Psychological flexibility as moderator of perceived stress and well-being in flexible learning

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Abstract. One of the most significant challenges identified in online learning environments is the impact on students' mental health. This study aims to explore the role of psychological flexibility in mitigating perceived stress and promoting well-being among undergraduate students engaged in flexible learning during the new normal. It hypothesized that psychological flexibility would significantly moderate the relationship between perceived stress and well-being. The research employed moderated hierarchical multiple regression analysis, utilizing data from 1925 participants using stratified convenience sampling with random selection. Participants were Filipinos, 1st–4th year Caraga State University–Main Campus students, enrolled in AY 2022–2023 (2nd semester), aged 18 and above (male and female) who completed an online survey questionnaire. The research employed moderated hierarchical multiple regression analysis. The findings revealed that perceived stress significantly predicted well-being, and subsequent moderation analysis indicated a significant moderating effect of the interaction between perceived stress and psychological flexibility. Both predictor and moderator variables exhibited a medium-size effect. The study establishes that psychological flexibility effectively moderates the relationship between stress and well-being. These results underscore the role of psychological flexibility as a protective factor, wherein an increase in psychological flexibility corresponds to a decrease in the adverse effects of perceived stress on well-being. The study's overall value lies in its potential to inform strategies for preventing mental health challenges among students and guiding the development of psychosocial interventions.

1 Introduction

The adjustment in education due to COVID-19 pandemic allowed state universities to transition from traditional to a new learning modality called Flexible Learning (FL), which uses online and offline learning resources and combines in-person, out-of-classroom, and face-to-face learning [1]. The Caraga State University (CSU), Butuan City Philippines has utilized flexible learning such as modular or online classes. Despite an increased efforts to maintain education continuity, it became evident that Flexible Learning (FL) in a developing country amplified challenges where students need an interactive discussion in a none face to

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face learning [2], and led to an excessive amount of adjustment [3]. As a result, well-being, which holds equal importance to other life's aspects [4] was dramatically affected. Excerpt from police data, it is 13-18 years old, and mostly college students committed suicide incidences. Even the researcher who belongs to the teaching department of the university has observed how students expressed their mental struggles through a significant decline of their academic performance since the implementation. Reports showed that these student's mental health challenges were attributed to a lack of coping support with the sudden changes to their learning.

Addressing these mental health concerns is considered necessary particularly in reducing perceived stress and thereby boosting the well-being of FL learners using psychological mechanisms, and that is through psychological flexibility processes. Psychological Flexibility (PF) provides a behavioral explanation of how an individual responds to a negative situation, such as avoidance, acceptance, and harnessing responses about a meaningful life goal [5] . Dawson et al. (2020) found its negative association with reduced anxiety among students [6]. Although the moderating effect of psychological flexibility proves to have supportive evidence, Doorley et al. (2020) argued that the bulk of previous research solely depended on a single measure with limited psychometric soundness and that pursuing further study with a valid and reliable measure is suggested. Gloster et al.

Since the grounds for considering psychological flexibility as moderator have not been well-established. More thorough research needs to be done in order to show that psychological flexibility possibly changes the strength and/or direction of the relationship between perceived stress and well-being. Therefore, this study investigated how PF is a protective factor in challenging situations while pursuing a student's valued flexible learning goal. Specifically, the study conducted a moderation analysis determining how PF buffered the relationship between perceived stress and the well-being of CSU-Main Campus college students and intends to answer the following: 1) What is the level of perceived stress of the participants? 2) What is the level of well-being of the participants? 3) What is the level of psychological flexibility of the participants? 4) Does perceived stress significantly predict well-being?

Framework. According to Lazarus and Folkman's Stress and Coping Transactional Theory [7], when a person faces environmental stress without sufficient resources to handle it, psychological distress may occur, which emphasizes two key processes: appraisal and coping. In primary appraisal, an individual evaluates whether a situation is irrelevant, favorable, or stressful; if deemed threatening, secondary appraisal follows, where the person assesses their ability to cope based on available resources. Coping strategies then emerge as either problem-focused (a healthy, action-oriented approach) or emotion-focused (an avoidant, unhealthy response). Thus, those with greater psychological flexibility can continue pursuing their valued goals, such as in online learning, despite distress, while a mismatch between appraisal and coping leads to psychological stress that can affect overall well-being.

