond this threshold. Even though this has yet only been proven for physical health (Haskell et al., 2007), it needs to be considered similarly for the relationship between physical activity and mental health.

Another finding was that participants who visited the gym less showed a slightly higher resilience score compared to those going more often. Even though this is a non-significant finding, it might point to a negative side effect of excessive exercise. Hence, too much physical activity can have a negative impact on an individual's mental health, namely inducing distress and exhaustion (Colledge et al., 2020; Lichtenstein et al., 2017). This also applies to high-

intensity activities in general, highlighting the fact that pursuing sports for its social and pleasurable aspects has the most positive impact on people's overall well-being. This is because sports are then pursued based on intrinsic motivation and there is no pressure or stress to perform or exercise excessively (Downward & Dawson, 2016; Jetzke & Mutz, 2019). It is important to consider this when interpreting the results, even though the level of intensity of physical activity that this sample engaged in can only be assumed by looking at the minutes spent at the gym per week.

Next, adult gym participation had no significant positive effect on resilience. Although research found that physical activity leads to an increase in resilience (Román-Mata et al., 2020; Weinberg & Gould, 2019; Wiedenman et al., 2023), this study's findings cannot validate such an effect for gym participation. While increasingly more adults engage in physical activity, including joining the gym, to relieve stress and get rid of negative energy (Campbell, 2024; Eather et al., 2023), the positive effect of gym participation on stress might be too small to also lead to a change in resilience levels. Further, it can point to a decrease in resilience in modern society compared to some years ago, even though this decline has until now only been observed in young adults (Marty, 2019; Zhao et al., 2022). In addition, any sports participation does not solely have a positive influence on resilience. In fact, too high expectations about the own performance, self-criticism, and excessive exercising can lead to stress, causing adverse effects on resilience and mental health (Colledge et al., 2020; Eather et al., 2023; Ferguson et al., 2021; Saraiva et al., 2024), which need to be considered in any study involving sports. While these adverse effects mainly hold for professional athletes in competitive sports since they experience more pressure to perform (Saraiva et al., 2024), they also apply, but to a lesser extent, to leisure sports such as gym participation. Furthermore, for participants engaging in additional sports besides gym, there could have been a confounding effect on the relationship between gym and resilience, thereby limiting the findings of this study.

Lastly, while courage did have a positive effect on resilience, there was no significant moderating effect on the relationship between adult gym participation and resilience. The same applies to the strengths of bravery, perseverance, honesty, and zest, even though bravery and perseverance did show significant positive correlations with resilience. This positive effect for bravery and perseverance is in line with existing research findings (De La Fuente et al., 2022; Salisu et al., 2020; Vančáková et al., 2021). In fact, bravery supports the tolerance of stress and fear, which is needed for staying resilient, whereas the endurance inherent to perseverance directly contributes to the increase and persistence of resilience (De La Fuente et al., 2022; Martínez-Martí & Ruch, 2016). Corresponding with Giles et al. (2018), this study showed that

perseverance influences resilience in the sports context. That is, participants who scored high on perseverance showed increased levels of resilience. Furthermore, this study revealed the negative effect of honesty on resilience, even when gym was included. This implies that, in the context of this study, possessing the strength of honesty seems to negatively affect an individual's resilience. Analogous to research findings about kindness, which also resulted in a decrease in resilience (Demirci et al., 2019), its negative effect could have been induced by a dysfunctional interaction with the other variables (i.e., gym participation), thereby reversing its positive influence. Further, failing to find a balance between being kind and being honest could also cause negative feelings, such as when giving honest feedback that hurts another person (Levine et al., 2020), which connects to the self-representation aspect of honesty. This can explain the negative correlation found between honesty and resilience, as well as in the moderation analysis, even though it remains unclear how the working of this negative effect of honesty in the gym context can be explained. Hence, further investigations into this relationship might be useful.

Looking at the insignificant effects, one possible explanation can be given by the Resilience Shield Model (RSM; Pronk et al., 2021). This model conceptualises resilience as a multi-faceted construct underlying various factors that can exert their influence on someone's level of resilience. It is composed of six layers which interact with one another, thereby causing fluctuations in resilience. First, the innate layer encompasses genetic and epigenetic factors, resembling biological predispositions. Next, the mind layer includes psychological and spiritual factors, while the body layer addresses the physiological factors of our body. The social layer displays support from others, and the professional layer involves job-related aspects. An overarching layer exists namely the adoption layer, which allows the domain-specific resilience that has been developed in the other layers to be used for new challenges (Notebaert et al., 2022). These layers underline the many factors that can influence someone's level of resilience, thereby causing it to fluctuate quickly.

