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Connected Yet Lonely: Examining the Interplay of Social Networking Addiction, Sleep Disturbance and Subjective Well-Being among University Students

Ayesha Fatima[a], Muneeb Ahmed Toor[b], Namra Shahzadi*[c]

a. MS Scholar, University of Management and Technology, Sialkot Campus.
b. PhD, Assistant Professor, University of Rasul.
c. PhD, Assistant Professor, University of Gujrat.

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ABSTRACT

Social networking sites are woven into the academic and social routines of university students, yet the psychological cost of compulsive use remains contested. Evidence is thinner for South Asian samples and for designs that examine sleep, loneliness, and well-being together rather than separately. A cross-sectional correlational survey was conducted with 199 university students (99 men, 100 women; age 18–24 years, M = 21.72, SD = 1.79) recruited through convenience sampling at private universities in Sialkot, Pakistan. Participants completed the Social Networking Addiction Scale, the Sleep Quality Scale, the UCLA Loneliness Scale, and the BBC Well-Being Scale on paper. Data were analysed using Pearson correlations, independent-samples t tests, and multiple regression. All six addiction dimensions showed small positive associations with sleep disturbance (r = .14 to .31). Associations with loneliness were negligible to small and reached significance for tolerance, conflict, and relapse only (r = .14 to .21). Five of six dimensions were weakly and negatively related to well-being (r = −.16 to −.24). Loneliness was strongly and negatively related to well-being (r = −.47). Women scored higher on mood modification (d = .39) and, at the margin of significance, on withdrawal; no gender differences emerged for sleep disturbance, loneliness, or well-being. In a multiple regression, the model accounted for 28.9% of the variance in well-being, with loneliness the dominant predictor (β = −.40).

1. Introduction

To many undergraduates these days, social networking sites are as much a part of the campus infrastructure as a library or coffee shop. They're also responsible for carrying lecture reminders, chatter from group projects, contact with family, and regular entertainment -- sometimes all of this in a matter of minutes -- with the same few handsets. There is a difficulty in distinguishing between normal engagement and problematic involvement, and this is why the psychological effects of heavy use have been so extensively (and at times conflictingly) studied (Kuss & Griffiths, 2017; Zsila & Reyes, 2023).

Although there is no diagnosis for problematic social networking use in contemporary classifications, problematic social network usage is often described as a behavioral addiction. One of the most common models is based on Griffiths' (2005) component model, which identifies the components of an addictive pattern, including salience, mood modification, tolerance,

* Correspondence to: PhD, Assistant Professor, University of Gujrat.
E-*mail address:* Namra.shahzadi@uog.edu.pk (N. Shahzadi)

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withdrawal, conflict, and relapse. In the context of social media, these factors can be described as someone who continues to think about social media, uses social media to manage their emotions, requires increasingly more time to get the same stimulation from social media, feels irritated when not on social media, gives up on other activities, and experiences a relapse when they try to decrease their social media use (Andreassen, 2015; Shahnawaz & Rehman, 2020). Specific thresholds for what constitutes excessive or problematic use differ significantly by country and measurement approach (Cheng et al., 2021; Shannon et al., 2022), and the divide between high and problematic use is a methodological one.

The following three outcome domains are present in this literature: The first is sleep. Access to social content is within arm's reach while on mobile, as is the case on the nighttime, where it can postpone bedtime, increase sleep-onset latency, and disrupt sleep. Research with young adults and adolescents has consistently correlated frequent participation with sleep problems (Levenson et al., 2016; Woods & Scott, 2016), and the concepts of fear-of-missing-out and emotional investment in online interactions have been proposed as maintaining mechanisms (Scott & Woods, 2018; Tandon et al., 2021). There is a small but solid correlation that can be found in the systematic reviews, which also highlight the variability in sleep and use measurements (Ahmed et al., 2024; Alonzo et al., 2021). In the Norwegian context, however, social media addiction (not screen time) was linked to poorer sleep habits among university students (Hjetland et al., 2021). Sleep is important in this context, because disrupted sleep has been shown to impair emotion regulation, which in turn could lead to greater likelihood of compensatory media use, which is emotionally motivated (Palmer & Alfano, 2017).

