



**QUEEN'S
UNIVERSITY
BELFAST**

Revealing the complex relationship between social media use, social comparison orientation and optimism on health outcomes

Gibbons, C., & Murray-Gibbons, S. (2022). *Revealing the complex relationship between social media use, social comparison orientation and optimism on health outcomes*.

Document Version:

Early version, also known as pre-print

Queen's University Belfast - Research Portal:

[Link to publication record in Queen's University Belfast Research Portal](#)

Publisher rights

Copyright 2024 The Authors.

This working paper is distributed under a Creative Commons Attribution License (<https://creativecommons.org/licenses/by/4.0/>), which permits unrestricted use, distribution and reproduction in any medium, provided the author and source are cited.

General rights

Copyright for the publications made accessible via the Queen's University Belfast Research Portal is retained by the author(s) and / or other copyright owners and it is a condition of accessing these publications that users recognise and abide by the legal requirements associated with these rights.

Take down policy

The Research Portal is Queen's institutional repository that provides access to Queen's research output. Every effort has been made to ensure that content in the Research Portal does not infringe any person's rights, or applicable UK laws. If you discover content in the Research Portal that you believe breaches copyright or violates any law, please contact openaccess@qub.ac.uk.

Open Access

This research has been made openly available by Queen's academics and its Open Research team. We would love to hear how access to this research benefits you. – Share your feedback with us: <http://go.qub.ac.uk/oa-feedback>

Revealing the Complex Relationship between Social Media Use, Social Comparison Orientation and Optimism on Health Outcomes

Chris Gibbons (✉ aptpsychology@gmail.com)

Queen's University Belfast

Sophie Murray-Gibbons

Liverpool John Moores University

Abstract

The study assessed the influence of social media use (SMU), social comparison orientation (SCO) and optimism on wellbeing, mood and sleep quality. SCO is important because of the value of comparative information in SMU. SCO and optimism were tested as mediators between SMU and mood and wellbeing, and optimism as a moderator on the effect of SCO on mood. An online survey and correlational design were used with a convenience sample (n = 306). In terms of SMU, only passive Instagram featured as a predictor of anxiety. Optimism was the strongest predictor in enhancing wellbeing, mood and sleep quality. SCO was a predictor of adverse anxiety and wellbeing. Optimism moderated against the impact SCO had on anxiety, and optimism and SCO were mediators between SMU and wellbeing and anxiety. SCO adversely affected mood and wellbeing. Optimism predicted good sleep quality, and it functions by effecting how comparative information is processed. Understanding this better, in relation to SMU, is likely to promote healthier online interactions.

Introduction

Wellbeing is a “state of complete physical, mental and social wellbeing and not merely the absence of disease and infirmity” (World Health Organisation, 2006, p106). While critics question the assumption of ‘completeness’ as integral to wellbeing, the definition highlights the critical role of psychology in wellbeing. Adverse wellbeing effects mood and sleep quality (Linton & Bryngelsson, 2000; Matricciani *et al.*, 2017). Research has explored the frequency and duration that individuals spend on SMU and its association with adverse health outcomes (Przybylski *et al.*, 2013) and time on devices (e.g., smart phones and tablets) has been associated with poor sleep quality (Matricciani *et al.*, 2017). A review on SMU, sleep and wellbeing, concluded that SMU is better understood as a range of more subtle factors (Scott & Woods, 2019). Yang (2016) developed a scale to measure these more subtle types of social media activity (SMA), called passive (e.g., checking profiles), active (e.g., sharing information) and interactive (e.g., commenting). In a survey of 208 undergraduate students, Yang (2016) found that each type of interaction was predictive of loneliness. However, the literature on the relationship between loneliness, psychological wellbeing and SMU is mixed. Some found that SMU offered a social connection and lowered loneliness (e.g., Verduyn *et al.*, 2017), while others reported increased loneliness (e.g., Yang, 2016). A review by Verduyn *et al.*, (2020) found that active engagement (e.g., commenting/liking content) was predictive of enhanced psychological wellbeing and Kross *et al.*, (2021) found that active SMA increased social support, positive feedback comments and user wellbeing. This suggests measuring more nuanced SMA is important.

Social comparison orientation and optimism

The relationship between SMU and wellbeing, mood and sleep quality is, however, more complex than a simple direct association. Two important factors affecting this are SCO and optimism. Social comparison theory (Festinger, 1954) describes the tendency for one to make comparisons with others’ experiences and accomplishments. Those high in SCO tend to be high in self-consciousness, neuroticism,

and low self-esteem, as well as socially oriented and responsive to social signals (Buunk & Gibbons, 2006). The importance of SCO is magnified in SMU where platforms are designed to make visible the lives and experiences of users, enabling instant comparisons (Yang, 2016). Upward comparisons involve comparing oneself with those more accomplished. Downward comparisons involve assessments against others less accomplished. However, as most posts and content are highly selective and positive, the system is set for upward comparisons. While there might be a boost to self-esteem where similarities are found, such comparisons frequently lead to envy, low self-esteem and low mood (Twenge *et al.*, 2018; Vogel, Rose & Roberts, 2014).

Park and Baek (2018) argued the effect of SCO on psychological health can be positive and negative from both upward and downward comparisons. Smith (2000) developed a scale to measure these different types of SCO, two upward sub-scales and two downward with positive and negative emotional components in each. Park and Baek (2018) tested these and found that the emotions triggered by such comparisons was the mediator between SCO and satisfaction with life. Tosun and Kasdama (2019) found that SMA, specifically passively engaging on Facebook, was positively associated with depression, but that this was mediated by the nature of the SCO. Specifically, by upward assimilative comparisons (i.e., where one attempts to draw inspiration or optimism through the comparisons made) and upward contrasting emotions (i.e., where one's emotional state contrasts negatively with that of others, inducing envy or sadness) (Park & Baek, 2018). The evidence suggests that SCO and the nature of the comparisons made, and the subsequent emotions evoked, can mediate between SMU and wellbeing and mood.

Optimism can be interpreted as an explanatory style, a way of interpreting success and failure and attributing outcomes in a way that leaves one feeling positive and in control (Seligman, 2002; 2012). Others conceive it as dispositional (Carver & Scheier, 2014) but researchers in both camps agree that it represents a set of cognitive strategies, such as a tendency to more readily attend to positive events over negative ones (defensive optimism), to more frequently expect positive future outcomes (Liu *et al.*, 2017); in interpreting disappointment as experiences one can learn from (Gibbons, 2008, 2022a, 2022b; Nes & Segerstrom, 2006) and by imagining scenarios much worse (a catastrophizing fantasy) to lessen associated anxiety (Seligman, 2002). A meta-analysis by Qi *et al.*, (2012) found that optimism was negatively associated with anxiety, depression and stress and positively associated with life satisfaction, self-esteem and positive affect. A number of studies also find optimism to be predictive of sleep quality (e.g., Hernandez *et al.*, 2014; Leola *et al.*, 2013; Uchino *et al.*, 2017).

