The Impact of Visibility and Representation on Minority Stress in Sexual Minority Athletes

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Abstract

Sexual minority individuals encounter added stress due to their minority status. This is particularly evident for sexual minority athletes, which is why this research attempted to investigate the relationship between perceived visibility and representation of sexual minority athletes and depression. Furthermore, the concealment of sexual identity was tested for mediation, since sexual minority athletes tend to conceal their identity as a result of increased discrimination and stigmatisation. Additionally, it was examined if the extent of athletic identity is associated with concealment. As the topic of sexual minority individuals in the sports context is understudied and research on visibility and representation of sexual minority athletes rare, this study aimed to fill this research gap.

The study was a quantitative online survey, part of a larger study and was conducted with a final sample of 63 participants. The scales that were used for this study were the Patient Health Questionnaire (PHQ-9), the Gender Minority Stress and Resilience Measure (GMSR), the Athletic Identity Measurement Scale (AIMS) as well as own items to measure perceived visibility and representation. Participants were mostly reached by personal distributions by the researchers.

Results demonstrated a significant positive relationship between concealment of identity and depression (b=.190, SE=.079, t=2.393, p=.020), suggesting the disclosure of one's sexual identity to increase mental health among sexual minority individuals across different contexts. For the other relations no significant result was found. Additionally, concealment was not found to mediate the relationship between visibility and depression.

A major limitation of this study was the scarce research on the effects of visibility and representation of sexual minority individuals, which could have led to most associations being not significant. Therefore this research highlights the need for future research, which could focus on different variables such as social support or replicating this study as qualitative research.

Keywords: visibility and representation, concealment of identity, mental health, athletic identity, sexual minority, mediation

The Impact of Visibility and Representation on Minority Stress in Sexual Minority Athletes

Sexual minority individuals are particularly underrepresented in the context of sport (Holmes, 2023). Sexual minority individuals are defined as people who experience non-heterosexual attraction, behaviours or identities, such as lesbian, gay, bisexual, pansexual, asexual, polyamorous, and other orientations (Meyer et al., 2021). That visibility and representation is low shows the example of former professional football player Marcus Urban (Holmes, 2023). He outed himself publicly in 2007, which was 16 years after finishing his career. By doing so, he was the first male professional football player in Germany and the second worldwide in the 150-year football history to disclose as a sexual minority. Yet now, 17 year later, no other male professional football player in Germany who is actively playing, has disclosed as gay or bisexual (Holmes, 2023).

The issue becomes evident as sexual minority individuals generally face additional stressors due to their minority status in society (Meyer, 2003). Especially in the sports context sexual minority individuals suffer from stigmatisation and discrimination, affecting their general mental health (Frost & Meyer, 2023). In order to avoid these negative experiences, sexual minority individuals tend to conceal their sexual identity (Amodeo et al., 2020). Several studies found a clear positive relation between concealment of one's sexual identity and depression (Pachankis et al., 2020; Reyes et al., 2023). Thus, this study aims at filling the research gap regarding the visibility and representation of sexual minority athletes and its association with their levels of depression, while also considering concealment as a potential mediator.

Minority Stress Theory

Meyer (2003) was the first to conceptualise the impact stress has on the mental health of sexual and gender minority individuals in a coherent model. According to Meyer (2003), sexual minority individuals often struggle to identify with social norms and structures prescribed by the cis-heteronormative society, leading to increased stress and inflated health inequalities. Thus, this study will focus on investigating the mental health of sexual minority individuals as a result of the amount of stress they experience regarding their minority status.

Based on his research, Meyer (2003) first proposed the minority stress theory, which aims at understanding social, psychological, and structural factors that can lead to mental health inequalities in sexual minority groups. Frost and Meyer (2023) postulate that minority stress roots in prejudice and stigma, differentiating this type of stress from the general stress that all people experience in their daily lives. As part of the minority stress theory, they distinguish

between distal and proximal stressors. Distal stressors arise from e.g. discrimination or victimisation by laws, policies and cultural norms, as well as from major life events, chronic stressors, etc. Proximal stressors refer to internalised stigma, which can be attributable to experiences of distal stressors such as stigmatisation, discrimination, or non-affirmation of others leading to protective behaviour such as concealing one's sexual identity. These proximal stressors can have a direct impact on the mental health of sexual minority individuals, whereas the distal stressors only have an indirect influence on mental health through an individual's internalisation (Hidalgo et al., 2019). A systematic review found that sexual minority individuals reported higher levels of depression, bipolar disorders, attempted suicide rates as well as anxiety and anxiety disorders than their heterosexual counterparts (Plöderl & Tremblay, 2015). Additionally, sexual minority adolescents are five times more susceptible to depression or self-harm than heterosexual adolescents, making mental health difficulties one of the biggest difficulties among sexual minority adolescents (Amos et al., 2020).

Sexual Minorities in Sport

As mentioned before, the sports industry reports particular slow progress on inclusivity and acceptance of sexual minority individuals. As Braumüller and Schlunski (2022) claim, prejudice against sexual minorities root in principles such as heteronormativity or hegemonic masculinity. The concept of heteronormativity pronounces that there are only two genders, namely male and female, and views this as natural and unambiguous. Moreover, this concept suggests that every individual can be assigned to one of the two groups while prioritising men over women at the same time. Heteronormativity in sport reinforces the stereotypical male, physical dominance and bodily appearance over women, also referred to as hegemonic masculinity. Furthermore, only heterosexual individuals are accepted, which includes the view that 'real' men have to be masculine and attracted to feminine women and vice versa. Individuals that do not conform to the norms of heteronormativity are commonly being marginalised and discriminated against (Braumüller & Schlunski, 2022).

In 2019, Cunnigham established a multilevel model, which aims at explaining discriminatory experiences of sexual and gender minority athletes in different sport settings. For that, he distinguishes between the macro level, the meso level and the micro level. According to Hartmann-Tews et al. (2020), the macro level refers to societal factors such as the aforementioned heteronormativity or hegemonic masculinity. The meso level describes organisational factors, which encompass the club culture and the teams itself but also e.g. formal gatherings. In these environments, people – or at least the majority – share the same values and beliefs, reflected directly by the behaviour of the members. By sharing similar values and

beliefs, the organisational culture can influence a minority person's feeling of belonging and well-being, but also determine either their disclosure or concealment of their identity. Lastly, the micro level entails individual factors such as the level of identifying with being an athlete or as being part of the sport culture (Hartmann-Tews et al., 2020).

Despite the fact that concepts such as heteronormativity or hegemonic masculinity have received increasing criticism among the (queer) community and some progress towards acceptance has been made, sexual minorities still suffer from marginalisation, discrimination and harassment (Amodeo et al., 2020). Sexual (and gender) minorities often feel excluded from sport or any physical activity in general due to their sexual orientation. As a result, gay or bisexual males are less likely to participate in team sports or physical activities compared to heterosexual males. Another important consequence of the marginalisation and discrimination or even the expectation of experiencing this, is the concealment of a person's identity (Amodeo et al., 2020). One study found a positive relationship between concealment and mental health problems such as depression, anxiety or negative affect (Pachankis et al., 2020). Another study among sexual minority athletes discovered outness as a predictor for better mental health (Reyes et al., 2023). In addition, concealment as not merely the absence of outness but the active prevention of disclosure, was found to be associated with higher negative affect among sexual minority adults and sexual (and gender) minority adolescence. Negative affect refers to distressed mood and has an influence on developing depression (Kiekens & Mereish, 2022).

As mentioned above, the micro level of the multilevel model includes factors, such as the level of identifying with being an athlete (Hartmann-Tews et al., 2020). In relation to that, Bush et al. (2012) found evidence that athletes who identify strongly with being an athlete and as part of the sport community experience higher levels of prejudice regarding their sexuality than athletes who do not. Since the experienced discrimination and prejudice of sexual minority individuals appears to lead to the concealment of their sexual identity, this study aims to examine if the extent of a person's athletic identity can be associated with an increased concealment of their sexual identity in the sports context.

Visibility and Representation of Sexual Minority Athletes

Gay and lesbian relationships are commonly represented in e.g. American movies or television shows (Żerebecki et al., 2021). It is proven that the portrayal of certain characters in television shows and movies can be related to the attitudes of the audience. For example, when sexual minority characters are portrayed positively, attitudes of audiences towards them may be more positive, which promotes inclusivity and acceptance of sexual minority groups and individuals (Żerebecki et al., 2021). Yet, in the context of sport, visibility and representation of

sexual minority individuals have been established much slower. Especially, since the sport community has been less inclusive and accepting of sexual minorities than other contexts, visibility and representation seems to be crucial when aiming at changing this problem (Kian et al., 2015).

The aforementioned example of former football player Marcus Urban illustrates the concept of hegemonic masculinity and that the sport industry is far from equality and acceptance for all athletes, especially sexual minority athletes (Holmes, 2023). Additionally, (male) football is currently the most liked sport in Germany and many other countries in Europe, which means that there is little to no LGB representation whatsoever for many young players.