Loneliness is a subjective feeling of lacking the social connection they wish for, and is now considered a public health issue (Cacioppo & Cacioppo, 2018; Brandt et al., 2022). It is a particularly tricky relationship to unravel, as there are plausible causal arrows in both directions between loneliness and SNS. For lonely people, this may lead them to seek connection through online channels, which can sometimes be successful, but sometimes be a replacement for richer contact and exacerbate isolation (Nowland et al., 2018). Increased use is linked to increased perceived social isolation among young adults (Primack et al., 2017) and, in an experiment that restricted use to approximately 10 minutes of use per platform per day, loneliness and depressive symptoms decreased over 3 weeks (Hunt et al., 2018). But it seems that the nature of the use is relevant, as problematic use has been correlated with isolation, while the social support received on and offline has been correlated with the direction of the relationship (Meshi & Ellithorpe, 2021).

Third, subjective well-being is typically defined as life evaluations and affective experience (Diener et al., 2018). In this instance, the evidence is truly mixed. Studies that took an advantage of the staggered rollout of Facebook in American colleges reported adverse mental health outcomes following the introduction of the platform (Braghieri et al., 2022), while multiple meta-analyses have reported small, negative associations between problematic use and psychological health (Huang, 2022; Marino et al., 2018). A few studies have shown that social media addiction is associated with decreased life satisfaction among university students (Hawi & Samaha, 2017), and that heavy media use is related to lower levels of well-being in large sample studies (Twenge & Campbell, 2019). Others respond that associations in population samples are typically small, and that effect sizes rivaling those of common items in the natural world like eating behaviors should quell apathy (Orben & Przybylski, 2019). Passive consumption versus active interaction also makes it difficult to make a general statement (Hall & Liu, 2022; Verduyn et al., 2017).

The present study is motivated by two additional issues. Gender is often suggested as a moderator of risk. The data gathered by the meta-analysis indicates that there may be slightly more data supporting social media-specific problems for females and overrepresentation of gaming-related problems for males, but this difference is small and could stem from differences in what type of online experiences each group engages in (Su et al., 2020). The issue of whether such differences are seen on specific addiction dimensions and not on a global score has received little attention to date. Secondly, the majority of the work cited above is from western or east Asian or the gulf. In comparison, the relationships seen in Pakistani university students are under-researched; however, as they have diverse and dense family connections, they have a high degree of mobile access to the internet and the speedy growth of platform use, it is impossible to assume that associations seen elsewhere are necessarily seen in the same way within their family network.

Another tendency in the literature is to look at sleep and loneliness, and almost always at sleep and well-being and loneliness as two sets of variables, but not in one context. There may be multiple overlapping causes contributing to the poor sleep and less positive feelings among the students, and only a comparison of the variables can identify which has a unique contribution. There is another benefit to this, treating addiction as six dimensions and not just one score, as the dimensions can be associated with outcomes very differently.

The present study therefore investigated the relationship between dimensions of social networking addiction with sleep disturbance, loneliness and subjective well-being, gender differences amongst these variables and how much variance in well-being can be explained by the combination of loneliness, sleep disturbance, and the dimensions of social networking addiction in a sample of Pakistani university students. We hypothesized that the higher the level of social networking addiction, the higher

the level of sleep disturbance and loneliness and the lower the level of well-being, and that there would be differences between the genders in terms of these study variables. The regression analysis was explorative and a hypothesis was not set regarding the directionality of the individual predictors.

2. Method

2.1. Design

The study employed a cross sectional, correlational survey design. As there was no manipulation of any variable and all measures were taken at one time, one can make conclusions about association and shared variance but no conclusions of the order or causation.

2.2. Participants and Sampling

The participants were selected by convenience sampling in private universities of Sialkot, Pakistan. The criteria involved being 18-24 years old, being enrolled in a university and using a social network at least once a week and having a regular internet connection. Students were excluded if they had a disability, were working at night time, followed irregular working or study hours, were older or outside of the age range specified or could not fill out a questionnaire in English. The final analytic sample comprised 199 students (99 men, 49.7%; 100 women, 50.3%) with a mean age of 21.72 years (SD = 1.79). Most were single (92.5%). Participants reported low (16.1%), moderate (60.3%), or high (23.6%) frequency of social media use; almost all accessed platforms mainly through smartphones (95.5%). The most commonly endorsed primary purpose of use was entertainment (41.7%), followed by social connection (33.7%) and information consumption (24.6%). Full demographic details are given in Table 1.

