

P8158 Final Project

Investigating the Effect of Athletic Identity on Overall Well-Being  
during COVID-19

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**Abstract**

Since measures to control the transmission of COVID-19 have been influential on one's experience of participating in athletic activities and team sports over the past few years, we conducted a study to investigate the effect that an individual's athletic identity may have had on their overall well-being. Towards this end, we first defined our latent constructs of interest by conducting exploratory factor analysis and confirmatory factor analysis, from which we derived the second-order latent variable athletic identity and a proposed mediating latent variable, resilience. A series of structural equation models for the athletes represented in the dataset were then constructed and it was determined that though the effect of athletic identity on overall well-being and the effect of athletic identity on resilience are both statistically insignificant, the effect of resilience on overall well-being is significant, which is a finding that is in agreement with previous research. Finally, a comparison analysis was conducted between athletes and non-athletes, from which it was determined that though the impact of athletic identity on overall well-being is not statistically significant for athletes, the two are significantly related for non-athletes.

## Introduction

The onset of COVID-19 has influenced almost every sphere of work and leisure. The athletic industry in particular has been affected by the pandemic in interesting ways, as it exists in the intersection of these two realms. With many sports events, including the 2020 Olympics, being cancelled or postponed over the past few years in response to the transmission of the virus, athletes have effectively experienced both the uncertainty of losing work and the disappointment of being unable to access an activity that they enjoy. As the effect of such circumstances may vary from individual to individual, depending on their personal devotion to their sport and identity as an athlete, we were interested in conducting a study to better understand how a person’s athletic identity may have affected their overall well-being in the context of a global pandemic.

## Dataset

The data that we used was collected by Christopher Knowles et al.<sup>[1]</sup>, after the first COVID-19 lockdown in the United Kingdom in the summer of 2020. This dataset contains demographic information and responses to five surveys for athletes and non-athletes in the UK. In total, 753 individuals over the age of 18 were included, 363 of which indicated that they were athletes, and 390 indicated that they were not. A higher proportion of females were interviewed in the group of non-athletes than in the group of athletes, and the athletes tended to be younger than the non-athletes (Appendix 1). Most athletes interviewed were ball sports and track and field athletes (Appendix 2). For this study, we decided to focus our analysis on the athletes represented in this dataset, reserving the non-athletes for a comparison analysis.

## Measures of Interest

The following scales and variables were considered over the course of our analysis as observed variables of defined latent constructs of interest.

**The Athletic Identity Measurement Scale (AIMS)** The Athletic Identity Scale<sup>[2]</sup> (Appendix 3) includes 6 items and respondents are asked to report their degree of agreement to the prompt on a 7-point Likert scale (responses ranging from “strongly disagree” to “strongly agree”). The variables in this scale were hypothesized to be reflective of the latent construct athletic identity, which was the measure that we were primarily interested in.

**The Mental Health Continuum Short Form (MHC-SF)** The outcome variable in this study is the sum score of responses from the Mental Health Continuum Short Form (MHC-SF)<sup>[3]</sup> (Appendix 4). This questionnaire measures emotional, social, and psychological well-being in its 14 items. Respondents were asked to indicate how often they experience the event asked in the prompt and their responses were coded from 0 to 5, based on the frequency of each event. Higher scores are associated with greater levels of positive well-being.

We elected to use the sum score of responses to this questionnaire rather than each individual measure of well-being for a few reasons. As athletic identity is a construct that should influence all dimensions of who an individual is, we wanted our measure of well-being to be a similarly comprehensive measure. Additionally, the nature of the total MHC-SF score being an observed, numeric value appealed to us. Though we considered using the three- or bi-factor latent variable structure that some researchers choose to use when employing the MHC-SF, the comparative ease of interpretability of having a measurable outcome variable seemed advantageous. Finally, we found that there is a precedent of use of the total MHC-SF score in previous research. Since this is a metric that has been used and found to be a valid and consistent measure of overall well-being in a number of different studies<sup>[4]</sup>, we felt comfortable with simply using the sum score as our outcome.

**The Brief Resilience Scale (BRS)** The Brief Resilience Scale<sup>[5]</sup> (Appendix 5) was developed to measure a person’s resilience through a set of six questions. Each of these items is measured on a 5-point Likert scale, where respondents mark their level of agreement to a given prompt. Depending on the question asked, each response is scored from 1 to 5, where higher scores indicate a higher level of resilience.

We were interested in this set of variables, as resilience is often thought of as a trait that high-performing athletes possess and endeavor to develop through their training. Furthermore, because resilience is also an attribute that has been identified to positively influence an individual’s well-being<sup>[6]</sup>, we hypothesized that this characteristic would exist on the causal pathway between athletic identity and overall well-being.

**Healthy Lifestyle Measurements** The dataset we used also contained the following variables: a binary variable assessing whether the respondent typically consumes five fruits or vegetables in a day, an ordinal variable assessing the respondent’s smoking habits, and a continuous variable measuring how many hours a sleep the respondent typically gets. At face value, these items appear to be measures of a healthy lifestyle, which piqued our interest as another potential mediating factor between athletic identity and overall well-being. Similarly to resilience, a healthy lifestyle has also been well-documented to be positively associated with an individual’s well-being<sup>[7]</sup> and also is a trait that is associated with athletes.