The RSM has been designed following debates about the validity and reliability of resilience tests and, due to its multi-dimensional structure, has been proven to display the construct of resilience better than the items in a resilience scale do (Notebaert et al., 2022). These insights of this model make it apparent that there are multiple factors influencing the level of resilience an individual feels at a certain point in time. Considering the findings of this study, gym participation resembles only one of many factors which influence resilience. While not being an indication for gym participation as having no influence on resilience, it points to other factors that influenced the scores of the participants in this study, thereby overshadowing

the influence of gym participation individually. These other factors could include, among others, current life stressors, mental health issues, biological predispositions, or the interplay of different types of sports.

Strengths

After discussing the main findings of this study, it is important to acknowledge its strengths. Firstly, there have not yet been many studies investigating the effect of character strengths on resilience, nor on sports, since the focus lay mostly on the investigation of physical activity on people's general mental health. Thus, this study contributes to research by gaining insights into the tridimensionality of gym participation, character strengths (i.e., the virtue of courage), and resilience, with the latter constituting a relatively unresearched concept, especially regarding sports and character strengths. Thereby, this study resembles an attempt to fill a gap in contemporary research, allowing new and more rigorous studies to be conducted to test these findings and extend their scope. With its strict exclusion criteria and transparent reporting of methodology and results, this study has a good basis which can be used for replication studies. By following the limitations and adapting the study design accordingly, replicating this study will certainly yield new insights, thereby contributing to the advancement towards closing the gap in research regarding the interplay of sports, character strengths, and resilience.

Limitations

However, it is also important to address this study's limitations. First, the sample is small and while it does reach the limit of the G*Power analysis (Faul et al., 2009), it is not significantly higher than needed. With the addition of a non-probability sampling procedure, a mean age of 23.58 years, which is not representative of the whole adult gym population, and predominantly female participants, the findings of this study have limited generalizability. In fact, research revealed that the resilience levels fluctuate throughout the ages, but generally show a peak beyond the age of 55. Further, resilience is dependent on gender, with females showing less fluctuations in resilience compared to males, whose resilience levels drop significantly during the early 50s (Reed & Reedman, 2020). This could be a reason for biased results. Moreover, the correlation and regression results do not equal causation. Hence, the effects that were found here only indicate influences between the variables that are likely to occur but are not fixed. Next, this study is cross-sectional and thus only gives insights into what the participants felt at a given point in time, thereby limiting the indication of any long-term effects or changes of the scores on the variables. This further limits the reliability of the resilience and courage scores since they do not indicate any possible long-term fluctuations.

Looking more closely at the effects, it is worth mentioning that only small effect sizes and R^2 coefficients were found. Therefore, only small proportions of the data were explained by the linear models, which makes it necessary to interpret the outcomes with caution. Additionally, the GACS-24 scale (McGrath, 2019) for assessing the strengths seems too small. With only one item per strength, it is too limited to make specific statements about the individual strengths. Its small internal reliability value is an indication of this limitation. Consequently, the use of a different strengths scale which includes multiple items per strength is advised since such an assessment likely yields more precise scores on each strength and is more reliable. Until now, the best-known questionnaire is the ViA-IS survey (Peterson & Seligman, 2004) that can be filled in online. However, since the responses cannot be managed by the researcher but instead are linked to single accounts, it was not feasible to realise in this study.

Regarding the study design, the influence of confounding variables cannot be ruled out. These can include interpersonal contact at the gym, the current life situation, general well-being, or engaging in multiple sports. That is to say, going to the gym does not exclude social contact with others and while it counts as an individual sports, it also includes conversations with others (e.g., workers, fellow gym-goers). This is especially true when visiting the gym with a 'gym buddy', which many people nowadays do. Consequently, these social interactions, and not the sports, can have an impact on resilience levels since they create feelings of belonging and connectedness, which have been shown to improve resilience (Giles et al., 2018). Looking into the results of this study, the resilience levels of the participants might have been influenced by this socialising aspect. Since the general sample showed average resilience levels and there were no significant differences between participants going to the gym more or less than 300 minutes per week, their resilience levels might have been influenced more by their social contacts than by the sport itself, thereby explaining the insignificant difference between the groups.