No a priori power analysis was reported. A sensitivity calculation indicates that, with N = 199 and a two-tailed α of .05, the study had 80% power to detect correlations of approximately r = .20 and, for the gender comparisons, standardised mean differences of approximately d = .40. Smaller effects, which are plausible in this field, could therefore have gone undetected.

2.3. Measures

- **Demographic form.** A researcher-developed form collected age, gender, marital status, educational level, family and socioeconomic background, residence, frequency and purpose of social media use, and type of device used.
- **Social Networking Addiction Scale (SNAS).** Problematic use of social networking sites was assessed with the 21-item SNAS (Shahnawaz & Rehman, 2020), rated on a seven-point scale from *strongly disagree* to *strongly agree* (possible total 21–147). The instrument yields six subscales that correspond to the components of Griffiths' (2005) model: salience, mood modification, tolerance, withdrawal, conflict, and relapse. Higher scores indicate more problematic use. Subscale scores were used in all analyses.
- **Sleep Quality Scale (SQS).** The 28-item SQS (Yi et al., 2006) uses a four-point frequency format (*rarely* to *almost always*), with a possible range of 0–84. Items belonging to two of its factors are reverse-scored. The original validation reported high internal consistency (α = .92) and acceptable test–retest reliability (r = .81). In the present analyses, higher scores were interpreted as greater sleep disturbance (poorer sleep quality). Because the instrument captures perceived sleep quality rather than sleep duration, the term *sleep disturbance* is used throughout this article in preference to *sleep deprivation*.
- **UCLA Loneliness Scale.** Loneliness was measured with the 20-item UCLA Loneliness Scale (Russell, 1996), rated from *never* to *always* (possible range 20–80). Nine items (1, 5, 6, 9, 10, 15, 16, 19, 20) were reverse-scored, with higher totals indicating greater loneliness. Previous work reports internal consistency between .89 and .94 and a one-year test–retest correlation of .73 (Russell, 1996).
- **BBC Well-Being Scale.** Subjective well-being was assessed with the 24-item BBC Well-Being Scale (Kinderman et al., 2011), rated on a five-point scale from *not at all* to *extremely*. It covers psychological well-being, physical health and well-being, and relationships, with higher totals indicating better well-being. The scale has shown good internal consistency (α = .935) and concurrent validity in its development sample. Total scores were analysed here.

Reliability coefficients for the present sample were not reported in the source analyses; the values above are taken from the original validation studies and should not be assumed to hold in this sample.

2.4. Procedure

Written permission was first sought from the heads of the participating institutions. After approval, students were approached on campus by a female researcher, who introduced herself, explained the purpose of the study, and assured participants that their responses would be confidential. Those who agreed provided written informed consent and completed the paper-based questionnaire booklet in a fixed order: demographic form, SNAS, SQS, UCLA Loneliness Scale, and BBC Well-Being Scale. Administration conditions were kept as uniform as possible across sites, and the researcher clarified any item that participants did not understand. Participation was voluntary, and participants were told they could withdraw at any time. Responses were scored according to the manuals of the respective instruments

2.5. Data Analysis

The data were analyzed in SPSS. The sample and the study variables were summarised using descriptive statistics (means, standard deviation, frequencies and percentages). Bivariate associations between the 6 SNAS subscales, sleep disturbance, loneliness and well-being were explored using Pearson product-moment correlations. Independent-samples t tests, with Cohen's (1988) d as the effect-size index, compared men and women. Last, a multiple regression model was used in which the six subscores of SNAS and sleep disturbance were entered as other predictors of subjective well-being, along with loneliness. A level of statistical significance of $\alpha = .05$ (two-tailed) was used. This is done without correction for multiple comparisons, and is taken into account when interpreting results.

2.6. Ethical Considerations

All the ethical guidelines for human experiments were followed such as: permission of Institution, informed written consent, voluntary participation, the right to withdraw and confidentiality of responses. Data were only applied for research purposes.