## Exploratory and Confirmatory Factor Analysis

### Latent Variable 1: Athletic Identity

Principal component analysis was first conducted on the seven AIMS variables collected in our dataset, from which a two-component latent structure was recommended (Appendix 6) and would explain 63.8% of the variation within the seven items. One-, two-, and three-factor models were then fit in exploratory factor analysis, from which the three-factor model was selected, using BIC and RMSEA as criteria for goodness-of-fit (Appendix 7, 8).

The three latent variables were named as follows: external identity, internal value, and negative events. The external identity latent construct corresponds with one’s demonstrable identity as an athlete and was initially found to be reflected in the items “I consider myself an athlete”, “I have many goals related to sport”, and “Most of my friends are athletes”. Internal value corresponds with how much someone values sports and was found to be reflected in the items “Sport is the most important part of my life” and “I spend more time thinking about sport than anything else”. Finally, the negative events latent construct corresponds with how one would react to negative events that may happen to them in sports and was reflected in the items “I feel bad about myself when I do badly in sport” and “I would be very depressed if I were injured and could not compete in sport”.

The Cronbach’s alphas for internal value and negative events were 0.81 and 0.63 respectively, indicating that they possess reasonable internal consistency, and the output suggested that no observed variables could be dropped to improve reliability for these two factors. However, we observed that Chronbach’s alpha would significantly improve for the external identity latent variable if the variable corresponding with the question “Are most of your friends athletes?” was removed its structure (Appendix 9), so this variable was dropped.

We hypothesized that the latent construct that we were interested in, athletic identity, exists as a second-order latent factor underlying the three latent variables identified. To verify this hypothesis, we conducted a confirmatory factor analysis (Appendix 10). Because the model fit measures were adequate for this latent structure ( $CFI > 0.99$ ,  $RMSEA < 0.05$ ,  $\chi^2$  p-value = 0.514), we concluded that there was enough evidence for the hypothesized structure to underlie the observed variables of interest, and decided to proceed by using the second-order latent in our structural equation model.

## **Latent Variable 2: Resilience**

We followed a similar process in representing resilience as a latent variable. After conducting principal component analysis, which recommended a one-component latent structure that would explain 64.0% of the variation within the six items (Appendix 11), we fit one- and two- factor models in exploratory factor analysis and compared their fits. The one-factor model was ultimately selected based on its lower BIC and parsimony (Appendix 12, 13).

We then assessed the internal consistency of this latent variable. This analysis produced a Chronbach’s alpha of 0.89, which indicated that the items in the BRS were reliable measures of the latent variable resilience. In addition, all items were kept within the latent construct, as no items were suggested to be removed in the deleted alpha test.

After this, we conducted a confirmatory factor analysis to evaluate the fit of the latent structure we had constructed. As the fit measures were all sufficient ( $CFI > 0.98$ ,  $RMSEA < 0.08$ ), and all factor loadings were indicated to be significant (Appendix 14), we concluded that this model fit the data adequately well.

### **Latent Variable 3: Healthy Lifestyle**

Finally, we endeavored to construct a latent variable that would reflect the “healthy lifestyle” measures that were collected in our dataset, as aforementioned. Similarly to the previous two latent constructs, we first conducted parallel component analysis (Appendix 15), in which a single component was recommended, though it would only explain 39.0% of the variability in the three items.

Both one- and two- factor models were then fit to the three items in exploratory factor analysis, from which both produced very poorly fit models. Though this inclined us to reconsider using this latent structure, we still decided to perform a reliability analysis on the one-factor model to examine its internal consistency (Appendix 16).

Unsurprisingly, the Cronbach’s alpha for this model was very low (-0.26) (Appendix 17), indicating that these three variables were not reliable measures of this latent variable. Upon seeing these results, we made the decision to not move forward with using this latent structure and excluded it from being used as a mediator between athletic identity and overall well-being.

### **Structural Equation Modeling**

After establishing the athletic identity and resilience latent variables, we constructed a number of structural equation models (SEM) to assess the strength of the association between athletic identity and overall well-being, with resilience acting as a mediator between the two.

#### **Athletic Identity and Overall Well-Being**

First, we constructed a SEM between athletic identity and overall well-being to examine the effect athletic identity has on the outcome without the presence of a mediating variable. Using the latent variable structure defined for athletic in confirmatory factor analysis, we constructed a simple regression path diagram between the second-order latent variable and the outcome, MHC-SF composite score (Appendix 18).

The resulting model revealed that the correlation between aspect of athletic identity and overall well-being was negative, though the p-value of this estimate was greater than 0.05. This indicated that there was not a significant association between athletic identity and overall well-being, at a 0.05 significance level, and we could not reject the null hypothesis that the estimated effect of athletic identity on overall well-being is 0.

#### **Athletic Identity and Overall Well-Being, Mediated by Resilience**

We then constructed another SEM to examine the association between athletic identity and overall well-being, placing the resilience latent construct between the two as a mediating variable.

Again, the resulting path analysis (Appendix 19) demonstrated a negative, but insignificant,

correlation between athletic and well-being, as athletic identity was estimated to have a standardized direct effect of -0.084. A negative correlation between athletic identity and resilience also existed, which was not statistically significant at the 0.05 significance level ( $p = 0.054$ ). Though athletic identity did not have significant correlations with the other two variables in the model, resilience was shown to have had a significant correlation with overall well-being. This indicated that increased levels of resilience tend to be associated with improved overall well-being (Appendix 20).