Future Research Directions

Considering the above-mentioned limitations, as well as strengths, some directions for future research can be named. Starting with the lack of studies generally, it is crucial for future studies to further focus on the relation between character strengths, sports, and resilience by investigating the different domains of the variables. Regarding the types of sports, it would be advisable to either choose individual sports that are proven to be done alone or to add questions to the survey asking about social contacts in the respective sports contexts. Since research found that team sports members get a feeling of connection through the social relationships within

their team (Giles et al., 2018), the same can apply to social interactions in individual sports, such as in group lessons at the gym. Thus, extending the survey with a check of possible confounding variables, such as socialising with others in individual sports, would likely yield more meaningful results. Otherwise, a focus on team sports or a comparison between the impact of competitive versus leisure sports on resilience can also give valuable insights regarding differences in how to cope with stress. Concerning other confounding variables that can influence the participants' resilience scores, it might be advisable to add questions in the survey enquiring about current emotional states and aligning the questions with the RSM. This would not only facilitate participants to indicate their levels of resilience, but it would also help the researcher to consider certain predispositions or life crises impacting resilience levels that sports cannot compensate for.

Additionally, conducting a study into the investigation of the positive and negative effects of sports on resilience could yield useful insights. As seen in this study, there was a slight decrease in resilience the more the participants exercised. Either this effect is random and has no underlying cause, or it indicates the negative effect of over-exercising on resilience. This cannot be checked in this study, but since other studies already found negative side effects of excessive sport (Colledge et al., 2020; Ferguson et al., 2021), investigating this occurrence further seems necessary. Moreover, combining this with a longitudinal design would create more reliable insights into changes in resilience, allowing more precise explanations for the effect of gym or sports participation on resilience over a long-term period. Further, considering the increase in mental illnesses (McGrath et al., 2023), it can also be useful to extend the scope of resilience to include similar coping strategies. For instance, some studies also found that adopting self-compassion serves as a buffer against the negative effects of sports (Saraiva et al., 2024). Hence, self-compassion appears to complement the construct of resilience, thereby making it interesting for future studies to focus not only on resilience but also to include other factors that can help to withstand possible negative effects of sports or life in general.

Practical Implications

While the findings of this study are insignificant, they do have implications. First, the findings indicate that there seem to be other aspects involved in determining someone's level of resilience that gym participation does not solely account for. Such aspects can include, for instance, the level of stress someone experiences in life. Additionally, with an increase in sports engagement, there are higher risks of adverse effects of exercising on both physical and mental health, which should not be overlooked. This is especially important in modern society which is constantly confronted with new challenges. Since bravery, perseverance, and zest have been

shown to positively influence resilience, it suggests that character strengths find application in improving someone's ability to cope with adversities and stay resilient, which is important to consider in future research and intervention designs. Hence, it follows that a healthy exercise behaviour and an optimal use of strengths is most promising for having a positive impact on the level of resilience a person possesses.

Generally, future studies are needed to examine the influence of character strengths in the sports context more thoroughly. By focusing on different types of sports and specific virtues or strengths, future studies can advance our understanding of relevant character strengths in sports, thereby enabling further investigations into possibilities for improving sports performance, while also aiding the progress and development of support programmes in leisure sports. Especially with the advance in positive psychology today (Wang et al., 2023), namely the focus on people's resources leading to optimal human flourishing (Grenville-Cleave, 2016; Warburton & Bredin, 2019), the demand and usability of studies about character strengths and life optimisation becomes ever more important. Thereby, the increased use of positive psychological highlights the need for future studies to focus on how to bring more positivity into the society, to which this study contributed its part.

Conclusion

While most of the findings in this study are insignificant, they do verify the multidimensionality of resilience, namely that it is influenced by a variety of factors and therefore problematic to grasp in a cross-sectional study. Besides, this study contributed to an advancement of research into the interaction between individual sports, courage, and resilience. In fact, the findings point to a possible negative effect of excessive physical activity on resilience and further underline the benefit of certain character strengths (i.e., bravery, perseverance, and zest) on resilience. By focusing on gym participation, the influence of a specific individual sports was investigated, which not only offered the insight that a stricter control of confounding variables needs to be conducted, but also made it apparent that it is advisable to design a longitudinal study to investigate the longer-term effects of sports on resilience. This would allow for more precise conclusions about the change in resilience in relation to sports engagement, while also accounting for a moderating effect of character strengths throughout that time. Concludingly, the findings of this study provide a new perspective for sports psychological research regarding the influence of character strengths on resilience, which is important to be extended by future research.