Current Study

As past research has shown, significant (mental) health inequalities between sexual minorities and their straight peers have been observed. Furthermore, Frost and Meyer (2023) reported an increase in hate crimes against sexual (and gender) minorities. Especially in the context of sport, the topic of minority stress of sexual minorities is understudied and underrepresented. While current research mainly focuses on people who are openly LGB in the professional or public setting, this research will concentrate on examining if visibility and representation are related to the mental health of all sexual minority athletes regardless of whether sports are played professionally or leisurely. Additionally, the aforementioned research illustrates that sexual minority athletes often have to conceal their sexual identity to avoid discrimination or stereotyping. Most of that research focuses on the influence of concealment on mental health issues such as depression or anxiety and shows a clear positive relationship among those variables, which this study expects to find as well. Moreover, the literature on the effects of the extent of athletic identity is outdated. Changes in societal attitudes or norms may have occurred since the original research. In order to validate the findings, this study will investigate if the extent of athletic identity is associated with the concealment of an athlete's sexual identity.

Research Question & Hypotheses

Based on the research, the current study will examine the following research questions: *"How are the visibility and representation of sexual minority athletes and the level of depression in sexual minority individuals related? To what extent is this relationship mediated by the concealment of one's sexual identity? Is the extent of athletic identity associated with the concealment of sexual identity?"* The following hypotheses were formulated in line with past research and the research question:

H1: A higher perceived visibility and representation of sexual minority athletes is related to lower levels of depression in sexual minority individuals.

H2: A higher perceived visibility and representation of sexual minority athletes is associated with reduced concealment of one's sexual identity.

H3: Concealment of one's sexual identity is positively related to levels of depression in sexual minority individuals.

H4: Concealment of one's sexual identity partially mediates the relationship between visibility and representation of sexual minority athletes and levels of depression of sexual minority individuals.

H5: A higher athletic identity is connected to increased concealment of one's sexual identity.

Figure 1

Theoretical Framework.
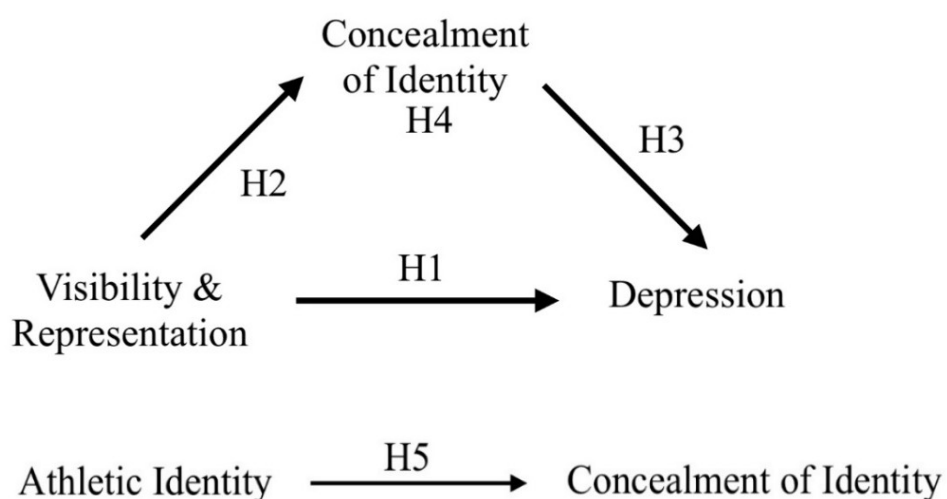
Methods

Design

The general purpose of this study was to examine the impact of visibility and representation on minority stress in sexual minority athletes. The study was designed cross-sectionally with one-time data collection, which was done using a quantitative online survey containing self-report questionnaires. Furthermore, this study was part of larger study that was ethically approved by the ethics committee of the University of Twente, approval number 240516.

MINORITY STRESS IN SEXUAL MINORITY ATHLETES

Participants

This study used a non-probability sampling strategy including 110 participants. After data cleaning, the remaining 63 participants met the inclusion criteria of being a sexual minority individual and being 16 years old or older. Overall, 57.3% of the participants completed the study, whereas 42.7 % had to be removed due to insufficient participation. Participants were excluded if they did not adhere to the inclusion criteria, gave incomplete answers or completed the survey with more than 5% of missing values of the used scales (Madley-Dowd et al., 2019). 32 participants were excluded for failing to fill out enough items and 15 others because they were neither a sexual nor a gender minority. All remaining 63 participants were between the ages of 16 and 49 with a mean age of 24.3 years. Furthermore, 44.4% of participants identified as female, 20.6% as male, 14.3% as non-binary and the rest were still exploring their gender-identity or chose to self-identify as e.g. genderfluid. For this question, multiple options were possible. 39.7% of participants were working, whereas 60.3% were either studying or still in school. Moreover, 61.9% were living in the Netherlands, 33.3% in Germany, and only 4.8% somewhere other than one of the two countries. Participants were recruited through the SONA system (11.1%) of the University of Twente as well as personal distributions (88.9%) through e.g. social media. The SONA system provides credits as a reward for participation; however no reward was offered to participants reached by the personal distributions. Participation was voluntary and prior to the beginning of the survey, participants had to provide informed consent and were informed that they could withdraw from the study at any point. The consent form conformed to ethical standards and the research was approved by the ethics committee BMS, domain humanities and social sciences of the University of Twente.

Materials

The study was published on Qualtrics.com (Qualtrics XM / The Leading Experience Management Software, 2024). The link could be found through the SONA platform as well as the personal distributions. Therefore, to access the study, a technical device with internet access (e.g. smartphone, laptop, tablet) was required. The study consisted of one questionnaire, which included a consent form, demographics, and items from different existing scales as well as items formulated by the researcher. The demographics included questions about age, gender identity, sexual identity, occupation or study programme, and country of residence. The existing questionnaires that were used are the Patient Health Questionnaire, the Gender Minority Stress and Resilience Measure, and the Athletic Identity Measurement Scale (Brewer et al., 1993; Spitzer et al., 1999; Testa et al., 2015).

Patient Health Questionnaire

The Patient Health Questionnaire (PHQ-9) is a common measure in primary care settings to assess the levels of depression in individuals. It contains nine items with responses ranging from (0) *not at all* to (3) *nearly every day* to measure the severity of depression in individuals. Examples of items are "*feeling down, depressed, or hopeless*" and "*trouble concentrating on things, such as reading the newspaper or watching television*". The items were scored by calculating the mean score for each participant, with higher scores indicating higher levels of depression. The PHQ-9 reported "excellent" internal reliability with a Cronbach's α of .89 and test-retest reliability with a kappa of .84. Additionally, evidence was found for a good criterion, construct and external validity. Furthermore, the PHQ-9 was proven to have a sensitivity for major depression of 88% as well as a specificity of 88%. Due to its good validity, the PHQ-9 is considered the standard measure for measuring depression (Blackwell & McDermott, 2014). For this study a Cronbach's α of .88 was measured, which supports the excellent internal reliability of past studies.

Gender Minority Stress and Resilience Measure

Overall, the Gender Minority Stress and Resilience Measure (GMSR) consists of nine subscales concerning minority stress and resilience factors. In this study the item numbers 41 to 45 are used to examine identity non-disclosure in sexual minority individuals, such as item number 41: "*Because I don't want others to know my queer identity, I don't talk about certain experiences from my past or change parts of what I will tell people*". The responses range from (1) *strongly disagree* to (5) *strongly agree* on a five-point Likert scale. Participant scores were computed by averaging the item scores, with higher scores indicating increased concealment. While developing the GMSR, Testa et al. (2015) found the internal consistency to be adequate for each of the nine scales with Cronbach's α scores between .61 to .93. Additionally, the criterion validity, convergent validity and the discriminant validity were found to be adequate. In this study, an excellent Cronbach's α coefficient of .85 was obtained.

Athletic Identity Measurement Scale

The Athletic Identity Measurement Scale (AIMS) is generally used to measure an individual's athletic identity. The scale consists of ten items, with responses ranging from (1) *strongly agree* to (7) *strongly disagree* on a seven-point Likert scale. The items were scored by calculating the mean score for each participant, with higher scores indicating higher athletic identity. However, the researcher only intended to give an indication for the possible influence of athletic identity on the examined relationships. Therefore, the researcher only used two items of the AIMS, namely "*Sport is the most important part of my life*" and "*I consider myself an*

athlete". One of the items is from the social identity subscale (item 1) and one from the exclusivity subscale (item 4). The negative affect subscale was not used because it is not related to the research question. The AIMS reported good internal consistency across various studies with Cronbach's α ranging from .76 to .93 (Mitchell et al., 2021). For this study a moderate to good Cronbach's α of .79 was measured.

Own Items

The researcher's own items were formulated with the intention to measure the perceived visibility and representation of sexual minority athletes. As there was no existing scale that measured this variable, the researcher had to create four items. The items formulated were "*I know of professional LGB and other sexual minority athletes*", "*I personally know LGB and other sexual minority athletes*", "*I know of LGB and other sexual minority people in leadership or other important positions in the sports context*" and "*I see LGB and other sexual minority athletes online or on tv*". The responses of items one to three ranged from (1) *strongly agree* to (5) *strongly disagree* on a five-point Likert scale, whereas responses for the last item ranged from (1) *always* to (5) *never* also on a five-point Likert scale. Participant scores were calculated with the average item score, with higher scores indicating high perceived visibility and representation. In this study a Cronbach's α of .77 was measured, which can be interpreted as moderate internal reliability.