Research exploring mediating influences on sleep quality have tested depression (the indirect path), between optimism and sleep (Lau *et al.*, 2015; Uchino *et al.*, 2017). However, Lau *et al.*, (2015) also tested optimism as a mediator between depression and sleep quality and found optimism was a stronger mediator than depression. They concluded that optimism is likely to induce better sleep because of its positive effects in reducing depressive mood, with depressive mood explaining poor sleep quality only insofar as it is associated with pessimism (Lau *et al.*, 2015).

Most of the research exploring the optimism-sleep relationship is cross-sectional. Lau *et al.*, (2017) adopted a longitudinal design following up a sample of 4,245 undergraduate students in Hong Kong across three test periods over two years. The study replicated the findings of cross-sectional research – that optimism mediated between sleep quality and mood and optimism measures taken at the start of the study was the strongest predictor of sleep quality 19 months later.

Liu *et al.*, (2017) found optimism influenced SMU: They maintained that because individuals high in optimism more readily draw favourable comparisons and because it is more readily associated with more positive health outcomes, optimism is likely to act as a mediator between SCO and health outcomes, such as depression. Moreover, because of the cognitive strategies optimists use, in relation to how they process comparative information (Seligman, 2012), it will buffer or moderate the influence of SCO on health-related outcomes.

Liu *et al.*, (2017) surveyed 1205 university students and measured their SCO on social media. They found evidence for the moderating role of optimism on depression – those scoring high on optimism reported lower scores on depression and there was little change in depression scores, irrespective of their scores on SCO on social media. For those low in optimism, depression scores were higher and increased as upward social comparison scores increased. They additionally found evidence for optimism as a mediator between SCO on social media and depression, and SCO on social media and self-esteem. The authors concluded that optimistic thinking allows the individual to interpret comparative information in a way that reduces the negative effects of upward comparisons (Liu *et al.*, 2017).

Aims

The study aimed to test the influence of SME and SMA (e.g., passive, active and interactive engagement on Instagram and Facebook) and SCO and optimism as predictors of sleep quality, mood and wellbeing (Qi *et al.*, 2012; Uchino *et al.*, 2017, Yang, 2016); to explore the separate mediating roles of SCO and optimism between SMA, SME and sleep, mood and wellbeing (Lau *et al.*, 2015; Park & Beak, 2018; Tosun & Kasdama, 2019; Yang, 2016), and the moderating role of optimism between SCO and mood (Liu *et al.*, 2017).

The following hypotheses were tested:

H₁ - There will be correlations between SME and SMA on wellbeing, mood and sleep quality.

H₂ - There will be correlations between SCO and optimism on wellbeing, mood and sleep quality.

H₃ - Optimism and SCO will mediate between SMU (SME and SMA) and mood, sleep quality and wellbeing.

H₄ - Optimism will have a moderating influence with SCO on mood.

Methodology

Participants, ethics and procedures

A convenience and snowball sample were obtained, ($n = 306$), via the researchers' social media groups (Facebook, Instagram and WhatsApp). Age ranged from 18–79 year ($M = 32.48$, $SD = 14.23$). In terms of gender, 20.3% ($n = 62$) were male, 67% ($n = 205$) were female. One participant identified as non-binary, and 12.1% ($n = 37$) did not respond. Inclusion criteria were adults aged 18 and over who had and used a social media account. Surveys were completed via Qualtrics, between November 2021 and February 2022. The study was approved by the Ethics Committee of the host university. Participants received a brief and contact details for further clarification. Participation was voluntary and all acknowledged informed consent before participating. All ethical considerations and methods were executed in accordance with the Declaration of Helsinki.

Measures

The questionnaire included 86 items. Information on demographics and the following measures were used. The Cronbach's alphas for all measures ranged from .624 to .924, suggesting all scales offered satisfactory to excellent internal reliability:

Mood

The Hospital Anxiety and Depression Scale (HADS), (Zigmond & Snaith, 1983), is a fourteen-item scale measuring mood – anxiety and depression. Each item is scored on a response-scale with four responses ranging between 0–3. An example item is: 'Worrying thoughts go through my head.' High scores indicate adverse mood.

Wellbeing

The Warwick-Edinburgh Mental Well-Being Scale (WEMWBS), (Stewart-Brown, 2007), measures wellbeing in the last month. The scale consists of fourteen items on a five-point Likert scale. An example item from this scale is: 'I have been feeling optimistic about the future'. High scores indicate positive mental wellbeing.

Sleep

The Pittsburg Sleep Quality Index (PSQI), (Buysse *et al.*, 1989), measured respondents' quality of sleep. The 0–3 frequency scale consists of nineteen items grouped into different factors, e.g., sleep quality, duration, disturbances. These were totalled. High scores indicate poor sleep quality.

Social media engagement (SME)

This measured the frequency and engagement with SMU. The response scales range from 'Not one day' (1) to Every day (7). Higher scores represent a higher level of engaging in these activities. A sample item is: 'How often did you use social media when eating breakfast?' (Przybylski *et al.*, 2013).

Social media activity (SMA)

Respondents rated 11 items on a five-point Likert scale measuring passive (e.g., reviewing and checking others' profiles), active (e.g., sharing information) and interactive (e.g., commenting and replying to others). An example item is: "How often do you comment on or reply to others' posts?" Higher scores indicated a higher frequency of engaging in specific SMA (Yang, 2016).

Optimism

The Values in Action 'Hope' sub-scale was used (Park and Peterson, 2006). It includes eight items with a five-point Likert scale e.g. 'I always look on the bright side'. These are totalled and high scores indicate greater optimistic thinking.

Social Comparison Orientation

IOWA-Netherlands Comparison Orientation Measure (SCOM), (Gibbons & Buunk, 1999) uses a 5-point Likert scale with participants asked to indicate how well each statement applied to them e.g. 'I compare what I have done with others as a way to find out how well I have done something'. High scores indicated high SCO.