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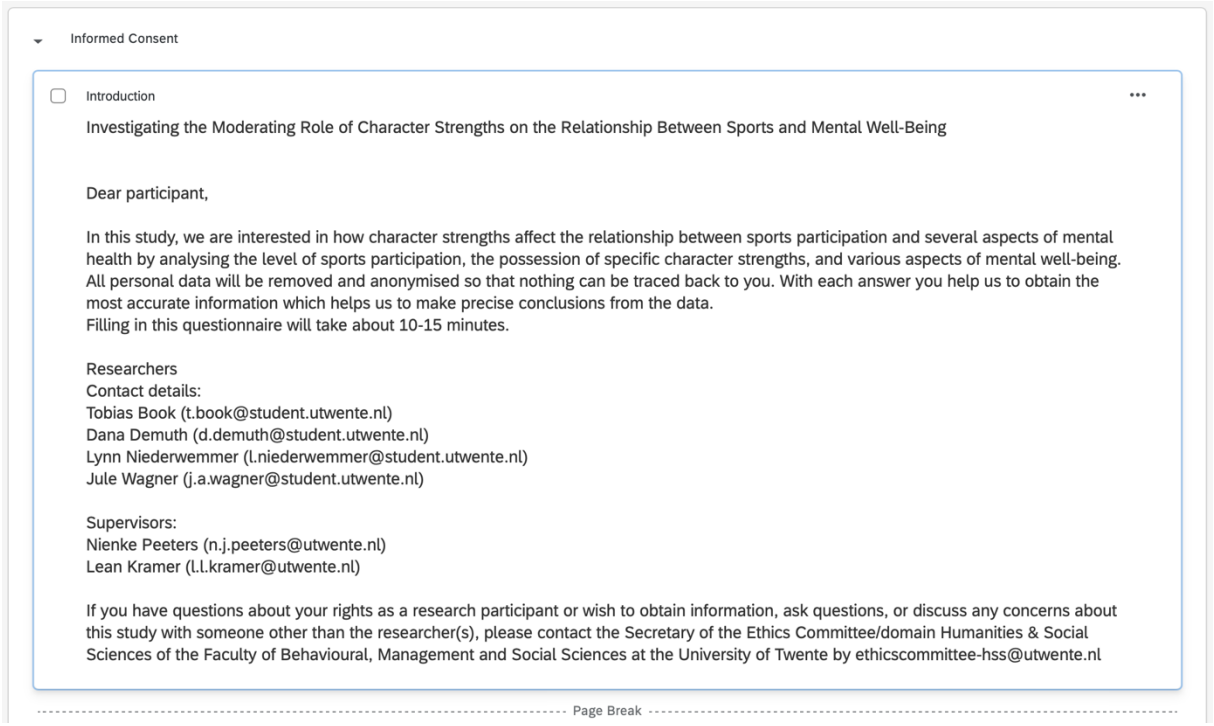
AI Statement

During the preparation of this work, the author used Chat GPT, Scribbr, and Grammarly. Chat GPT was used in order to help with the data analysis by obtaining ideas for codes that can be used in R-Studio. In addition, it served the purpose of finding synonyms for specific words and statements, as well as to get inspiration for reformulations of single sentences. Scribbr helped with the management of the references of this thesis. Grammarly was used to check the grammar and spelling of this thesis. After using these tools, the author reviewed and edited the content as needed and takes full responsibility for the content of the work.

Appendix A

The Qualtrics Questionnaire



Informed Consent

Introduction

Investigating the Moderating Role of Character Strengths on the Relationship Between Sports and Mental Well-Being

Dear participant,

In this study, we are interested in how character strengths affect the relationship between sports participation and several aspects of mental health by analysing the level of sports participation, the possession of specific character strengths, and various aspects of mental well-being. All personal data will be removed and anonymised so that nothing can be traced back to you. With each answer you help us to obtain the most accurate information which helps us to make precise conclusions from the data.
Filling in this questionnaire will take about 10-15 minutes.

Researchers
Contact details:
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Dana Demuth (d.demuth@student.utwente.nl)
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Nienke Peeters (n.j.peeters@utwente.nl)
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If you have questions about your rights as a research participant or wish to obtain information, ask questions, or discuss any concerns about this study with someone other than the researcher(s), please contact the Secretary of the Ethics Committee/domain Humanities & Social Sciences of the Faculty of Behavioural, Management and Social Sciences at the University of Twente by ethicscommittee-hss@utwente.nl