Procedure

Before starting data collection, the research was approved by the BMS ethics committee of the University of Twente. After the survey was approved, it was published on Qualtrics and distributed via the SONA platform as well as through personal distributions of the link to the survey. First, participants were provided with the aim of the research and asked for active consent. Only after giving consent, the participants were able to start the survey, otherwise the participants could choose the option to withdraw from the study. Then, they had to fill in the demographic information about their age, gender identity, sexual identity, occupation or study background, and country of residence. Lastly, the participants filled in the items of the survey, which took around eight to twelve minutes. The survey ended with a short debriefing including information and resources in case the topic caused emotional distress in individuals due to their minority status and their experiences with it.

Data Analysis Plan

In general the analyses attempted to examine the relationship between visibility and representation of sexual minority athletes, their levels of depression and the concealment of peoples' sexual identity. The relationships between those variables were investigated for

mediation, with visibility and representation as the independent variable, level of depression as the dependent variable and concealment of identity as the mediator variable.

Prior to data collection, a sample size calculation was done with the G*Power tool, which suggested 55 participants for the analyses. The priori analysis was conducted for a two-tailed linear multiple regression analysis with a fixed model and a single regression coefficient. The effect size was .15, the type one error probability was .05 and the type two error probability was .8. As the power analysis suggested at least 55 participants, and the final sample was 63, the sample size was sufficient. For the data analysis, the statistical program RStudio version 4.3.1 was used. First the dataset was cleaned by removing all participants that do not meet the inclusion criteria of being 16 years or older and being a sexual minority individual. Additionally, all participants who failed to fill out at least 95% of the questions were removed (Madley-Dowd et al., 2019). Initially, the sample was supposed to exclude all people that do not engage in physical activity at least once a week to distinguish athletes from non-athletes. However, two separate analyses were done, one including non-athletes and one excluding them. After data cleaning for excluding the non-athletes, the final sample included only 44 participants. Based on the power analysis, the study would have been underpowered, making the results not as substantial as intended. Therefore, the decision was to include both athletes and non-athletes into the final sample. The results of the underpowered analysis are illustrated in Appendix A.

After data cleaning, the demographics were analysed with a non-numeric dataset. Then, a descriptive analysis of the variables, namely visibility and representation, levels of depression, and concealment of identity was carried out to gain insight into their means, standard deviations and correlations.

Moreover, the statistical assumptions of linearity, normality, equal variance and independence were tested. Concerning the normality assumption, the Shapiro-Wilk normality test was carried out and a histogram of the residuals was plotted for each variable (Appendix B). Regarding the linearity assumption, scatterplots with a regression line were created for each relationship. Additionally, the residuals were plotted against the fitted values for each relationship (Appendix C). In terms of the independence assumption, the Durbin-Watson test was conducted (Appendix D). Lastly, the assumption of equal variance was tested by carrying out the studentized Breusch-Pagan test for each relationship (Appendix E). The results demonstrated that all assumptions except the independence assumption were violated. However, no attempts to address the violations were made and the linear regression analyses were still conducted due to the small scope of this study. The mediation analysis was also carried out, since it is a non-parametric analysis and does not rely on the linear assumptions. After

testing the parametric assumptions, a linear regression analysis was done for each of the first three and the last hypotheses. For the fourth hypothesis, a mediation analysis was carried out with the process model by Hayes (2009).

Results

Demographics

As the main focus of the study regarding the demographics were the sexual identity of participants, these results are presented in Table 1. Most participants identified as bisexual (42.9%) and/or pansexual (34.9%). Participants were able to choose multiple options for this question. Additionally, the participants could choose to self-identify and identified as e.g. queer or demisexual. Some participants were not sure about their sexual identity yet, did not want to label it, or found it too complicated to put in any category.

Table 1

Sexual Identity of Participants.

Sexual Identity	Number of participants (N=)	Percentage [%]
Asexual	9	14.3
Bisexual	27	42.9
Pansexual	22	34.9
Homosexual	9	14.3
Lesbian	10	15.9
Self-identify	7	11.1

Descriptive Statistics

To examine the characteristics of the data regarding the four variables visibility and representation, levels of depression, concealment of identity, and athletic identity, a descriptive statistics analysis was done. Table 2 displays the minimum, maximum, mean, standard deviation, and median for each variable. Important to highlight are the relatively low means and medians for each variable as it means that many people scored low on each of the four subscales. Additionally, the correlation between the variables was measured. The results show a correlation of $r=-.15$ between visibility and representation and levels of depression, a correlation of $r=.07$ between visibility and representation and concealment of identity, a correlation of $r=.29$ between concealment of identity and levels of depression, and a correlation of $r=-.17$ between athletic identity and concealment of identity.

Table 2

Descriptive Statistics of all Variables.

Variable	Minimum	Maximum	Mean	Standard Deviation	Median
Visibility & Representation	1.00	4.75*	2.43	.90	2.50
Depression	1.00	3.67*	2.05	.68	2.00
Concealment	1.00	5.00*	2.11	1.06	1.80
Athletic Identity	1.00	7.00**	2.94	1.62	2.50

*Note. * highest possible score = 5.00, ** highest possible score = 7.00*

Hypothesis Testing

To test the first hypothesis, a linear regression analysis was done (Table 3). The results show no statistically significant relationship between visibility and representation, and levels of depression (b=-,111, SE=.096, t=-1.155, p=.253). Based on the results, the null hypothesis cannot be rejected, which suggests the rejection of hypothesis H1.

Table 3

Linear Regression Analysis between Visibility and Representation, and Levels of Depression.

	Estimate	Std. Error	Statistic	P-value	95% CI
Intercept	2.314	.248	9.337	<.001	[1.819, 2.810]
Visibility & Representation	-.111	.096	-1.155	.253	[-.302, .081]

To test the second hypothesis, a linear regression analysis was conducted (Table 4). The results illustrate a statistically insignificant relationship between visibility and representation, and concealment of identity (b=.087, SE=.149, t=.586, p=.560). Based on the results, the null hypothesis cannot be rejected, which suggests the rejection of hypothesis H2.

Table 4

Linear Regression Analysis between Visibility and Representation, and Concealment of Identity.

	Estimate	Std. Error	Statistic	P-value	95% CI
Intercept	1.898	.385	4.924	<.001	[1.127, 2.669]
Visibility & Representation	.087	.149	.586	.560	[-.211, .385]

To test the third hypothesis, a linear regression analysis was carried out (Table 4). The results show a statistically significant relationship between concealment of identity, and levels of depression (*b*=.190, *SE*=.079, *t*=2.393, *p*=.020). Based on the results, the null hypothesis can be rejected, suggesting the acceptance of hypothesis H3.

Table 5

Linear Regression Analysis between Concealment of Identity, and Levels of Depression.

	Estimate	Std. Error	Statistic	P-value	95% CI
Intercept	1.645	.187	8.802	<.001	[1.271, 2.019]
Concealment	.190	.079	2.393	.020	[.031, .349]

To test the fourth hypothesis, a mediation analysis was conducted. The mediation was done with the process model (Hayes, 2009). The results illustrate a confidence interval that includes the value zero and a non-significant indirect effect (*b*=.022, *t*=.037, *BootLLCI*=-.035, *BootULCI*=.116) and a non-significant direct effect (*b*=-.139, *SE*=.108, *t*=-1.288, *p*=.205, *LLCI*=-.356, *ULCI*=.079). Therefore, there is no mediation effect found, which leads to the rejection of hypothesis H4.

To test the fifth hypothesis, a linear regression analysis was done (Table 6). The results show no statistically significant relationship between athletic identity, and concealment of identity (*b*=-,112, *SE*=.082, *t*=-1.367, *p*=.177). Based on the results, the null hypothesis cannot be rejected, which suggests the rejection of hypothesis H5.

Table 6

Linear Regression Analysis between Athletic Identity, and Concealment of Identity.

	Estimate	Std. Error	Statistic	P-value	95% CI
Intercept	2.440	.275	8.865	<.001	[1.900, 2.991]
Athletic Identity	-.112	.082	-1.367	.177	[-.276, .052]

Discussion

The purpose of this research was to examine the relationships between perceived visibility and representation of sexual minority individuals in sports, depression, and concealment of identity. Furthermore, it was tested if concealment of identity would facilitate the relationship between visibility and representation and depression. Moreover, the impact of the extent of athletic identity on concealment was investigated. Based on the correlations and the linear regression analyses, this study suggested a connection between concealment of identity and higher levels of depression in sexual minority individuals. However, this study did not find evidence that visibility and representation of sexual minority athletes plays a role in their levels of depression or their decisions regarding disclosure of their sexual minority identity. Additionally, the study was not able to relate the extent of athletic identity to the concealment of one's sexual identity. Lastly, the mediation analysis suggested that concealment of identity does not mediate the relationship between visibility and representation of sexual minority athletes and depression.