The standardized indirect effect from athletic identity to overall well-being was -0.056, which also proved to be insignificant at the 0.05 significance level. Ultimately, the results from this model demonstrated that resilience did not mediate the effect of athletic identity on overall well-being, and athletic identity again did not significantly impact overall well-being. Resilience, however, did appear to have a significant effect on overall well-being.

### **Athletic Identity and Overall Well-Being, Mediated by Resilience, and According to Athlete Status**

We then conducted a series of regressions to test if there are any differences that exist in the effects of athletic identity, resilience, and overall well-being between athletes and non-athletes (Appendix 21). To do so, we constructed two SEMs associating athletic identity with MHC-SF composite score and mediated by resilience; one using the portion of the dataset corresponding to responses from athletes and the other using the portion of the dataset corresponding to responses from non-athletes. These models were constructed to report unstandardized coefficients in order to assist in comparing the results between these two groups.

As expected, the correlations between the model variables were different for athletes and non-athletes. The SEM for non-athletes indicated a stronger correlation between athletic identity and overall well-being than the SEM for athletes did. For non-athletes, the coefficient between athletic identity and overall well-being was -1.657, and was indicated to be significant, whereas the corresponding association for athletes was much smaller in magnitude and insignificant.

Resilience had a significant correlation with overall well-being for both athletes and non-athletes. However, the correlation between athlete identity and resilience was not significant for both groups. Additionally, the estimated indirect and direct effects of athletic identity on overall well-being were not significant for both athletes and non-athletes. Thus, we are inclined to conclude that these results indicate that the mediation effect of resilience in both groups is not significant at 0.05 significance level (Appendix 22, 23).

## **Discussion**

Though the constructed models indicated consistently insignificant effect estimates between athletic identity and overall well-being for athletes, the estimated effects between these two variables were consistently negative, with and without the presence of resilience as the mediator between the

two. The significant negative association between athletic identity and overall well-being between non-athletes seems to make this phenomenon more pronounced. Given the context of this survey, a lack of access to one's sport is a possible explanation for the negative effect athletic identity seems to be producing on overall well-being. Individuals who have a stronger athletic identity may have felt a greater frustration than individuals with a weaker athletic identity during the COVID-19 lockdowns, as it may have become more inconvenient or entirely impossible to participate in sports as they had been accustomed to.

The differences in direct effects between athletic identity and overall well-being between athletes and non-athletes was notable in our structural equation modeling. Non-athletes appeared to have had athletic identity affect their overall well-being nearly 2.5 times more negatively than athletes. Perhaps one possible explanation for the well-being of non-athletes being affected far more than the well-being of athletes by one's reported athletic identity is that though COVID-19 made the experience of playing a sport different universally, athletes may have had more resources at their disposal to cope with the changes. For example, an athlete may have individuals around them, such as coaches and other athletic professionals, who would be able to support them or even keep them accountable to their training regimen. On the other hand, non-athletes may have had a more difficult time maintaining a community of similarly minded individuals around them, and may have had a more difficult time adjusting to the striking change of pace the COVID-19 lockdowns may have brought about.

Our findings for resilience were the least surprising, as the positive association with overall well-being that we noticed in our analysis agrees with previous research that has been conducted. Resilience did seem to have a greater positive effect on overall well-being for non-athletes than it did for athletes, but was still noted to be the variable with the greatest influence on overall well-being in both models.

## **Limitations and Recommendations for Further Study**

Perhaps the biggest limitation of our analysis is that there likely exist more variables between the causal pathways we have defined between athletic identity, resilience, and overall well-being, and such mediating relationships may be very complex. In addition, confounding characteristics, such as demographic attributes, were also excluded from our analysis and models. We would recommend future analysis to assess the effects such confounders may have had on the variables we have analyzed and additionally investigate whether any additional factors may mediate the effect of athletic identity to overall well-being in significant ways.

Additionally, we would recommend that the latent variable measuring healthy lifestyles be revisited in future studies. We propose that it may be worthwhile to consider this latent variable to be a formative (rather than reflective) construct, as this may more accurately reflect its nature and allow this variable to be used in a SEM.

Finally, though this study is in agreement with research that has been conducted regarding the positive effect resilience has on one's overall well-being, the act of developing resilience implicitly requires undergoing some sort of adverse event. Often, resilience is a characteristic that is paired with the experience of trauma. Thus, while making efforts to bolster one's resilience may be something to consider, some exercises to do so may be more risky than they would be beneficial.



## References

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7. Dale, H., Brassington, L., & King, K. (2014, March 5). The impact of healthy lifestyle interventions on Mental Health and Wellbeing: A systematic review. *Mental Health Review Journal*. <https://www.emerald.com/insight/content/doi/10.1108/MHRJ-05-2013-0016/full/html>