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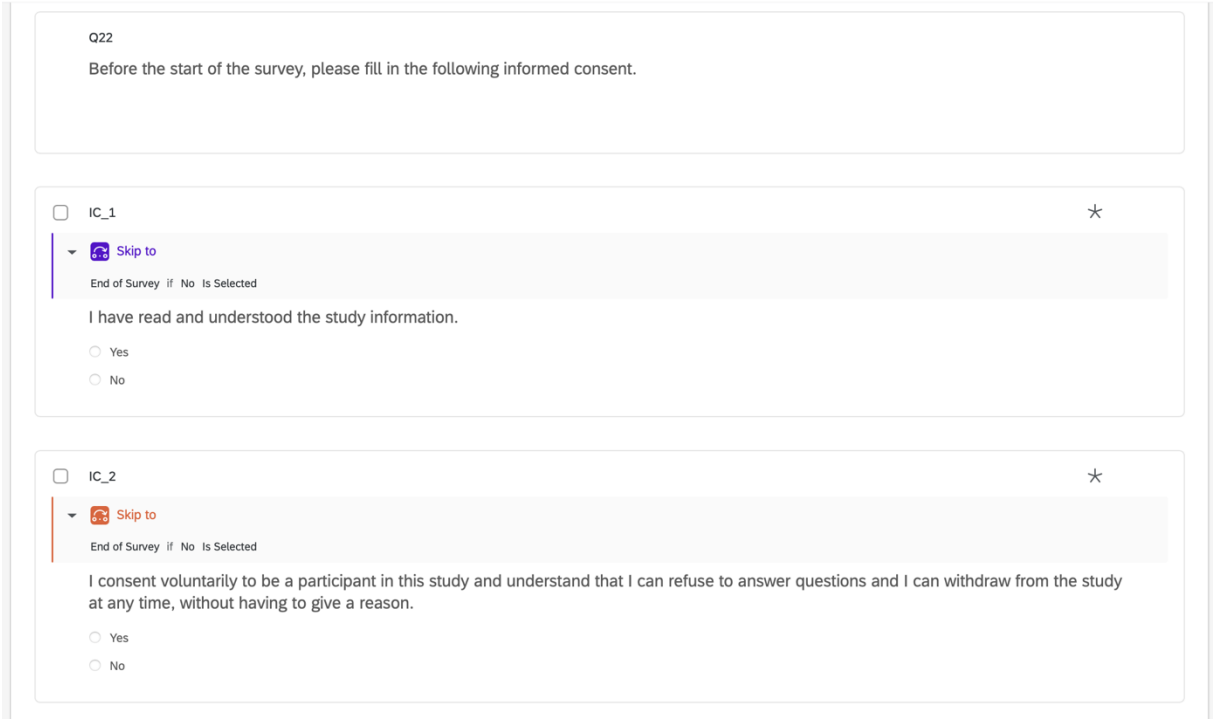


Q22

Before the start of the survey, please fill in the following informed consent.

IC_1 *

Skip to

End of Survey if No Is Selected

I have read and understood the study information.

Yes
No

IC_2 *

Skip to

End of Survey if No Is Selected

I consent voluntarily to be a participant in this study and understand that I can refuse to answer questions and I can withdraw from the study at any time, without having to give a reason.

Yes
No

IC_3

Skip to

End of Survey if No Is Selected

I understand that taking part in the survey involves a survey questionnaire.

Yes

No

IC_4

Skip to

End of Survey if No Is Selected

I understand that information I provide will be used for research.

Yes

No

IC_5

Skip to

End of Survey if No Is Selected

I understand that all personal information that will be collected about me that could identify me, will not be shared beyond the study team.

Yes

No

IC_6

Skip to

End of Survey if No Is Selected

I give permission for the survey data that I provide to be archived anonymously in OneDrive.

Yes

No

Import from library

Add new question

Add Block

Demographics

Q23

Now, please answer these questions about your demographics:

age

How old are you (in years)?

gender

What gender do you identify with?

- Female
- Male
- Other

nationality

What is your nationality?

- German
- Dutch
- Other, namely:

Import from library | Add new question

Add Block

Sport Participation

Q24

Next, you will be asked a few questions about your sport:

sport_type

Skip to

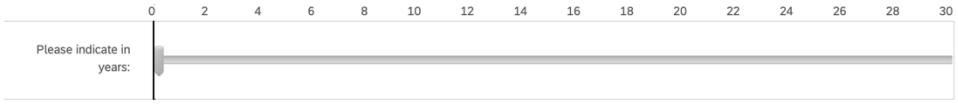
End of Survey if Other, namely: Is Selected

What is your specific type of sport?
Please be aware that this study focuses only on people who play soccer or go to the gym.