Interpretation of Results

The results were somewhat unexpected, as there were no significant relationships between the variables with the exception of concealment and depression. On the one hand, the research on visibility and representation was scarce, which made it challenging to predict how it may be related to concealment and depression. On the other hand, it was proven that the portrayal of certain characters in e.g. television shows and movies can be related to the attitudes of the audience (Żerebecki et al., 2021). Since such a relation was proven in the entertainment industry, it was anticipated to reveal similar connections in this study. However, the fact that there was no mediation was expected after finding no links between visibility and representation and neither depression nor concealment. As mentioned before, the analyses were done in two different ways: one excluding individuals who did not do sports or engaged in physical activity at least once a week, and the other including them to counteract a low sample size. Surprisingly,

both analyses demonstrated similar results, with only one significant result between concealment of identity and levels of depression was found in the second version. This suggests that there might be no notable difference between actively participating in sport i.e. being an athlete and merely watching it as a non-athlete.

One explanation for the insignificance of the outcomes may be due to generally low levels of depression and concealment of identity reported, which could imply that the participants have not experienced as many negative situations as expected. Furthermore, it is possible that the participants were able to rely on a supportive social environment that accepted their sexual identity, neglecting concealing their identity as a possibility. For example, one study that found a negative relation between concealment and well-being also revealed that loneliness mediated this relationship (Huang & Chan, 2022). Additionally, the negative relation was only observed in supportive families. This underscores the role social support appears to play regarding concealment and depression, which could be tested further in a future study. Additionally, this is in accordance with the meso level of Cunninham's multilevel model, which encompasses the club culture, and the beliefs and values of the members (Hartmann-Tews et al., 2020). As mentioned before, the organisational culture can influence a minority person's feeling of belonging and well-being, but also determine either their disclosure or concealment of their identity. Thus, a reason for the insignificant results of the study might be related to the fact that many participants were part of a supporting and accepting environment, which could have protected them from experiencing added stress due to their minority status.

Limitations

The results of the study should be interpreted by considering its limitations. Firstly, the majority of participants were in their 20s, which impacts the generalisability of results. Individuals in this age group might share similar experiences and/or coping strategies that are different from individuals from other generations such as seeking a supportive environment to mitigate minority stress (Noyola et al., 2020). Furthermore, most participants were from the Netherlands or from Germany, countries that probably share similar policies regarding sexual orientation. Additionally, the participants were mostly reached by personal distributions (88.9%). As students, the personal distributions as well as the University's SONA platform may have contributed to receive a well-educated sample. Lastly, a limitation pertains to the Athletic Identity Measurement Scale (AIMS), since only two items were used for this research. This could have influenced the results for this variable.

Another important limitation could be related to the fact that more than half of the participants had to be removed due to insufficient participation. This suggests e.g. a potential

lack of seriousness and commitment towards filling out the survey. Furthermore, general research on visibility and representation especially in the sports context, is rare, which makes a correct prediction about the outcome particularly challenging. However, one exception was the research on the relationship between concealment of identity and levels of depression. Current research on this topic suggested a clear positive relationship, which the results of this study supported. Additionally, some participants might have been hesitant to finish the survey due to possible negative experiences related to their minority status in the past.

Moreover, visibility and representation as the independent variable was measured by questions formulated by the researcher and not with an existing scale due to a lack of research and therefore an existing scale. Using own questions could have been a reason for finding no relations with visibility and representation. However, the measured Cronbach's α score of .77 shows moderate to good internal reliability, which makes it a strength rather than a limitation.

Furthermore, the study focused on sexual minority individuals who can be seen as a vulnerable group. As stated above, sexual minority individuals are exposed to additional stressors such as discrimination and stigmatisation due to being a minority group (Frost & Meyer, 2023). Because of that some participants might have been hesitant to answer the questions honestly due to possible negative experiences in the past.

Besides, another limitation lies in the aforementioned hegemonic masculinity principle, which claims a hierarchy in sport. Straight men are above homosexual men, and homosexual women are above straight women as the stereotypical male, physical dominance and bodily appearance are favoured in many sports (Braumüller & Schlunski, 2022). In the past, gay men had to conceal their sexual identity in order to seem masculine and lesbian women in order to seem feminine (Hartmann-Tews, 2022). However, the development in women's football regarding lesbian players stands in contrast to the extreme aversion against gay players in men's football. For example, during the women's football world cup in 2023 more than 100 players and coaches have disclosed themselves as lesbian (Natalie & Natalie, 2023). This shows that the problem of hegemonic masculinity in relation to visibility and representation pertains stronger and more extreme in male sports. Yet, this study included more women than men, which could explain why visibility and representation was not related to neither concealment nor depression.

Lastly, this study was a correlational study, which is why no inferences for causal relations can be made (Asamoah, 2014). This means that the directionality of the variables cannot be established with a correlational study. For example, there are two options for the relationship between concealment and depression. On the one hand, concealment of identity

could lead to higher levels of depression. On the other hand, high levels of depression could lead to an increased concealment. Additionally, the association could only exist because they are both related to a third variable. In order to determine the true causation, an experimental study with manipulated variables should be done (Asamoah, 2014). For example, a study could be designed where participants are randomly assigned to different conditions that encourage either to conceal or disclose their sexual identity and analyse the effect on depression.

Reflection of Significance and Scope of Results

Previous research has shown a positive relationship between concealment of identity and level of depression (Pachankis et al., 2020; Reyes et al., 2023). Suitably, this study found the same results for this specific sample i.e. sexual minority athletes and non-athletes, and mostly well-educated Dutch and German individuals. This advocates for the benefits of disclosing one's sexual identity to increase mental health among sexual minority individuals across different contexts.

Additionally, the Cronbach's α score of the self-generated items showed moderate to good internal reliability. This means that the items could be used for future research to measure perceived visibility and representation of sexual minority individuals in the sports context and by that filling a research gap in that particular area.

Recommendations for Future Research

Based on the limitations due to the young and probably well-educated sample and the homogeneity in terms of country of residence, it would be useful for future research to test the same variables with a bigger and more divers sample. With this it would increase generalisability of results. Additionally, there was no mediation found for concealment of identity even though it was expected after the linear regression analyses. Nonetheless, future research could test other variables that might be related to the mental health and well-being of sexual minority individuals. Potential resilience factors that could be investigated include e.g. sociocultural influences or personal resources and skills (Magrath, 2021). As social support has already been associated with well-being in relation to the minority stress theory, personal skills such as reflecting on stressors as challenges or opportunities for growth could be examined in future research about sexual minority athletes.

Moreover, this study is based on a quantitative sample, which lacks personal experiences and perspectives. A future study could measure the same variables as a qualitative study to get more insights into an individual's beliefs and experiences. For example, the difference in personal experiences in men and women could be evaluated, since visibility and representation

for male and female sexual minority athletes varies. Additionally, e.g. non-binary individuals could be included in a future qualitative study. Based on the heteronormativity principle, non-binary individuals do not fit into either of the two predetermined groups in sports, namely men and women (Braumüller & Schlunski, 2022). Therefore, it might be essential to include their perspective on this topic.

Conclusion

In conclusion, the minority stress theory is greatly relevant in the sports context, since it highlights unique stressors and challenges faced by sexual minority athletes. The fear of discrimination and stigmatisation from not only the immediate social environment but the whole sports- and club community can be connected to higher concealment and lower mental health. This study contributed to the understanding of those stressors, which could lead to the creation of tailored interventions aimed at improving inclusivity and support for sexual minority athletes at both the professional as well as the leisure level. As a result, this would hopefully lead to less concealment and better mental health among sexual minority athletes.

Even though, most relationships were insignificant, this study contributed to the limited research on sexual minority individuals especially in the sports setting, thereby filling a research gap in that area. Additionally, the self-generated items added a new measurement tool for perceived visibility and representation of sexual minority athletes, which could be used for future research on that topic.

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Appendix A. Results Excluding Non-Athletes

Table 7

Descriptive Statistics of all Variables.

Variable	Minimum	Maximum	Mean	Standard Deviation	Median
Visibility & Representation	1.00	4.75*	2.61	.94	2.50
Depression	1.00	3.67*	2.02	.68	1.94
Concealment	1.00	4.20*	2.07	1.02	1.80
Athletic Identity	1.00	7.00**	3.47	1.55	3.50

*Note. * highest possible score = 5.00, ** highest possible score = 7.00*

Table 8

Linear Regression Analysis between Visibility and Representation, and Levels of Depression.

	Estimate	Std. Error	Statistic	P-value
Intercept	2.326	.307	7.580	<.001
Visibility & Representation	-.116	.111	-1.050	.300

Table 9

Linear Regression Analysis between Visibility and Representation, and Concealment of Identity.

	Estimate	Std. Error	Statistic	P-value
Intercept	1.771	.464	3.822	<.001
Visibility & Representation	.114	.168	.679	.501

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Table 10

Linear Regression Analysis between Concealment of Identity, and Levels of Depression.

	Estimate	Std. Error	Statistic	P-value
Intercept	1.644	.228	7.213	<.001
Concealment	.183	.099	1.853	.071

Table 11

Direct Effect of X on Y.

Effect	Std. Error	Statistic	P-value	Lower CI	Upper CI
-.128	.092	-1.388	.170	-.313	.056

Table 12

Indirect/Mediating Effect(s) of X on Y.

	Effect	Boot Std. Error	Boot Lower CI	Boot Upper CI
Concealment	.017	.030	-.031	.090

Table 13

Linear Regression Analysis between Athletic Identity, and Concealment of Identity.

