









Successive CFAs were computed separately for each country to confirm the three-factor structure of the WEUS. Overall, the model demonstrated acceptable fit for the British ( $\chi^2=70.19$ ,  $df=22$ ,  $p<.001$ ; CFI=0.944; TLI=0.909; RMSEA=0.082), the Malawian ( $\chi^2=55.84$ ,  $df=22$ ,  $p<.001$ ; CFI=0.950; TLI=0.918; RMSEA=0.070), and the Chinese ( $\chi^2=36.78$ ,  $df=22$ ,  $p=.002$ ; CFI=0.984; TLI=0.973; RMSEA=0.043) samples (Figure 2-4).

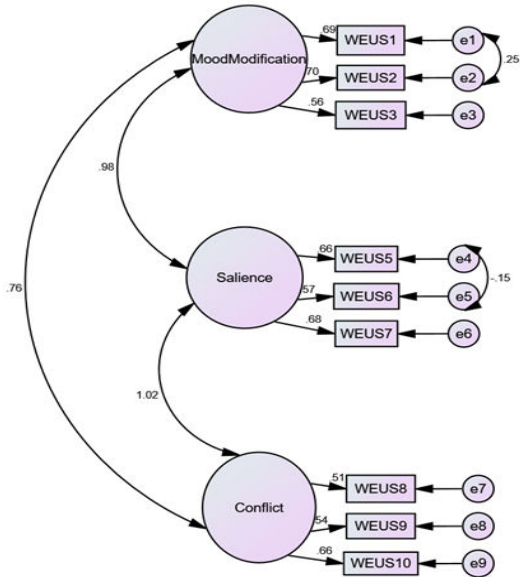


Figure 2: CFA Model for UK sample.

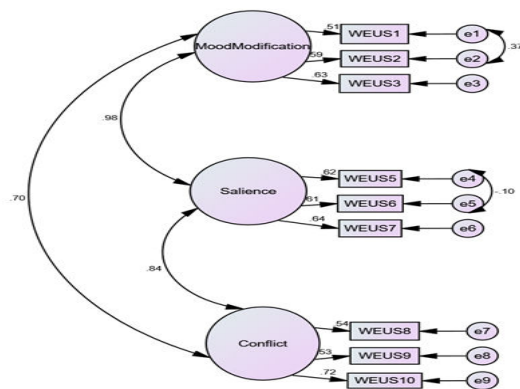


Figure 3: CFA Model for Malawi sample.

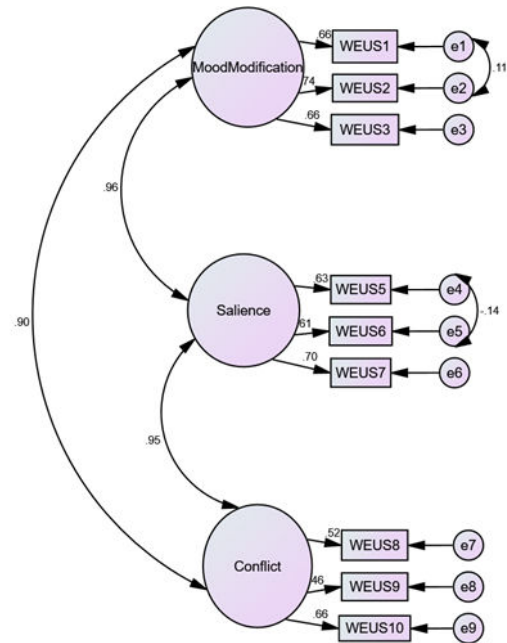


Figure 4: CFA Model for China sample.

### Multiple group confirmatory factor analysis

After confirming the model in all the samples as well as CFA in all the combined data, the next step involved multiple group factor analysis. In this study, the identified model of 3 factors and 9 items was analyzed using this technique (Table 5).

Model	X2 (df)	Δ X2 (df)	p	CFI	RMSEA	90% CI	ΔCFI	ΔRMSEA
Configural: loadings +intercepts free	83.91 (43)			0.966	0.037	.029, .045		
Metric: loadings fixed + intercepts free	89.73 (48)	5.82 (5)	0.027	0.962	0.036	.029, .043	0.004	0.001
Model 3: loadings free +intercepts fixed	96.63 (54)	12.72 (11)	0.153	0.959	0.034	.027, .041	0.007	0.003
Scalar: loadings +intercepts fixed	242.09 (66)	158.18 (23)	0.001	0.899	0.048	.042, .053	0.067	-0.011

**Table 5:** Multiple CFA of WEUS (China, Malawi and UK).

## Discussion

The aim of the present study was to evaluate MI of the WEUS across groups of SNS users from China, Malawi and the UK, using the three-factor model, as it has been previously established in the original scale. Based on incremental fit indices values and the S-B  $\chi^2$  difference test, the findings indicated support for the configural and metric invariance and partial support for the scalar invariance [31]. The support for configural invariance indicates that the three-factor structure of the WEUS holds invariantly across the different countries compared. The support for metric invariance and Model three revealed that the magnitudes of the relationships are equivalent (i.e. using the same metric scale) across Chinese, Malawian and UK users of social networking sites. Finally, the support for partial scalar invariance indicated that for the same level of the latent SNS addiction trait, individuals across the three groups compared will endorse the same response ratings in items 1, 2, 4, 5, 7, and 9 and different response ratings in items 3, 6 and 8 [32].

With regard to the reported loadings and intercepts inequalities, this finding may be interpreted on the basis of differences considering the cultural dimension of individualism/collectivism. Since the UK is considered high on individualism, the interpersonal restraint and relationships difficulties associated to SNS addiction may be reported differently from the way they are reported in China [33].

This goodness of fit was evident in all the three comparisons, thus China, Malawi and UK. The factor analysis met the three criteria for applicability of the SNAS in the three samples. The configural invariance, weak factor invariance and strong factor invariance were all met. However, the analysis did not meet the requirement of a strict factorial invariance because the measurement residuals were significant ( $p=.001$ ) when the other models were assumed to be correct. However, as noted earlier, strict factorial invariance is difficult to attain in practice. As such, when a model attains strong factorial invariance, as the case in this study, it is deemed adequate for establishing measurement invariance of a scale [34].

Notwithstanding the discussed insights, the present study includes several limitations.

First, this study did not control for factors such as gender; therefore, the findings may be confounded by them. Future studies should seek to understand this difference. Further, future studies should seek to

understand the cultural differences in social networking addiction and understand the psychological predictors of social networking addiction by employing both qualitative and quantitative methods in order to comprehensively understand the cultural differences in addictive use of social networking sites. In addition, it would also be interesting for future studies to understand people’s perception towards social networking addiction and government and institutional responses towards social networking addiction in different countries. It is pertinent to investigate actual perceptions that people have towards social networking addiction, if it is viewed as a disease or mere lack of will power [35,36].

## Conclusion

As the Internet continues to integrate into the daily lives of a global community, human-computer interaction will be a domain of continued study and inquiry in cross-cultural research. Addiction studies have demonstrated cross-cultural differences in addiction motivations and expressions, and although the WEUS has been validated China as a theoretically and psychometrically sound instrument, its MI across countries has not previously been confirmed to secure its appropriate use for international comparisons. This study, hence sought to investigate the MI across three countries and three cultures namely, United Kingdom representing the Western culture, Malawi, representing the African culture and China representing the Eastern Culture. The results of the study showed magnitudes of the relationships are equivalent across Chinese, Malawian and UK users of social networking sites.

## Author Disclosure Statement

No competing financial interests exist.

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