- Soccer
- Gym
- Other, namely:

sport_start

How long have you been practising your sport (Gym or Soccer)?



sport_week_gym

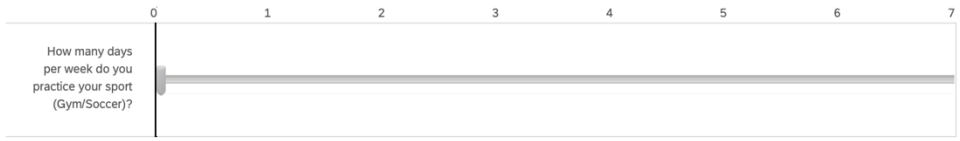
Display this question

If What is your specific type of sport? Please be aware that this study focuses only on people who... Gym Is Selected

Skip to

End of Survey if How many days per week do y... Is Less Than 1

Please indicate ...



sport_week_soccer

Display this question

If What is your specific type of sport? Please be aware that this study focuses only on people who... Soccer Is Selected

Please indicate ...

sport_hours_soccer

Display this question

If What is your specific type of sport? Please be aware that this study focuses only on people who... Soccer Is Selected

Skip to

End of Survey if How many hours per week do ... Is Less Than 1

Please indicate...

sport_hours_gym

Display this question

If What is your specific type of sport? Please be aware that this study focuses only on people who... Gym Is Selected

Please indicate...

Add Block

Global Assessment of Character Strengths

Courage

Display this question

If What is your specific type of sport? Please be aware that this study focuses only on people who... Gym Is Selected

This questionnaire asks you to describe aspects of your personality. Please read through the definitions and indicate the extent to which you agree. Be as honest as you can.

	Very Strongly Disagree	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Very Strongly Agree
You face your fears and overcome challenges and adversity; you stand up for what is right; you do not shrink in the face of pain or inner tension or turmoil.							
You keep going and going when you have a goal in mind; you attempt to overcome all obstacles; you finish what you start.							
You are a person of high integrity and authenticity; you tell the truth, even when it hurts; you present yourself to others in a sincere way; you take responsibility for your actions.							
You are enthusiastic toward life; you are highly energetic and activated; you use your energy to the fullest degree.							

Page Break

Transcendence

Display this question

If What is your specific type of sport? Please be aware that this study focuses only on people who... Gym Is Selected

This questionnaire asks you to describe aspects of your personality. Please read through the definitions and indicate the extent to which you agree. Be as honest as you can.

	Very Strongly Disagree	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Very Strongly Agree
You notice the beauty and excellence around you; you are often awe-struck by beauty, greatness, and/or the moral goodness you witness; you are often filled with wonder.							
You regularly experience and express thankfulness; you don't take the good things that happen in your life for granted; you tend to feel blessed in many circumstances.							
You are optimistic, expecting the best to happen; you believe in and work toward a positive future; you can think of many pathways to reach your goals.							
You are playful; you love to make people smile and laugh; your sense of humor helps you connect closely to others; you brighten gloomy situations with fun and/or jokes.							

Page Break

Justice

Display this question

If What is your specific type of sport? Please be aware that this study focuses only on people who... Soccer Is Selected

This questionnaire asks you to describe aspects of your personality. Please read through the definitions and indicate the extent to which you agree. Be as honest as you can.

	Very Strongly Disagree	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Very Strongly Agree
You are a collaborative and participative member on groups and teams; you are loyal to your group; you feel a strong sense of duty to your group; you always do your share.							
You believe strongly in an equal and just opportunity for all; you don't let personal feelings bias your decisions about others; you treat people the way you want to be treated.							
You positively influence those you lead; you prefer to lead than to follow; you are very good at organizing and taking charge for the collective benefit of the group.							

Page Break

Page Break

Humanity

Display this question

If What is your specific type of sport? Please be aware that this study focuses only on people who... Soccer Is Selected

This questionnaire asks you to describe aspects of your personality. Please read through the definitions and indicate the extent to which you agree. Be as honest as you can.

	Very Strongly Disagree	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Very Strongly Agree
You do good things for people; you help and care for others; you are generous and giving; you are compassionate.							
You pay close attention to social nuances and the emotions of others; you have good insight into what makes people "tick"; you seem to know what to say and do in any social situation.							
You are warm and genuine to others; you not only share but are open to receiving love from others; you value growing close and intimate with others.							

Brief Resilience Scale

resilience

Display this question

If What is your specific type of sport? Please be aware that this study focuses only on people who... Gym Is Selected

Please indicate the extent to which you agree with each of the following statements.