	Estimate	Std. Error	Statistic	P-value
Intercept	2.341	.384	6.096	<.001
Athletic Identity	-.079	.101	-.777	.441

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Appendix B. Assumption of Normality

Figure 2

Histogram of Residuals for Visibility and Representation and Levels of Depression.
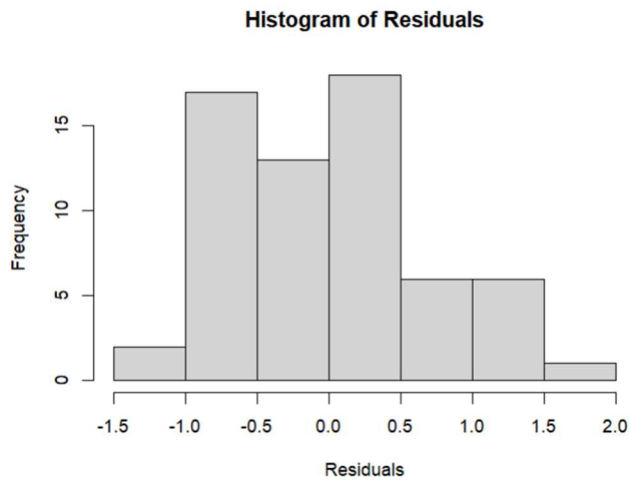
Figure 3

Histogram of Residuals for Visibility and Representation and Concealment of Identity.
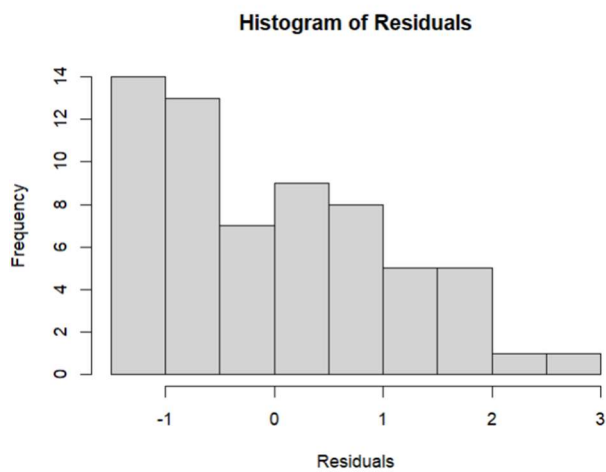
Figure 4

Histogram of Residuals for Concealment of Identity and Levels of Depression.
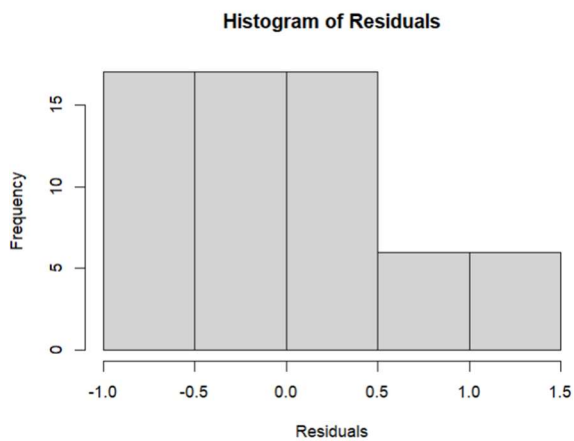
Figure 5

Histogram of Residuals for Athletic Identity and Concealment of Identity.

Histogram of Residuals
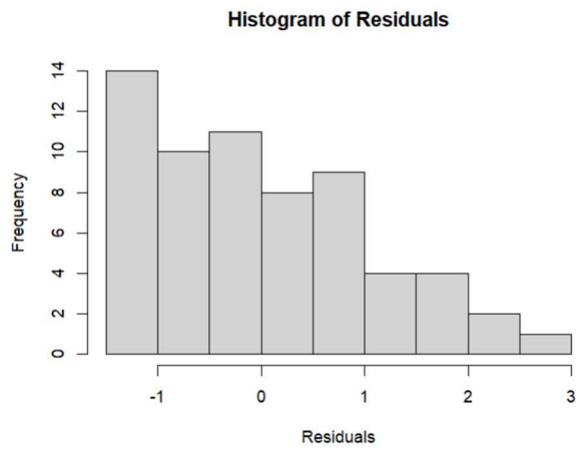
Shapiro-Wilk Test

W=.961, p=.045; W=.910, p<.001; W=.950, p=.012; W=.927, p=.001

Appendix C. Assumption of Linearity

Figure 6

Scatterplot of Visibility and Representation and Levels of Depression.

Scatterplot of Visibility vs. Depression
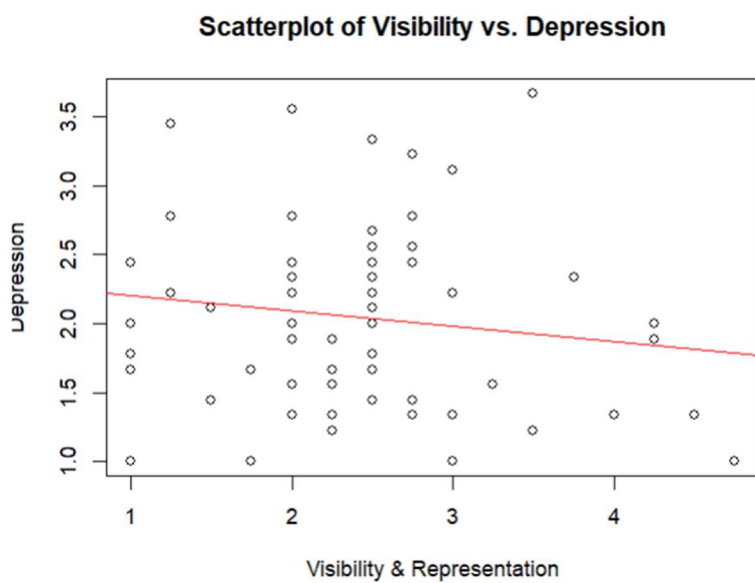
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Figure 7

Scatterplot of Visibility and Representation and Concealment of Identity.

Scatterplot of Visibility vs. Identity disclosure
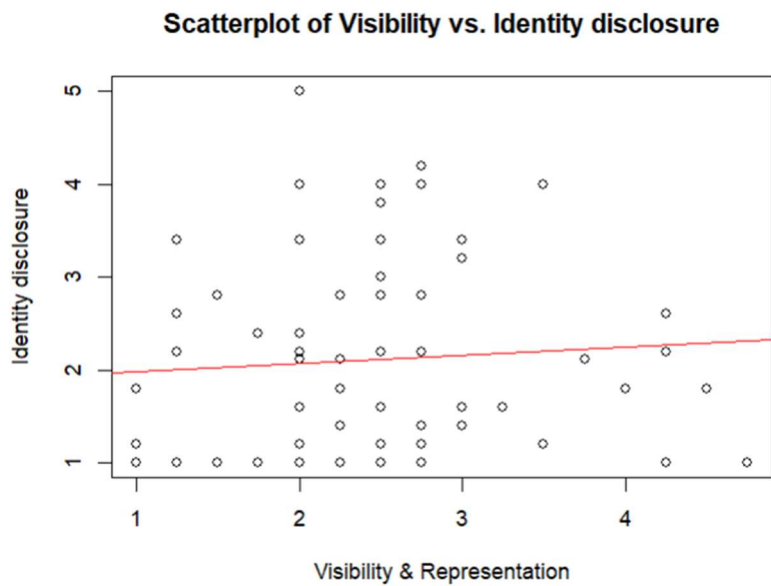
Figure 8

Scatterplot of Concealment of Identity and Levels of Depression.

Identity disclosure vs. Depression
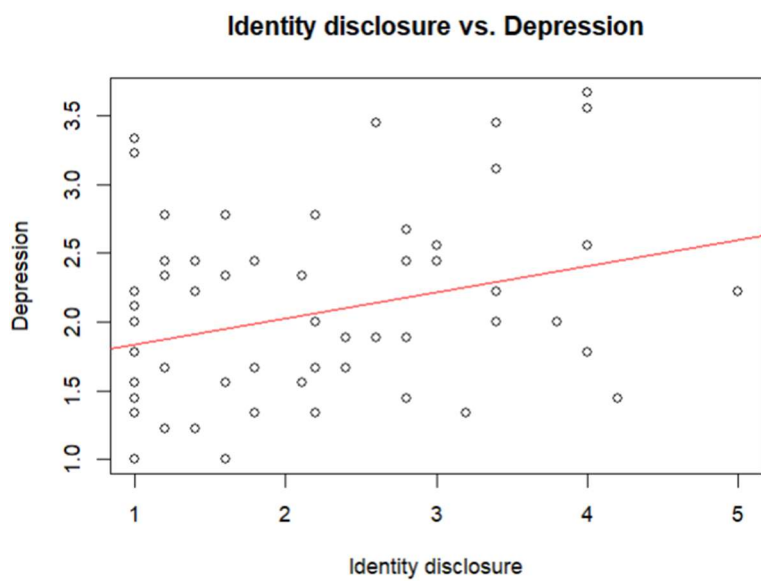
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Figure 9