## **Appendices**

- Appendix 1: Athletes and Non-Athletes Demographics
- Appendix 2: Athletes and Non-Athletes Sports Played
- Appendix 3: The Athletic Identity Measurement Scale (AIMS)
- Appendix 4: The Mental Health Continuum Short Form (MHC-SF)
- Appendix 5: The Brief Resilience Scale (BRS)
- Appendix 6: Athletic Identity PCA
- Appendix 7: Athletic Identity EFA 3-Factor Model
- Appendix 8: Athletic Identity EFA Fit Measures
- Appendix 9: External Identity Reliability
- Appendix 10: Athletic Identity CFA Loadings
- Appendix 11: Resilience PCA
- Appendix 12: Resilience EFA
- Appendix 13: Resilience EFA Fit Measures
- Appendix 14: Resilience CFA Loadings
- Appendix 15: Healthy Lifestyle PCA
- Appendix 16: Healthy Lifestyle EFA
- Appendix 17: Healthy Lifestyle Reliability
- Appendix 18: Athletic Identity and Overall Well-Being
- Appendix 19: Resilience Mediating SEM
- Appendix 20: Resilience Mediating SEM with Standardized Effects
- Appendix 21: Athlete and Non-Athlete Comparison SEM
- Appendix 22: Unstandardized Effects of Athletic Identity, Athletes
- Appendix 23: Unstandardized Effects of Athletic Identity, Non-Athletes
- Appendix 24: GitHub Repository

## Appendix 1: Athletes and Non-Athletes Demographics

Characteristic	Athlete, N = 363 <sup>†</sup>	Non-athlete, N = 390 <sup>†</sup>
gender		
Female	162 (45%)	238 (61%)
Male	201 (55%)	152 (39%)
age_grp		
18-20	59 (16%)	14 (3.6%)
21-30	127 (35%)	76 (19%)
31-40	86 (24%)	96 (25%)
41-50	61 (17%)	98 (25%)
51-60	21 (5.8%)	52 (13%)
61-70	7 (1.9%)	41 (11%)
71+	2 (0.6%)	13 (3.3%)
<sup>†</sup> n (%)		

## Appendix 2: Athletes and Non-Athletes Sports Played

Characteristic	N = 353 <sup>†</sup>
sprt	
Ball sports	184 (52%)
Track & Field	108 (31%)
Dance, Gymnastics and Strength	20 (5.7%)
Rowing & Kayaking	19 (5.4%)
Cycling	6 (1.7%)
Swimming	6 (1.7%)
Combat Sports	4 (1.1%)
Equestrian	4 (1.1%)
Orienteering	2 (0.6%)
<sup>†</sup> n (%)	

### Appendix 3: The Athletic Identity Measurement Scale (AIMS)

First Order Factors	AIMS Items
Social identity	
AIMS 1	I consider myself an athlete.
AIMS 2	I have many goals related to sport.
AIMS 3	Most of my friends are athletes.
Exclusivity	
AIMS 4	Sport is the most important part of my life.
AIMS 5	I spend more time thinking about sport than anything else.
Negative affectivity	
AIMS 6	I feel bad about myself when I do poorly in sport.
AIMS 7	I would be very depressed if I were injured and could not compete in sport.

*Note:* Participants respond to the 7-items of the Athletic Identity Measurement Scale (AIMS) on a Likert-type scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*).

## Appendix 4: The Mental Health Continuum Short Form (MHC-SF)

Adult MHC-SF (ages 18 or older)

Please answer the following questions are about how you have been feeling during the past month. Place a check mark in the box that best represents how often you have experienced or felt the following:

During the past month, how often did you feel ...	NEVER	ONCE OR TWICE	ABOUT ONCE A WEEK	ABOUT 2 OR 3 TIMES A WEEK	ALMOST EVERY DAY	EVERY DAY
1. happy						
2. interested in life						
3. satisfied with life						
4. that you had something important to contribute to society						
5. that you belonged to a community (like a social group, or your neighborhood)						
<b>SEE BELOW 6. that our society is a good place, or is becoming a better place, for all people</b>						
7. that people are basically good						
8. that the way our society works makes sense to you						
9. that you liked most parts of your personality						
10. good at managing the responsibilities of your daily life						
11. that you had warm and trusting relationships with others						
12. that you had experiences that challenged you to grow and become a better person						
13. confident to think or express your own ideas and opinions						
14. that your life has a sense of direction or meaning to it						

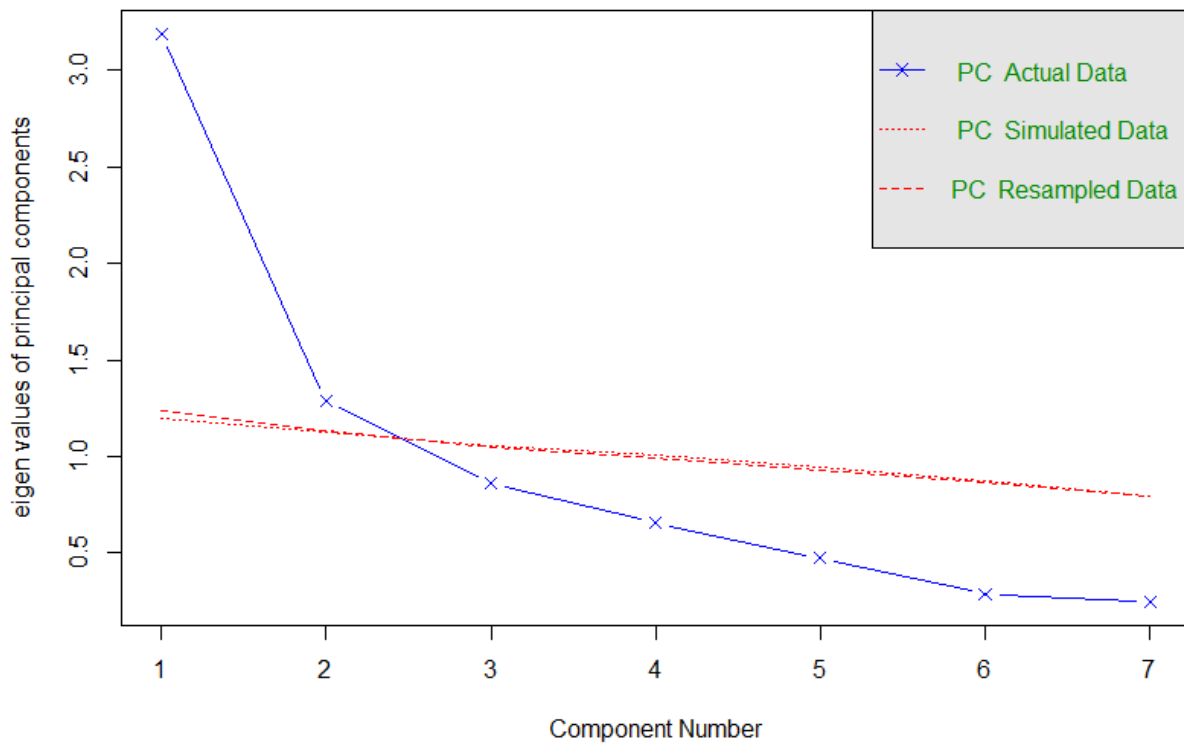
**Note:** The original wording for item 6 was “that our society is becoming a better place for people like you.” This item does not work in all cultural contexts. However, when validating the MHC-SF, test both versions of item 6 to see which one works best in your context.