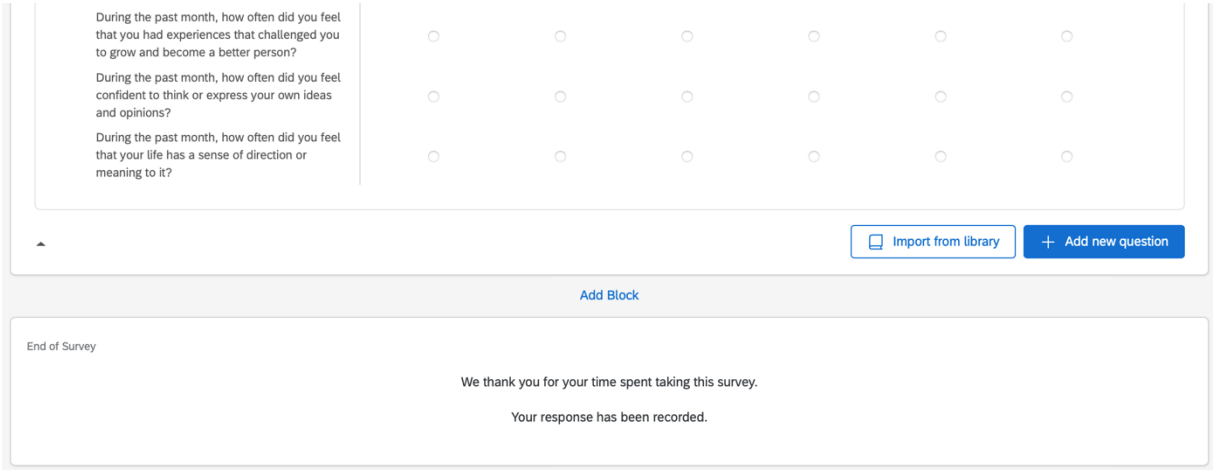
	Strongly Disagree	Disagree	Neutral	Agree	Strong,y Agree
I tend to bounce back quickly after hard times.					
I have a hard time making it through stressful events.					
It does not take me long to recover from a stressful event.					
It is hard for me to snap back when something bad happens.					
I usually come through difficult times with little trouble.					
I tend to take a long time to get over set-backs in my life.					

MHC-SF

MHC-SF

Please respond to each item by marking one box per row.

	Never	Once or twice	About once a week	About 2 or 3 times a week	Almost everyday	Everyday
During the past month, how often did you feel happy?						
During the past month, how often did you feel interested in life?						
During the past month, how often did you feel satisfied with life?						
During the past month, how often did you feel that you had something important to contribute to society?						
During the past month, how often did you feel that you belonged to a community (like a social group, or your neighborhood)?						
During the past month, how often did you feel that our society is a good place, or is becoming a better place, for all people?						
During the past month, how often did you feel that people are basically good?						
During the past month, how often did you feel that the way our society works makes sense to you?						
During the past month, how often did you feel that you liked most parts of your personality?						
During the past month, how often did you feel good at managing the responsibilities of your daily life?						
During the past month, how often did you feel that you had warm and trusting relationships with others?						


During the past month, how often did you feel that you had experiences that challenged you to grow and become a better person?
During the past month, how often did you feel confident to think or express your own ideas and opinions?
During the past month, how often did you feel that your life has a sense of direction or meaning to it?
Import from library
Add new question
Add Block
End of Survey
We thank you for your time spent taking this survey.
Your response has been recorded.

Appendix B

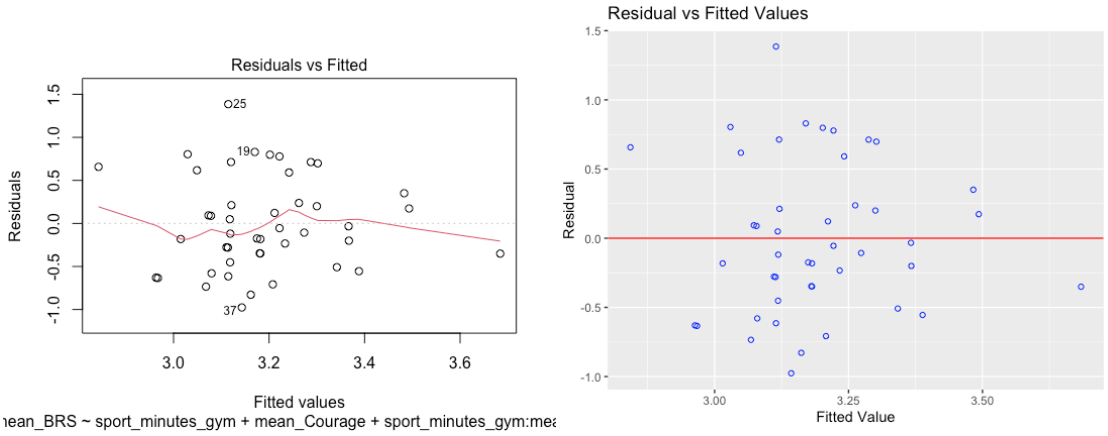
Assumptions for Linear Regression Model (Step 4 in the regression analysis)

1. Independence

   Based on the study design, it can be argued that the measures are not dependent on each other. That is, the participants' scores on each variable do not depend on their score on another. The Durbin-Watson test was conducted to verify this statement. The DW Statistic equals 2.36 with a *p*-value of .89. Since this is a non-significant result, it can be concluded that the residuals are not dependent on each other. Hence, the assumption of independence is met.