Scatterplot of Athletic Identity and Concealment of Identity.
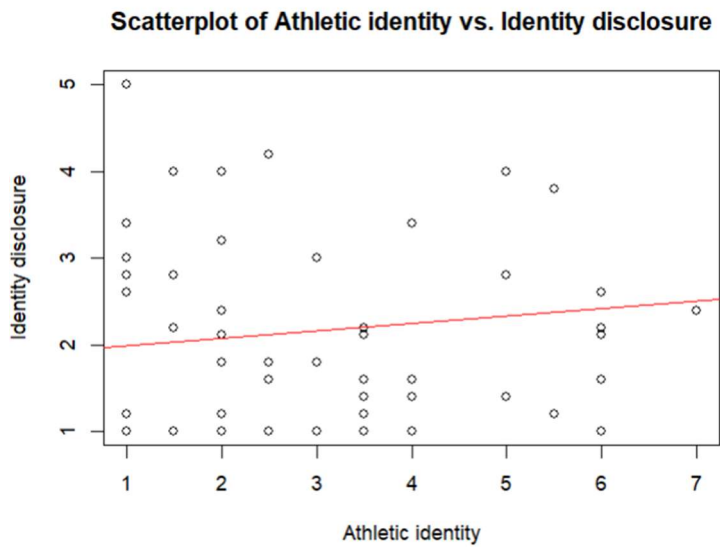
Figure 10

Residuals vs. Fitted Values Plot of Visibility and Representation and Levels of Depression.
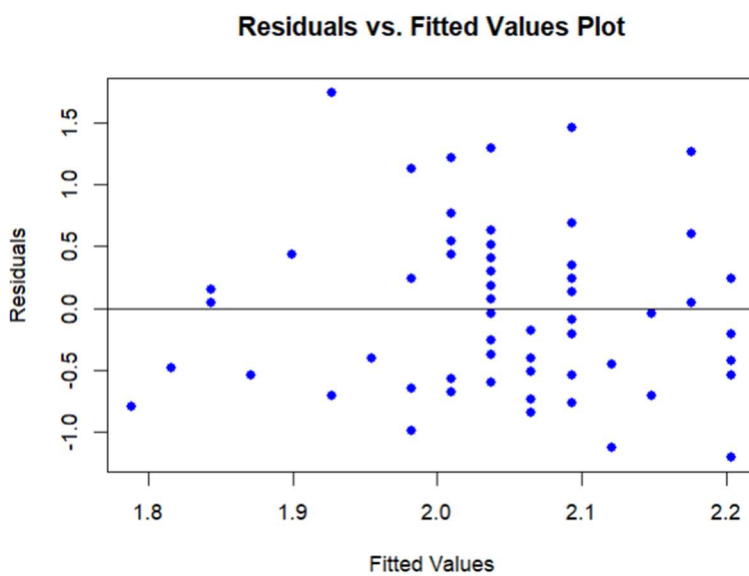
Figure 11

Residuals vs. Fitted Values Plot of Visibility and Representation and Concealment of Identity.
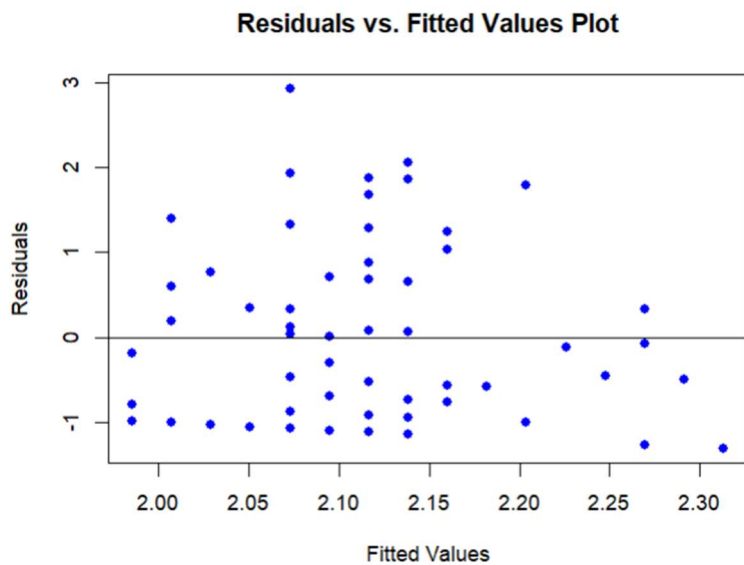
Figure 12

Residuals vs. Fitted Values Plot of Concealment of Identity and Levels of Depression.
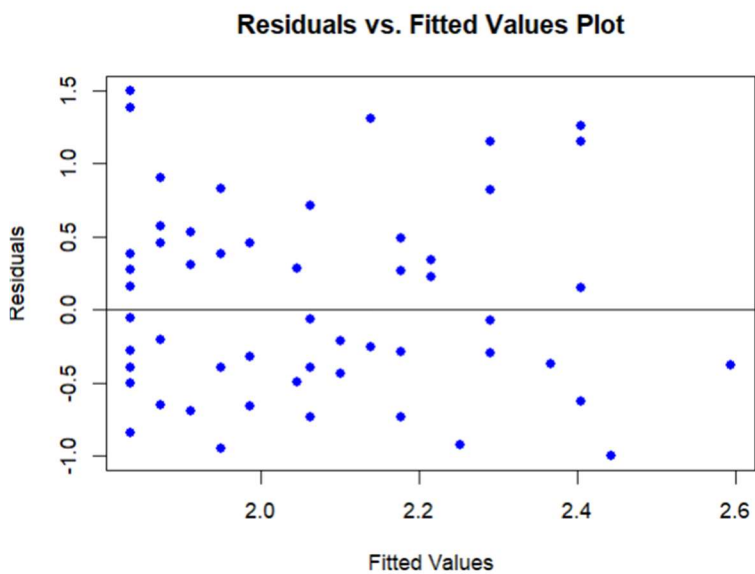
Figure 13

Residuals vs. Fitted Values Plot of Athletic Identity and Concealment of Identity.
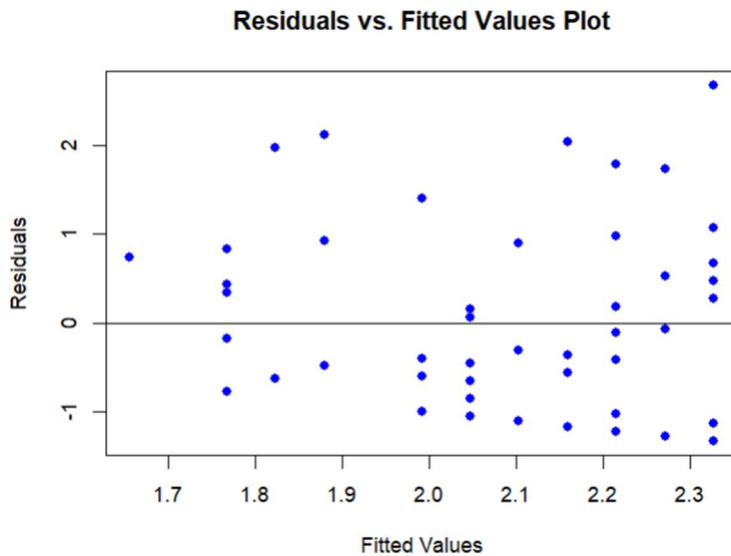
Appendix D. Assumption of Independence

Durbin-Watson Test

DW=2.033, p=.916; DW=1.879, p=.610; DW=1.915, p=.726; DW=1.760, p=.312

Appendix E. Assumption of Equal Variance

Studentized Breusch-Pagan Test

BP=.056, p=.813; BP=.007, p=.933; BP=.524, p=.469; BP=.987, p=.321

Appendix F. R Script

BA Thesis

numeric dataset

#(install) and load packages

install.packages("tidyverse")

library(tidyverse)

install.packages("haven")

library(haven)

```r
install.packages("foreign")

library(foreign)

install.packages("broom")

library(broom)

install.packages("dplyr")

library(dplyr)

install.packages("janitor")

library(janitor)

install.packages("ggplot2")

library(ggplot2)

install.packages("modelr")

library(modelr)

install.packages("readxl")

library(readxl)

install.packages("readr")

library(readr)

install.packages("car")

library(car)

install.packages("psych")

library(psych)

install.packages(c("tidyr", "stringr", "stats", "performance", "summarytools", "Hmisc"))

library(tidyr)

library(stringr)

library(readr)

library(magrittr)
```

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```
library(stats)

library(performance)

library(summarytools)

library(Hmisc)

install.packages("lmtest")

library(lmtest)


#import data

setwd("C:/Users/Amelie/Documents/data_num")

data <- read.csv("Minority stress in SGM individuals_26. Mai 2024_05.25.csv")


View(data)


#deleting unimportant columns

data$StartDate <- NULL

data$EndDate <- NULL

data$Status <- NULL

data$IPAddress <- NULL

data$Finished <- NULL

data$RecordedDate <- NULL

data$ResponseId <- NULL

data$RecipientLastName <- NULL

data$RecipientFirstName <- NULL

data$RecipientEmail <- NULL

data$ExternalReference <- NULL
```

```
data$LocationLatitude <- NULL

data$LocationLongitude <- NULL

data$DistributionChannel <- NULL

data$UserLanguage <- NULL

data$Sona.inquiry <- NULL

data$SONA.ID <- NULL


#delete columns with irrelevant scales

data1 <- data %>%

  select(-contains("MHC.SF"))