The researcher developed person-environment transaction model based on the adapted Transactional Model of Stress and Coping and it illustrated the relationship among the study's variables. The unidirectional arrow suggests the influence of perceived stress (X) on well-being (Y), a cognitive appraisal stage of the current situation. The downward direction arrow emphasizes the moderating effect of psychological flexibility (Z) in the relationship between perceived stress and well-being, which indicates the coping stage. In this context, the independent variable (predictor) is perceived stress, well-being is the dependent variable (outcome), and psychological flexibility is the moderator or the third variable.

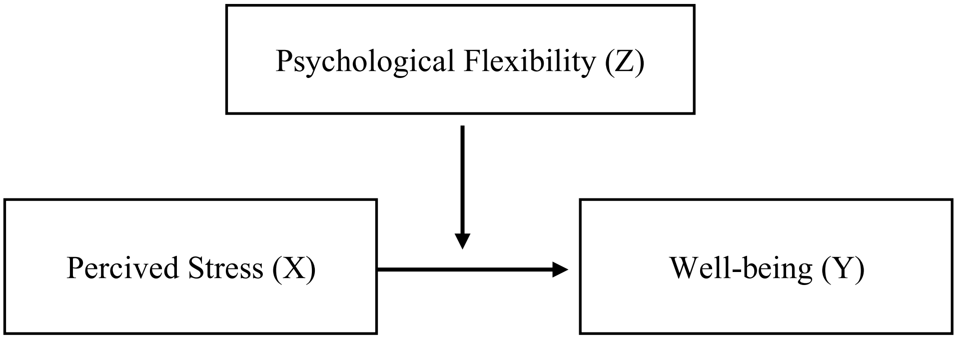

Fig 1. Hypothesized Moderation Model on the Role of Psychological Flexibility in the Relationship between Perceived Stress and Well-being

The Present Study. To date, limited research has been conducted on college students in the Philippines based on online databases reviewed that focus on stress and resilience in higher education institutions. Therefore, this study aimed to explore the moderating role of psychological flexibility on the relationship between perceived stress and well-being. It was hypothesized that lower levels of perceived stress would be associated with higher levels of subjective well-being and higher levels of psychological flexibility would negatively moderate the relationship between climate concern and climate-related distress.

2 Method

This study used a descriptive-correlational survey design. The descriptive part of the study described the mean, standard deviation, and correlations of measures such as Perceived Stress Scale, WHO 5-Well-being Index, and Personalized Psychological Flexibility Index measures. These instruments demonstrated adequate reliability with PSS= .78 to .91 internal consistency and r = .77–.90 test-retest reliability, WHO-5 is reported as acceptable to excellent across international validations, and PPFI with r= .77 to .84 internal consistency and strong test retest. Furthermore, this design explained the phenomenon and tested the hypothesis that psychological flexibility moderates perceived stress and well-being. Researchers administered an online survey using questionnaires to collect information about the main variables of the study.

2.1 Participant

The researcher conducted the study at Caraga State University (CSU)-Main Campus, Ampayon Butuan City. It is located at KM 7 NH1, Butuan City, Agusan del Norte, Philippines. The researcher as part of the academic institution supports its ongoing progress and responsiveness to the region's increasing need for academic and psychological preparedness for development. A research assistant aided in sending the survey and making follow-ups with the students. Overall, there were 2, 307 surveyed sample and after thorough data cleaning and preparation, a total of 1925 samples were retained. The participants' inclusion criteria included:1) bonafide college students of Caraga State University-Main Campus, 2) enrolled in AY 2022-2023, 2nd semester, 3) from 1st year to 4th-year levels, and 4) who experienced flexible learning. The exclusion criteria followed were 1) not college students, 2) not enrolled in CSU-Main Campus, 3) not enrolled in AY 2022-2023, 2nd semester, and 4) did not experience flexible learning.

2.2 Research Instrument

The instruments used in data gathering were available in the public domain and did not require permission from the authors. These were the Perceived Stress Scale (PSS), the Well-being Index (WHO-5), and the Personalized Psychological Flexibility Index (PPFI). The PSS measures how unpredictable, uncontrollable, and overloaded respondents find their lives, with responses rated from 0 (never) to 4 (very often). It demonstrated acceptable reliability with a Cronbach's alpha of 0.65, and all items were found valid. The WHO-5 assessed how participants felt over the last two weeks from 0 (at no time) to 5 (all the time). Its Cronbach's alpha was 0.42, indicating low internal consistency, but all items were still deemed valid. The PPFI evaluates how individuals manage distress during goal pursuit using a scale from strongly disagree to strongly agree. It showed good reliability with Cronbach's alphas ranging from 0.77 to 0.84, and all items were confirmed valid.