### Appendix 5: The Brief Resilience Scale (BRS)

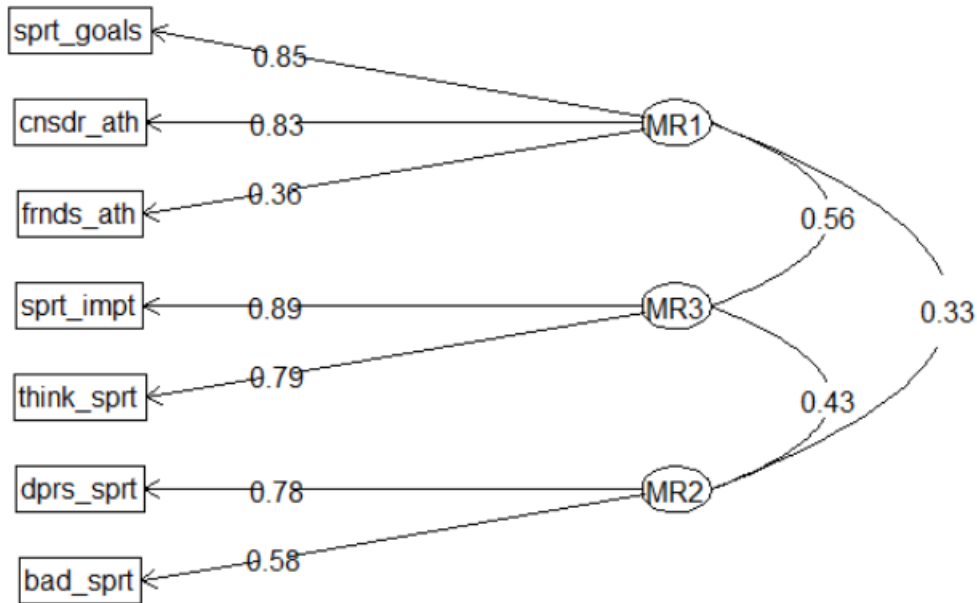
Please respond to each item by marking <u>one box per row</u>		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
BRS 1	I tend to bounce back quickly after hard times	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
BRS 2	I have a hard time making it through stressful events.	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
BRS 3	It does not take me long to recover from a stressful event.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
BRS 4	It is hard for me to snap back when something bad happens.	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
BRS 5	I usually come through difficult times with little trouble.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
BRS 6	I tend to take a long time to get over set-backs in my life.	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1

### Appendix 6: Athletic Identity PCA

#### Parallel Analysis Scree Plots



## Appendix 7: Athletic Identity EFA 3-Factor Model



## Appendix 8: Athletic Identity EFA Fit Measures

Number of Factors	RMSEA	BIC	$\chi^2$	p-value
1	0.231	201.72	2.3e-52	
2	0.234	119.31	7.1e-32	
3	0.076	-8.36	0.025	

## Appendix 9: External Identity Reliability

lower alpha upper 95% confidence bc  
0.59 0.65 0.72

Reliability if an item is dropped:

	raw_alpha	std.alpha	G6(smc)	a
cnsdr_ath	0.47	0.49	0.33	
sprt_goals	0.46	0.47	0.31	
frnds_ath	0.75	0.76	0.61	