Statistical Analyses

Correlations were run to determine linearity, followed by hierarchical multiple regressions between those predictors significant with a given outcome measure. Normality checks (kurtosis, skewness, Q-Q plots and z-score distributions) indicated normality for all outcome measures (Ghasemi & Zahediasl, 2012). An interaction variable was computed to test the moderating effect of optimism on SCO (called SCOXOptimism). Table 1 tested the linearity assumption for the variables entered into the regression analyses. For mediation analyses, the significant SME or SMA predictors from Table 1 were entered and in block two the mediator (SCO or optimism). This allows the direct (block one) and indirect (block two) path to be tested. Those significant were reported.

Results

Table 1. Correlations between predictors (SCO, optimism, SME, SMA) and anxiety, depression sleep quality and wellbeing.

	Poor sleep quality	Wellbeing	Anxiety	Depression
Social Comparison orientation (SCO)	.22***	-.32***	.42***	.15**
Optimism	-.39***	.67***	-.46***	-.51***
Social Media Engage (SME)	.08	-.13*	.20***	.07
Social Media Activity (SMA):				
Interactive instagram	.03	.05	.07	-.06
Passive instagram	.02	-.14*	.23***	.08
Active instagram	-.03	-.01	.04	-.02
Interactive facebook	-.03	.12	-.05	-.12
Passive facebook	-.01	.07	.03	-.13
Active facebook	-.03	.00	-.02	.00

*significant at $p < .1$, **significant at $p < .05$, ***significant at $p < .01$

Only those results significant or trending towards significance were entered into the regression analyses. Only with the analysis with anxiety was there evidence of moderation.

Table 2. Regression model for Poor sleep quality

Model		Unstandardized Coefficients		Standardized Coefficients
		B	Std. Error	Beta
1	(Constant)	15.952	1.470	
	Optimism	-.457	.078	-.410

The final regression model explained 16.3% of the variance in global sleep or scores measuring poor sleep quality. The results indicated a significant effect between optimism and poor sleep quality, $F(1, 168) = 34.001$, $p < .001$, $R^2 = .166$, Adjusted $R^2 = .157$). Optimism, $\beta = -.410$ ($p < .001$) was a significant predictor. The result offers partial support for H_2 .

Table 3. Regression model for wellbeing

Model		Unstandardized Coefficients		Standardized Coefficients
		B	Std. Error	Beta
1	(Constant)	17.119	3.491	
	SCO	-.155	.056	-.132
	Optimism	1.861	.127	.691

The final regression model explained 53.7% of the variance in wellbeing scores. The results indicated there was a collective significant effect between both variables in the model and wellbeing, $F(2, 220) = 129.64, p < .001, R^2 = .541, \text{Adjusted } R^2 = .537$). The individual predictors were explored further and indicated that optimism, $\beta = .691 (p < .001)$; SCO $\beta = -.132 (p = .006)$ were significant predictors in the model. The results offer support for H_2 only.

Table 4. Regression model for anxiety

Model		Unstandardized Coefficients		Standardized Coefficients
		B	Std. Error	Beta
1	(Constant)	14.310	2.112	
	SCO	.139	.035	.255
	Optimism	-.619	.075	-.502
	Passive instagram	.209	.122	.107
	SCOxOptimism	.032	.009	.207

The final regression model explained 39.7% of the variance in anxiety scores. The results indicated there was a collective significant effect between the variables in the model and anxiety, $F(4, 173) = 30.126, p < .001, R^2 = .411, \text{Adjusted } R^2 = .397$). The individual predictors were explored further and indicated that optimism, $\beta = -.502 (p < .001)$; SCO $\beta = .255 (p < .001)$; passive Instagram $\beta = .107 (p = .088)$; and SCOxOptimism interaction $\beta = .207 (p < .001)$ were significant predictors in the model. The results offer partial support for H_1 and H_2 and support H_4 .

As SCO increases, scores on anxiety increase for those low, average and high in optimism. Those high in optimism (the bottom line) score lower on anxiety compared to those average or low in optimism. This offers support for H_4 .

Table 5. Regression model for depression

Model		Unstandardized Coefficients		Standardized Coefficients
		B	Std. Error	Beta
1	(Constant)	14.191	.930	
	Optimism	-.504	.050	-.557

The final regression model explained 31% of the variance in depression scores. The results indicated there was a collective significant effect between optimism and depression, $F(1, 230) = 103.34, p < .001, R^2 = .310, \text{Adjusted } R^2 = .307$). The individual predictor was explored further and indicated that optimism, $\beta = -.557 (p < .001)$ was significant in the model. The results offer partial support for H_2 .

Mediation analyses between social media behaviour and anxiety and wellbeing.

To test H_3 , only those correlations significant or trending to significance, between SME and SMA against anxiety and wellbeing (Table 1), were entered into a multiple regression. In block one the SME or SMA was entered and in block two the mediator (SCO or optimism). This allows the direct (block one) and indirect (block two) path to be tested. Only those significant are reported.

Table 6 Unmediated and mediated values between types of SMU (passive instagram and social media engagement) and anxiety and wellbeing

<i>Passive Instagram and anxiety; SME and anxiety (with Social Comparison Orientation as the mediator)</i>		
	β value	<i>p</i> value
Passive instagram		
Unmediated path	.234	.002
Mediated path	.113	.125
SME		
Unmediated path	.190	.004
Mediated path	.050	.433
<i>Passive Instagram and wellbeing; SME and wellbeing (with Social Comparison Orientation as the mediator)</i>		
	β value	<i>p</i> value
Passive instagram		
Unmediated path	-.138	.063
Mediated path	-.050	.516
SME		
Unmediated path	-.124	.060
Mediated path	-.014	.832
<i>SME and wellbeing (with Optimism as the mediator)</i>		
	β value	<i>p</i> value
Unmediated path	-.133	.043
Mediated path	-.016	.743

The mediation analyses reveal evidence of SCO and optimism as mediators between types of SMU and anxiety and wellbeing, and offers partial support for H₃.

Discussion

It was expected that SME and the different SMA (passive, active and interaction) would be predictive of wellbeing, mood and sleep quality. The critical role of comparative information-processing online, would indicate that SCO would be predictive, as would optimism, given the evidence of its efficacy in relation to in-person and online interactions. For the results with sleep quality (Table 2), only optimism featured – increases in optimism were negatively associated with poor sleep quality. This result is consistent with Hernandez *et al.*, (2014) and Lemola *et al.*, (2013).