2.3 Data Analysis Technique

The data was analyzed in IBM SPSS Statistics Version 21. Bivariate relationships between the predictor variable (perceived stress), the moderator variables (psychological flexibility) and the outcome variables (well-being) were assessed using Pearson's product-moment correlation coefficient. Multiple regression using Hayes PROCESS was used to explore the independent contributions of perceived stress, psychological flexibility and to well-being which do the mean centering and interaction term automatically. Before running moderation analysis, researcher also tested preliminary assumptions for regression which checked for linearity, multicollinearity, significant outliers, leverage points or influential cases, homoscedasticity, and normality of data and found no serious violations. In the study, two steps were involved. For hypothesis 1, the predictor variables were introduced (model 1) to explore the independent contribution of perceived stress and psychological flexibility to the outcome variable, well-being, explicitly investigating how perceived stress predicts well-being. For hypothesis 2, the moderator (psychological flexibility) was introduced to test the moderation effect of psychological flexibility on well-being (model 2).

2.4 Research Procedure

The researcher secured institutional approval from Xavier University to conduct research through the Psychology department and secured permission from IREB to start data collection. After receiving approval from IREB, the researcher requested access to the student information of CSU College Students through the Office of Academic Affairs and complied with the Data Privacy Act rules. After obtaining approval, the researcher conducted sampling, data gathering, and retrieval procedures within July 2023.

In the sampling phase, an employed research assistant contracted by the researcher with a non-disclosure agreement took charge of disseminating an online survey via an institutional student e-mail address. Employing a research assistant will guarantee the absence of any student-faculty relationship, prevent direct contact or interaction, and eliminate the possibility of coercion, given that the researcher is a university faculty member. The survey e-mail contained the study title and purpose, the specific context of the questionnaire that is about flexible learning during the new normal in CSU, the customized URL link of the instruments, its generated QR Code, how to win a raffle prize as incentives, and short video presentation on how to answer the tools to ensure a more realistic response from the participants.

In the data gathering phase, the first page of the online form provided the informed consent form, which explained in detail the voluntary nature of participation, confidentiality, and anonymity of participants' data. The research assistant forwarded the survey tools, and no other known authority or person over them will take part on behalf of the researcher assistant. After confirmation of the informed consent page, follow the certificate of consent. Moving past this page, an actual battery of survey questionnaires presented in sequential order: the short-version test, which is the 10-item Perceived Stress Scale (PSS), followed by the 5-item WHO-5 Well-being Index, and the 19-item Personalized Psychological Flexibility Index (PPFI). Following the instrument's pages, it directed them to a debriefing page containing the researcher's contact information for any follow-up questions. It also served as an opportunity to thank the participants for taking their time for the study. Overall, it will take them approximately 30 minutes to complete all the questionnaires.

In the storage and retrieval phase, the researcher downloaded the online responses via Google form survey, which provided readily available raw data. The raw data was then correctly labeled according to the name of the scale and its corresponding items. The researcher transferred the Excel spreadsheet to SPSS software to create data sets, code variables, and test assumptions. The respondent's identity was properly de-identified using numerical code.

3 Result

Table 1 showed the bivariate correlations of the study variables and found that there was a linear relationship which was statistically significant supporting the theory. A moderate, negative correlation was found between perceived stress and well-being ($r= -.435$, $p < .000$), and negatively correlated with psychological flexibility ($r = -.122$, $p <.000$). And well-being was found to be positively correlated with psychological flexibility $r = .143$, $p < .000$).

Table 1. Means, Standard Deviations, and Intercorrelations of Scores of Measures (N =1925).

	M	*SD*	2	3
1.Perceived Stress	22.52	4.744	-.435**	-.122**
2.Well-being	59.55	19.22	-	.143**
3.Psychological Flexibility	64.40	8.659	-	-

Measure 1 was scored on a scale of 0-4, 2 was scored on a scale of 0-5, 3 was scored on a scale of 1-7.
*Significant at the 0.05 level, **significant at the 0.01 level (1-Tailed)

Table 2 showed the Process Model 1 that was used to calculate whether or not psychological flexibility moderated the relationship between perceived stress and well-being. In the preliminary analysis, it was found that perceived stress (predictor) was significantly associated with well-being, that the lower the perceived stress, the higher the well-being of the participants ($\beta =-1.7120$). This provided sufficient evidence that the effect of perceived stress exists in the study. The predictors also accounted for a significant change in well-being ($R^2 = .2023$, $p < .0000$) with medium-size predictive strength. Importantly, it revealed that there is a statistically significant moderating effect of the interaction term (perceived stress*psychological flexibility) between perceived stress and well-being ($\beta=.0268$, SE=.0077, $p < .0005$). The interaction term also accounted for a significant amount of change in well-being R2=.2023 ($p < .0000$) with medium-size predictive strength (20.2%). This result provided sufficient evidence that the moderating effect of PF exists in the study and has positive practical significance in the real world. This further confirmed that PF has a buffering effect, that as PF increases, negative impacts of perceived stress on well-being decreases, thus, the hypotheses was supported.