View(data1)


data2 <- data1 %>%

  select(-contains("Discrimination"))


View(data2)


data3 <- data2 %>%

  select(-contains ("Negative.expectation"))


data4 <- data3 %>%

  select(-contains ("Community.connectedn"))


data5 <- data4 %>%
```

```r
  select(-contains ("Sleep.Quest"))


data6 <- data5 %>%

  select(-contains ("Health.Care"))


data6$Gender.Identity.Disc <- NULL

data6$Q_UnansweredPercentage <- NULL

data6$Q_UnansweredQuestions <- NULL


#deleting participants that have filled out less than 55% of questions

summary(data6$Progress)

data6$Progress <- as.numeric(data6$Progress)

data7 <- data6[data6$Progress >= 54,  ]


#delete heterosexual participants

data8 <- data7[!(data7$sexual.identity %in% c("1")), ]


#delete people who don't do sports

data9 <- data8[!(data8$sports %in% c("2")), ]


cleandata <- data8


#structure of data

str(cleandata)
```

```
#convert character columns to numeric

cleandata1 <- as.data.frame(sapply(cleandata, as.numeric))



#delete first two rows

cleandata2 <- cleandata1[-c(1, 2), ]



###scales

#delete item 1 and 2 from PHQ.9 -> anxiety items

cleandata2$PHQ.9...4_1 <- NULL

cleandata2$PHQ.9...4_2 <- NULL



#select data for PHQ.9

PHQ <- cleandata2[,
        c('PHQ.9...4_3','PHQ.9...4_4','PHQ.9...4_5','PHQ.9...4_6','PHQ.9...4_7','PHQ.9...4_8','
        PHQ.9...4_9','PHQ.9...4_10','PHQ.9...4_11')]



#select data for own/visibility items

vis <- cleandata2[, c('sports.2_1','sports.2_2','sports.2_3','Sports.3_1')]



#select data for QMSR/identity disclosure

QMSR <- cleandata2[,
        c('Identity.disclosure_1','Identity.disclosure_2','Identity.disclosure_3','Identity.disclosu
        re_4','Identity.disclosure_5')]



#select data for AIMS/athletic identity

AIMS <- cleandata2[, c('sports.1_1','sports.1_2')]
```

```
###calculating row means

##PHQ

rowmeans_PHQ <- rowMeans(PHQ, na.rm = TRUE)


##vis

rowmeans_vis <- rowMeans(vis, na.rm = TRUE)


##QMSR

#calculate column means, excluding NA values

columnmeans_QMSR <- colMeans(QMSR, na.rm = TRUE)


#replace NA values in each column with the corresponding column mean

for (i in 1:ncol(QMSR)) {

  QMSR[is.na(QMSR[, i]), i] <- columnmeans_QMSR[i]

}


rowmeans_QMSR <- rowMeans(QMSR, na.rm = TRUE)


##AIMS

rowmeans_AIMS <- rowMeans(AIMS, na.rm = TRUE)



##cronbachs alpha
alpha(vis)
```

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```
alpha(PHQ)

alpha(QMSR)

alpha(AIMS)


###descriptive statistics


##PHQ

summary(rowmeans_PHQ)

sd(rowmeans_PHQ)


##vis

summary(rowmeans_vis)

sd(rowmeans_vis)


##QMSR

summary(rowmeans_QMSR)

sd(rowmeans_QMSR)


##AIMS

summary(rowmeans_AIMS)

sd(rowmeans_AIMS)


##correlations

cor(rowmeans_vis, rowmeans_PHQ)

cor(rowmeans_vis, rowmeans_QMSR)
```

```
cor(rowmeans_QMSR, rowmeans_PHQ)

cor(rowmeans_AIMS, rowmeans_QMSR)



##cronbachs alpha for visibility

alpha(vis)



###assumption testing



##LINEARITY

plot(rowmeans_vis, rowmeans_PHQ,

    xlab = "Visibility & Representation",

    ylab = "Depression",

    main = "Scatterplot of Visibility vs. Depression")

abline(lm(rowmeans_PHQ ~ rowmeans_vis, data = cleandata2), col = "red")



plot(rowmeans_vis, rowmeans_QMSR,

    xlab = "Visibility & Representation",

    ylab = "Identity disclosure",

    main = "Scatterplot of Visibility vs. Identity disclosure")

abline(lm(rowmeans_QMSR ~ rowmeans_vis, data = cleandata2), col = "red")



plot(rowmeans_QMSR, rowmeans_PHQ,

    xlab = "Identity disclosure",
```

```
    ylab = "Depression",

    main = "Identity disclosure vs. Depression")

abline(lm(rowmeans_PHQ ~ rowmeans_QMSR, data = cleandata2), col = "red")


plot(rowmeans_AIMS, rowmeans_QMSR,

    xlab = "Athletic identity",

    ylab = "Identity disclosure",

    main = "Scatterplot of Athletic identity vs. Identity disclosure")

abline(lm(rowmeans_QMSR ~ rowmeans_vis, data = cleandata2), col = "red")


#Create Residual vs Fitted Values Plots to test the assumption of linearity


#RvFVP for vis and PHQ


#create regression model and extract residuals and fitted values from the model

model1 <- lm(rowmeans_PHQ ~ rowmeans_vis, data = cleandata2)

summary(model1)

residuals <- residuals(model1)

fitted_values <- fitted(model1)


#plot RvFVP with a line to demonstarte the distribution of residuals around 0 and a reference
        line at 0

num_bins <- 10

bins <- cut(fitted_values, breaks = num_bins)

mean_residuals <- tapply(residuals, bins, mean)
```

```
bin_centers <- sapply(levels(bins), function(x) mean(as.numeric(unlist(strsplit(x, ",")))), na.rm
        = TRUE))

length(mean_residuals)

length(bin_centers)

plot(fitted_values, residuals,

    xlab = "Fitted Values",

    ylab = "Residuals",

    main = "Residuals vs. Fitted Values Plot",

    pch = 16,

    col = "blue"

)

lines(bin_centers, mean_residuals, col = "red")

abline(h = 0, col = "black")




#RvFVP vis and QMSR


#create regression model and extract residuals and fitted values from the model

model2 <- lm(rowmeans_QMSR ~ rowmeans_vis, data = cleandata2)

summary(model2)

residuals <- residuals(model2)

fitted_values <- fitted(model2)


#plot RvFVP with a line to demonstarte the distribution of residuals around 0 and a reference
        line at 0

num_bins <- 10
```

```r
bins <- cut(fitted_values, breaks = num_bins)

mean_residuals <- tapply(residuals, bins, mean)

bin_centers <- sapply(levels(bins), function(x) mean(as.numeric(unlist(strsplit(x, ",")))), na.rm
        = TRUE))

length(mean_residuals)

length(bin_centers)

plot(fitted_values, residuals,

    xlab = "Fitted Values",

    ylab = "Residuals",

    main = "Residuals vs. Fitted Values Plot",

    pch = 16,

    col = "blue"

)

lines(bin_centers, mean_residuals, col = "red")

abline(h = 0, col = "black")


#RvFVP QMSR and PHQ


#create regression model and extract residuals and fitted values from the model

model3 <- lm(rowmeans_PHQ ~ rowmeans_QMSR, data = cleandata2)

summary(model3)

residuals <- residuals(model3)

fitted_values <- fitted(model3)


#plot RvFVP with a line to demonstarte the distribution of residuals around 0 and a reference
        line at 0
```

```
num_bins <- 10

bins <- cut(fitted_values, breaks = num_bins)

mean_residuals <- tapply(residuals, bins, mean)

bin_centers <- sapply(levels(bins), function(x) mean(as.numeric(unlist(strsplit(x, ",")))), na.rm
       = TRUE))

length(mean_residuals)

length(bin_centers)

plot(fitted_values, residuals,

    xlab = "Fitted Values",

    ylab = "Residuals",

    main = "Residuals vs. Fitted Values Plot",

    pch = 16,

    col = "blue"

)

lines(bin_centers, mean_residuals, col = "red")

abline(h = 0, col = "black")



#RvFVP AIMS and QMSR



#create regression model and extract residuals and fitted values from the model

model4 <- lm(rowmeans_QMSR ~ rowmeans_AIMS, data = cleandata2)

summary(model4)

residuals <- residuals(model4)

fitted_values <- fitted(model4)
```

MINORITY STRESS IN SEXUAL MINORITY ATHLETES

#plot RvFVP with a line to demonstarte the distribution of residuals around 0 and a reference
    line at 0

num_bins <- 10

bins <- cut(fitted_values, breaks = num_bins)

mean_residuals <- tapply(residuals, bins, mean)

bin_centers <- sapply(levels(bins), function(x) mean(as.numeric(unlist(strsplit(x, ","))), na.rm
    = TRUE))

length(mean_residuals)

length(bin_centers)

plot(fitted_values, residuals,

    xlab = "Fitted Values",

    ylab = "Residuals",

    main = "Residuals vs. Fitted Values Plot",

    pch = 16,

    col = "blue"

)

lines(bin_centers, mean_residuals, col = "red")

abline(h = 0, col = "black")