Where wellbeing was the outcome measure (Table 3), both optimism and SCO were significant. Optimism explained a larger variance in wellbeing. This supports the Qi *et al.*, (2012) meta-analysis on the beneficial role of optimism on health and, consistent with Liu *et al.*, (2017) and Festinger's conception of social comparison theory, a negative relationship was observed between SCO and wellbeing. The result indicates that the type of comparisons respondents made had an adverse impact on wellbeing. Given upward comparisons online are more frequent (Twenge, *et al.*, 2018), this finding suggests it was this type of comparison that accounted for the harmful effect of SCO on wellbeing (Vogel *et al.*, 2015; Tandoc, Ferrucci & Duffy, 2015).

For the regression with depression (Table 5), optimism was the only significant predictor and it negatively predicted depression scores. With just one predictor, the variance explained was large, suggesting it was an important coping ingredient and supports Qi *et al.*, (2012).

For the regression with anxiety (Table 4), optimism was the strongest predictor – increases in optimism predicted low anxiety. SCO was predictive and, as with wellbeing, it had an adverse effect on anxiety. This supports Liu *et al.*, (2017). The only evidence for social media influencing any DV was with passive Instagram predicting anxiety. This is consistent with Yang's (2016) finding in relation to passive Instagram use and loneliness.

This model reported evidence of optimism as a moderator between SCO on anxiety (figure 1). A positive relationship was observed between SCO and anxiety, irrespective of scores on optimism. However, the results revealed that those high on optimism scored lower on anxiety. This suggests that optimism acted as a buffer against the adverse effects of SCO on anxiety. Liu *et al.*, (2017) found the same pattern with depression. The results suggest that optimistic thinking allows the individual to interpret comparative information in a way that reduces its potentially negative effects. The value of comparative information-processing online gives SCO particular potency. This is indicated by its positive association with anxiety and supports Tosun and Kasdarma (2020). The value of optimism to act as a buffer suggests there is merit in the cognitive strategies, such as defensive optimism, catastrophizing fantasies and reframing, more frequently used by optimists (Gibbons, 2022a, 2022b).

While the current study sought to explore the relationship between SCO and SMU, the items on the SCO scale are context free (Gibbons & Buunk, 1999). They make no reference to the comparisons made online as distinguishable from in-person comparisons. The items, in fact, appear to be designed for in-person comparisons e.g. '*I often like to talk with others about mutual opinions and experiences*' [item 7]. While most can be interpreted as relevant for virtual as well as in-person comparisons, its lack of specificity to social media may question its validity for this context and the results may reflect the importance of SCO in relation to anxiety for both in-person and virtual comparisons.

Mediation analysis

Positive relationships were found between the frequency of passive Instagram use and anxiety and SME and anxiety, and similarly for wellbeing in place of anxiety (Figures 2 & 3, Table 6). However, the

relationship was no longer significant when SCO was added. This suggests that SCO was a mediator - those scoring high on SCO were more likely to engage online and, independently, those scoring high on SCO, more frequently scored high on anxiety. This implies that the attempts to draw comparisons with the lives of others was, for those scoring high on SCO, more disruptive to anxiety and wellbeing. Twenge *et al.*, (2018) drew the same conclusion. Users that drew upward comparisons were more likely to interpret their life as less worthy and interesting. Twenge *et al.*, (2018) argued that while users know that content shared on social media is frequently akin to a 'highlight reel' - of the best in others' lives, they struggle to separate their emotional response from this cognitive understanding.

Twenge *et al.*, (2018) sampled adolescents and Erikson (1994), in his psycho-social theory of development, argued that striving for identity achievement is critical during adolescence. One's sense of identity is formed through the interactions and responses of others, first with family, then friends and peer groups. As the self expands, the reactions of one's peer group become increasingly important. This may explain why social comparison with peers and peer pressure are highest during adolescence (Vogel *et al.*, 2014). The sample in this study was broader than just adolescents (age range 18-79 years). It is possible that this finding suggests the tendency Twenge *et al.*, (2018) demonstrated in adolescents, remains important in older cohorts. Erikson (1994) argued development was not confined to the family or to childhood, but to relationships outside the family and those formed across the lifespan. Using social media, not just daily but frequently throughout the day, is ubiquitous. It offers an opportunity to connect with and see the lives of others (Yang, 2016) and while the lives of those you are viewing may have a particular relevance during adolescence, they can remain important, for different reasons, across the lifespan (Erikson, 1994). This may offer an explanation for the evidence on SCO mediation found here.

SME and passive instagram use, a particular type of SMA, featured in the direct path with anxiety and with wellbeing (figure 3, Table 6) but these were no longer significant when SCO was added. Both passive instagram and SME positively correlated with SCO. Passive instagram describes users passively browsing newsfeeds and profiles without leaving comments or engaging (Yang, 2016). If one is motivated to draw superficial comparisons rather than to understand and connect with others in a meaningful way, then passively scrolling is a logical choice. The most likely outcome from this is a judgement and emotional response to what one's (unedited) life is like compared to the edited highlights of others (Twenge *et al.*, 2018). It is a type of comparison likely to lead to disappointment (Yang, 2016) and, in this study, to increased anxiety and lower wellbeing. This is consistent with the adverse effect of upward social comparisons (Tandoc, Ferrucci & Duffy, 2015; Twenge, *et al.*, 2018).

Optimism featured as a mediator between SME and wellbeing (figure 4, Table 6). SME was negatively associated with wellbeing but was no longer significant when optimism was added. Optimism negatively related to SME and positively with wellbeing. This suggests that the amount of SME is significant, less is more beneficial and is associated with higher optimism scores and it implies that the nature of that engagement is important. This is consistent with the different impacts that passive, active and interactive engagement have on wellbeing (Smith, 2000; Yang, 2016). While the specifics of this were not measured, it is likely that those more optimistic brought the same thinking patterns used in their in-person life to

their online life (Gibbons, 2022a, 2022b; Liu *et al.*, 2017). For example, they may look to form more meaningful connections, offer more positive comments, make more compliments and be biased to attend more to positive messages over toxic ones.

Limitations and improvements

As the sample was convenience and volunteer based and given the non-response rate for some of the measures, validity could be an issue. Order effects and state congruence recall may also have affected the completion rate and response validity. The use of a single attention-testing item (e.g., please choose a specified response below) in each scale and excluding respondents who did not accurately answer these attention-testing items is likely to increase validity and could form part of the screening plan.

Optimism featured in all the regression models – it is beneficial for sleep, mood and wellbeing. It featured as a moderator with SCO and as a mediator between SME and wellbeing. The results suggest that optimistic strategies appear to be beneficial, not just in face-to-face interactions but in online ones (NB the SCO items were context free). It would be fruitful to explore this further i.e., how those high in optimism engage on SMU compared to those low in optimism. The mediation result reported an inverse relationship – those high in optimism engaged less. However, this study leaves unanswered the nature of that engagement and cognitive strategies used. Exploring this further could inform the current user-guides on healthy tips for SMU. These currently focus on encouraging less time on devices, checking the credibility of sources and encouraging click restraint (Bartolomeo, 2020) but do not consider such cognitive strategies.