2.7. Results

Table 1: Demographic and Usage Characteristics of Participants (N = 199)

Characteristic	*n*	%
Gender		
Men	99	49.7
Women	100	50.3
Marital status		
Single	184	92.5
Married	10	5.0
In a relationship	5	2.5
Frequency of social media use		
Limited	32	16.1
Moderate	120	60.3
High	47	23.6
Primary device		
Smartphone	190	95.5
Tablet or PC	9	4.5
Main purpose of use		
Entertainment	83	41.7
Social connection	67	33.7
Information consumption	49	24.6

Note. Age: $M = 21.72$ years, $SD = 1.79$.

Table 1 provides a summary of the demographic and usage characteristics of the analytic sample of 199 students. The sample was evenly split of gender, and the average participant was a single, smartphone-owning student in his or her early twenties who said he or she used social media at a moderate amount.

Table 2: Means, Standard Deviations, and Intercorrelations Among Study Variables (N = 199)

Variable	*M*	*SD*	1	2	3	4	5	6	7	8
Salience	17.2	5.72								
Mood modification	14.4	4.37	.62**							
Tolerance	12.2	4.45	.66**	.64**						
Withdrawal	15.3	5.92	.47**	.46**	.56**					

Conflict	10.5	4.27	.33**	.38**	.43**	.49**				
Relapse	15.5	6.09	.48**	.47**	.61**	.59**	.52**			
Sleep disturbance	39.6	10.4	.14*	.20**	.24**	.24**	.21**	.31**		
Loneliness	49. 3	7.34	.09	−.05	.20**	.11	.21**	.14*	.12	
Well-being	79.8	15.86	−.21**	.01	−.24**	−.22**	−.19**	−.16*	−.08	−.47**

The results showed that there were significant positive correlations between the majority of dimensions of social networking addiction such as mood modification, tolerance, withdrawal, conflict and relapse (r = .33 to .66, p< .01). All dimensions of addiction were positively correlated with sleep disturbance, ranging from r = .14 to .31 with p < .05 or p < .01. The loneliness factor was significantly associated positively with tolerance, conflict, and relapse; there were mainly nonsignificant relationships between loneliness and other factors. The correlations were all highly negative for all addiction-related symptom subscales and sleep disturbance, suggesting that more severe symptoms of addiction and sleep disturbances are linked to lower well-being.

Table 3: Gender Differences in Study Variables (N = 199)

Variable	Men *M* (*SD*)	Women *M* (*SD*)	*t*(197)	*p*	Cohen's *d*
Salience	16.70 (5.80)	18.73 (5.49)	2.54	.01	.35
Mood modification	13.18 (4.53)	14.89 (4.05)	2.80	< .01	.39
Tolerance	12.13 (4.52)	13.31 (4.33)	1.88	.06	.26
Withdrawal	14.32 (5.63)	15.92 (6.12)	1.91	.05	.27
Conflict	9.96 (3.87)	10.33 (4.65)	0.61	.54	.08
Relapse	14.56 (6.04)	16.14 (6.07)	1.84	.06	.26
Sleep disturbance	38.51 (10.91)	40.00 (10.77)	0.97	.33	.13
Loneliness	49.11 (7.44)	48.90 (7.28)	0.16	.87	.02
Well-being	80.36 (16.57)	78.41 (15.16)	0.88	.38	.12

Note. *p* values are two-tailed and unadjusted for multiple comparisons.

Independent-samples *t* tests compared men (n = 99) and women (n = 100) on each variable (Table 3). Women scored higher than men on salience ($t(197) = 2.54$, $p = .01$, $d = .35$) and mood modification ($t(197) = 2.80$, $p < .01$, $d = .39$), both small effects. The difference for withdrawal ($t(197) = 1.91$, $p = .05$, $d = .27$) sat at the margin of conventional significance; because the reported p value is rounded, and the test statistic corresponds to a two-tailed p of about .058, this difference is best regarded as borderline rather than established. Men and women did not differ in sleep disturbance ($d = .13$), loneliness ($d = .02$), or well-being ($d = .12$).