##INDEPENDENCE

#conduct Durbin-Watson Tests

dwtest(model1, alternative = "two.sided")

dwtest(model2, alternative = "two.sided")

dwtest(model3, alternative = "two.sided")

dwtest(model4, alternative = "two.sided")

MINORITY STRESS IN SEXUAL MINORITY ATHLETES

```
##NORMALITY

#conduct Shapiro-Wilk Tests

shapiro.test(residuals(model1))

shapiro.test(residuals(model2))

shapiro.test(residuals(model3))

shapiro.test(residuals(model4))


#plot Histograms of residuals

hist(residuals(model1), main = "Histogram of Residuals", xlab = "Residuals")

hist(residuals(model2), main = "Histogram of Residuals", xlab = "Residuals")

hist(residuals(model3), main = "Histogram of Residuals", xlab = "Residuals")

hist(residuals(model4), main = "Histogram of Residuals", xlab = "Residuals")


##EQUAL VARIANCE

#conduct Breusch-Pagan Tests to test the assumption of equal variance

bptest(model1)

bptest(model2)

bptest(model3)

bptest(model4)


###linear regression analyses


#conduct a regression analysis for the relationship between vis and PHQ

model1 <- lm(rowmeans_PHQ ~ rowmeans_vis, data = cleandata2)

summary(model1)
```

```
#conduct a regression analysis for the relationship between vis and QMSR

model2 <- lm(rowmeans_QMSR ~ rowmeans_vis, data = cleandata2)

summary(model2)


#conduct a regression analysis for the relationship between QMSR and PHQ

model3 <- lm(rowmeans_PHQ ~ rowmeans_QMSR, data = cleandata2)

summary(model3)


#conduct a regression analysis for the relationship between AIMS and QMSR

model4 <- lm(rowmeans_QMSR ~ rowmeans_AIMS, data = cleandata2)

summary(model4)

## conf. intervals

ci1 <- confint(model1)

print(ci1)


ci2 <- confint(model2)

print(ci2)


ci3 <- confint(model3)

print(ci3)


ci4 <- confint(model4)

print(ci4)
```

MINORITY STRESS IN SEXUAL MINORITY ATHLETES

mediation BA thesis

#select items for depression

```
PHQ <- cleandata2[,
      c('PHQ.9...4_3','PHQ.9...4_4','PHQ.9...4_5','PHQ.9...4_6','PHQ.9...4_7','PHQ.9...4_8','
      PHQ.9...4_9','PHQ.9...4_10','PHQ.9...4_11')]
```

#select data for own/visibility items

```
vis <- cleandata2[, c('sports.2_1','sports.2_2','sports.2_3','Sports.3_1')]
```

#select data for QMSR/identity disclosure

```
QMSR <- cleandata2[,
      c('Identity.disclosure_1','Identity.disclosure_2','Identity.disclosure_3','Identity.disclosu
      re_4','Identity.disclosure_5')]
```

#create variable with the row means for each scale

```
vis_score <- rowMeans(vis)
```

```
cleandata2 <- cbind(cleandata2, vis = vis_score)
```

```
PHQ_score <- rowMeans(PHQ)
```

```
cleandata2 <- cbind(cleandata2, PHQ = PHQ_score)
```

#calculate column means, excluding NA values

```
columnmeans_QMSR <- colMeans(QMSR, na.rm = TRUE)
```

#replace NA values in each column with the corresponding column mean

```
for (i in 1:ncol(QMSR)) {
```

MINORITY STRESS IN SEXUAL MINORITY ATHLETES

```
  QMSR[is.na(QMSR[, i]), i] <- columnmeans_QMSR[i]}


rowmeans_QMSR <- rowMeans(QMSR, na.rm = TRUE)

cleandata2 <- cbind(cleandata2, QMSR = rowmeans_QMSR)


#mediation analysis

process (data = cleandata2, y = "PHQ", x = "vis", m ="QMSR", model = 4)


## sports data

#select data for PHQ.9

PHQ1 <- sportdata2[,
        c('PHQ.9...4_3','PHQ.9...4_4','PHQ.9...4_5','PHQ.9...4_6','PHQ.9...4_7','PHQ.9...4_8','
        PHQ.9...4_9','PHQ.9...4_10','PHQ.9...4_11')]


#select data for own/visibility items

vis1 <- sportdata2[, c('sports.2_1','sports.2_2','sports.2_3','Sports.3_1')]


#select data for QMSR/identity disclosure

QMSR1 <- sportdata2[,
        c('Identity.disclosure_1','Identity.disclosure_2','Identity.disclosure_3','Identity.disclosu
        re_4','Identity.disclosure_5')]


#calculate column means, excluding NA values

columnmeans_QMSR1 <- colMeans(QMSR1, na.rm = TRUE)


#replace NA values in each column with the corresponding column mean

for (i in 1:ncol(QMSR1)) {
```

MINORITY STRESS IN SEXUAL MINORITY ATHLETES

```
  QMSR1[is.na(QMSR1[, i]), i] <- columnmeans_QMSR1[i]}
```

#create variable with the row means for each scale

```
vis1_score <- rowMeans(vis1)
```

```
sportdata2 <- cbind(sportdata2, vis1 = vis1_score)
```

```
PHQ1_score <- rowMeans(PHQ1)
```

```
sportdata2 <- cbind(sportdata2, PHQ1 = PHQ1_score)
```

```
rowmeans_QMSR1 <- rowMeans(QMSR1, na.rm = TRUE)
```

```
sportdata2 <- cbind(sportdata2, QMSR1 = rowmeans_QMSR1)
```

#mediation analysis

```
process (data = sportdata2, y = "PHQ1", x = "vis1", m ="QMSR1", model = 4)
```

Appendix G. R Script of Demographics

```
### Bachelor Thesis ###
```

```
## demographics ##
```

#import data

```
getwd()
```

```
setwd("C:/Users/Amelie/Documents/data")
```

```
demo <- read.csv("Minority stress in SGM individuals_26. Mai 2024_05.21.csv")
```

#deleting unimportant columns

```
demo$StartDate <- NULL

demo$EndDate <- NULL

demo$Status <- NULL

demo$IPAddress <- NULL

demo$Finished <- NULL

demo$RecordedDate <- NULL

demo$ResponseId <- NULL

demo$RecipientLastName <- NULL

demo$RecipientFirstName <- NULL

demo$RecipientEmail <- NULL

demo$ExternalReference <- NULL

demo$LocationLatitude <- NULL

demo$LocationLongitude <- NULL

demo$DistributionChannel <- NULL

demo$UserLanguage <- NULL

demo$Sona.inquiry <- NULL

demo$SONA.ID <- NULL


#delete columns with irrelevant scales
demo1 <- demo %>%

  select(-contains("MHC.SF"))


demo2 <- demo1 %>%

  select(-contains("Discrimination"))
```

MINORITY STRESS IN SEXUAL MINORITY ATHLETES

```
demo3 <- demo2 %>%

  select(-contains ("Negative.expectation"))


demo4 <- demo3 %>%

  select(-contains ("Community.connectedn"))


demo5 <- demo4 %>%

  select(-contains ("Sleep.Quest"))


demo6 <- demo5 %>%

  select(-contains ("Health.Care"))


demo6$Gender.Identity.Disc <- NULL

demo6$Q_UnansweredPercentage <- NULL

demo6$Q_UnansweredQuestions <- NULL


#deleting participants that have filled out less than 55% of questions

summary(demo$Progress)

demo6$Progress <- as.numeric(data6$Progress)

demo7 <- data6[data6$Progress >= 54,  ]


demo8 <- demo7[!(demo7$sexual.identity %in% c("1")), ]


# Count the number of participants for demographics

count_1 <- sum(demo8$sexual.identity == 2, na.rm = TRUE)
```

MINORITY STRESS IN SEXUAL MINORITY ATHLETES

```
print(count_1)


count_2 <- sum(demo8$sexual.identity == 3, na.rm = TRUE)

print(count_2)


count_3 <- sum(demo8$sexual.identity == 4, na.rm = TRUE)

print(count_3)


count_4 <- sum(demo8$sexual.identity == 5, na.rm = TRUE)

print(count_4)


count_5 <- sum(demo8$sexual.identity == 6, na.rm = TRUE)

print(count_5)


count_6 <- sum(demo8$sexual.identity == 7, na.rm = TRUE)

print(count_6)


count_7 <- sum(demo8$sexual.identity == 8, na.rm = TRUE)

print(count_7)


count_8 <- sum(demo8$gender.identity == 1, na.rm = TRUE)

print(count_8)


count_9 <- sum(demo8$gender.identity == 2, na.rm = TRUE)

print(count_9)
```

```
count_10 <- sum(demo8$gender.identity == 3, na.rm = TRUE)

print(count_10)


count_11 <- sum(demo8$gender.identity == 4, na.rm = TRUE)

print(count_11)


count_12 <- sum(demo8$gender.identity == 5, na.rm = TRUE)

print(count_12)


count_13 <- sum(demo8$gender.identity == 6, na.rm = TRUE)

print(count_13)


count_14 <- sum(demo8$occupation == 3, na.rm = TRUE)

print(count_14)


count_15 <- sum(demo8$residence == 1, na.rm = TRUE)

print(count_15)


count_16 <- sum(demo8$residence == 2, na.rm = TRUE)

print(count_16)


###end
```