SCO was associated with adverse anxiety and wellbeing. On SMU, increased social comparison tendencies were harmful. Passive engagement, such as scrolling feeds and profiles, is more frequently engaged by those high in SCO. It is more frequently associated with upward comparisons and adverse health (Twenge *et al.*, 2018; Vogel, Rose & Roberts, 2014). Optimists engage less frequently on SMU and adopting the strategies employed by optimists, irrespective of one's level of dispositional optimism, is likely to be advantageous to mood, wellbeing and even sleep. It influences how one processes comparative information in in-person interactions and on SMU.

Fredrickson and Losada (2005) took a positive psychology approach to nurture more productive business meetings in the corporate sector. They found a 3:1 ratio of positive to negative comments/statements was the optimal ratio associated with greater economic success. There may be an optimal ratio to time on devices, to time scrolling, posting, commenting etc. The analysis in this study points to the merit of exploring this and the types of cognitive strategies associated with healthy SMU.

Declarations

Ethics approval and consent to participate

The study received Ethics approval from the Ethics committee in the School of Psychology at Liverpool John Moores University (Reference: PSYREPSubmissions220222).

As part of the review, the panel considered the participant brief and consent form and all participants gave informed consent before participating. All were informed that participation was voluntary and they were free to stop at any time and all acknowledged informed consent before participating, in accordance with the Declaration of Helsinki.

The use of the survey method and collection of data was performed in accordance with Declaration of Helsinki

The above information is detailed in the manuscript.

Consent for publication

Not applicable

Availability of data and materials

The data set is available through Orcid: DOI 0000-0001-6631-721X

The question items are subject to copyright but the sources for all the measures used are referenced and interested parties can contact any of these sources. The authors vary on their decisions to make their tests available for free for educational purposes.

Competing interests

The author has no competing interests

Funding

Not applicable

Authors' contributions

CG and SMG wrote the main manuscript and ran the analysis, SMG administered and gathered the data. CG and SMG ran analyses and interpretations. Both authors reviewed the manuscript.

Acknowledgements

Not applicable

Authors' information

Dr Chris Gibbons (1) is an Associate Professor in psychology at Queen's University Belfast. His research focus is on health psychology, positive psychology, including the influences on student well-being and

performance in higher education. He has been Chair of the Association for Psychology Teachers (<https://www.associationforpsychologyteachers.com/>) since it was founded in 1995 and is the recipient of numerous teaching awards. In August 2021 he received a Teaching Hero Award from the National Forum For The Enhancement Of Teaching And Learning In Higher Education.

Ms Sophie Murray-Gibbons (2) recently completed her Masters in Health Psychology at Liverpool John Moores University. Her research interest is in health-related psychology, including stress, coping and the influences of social media on wellbeing.

References

1. Bartolomeo, J.(2020), How to fact-check the internet, *Scholastic*
<https://choices.scholastic.com/issues/2019-20/120119/howt-to-fact-check-the-internet.html>
2. Buunk, A. P., & Gibbons, F. X. (2006). Social comparison orientation: A new perspective on those who do and those who don't compare with others. In S. Guimond (Ed.), *Social comparison and social psychology: Understanding cognition, intergroup relations, and culture* (pp. 15–32). Cambridge University Press.
3. Buysse, D. J., Reynolds III, C. F., Monk, T. H., Berman, S. R., & Kupfer, D. J. (1989). The Pittsburgh Sleep Quality Index: a new instrument for psychiatric practice and research. *Psychiatry research*, 28(2), 193–213. [https://doi.org/10.1016/0165-1781\(89\)90047-4](https://doi.org/10.1016/0165-1781(89)90047-4)
4. Carver, C. S., & Scheier, M. F. (2014). Dispositional optimism. *Trends in cognitive sciences*, 18(6), 293–299. <https://doi.org/10.1016/j.tics.2014.02.003>
5. Festinger, L. (1954). A theory of social comparison processes. *Human relations*, 7(2), 117–140.
6. Fredrickson, B. L., & Losada, M. F. (2005). Positive affect and the complex dynamics of human flourishing. *American psychologist*, 60(7), 678. <https://doi.org/10.1037/0003-066X.60.7.678>
7. Ghasemi, A., & Zahediasl, S. (2012). Normality tests for statistical analysis: a guide for non-statisticians. *International journal of endocrinology and metabolism*, 10(2), 486.
<https://doi.org/10.5812/ijem.3505>
8. Gibbons, C. (2008). *Measuring Stress and Eustress in Nursing Students* (Doctoral dissertation, Queen's University Belfast), <https://ethos.bl.uk/OrderDetails.do?uin=uk.bl.ethos.501265>
9. Gibbons, C. (2022a). Surviving a pandemic-Understanding the role of student stress, personality and coping on course satisfaction and anxiety during lockdown. *Innovations in Education and Teaching International*, 1–13. <https://doi.org/10.1080/14703297.2022.2064326>
10. Gibbons, C (2022b) Understanding the role of student stress, personality and coping on learning motivation and mental health during a pandemic, *BMC Psychology* – 57d18379-62a8-477c-943a-1ea09d59d575 v.3.1 <https://doi.org/10.21203/rs.3.rs-1021633/v1>
11. Gibbons, F. X., & Buunk, B. P. (1999). Individual differences in social comparison: development of a scale of social comparison orientation. *Journal of personality and social psychology*, 76(1), 129. <https://doi.org/10.1037/0022-3514.76.1.129>