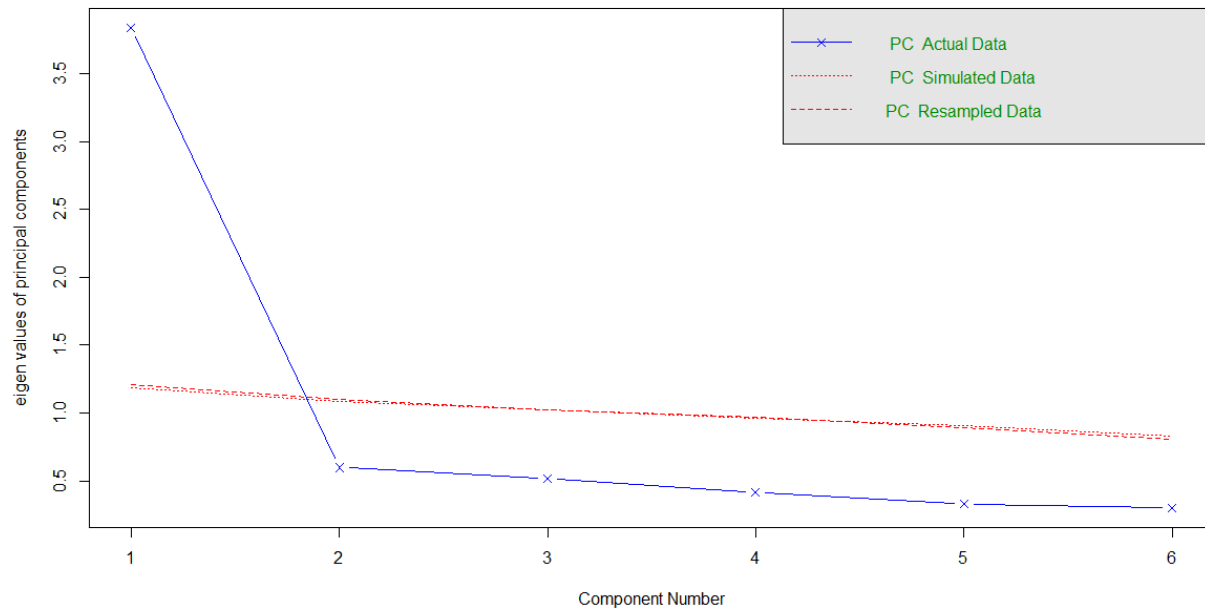
## Appendix 10: Athletic Identity CFA Loadings

Latent Variables:

	Estimate	Std.Err	z-value	P(> z )
external_identity =~				
sprt_goals	0.677	0.073	9.247	0.000
cnsdr_ath	0.584	0.056	10.404	0.000
internal_value =~				
sprt_impt	0.627	0.109	5.728	0.000
think_sprt	0.840	0.166	5.077	0.000
negative_events =~				
dprs_sprt	0.625	0.078	8.053	0.000
bad_sprt	0.799	0.103	7.777	0.000
athlete_identity =~				
external_dhtty	0.809	0.143	5.658	0.000
internal_value	1.396	0.374	3.729	0.000
negative_evnts	0.813	0.152	5.364	0.000

## Appendix 11: Resilience PCA

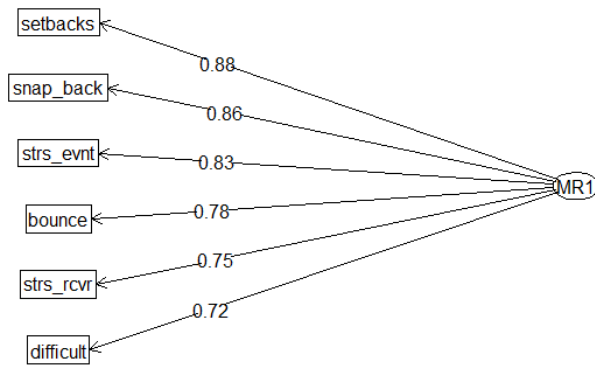
Parallel Analysis Scree Plots





## Appendix 12: Resilience EFA

### Factor Analysis



## Appendix 13: Resilience EFA Fit Measures

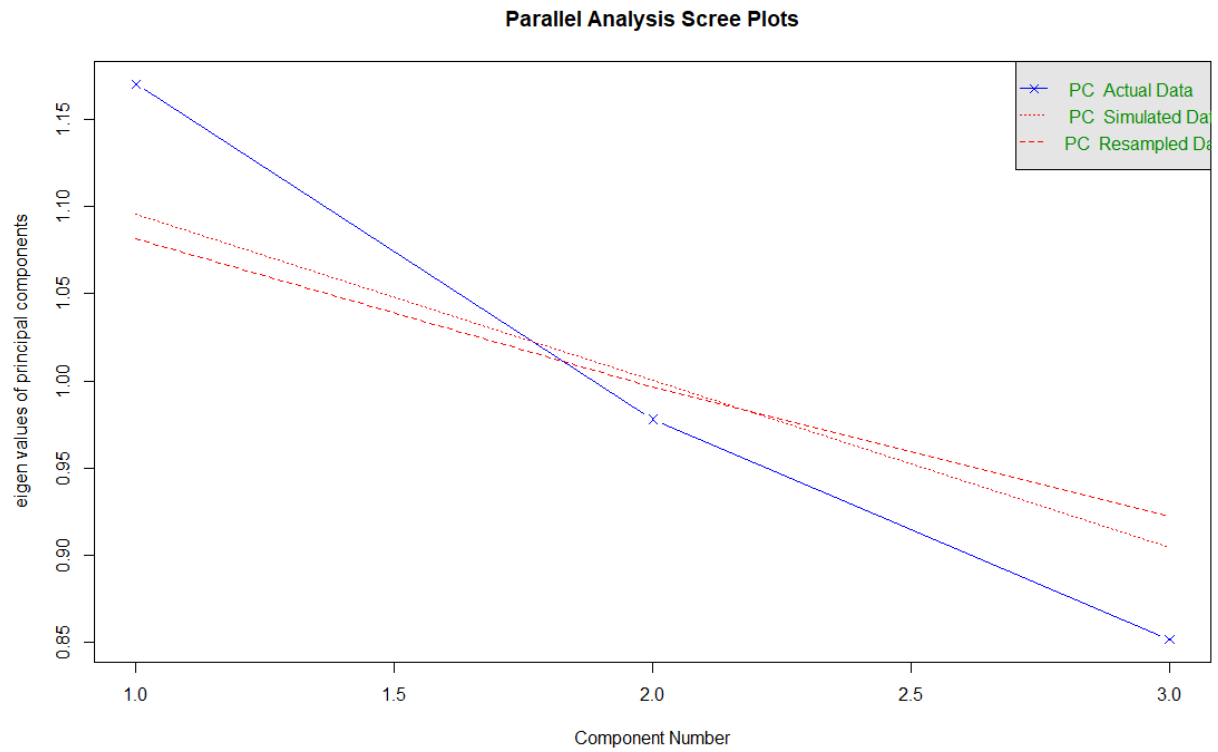
Number of Factors	RMSEA	BIC	$\chi^2$ p-value
1	0.090	-17.41	4.6e-05
2	0.056	-15.02	0.073