Table 4: Multiple Regression Predicting Subjective Well-Being (N = 199)

Predictor	*B*	*SE B*	β	*t*	*p*
Constant	129.42	7.85		16.48	< .001
Loneliness (UCLA)	−.869	.141	−.402	−6.16	< .001
Sleep disturbance (SQS)	.004	.095	.003	0.04	.969
Relapse	.132	.228	.051	0.58	.564
Conflict	−.142	.283	−.038	−0.50	.615
Withdrawal	−.353	.222	−.132	−1.59	.113
Tolerance	−.469	.355	−.132	−1.32	.188
Mood modification	.876	.321	.241	2.73	.007
Salience	−.516	.244	−.186	−2.12	.036

Table 4 presents the coefficients. Loneliness was the strongest unique predictor ($\beta = -.40$, $p < .001$); each additional point on the UCLA scale was associated with a 0.87-point reduction in well-being, holding the other predictors constant. A standard multiple regression entered loneliness, sleep disturbance, and the six addiction subscales simultaneously as predictors of subjective well-being. The model was statistically significant, $F(8, 190) = 9.66$, $p < .001$, $R^2 = .289$ (adjusted $R^2 = .259$), indicating that the predictors together accounted for just under 29% of the variance in well-being. This is a moderate amount, and, as the correlations anticipate, most of it traces back to a single predictor: loneliness alone shared about 22% of the variance with well-being at the bivariate level.

3. Discussion

This study set out to describe how dimensions of social networking addiction relate to sleep disturbance, loneliness, and well-being among Pakistani university students, whether men and women differ, and which of these variables carries the most

weight for well-being. Three conclusions can reasonably be drawn. Compulsive use was modestly connected to poorer sleep and lower well-being; its connection to loneliness was weaker and less consistent; and loneliness, not sleep or any single addiction dimension, was the factor most strongly tied to how students rated their well-being.

The consistently positive relationships among addiction dimensions and sleep disturbance support a growing literature that suggests that the use of social media, particularly socially frequently and with emotional investment, can lead to poorer sleep (Levenson et al., 2016; Woods & Scott, 2016) and reviews that indicate a modest, but reliable, relationship (Ahmed et al., 2024; Alonzo et al., 2021). The strongest link, with relapse, is of some interest. The re-returner after making a resolve to cut back on use might just be the same person who continues to scroll past a planned bedtime, and the discovery echoes evidence that addiction-level use, rather than the amount of screen time, correlates with poorer sleep (Hjetland et al., 2021). However, the magnitudes here were small, and the sleep measure in these data was a perception of sleep quality, not sleep duration or sleep timing, so the data cannot reveal whether it is late night use which is the operative mechanism. However, it is also possible (and is a reverse pathway here) that tired and emotionally depleted students will gravitate toward compulsive use, a pathway that is also plausible given the findings that poor sleep also increases difficulties with emotional regulation (Palmer & Alfano, 2017).

Among the six dimensions of addiction (tolerance, conflict, and relapse), only three showed a significant association with loneliness which had low correlation coefficients. Research that finds larger correlations generally includes more general measures of problematic use or more depressed and distressed samples (Huang, 2022; Meshi & Ellithorpe, 2021). It's also important to note which dimensions were involved. The costs of escalating use are encompassed by tolerance, conflict, and relapse, which refer to "displaced obligations" and "failed attempts to reduce.Tolerance, conflict, and relapse refer to "displaced obligations" and "failed attempts to reduce" and describe the costs of escalating use, while salience and mood modification refer to "preoccupation" and "mood regulation. The first interpretation (Hall & Liu, 2022) is that loneliness is a part of such uses, which crowd out other relationships, but not necessarily so with other forms of use. The absent link between mood modification and the use of platforms for the purpose of feeling better also supports the notion that online contact can be a legitimate way back to connection for some users (Nowland et al., 2018). These interpretations are "hindsight" and there are no alternative interpretations which can be tested with the present data.

Five of six addiction dimensions were negatively, but weakly, related to well-being. This direction is in line with studies on university students (Hawi & Samaha, 2017), meta-analytic evidence on problematic use (Marino et al., 2018; Huang, 2022), and quasi-experimental findings suggesting that exposure to social media can erode mental health (Braghieri et al., 2022). The magnitudes, at around 3-6% of shared variance, are also in line with the modest estimates that have been highlighted by critics of strong claims (Orben & Przybylski, 2019). Overall, the results are more consistent with a small, probably multidetermined association than a dramatic effect of social media on student well-being.