12. Hernandez, R., Vu, T. H. T., Kershaw, K. N., Carnethon, M., Knutson, K. L., Colangelo, L., & Liu, K. (2014). Abstract P109: The cross-sectional and longitudinal association of dispositional optimism with sleep duration and quality: Findings from the coronary artery risk development in young adults (CARDIA) study. *Circulation*, 129(suppl_1), AP109-AP109. https://doi.org/10.1161/circ.129.suppl_1.p109
13. Kross, E., Verduyn, P., Sheppes, G., Costello, C. K., Jonides, J., & Ybarra, O. (2021). Social media and well-being: Pitfalls, progress, and next steps. *Trends in Cognitive Sciences*, 25(1), 55–66. <https://doi.org/10.1016/j.tics.2020.10.005>
14. Lau, E. Y. Y., Hui, C. H., Cheung, S. F., & Lam, J. (2015). Bidirectional relationship between sleep and optimism with depressive mood as a mediator: a longitudinal study of Chinese working adults. *Journal of Psychosomatic Research*, 79(5), 428–434. <https://doi.org/10.1016/j.jpsychores.2015.09.010>
15. Lemola, S., Räikkönen, K., Gomez, V., & Allemand, M. (2013). Optimism and self-esteem are related to sleep. Results from a large community-based sample. *International journal of behavioral medicine*, 20(4), 567–571. <https://doi.org/10.1007/s12529-012-9272-z>
16. Linton, S. J., & Bryngelsson, I. L. (2000). Insomnia and its relationship to work and health in a working-age population. *Journal of Occupational Rehabilitation*, 10(2), 169–183. <https://doi.org/10.1023/A:1009408204694>
17. Liu, Q. Q., Zhou, Z. K., Yang, X. J., Niu, G. F., Tian, Y., & Fan, C. Y. (2017). Upward social comparison on social network sites and depressive symptoms: A moderated mediation model of self-esteem and optimism. *Personality and Individual Differences*, 113, 223–228. <https://doi.org/10.1016/j.paid.2017.03.037>
18. Matricciani, L., Bin, Y. S., Lallukka, T., Kronholm, E., Dumuid, D., Paquet, C., & Olds, T. (2017). Past, present, and future: trends in sleep duration and implications for public health. *Sleep health*, 3(5), 317–323. <https://doi.org/10.1016/j.sleh.2017.07.006>
19. Nes, L. S., & Segerstrom, S. C. (2006). Dispositional optimism and coping: A meta-analytic review. *Personality and social psychology review*, 10(3), 235–251. https://doi.org/10.1207/s15327957pspr1003_3
20. Park, N., & Peterson, C. (2006). Moral competence and character strengths among adolescents: The development and validation of the Values in Action Inventory of Strengths for Youth. *Journal of adolescence*, 29(6), 891–909. <https://doi.org/10.1016/j.adolescence.2006.04.011>
21. Park, S. Y., & Baek, Y. M. (2018). Two faces of social comparison on Facebook: The interplay between social comparison orientation, emotions, and psychological well-being. *Computers in Human Behavior*, 79, 83–93. <https://doi.org/10.1016/j.chb.2017.10.028>
22. Przybylski, A. K., Murayama, K., DeHaan, C. R., & Gladwell, V. (2013). Motivational, emotional, and behavioral correlates of fear of missing out. *Computers in human behavior*, 29(4), 1841–1848. <https://doi.org/10.1016/j.chb.2013.02.014>
23. Qi, X. D., Zhang, D. J., Shao, J. J., Wang, J. N., & Gong, L. (2012). A meta-analysis of the relationship between dispositional optimism and mental health. *Psychol Dev Educ*, 4, 392–404.

24. Scott, H., & Woods, H. C. (2019). Understanding links between social media use, sleep and mental health: recent progress and current challenges. *Current Sleep Medicine Reports*, 5(3), 141–149. <https://doi.org/10.1007/s40675-019-00148-9>
25. Seligman, M. E. (2002). *Authentic happiness: Using the new positive psychology to realize your potential for lasting fulfillment*. Simon and Schuster.
26. Seligman, M. E. (2012). *Flourish: A visionary new understanding of happiness and well-being*. Simon and Schuster.
27. Smith, R. H. (2000). Assimilative and contrastive emotional reactions to upward and downward social comparisons. In *Handbook of social comparison* (pp. 173–200). *Springer, Boston, MA*. https://doi.org/10.1007/978-1-4615-4237-7_10
28. Tandoc Jr, E. C., Ferrucci, P., & Duffy, M. (2015). Facebook use, envy, and depression among college students: Is facebooking depressing?. *Computers in human behavior*, 43, 139–146. <https://doi.org/10.1016/j.chb.2014.10.053>
29. Tosun, L. P., & Kaşdarma, E. (2020). Passive Facebook use and depression: A study of the roles of upward comparisons, emotions, and friendship type. *Journal of Media Psychology: Theories, Methods, and Applications*, 32(4), 165. <https://doi.org/10.1027/1864-1105/a000269>
30. Twenge, J. M., Joiner, T. E., Rogers, M. L., & Martin, G. N. (2018). Increases in depressive symptoms, suicide-related outcomes, and suicide rates among US adolescents after 2010 and links to increased new media screen time. *Clinical Psychological Science*, 6(1), 3–17. <https://doi.org/10.1177/2167702617723376>
31. Uchino, B. N., Cribbet, M., de Grey, R. G. K., Cronan, S., Trettevik, R., & Smith, T. W. (2017). Dispositional optimism and sleep quality: A test of mediating pathways. *Journal of Behavioral Medicine*, 40(2), 360–365. <https://doi.org/10.1007/s10865-016-9792-0>
32. Verduyn, P., Gugushvili, N., Massar, K., Täht, K., & Kross, E. (2020). Social comparison on social networking sites. *Current opinion in psychology*, 36, 32–37. <https://doi.org/10.1016/j.copsyc.2020.04.002>
33. Verduyn, P., Ybarra, O., Résibois, M., Jonides, J., & Kross, E. (2017). Do social network sites enhance or undermine subjective well-being? A critical review. *Social Issues and Policy Review*, 11(1), 274–302. <https://doi.org/10.1111/sipr.12033>
34. Vogel, E. A., Rose, J. P., Roberts, L. R., & Eckles, K. (2014). Social comparison, social media, and self-esteem. *Psychology of popular media culture*, 3(4), 206. <https://doi.org/10.1037/ppm.0000047>
35. Woods, H. C., & Scott, H. (2016). # Sleepyteens: Social media use in adolescence is associated with poor sleep quality, anxiety, depression and low self-esteem. *Journal of adolescence*, 51, 41–49. <https://doi.org/10.1016/j.adolescence.2016.05.008>
36. World Health Organization. (2006). *Neurological disorders: public health challenges*. World Health Organization.
37. Yang, C. C. (2016). Instagram use, loneliness, and social comparison orientation: Interact and browse on social media, but don't compare. *Cyberpsychology, behavior, and social networking*, 19(12), 703–