## Appendix 14: Resilience CFA Loadings

Latent Variables:

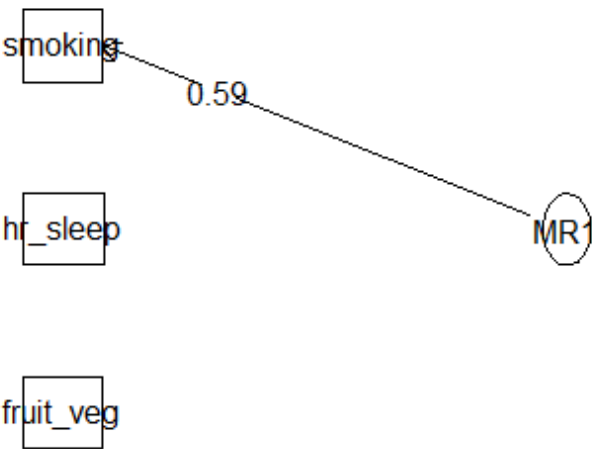
	Estimate	Std.Err	z-value	P(> z )
resilience =~				
bounce	0.662	0.045	14.732	0.000
strs_evnt	0.852	0.052	16.419	0.000
strs_rcvr	0.679	0.051	13.415	0.000
snap_back	0.814	0.048	17.031	0.000
difficult	0.644	0.051	12.559	0.000
setbacks	0.828	0.046	17.954	0.000

## Appendix 15: Healthy Lifestyle PCA



Appendix 16: Healthy Lifestyle EFA

**Factor Analysis**

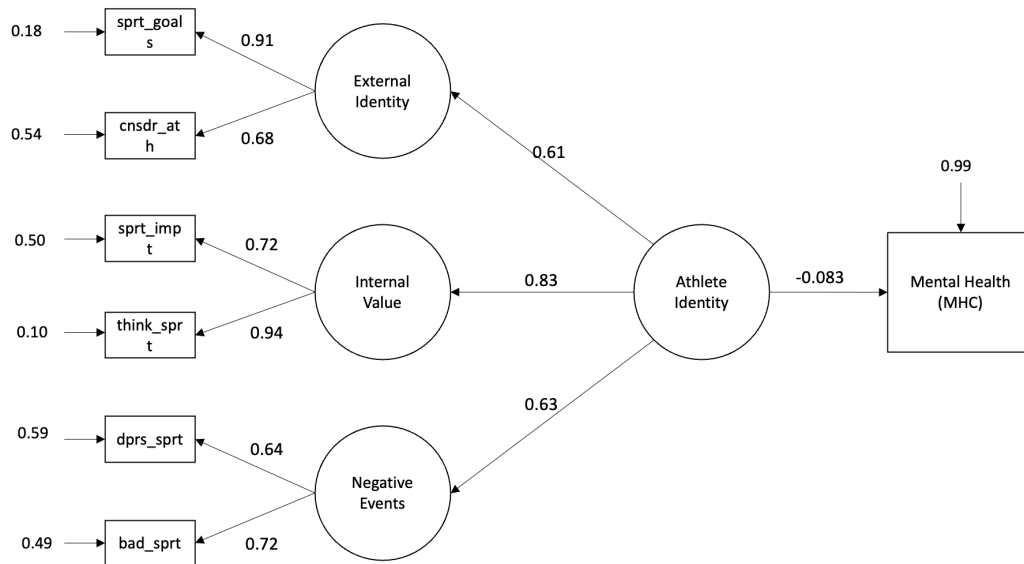


Appendix 17: Healthy Lifestyle Reliability

	lower	alpha	upper	95% conf
	-0.47	-0.26	-0.04	
Reliability if an item is drop				
	raw_alpha	std.alpha	G	
hr_sleep	-0.112	-0.150		
smoking	0.043	0.055		
fruit_veg	-0.330	-0.330		