The regression provides perspective on this finding. Loneliness accounted for more variance in well-being than any dimension of addiction, and when all predictors were entered together only salience (negatively) and mood modification (positively, likely a suppression effect) contributed uniquely. This hierarchy suggests that the apparent association between compulsive use and low well-being may be partially mediated by loneliness, which may be a common correlate of both rather than a mediator, a question that a cross-sectional design cannot address. This is in line with the general view that social connection is a foundation of subjective well-being (Cacioppo & Cacioppo, 2018; Diener et al., 2018) and with the observation that the consequences of use depend on whether it supplements or replaces meaningful contact (Verduyn et al., 2017). This also fits Hunt et al.'s (2018) experiment in which reduced use reduced loneliness, but this sample provides no evidence for that causal direction.

Interestingly, sleep disturbance did not correlate with well-being or contribute to the regression, contrary to the strong relationship between sleep and emotional functioning in the broader literature (Palmer & Alfano, 2017). Before assuming sleep is not important for these students, there are several reasons to consider. The scale measures subjective sleep quality at one time point, students in the sample may have normalized short or irregular sleep; and the sleep-loneliness correlation ($r = .12$) was near, but not significant, so a small association cannot be ruled out.

Women reported greater mood modification and salience (withdrawal showed a borderline effect in the same direction) and men and women were similar on sleep, loneliness and well-being. This is broadly consistent with the meta-analytic evidence that women are somewhat more susceptible than men to problems that are specific to social media (Su et al., 2020) and with the notion that women may be more likely to use social media for emotional expression and for the maintenance of relationships. A culturally situated interpretation is very tempting (e.g. that the online space plays a particularly important social role in a culture where women's physical mobility or their unsupervised contact with peers is more restricted), but again the present study did not look at any of those factors and that interpretation remains purely speculative.

4. Implications

The dimensional approach highlights that the components of problematic social media use are not interchangeable. In particular, relapse and tolerance were more consistently associated than mood modification with sleep and loneliness. This suggests that mood regulation via social media use (a characteristic of everyday social media use for many students) is a different construct to the lack of control features associated with problematic social media use (Griffiths, 2005; Kuss & Griffiths, 2017). The fact that loneliness was prominent supports models of social media use as a reflection and reaction to individuals' social needs rather than a standalone source of distress (Nowland et al., 2018). The findings suggest that screening for loneliness may be more useful when assessing wellbeing than screening for screen time. Interventions could also focus on increasing face to face interaction and developing strategies to increase control of screen use (tolerance, conflict, relapse). A cost-effective solution would be to include brief psychoeducation sessions around evening screen use and good sleep hygiene practices however from the data presented here it cannot be shown that this would improve wellbeing. It would be beneficial to assess these solutions.

5. Limitations

Due to the cross-sectional design, this study cannot make any causal or temporal conclusions. The sample is also limited due to convenience sampling from only a few private universities in one city, so it cannot be generalized to public sector institutions, students in rural areas or other areas of Pakistan. Self-report measures were used meaning there is potential for common method bias. Furthermore, the questionnaires were written in English and might have caused issues understanding for some participants. I noticed that some participants had answered the same for a lot of questions, indicating they might have been answering carelessly. Some participants also got tired of completing the questionnaires. Finally, some male participants appeared reluctant to ask the female researcher for clarification. No reliability scores were calculated for this sample. Assumptions were not checked, collinearity was not investigated. There was no correction for multiple comparisons. There was no overall score for addiction. Sleep was also only a measure of perceived quality. The sample was almost evenly split between males and females due to the way the sample was gathered and also the majority of participants were single meaning analysis could not be done on relationship status.

6. Conclusion and Future Recommendations

Pakistani university students included in this study, problematic social networking use was associated with poorer sleep quality and lower psychological well-being. Its relationship with loneliness, however, was less consistent. Women also reported slightly higher scores on some dimensions of problematic use. These findings have practical implications for student mental health services. When students present with emotional difficulties, exploring their social connections may provide more meaningful information than focusing solely on the amount of time they spend online. Further research should examine whether loneliness acts as a mediator or moderator in the relationship between problematic social networking use and well-being. Future studies should also account for correlations among predictor variables. Including students from public and private universities across different cities and rural and urban settings would help determine whether these findings can be generalized to a wider student population. In addition, using validated Urdu-language instruments and examining their reliability and factor structure within the study sample would improve measurement accuracy and strengthen the psychometric quality of the findings.

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