Figures

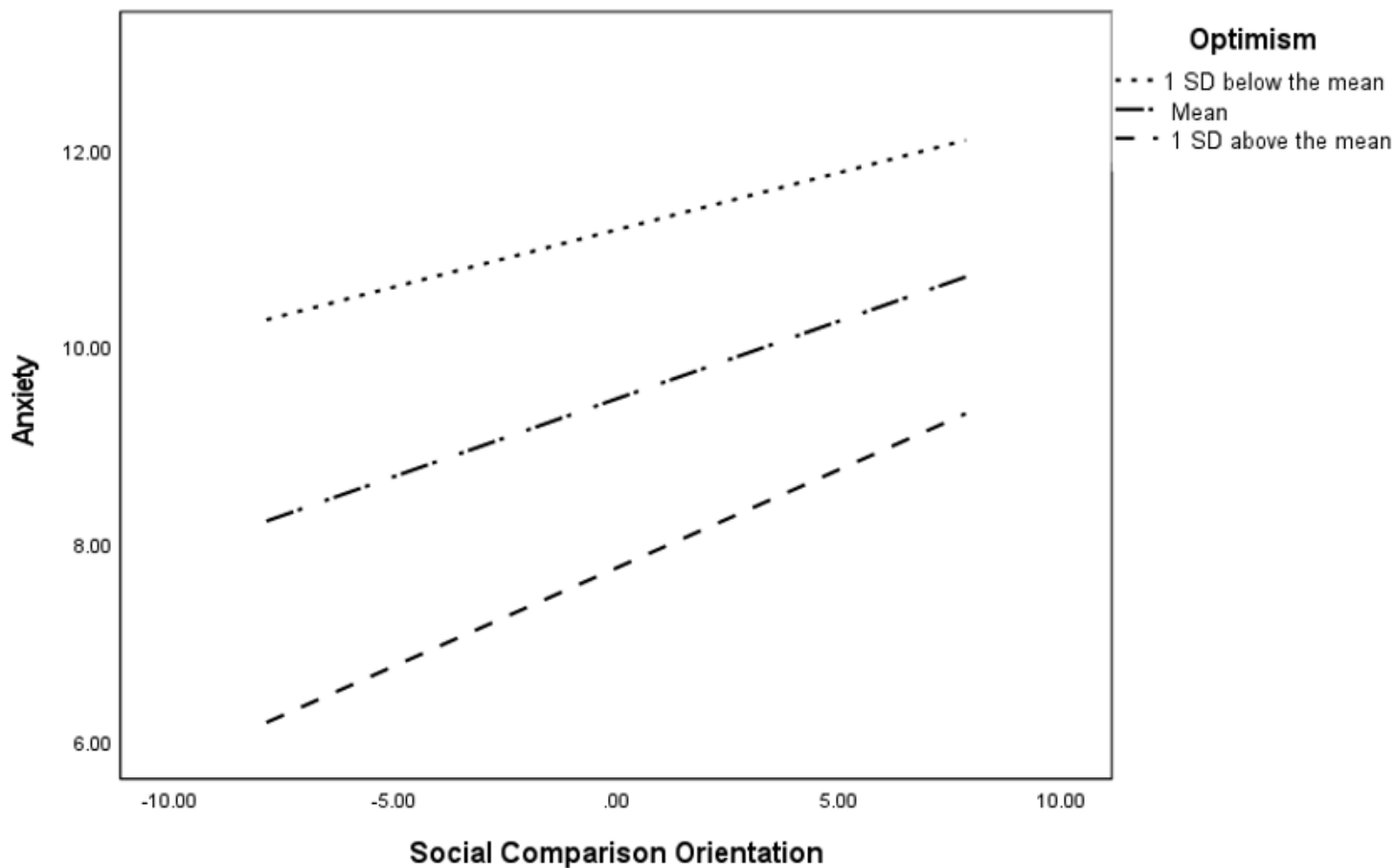


Figure 1

Slope graph testing the interaction between optimism and Social Comparison Orientation on anxiety

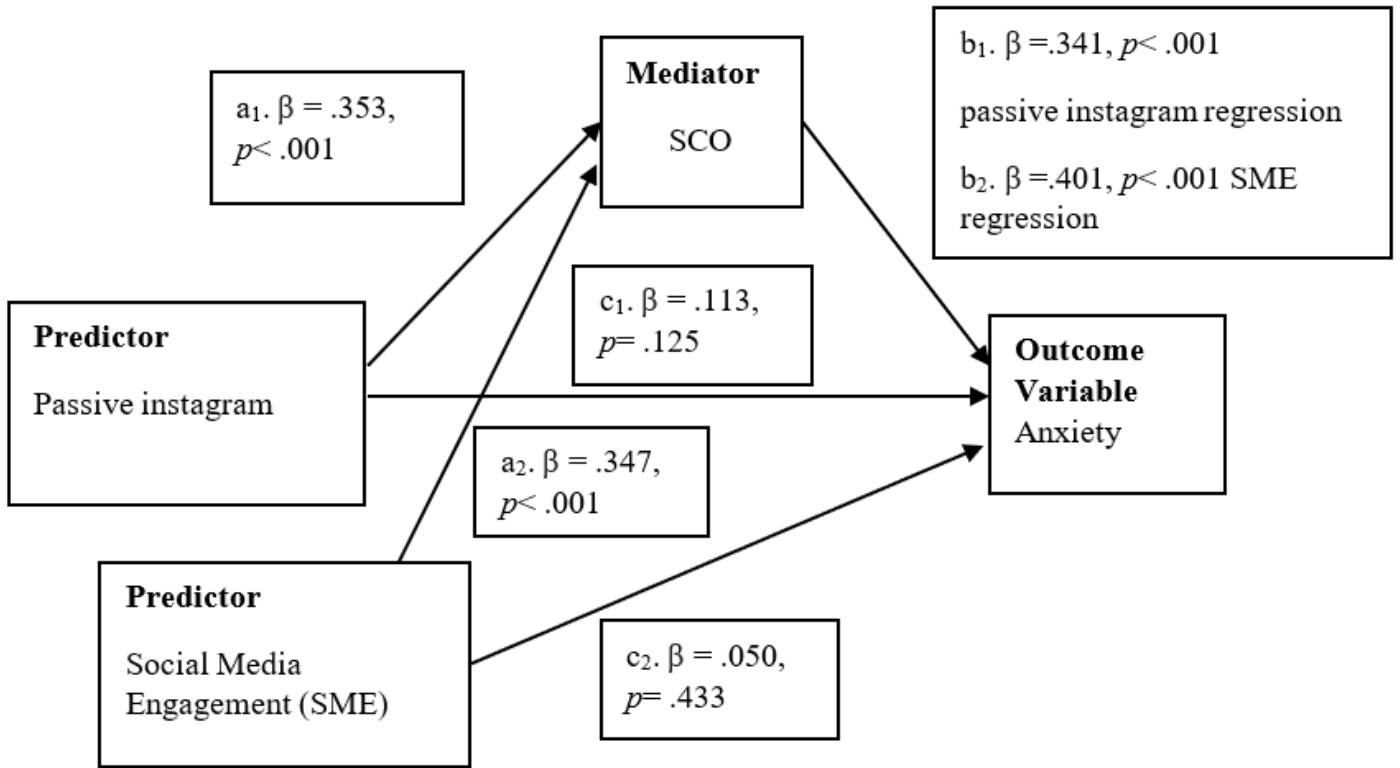


Figure 2

Social Comparison Orientation (SCO) Mediator with passive instagram, SME and anxiety