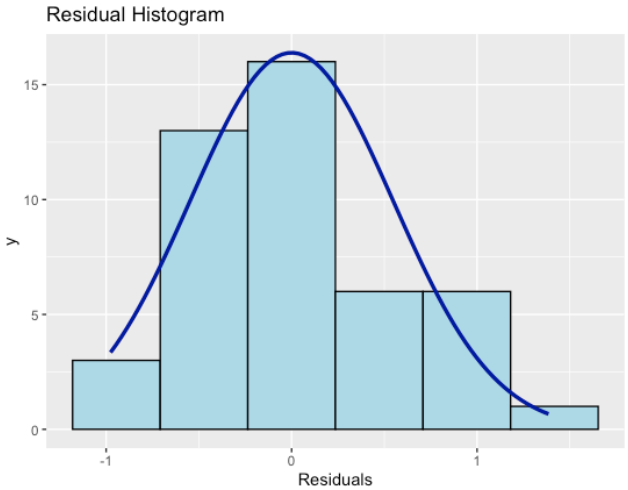
2. Homoscedasticity

   The Breusch Pagnan Test was conducted to test the assumption of homoskedasticity, so the equal variance among the residuals of the moderation model. The test's statistic is 1.56 with a *p*-value of .21, which is non-significant. Hence, this assumption is met. A plot of the residuals can be seen below.



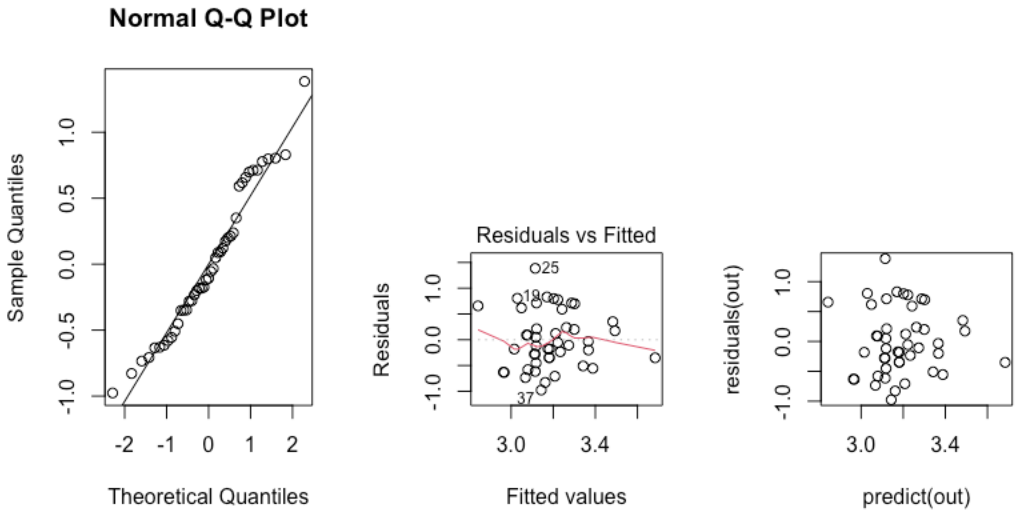
3. Normality

   The Shapiro-Wilk normality test was conducted to check whether there is a normal distribution among the residuals. With a W-Statistic of 0.96 and a *p*-value of .16, the results are non-significant, which indicates a normal distribution among the residuals. Additionally, the skewness and kurtosis of the residuals of the model was checked. Both showed a non-significant result ($p_{skew} = .24$, $p_{kurtosis} = .46$), underlining the fact that the residuals are normally distributed. Plots showing this distribution can be found below.



4. Linearity

In order to check the assumption that the residuals follow a linear distribution, the Rainbow test was done. Its Rain Statistic equals 1.70 with a corresponding *p*-value of .13, indicating a non-significant result. This means that the residuals are linearly distributed, and that this assumption is thus met. Plots can be found below.



5. Non-Multicollinearity

The check for non-multicollinearity was based on the VIF Analysis. Its results show that the VIF for gym participation and the moderator gym*courage are > 10. Hence, this assumption is not met. Based on their insignificant correlation, however, the linear analyses were continued.

VIF (Gym) = 80.74
VIF (Gym*Courage) = 94.99

r (Gym & Courage) = .16, *p* = .28