## Appendix 18: Athletic Identity and Overall Well-Being

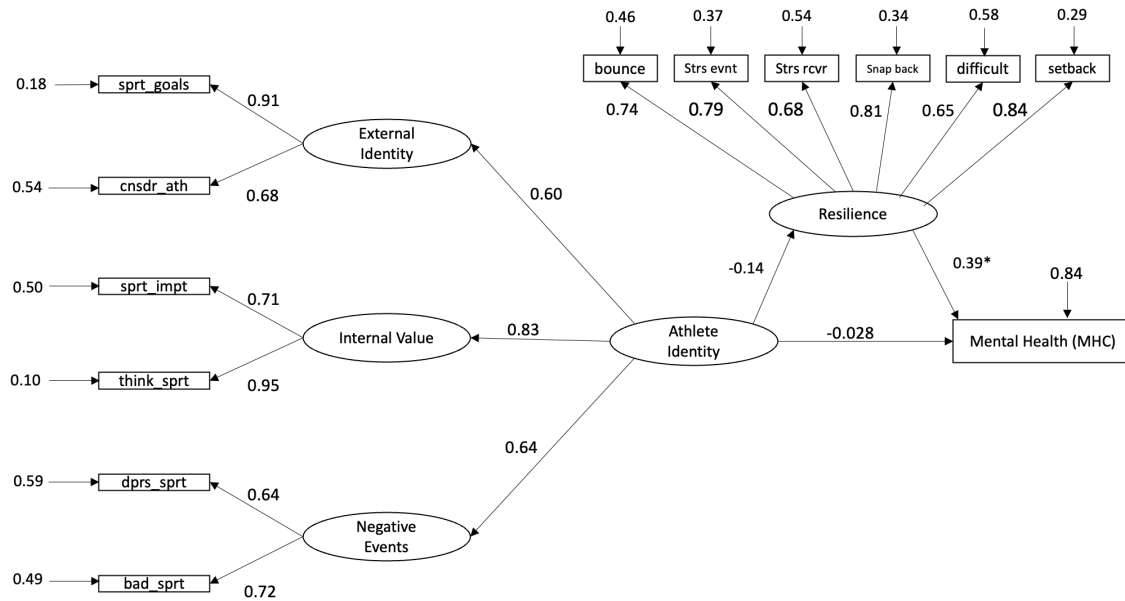
### Model 1: Relationship between Athlete Identity and Mental Health (MHC) for Athletes



\*Standardized Path Coefficients

## Appendix 19: Resilience Mediating SEM

### Model 2: Relationship between Athlete Identity and Mental Health (MHC) Mediated by Resilience for Athletes



Standardized Path Coefficients  
Note: Value with \* is significant at 0.05

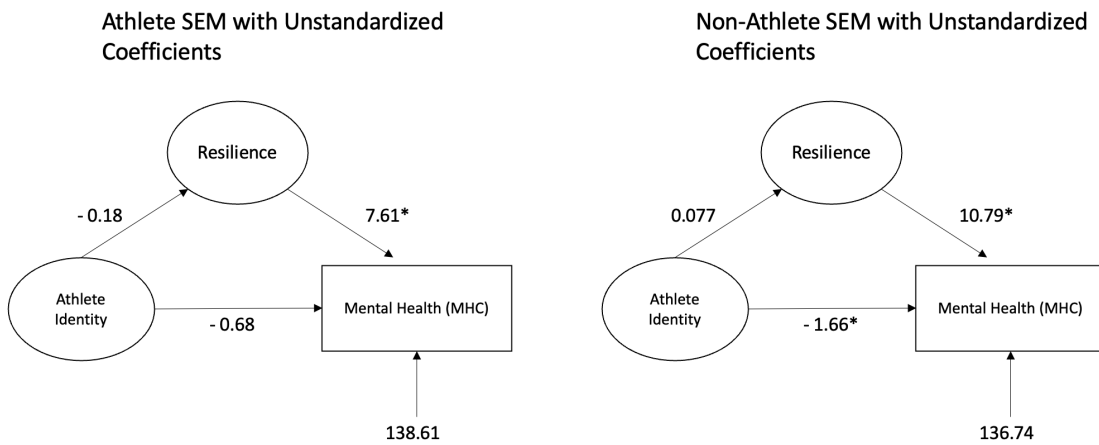
## Appendix 20: Resilience Mediating SEM with Standardized Effects

Defined Parameters:

	Estimate	Std.Err	z-value	P(> z )	Std.lv	Std.all
indrct_thlt_dn	-1.374	0.732	-1.877	0.061	-0.724	-0.056
t1l_thlt_dntty	-2.054	1.669	-1.231	0.218	-1.082	-0.084

## Appendix 21: Athlete and Non-Athlete Comparison SEM

Comparison of Mediation Effect of Resilience on Relationship between Athlete Identity and Mental Health for Athletes and Non-Athletes



Note: Value with \* is significant at 0.05

## Appendix 22: Unstandardized Effects of Athletic Identity, Athletes

Defined Parameters:

	Estimate	Std.Err	z-value	P(> z )
indrct_thlt_dn	-1.374	0.732	-1.877	0.061
t1l_thlt_dntty	-2.054	1.669	-1.231	0.218

## Appendix 23: Unstandardized Effects of Athletic Identity, Non-Athletes

Defined Parameters:

	Estimate	Std.Err	z-value	P(> z )
indrct_thlt_dn	0.833	0.545	1.527	0.127
t1l_thlt_dntty	-0.824	0.866	-0.951	0.341

###

Appendix 24: GitHub Repository

All of the code for this study can be found in this [GitHub repository](#).