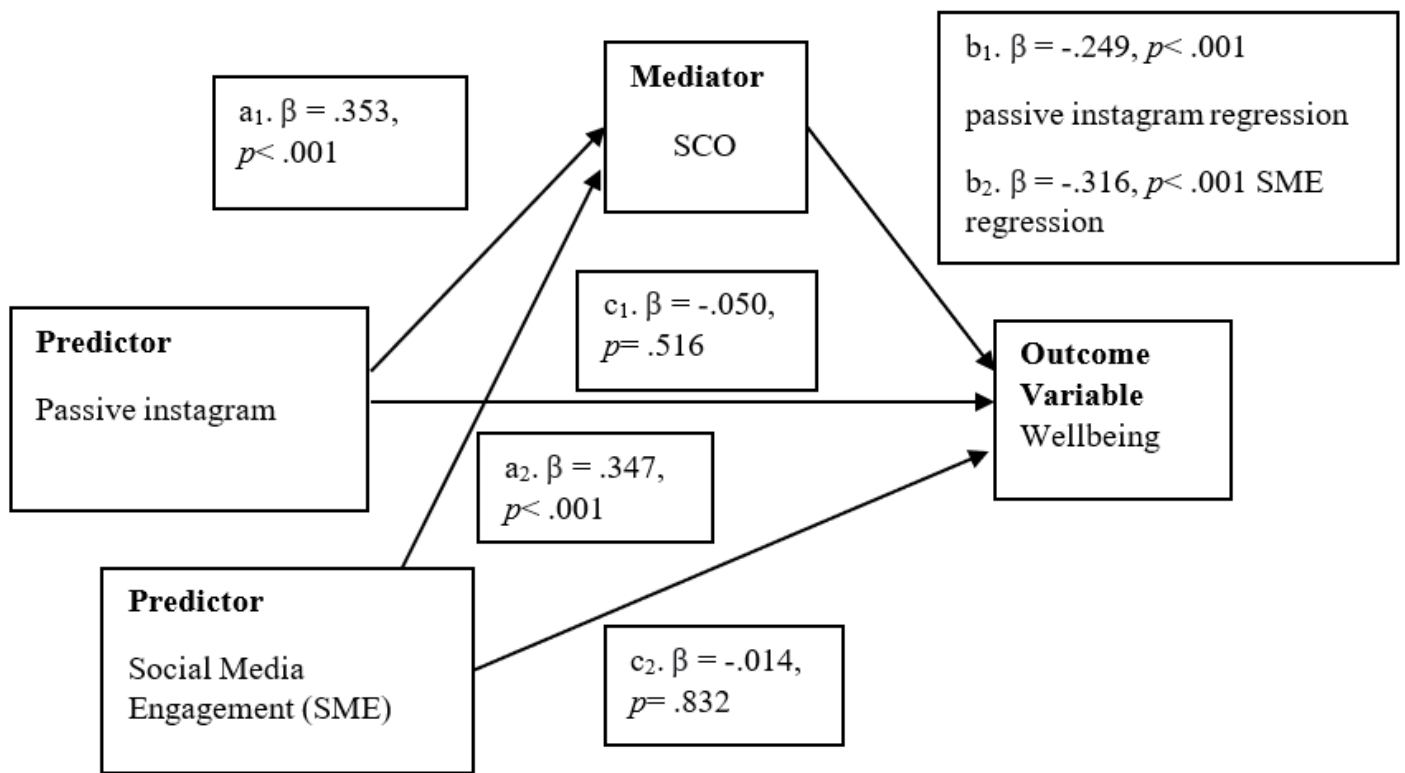


Figure 3

Social Comparison Orientation (SCO) Mediator with passive instagram, SME and wellbeing

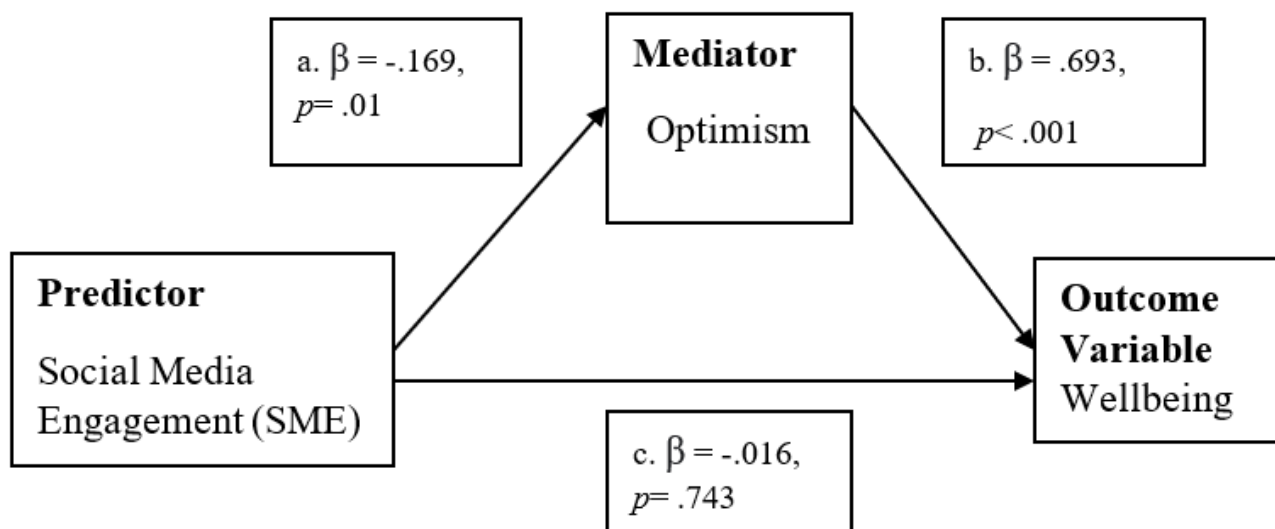


Figure 4

Optimism Mediator with SME and wellbeing