Table 2. Moderation Analysis with Psychological Flexibility as Moderator (N =1925).

Model(s) and variable(s)	β	SE	t	R	R^2	Sig
				.4498	.2023	0000*
Psychological Flexibility	.1950	.0471	4.1378			0000*
Perceived Stress	-1.7120	.0795	-21.5288			0000*
Perceived Stress* Psychological Flexibility	.0268	.0077	3.5041			0005*

Dependent Variable (Well-being), Independent Variable (Perceived Stress), Moderator (Perceived Stress* Psychological Flexibility); Regression Coefficient(β), Standard Error (SE) of β; t-value (T); R Squared (R2); *significant at the 0.05 level.

To further support and give more meaning to the results, Figure 2 presented a simple slope analysis showing that when perceived stress is high, participants with high psychological flexibility reported the highest well-being compared to those with moderate and low flexibility. This indicates that individuals using acceptance and harnessing styles, or problem-focused coping strategies, effectively manage stress and enhance well-being, whereas those relying on escape and avoidance styles, or emotion-focused coping strategies, experience poorer well-being and higher stress. The graph confirmed the predominant role of psychological flexibility in buffering perceived stress supporting the hypothesis.

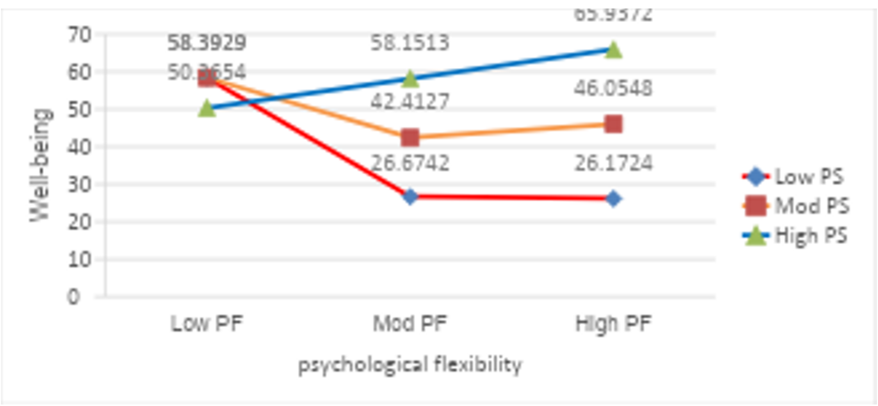

Fig 2. Visual Inspection of Interaction Effect

4 Discussion

In the preliminary analysis, it was found that perceived stress (predictor) was significantly associated with well-being, that the lower the perceived stress, the higher the well-being of the participants (β =-1.7120). This provided sufficient evidence that the effect of perceived stress exists in the study. The predictors also accounted for a significant change in well-being (R2 = .2023, $p < .0000$) with medium-size predictive strength. This magnitude implied that the relationship has a positive impact and meaning in the actual setting as well. Overall, this confirmed that perceived stress is a significant predictor of subjective well-being and that higher levels of perceived stress are associated with lower well-being. Results supported the findings that perceived stress as a significant contributor to psychological well-being [8].

For the highlights, psychological flexibility moderated perceived stress and well-being among university student samples. Related literatures have agreed to this finding that psychological flexibility works as an adaptive resource in adverse experience that although student lives are stressful, they can still cope and bounce back [9]. A higher psychological flexibility was associated with the highest college adjustment and well-being and a low flexibility was associated with the worst college adjustment and well-being [10]. A lower-level of mental health if remains untreated can negatively can increase the tendencies of depression, anxiety, and stress [11]. In contrast, greater psychological well-being and reduced distress are positively associated with optimism and health values [12] and heightened psychological engagement, where students actively participate in activities crucial to their learning development [13].

More studies have supported how psychological flexibility influences various psychological outcomes, especially the mental health of university students [14]. Overall, the researcher concluded that psychological flexibility significantly moderated the effect of perceived stress on well-being. Thus, the second hypothesis is supported. The results further supported the theory that employing problem-focused coping methods could mitigate the effects of stress by using coping strategies (acceptance and harnessing responses) that alter stress perception [15]. According to the PF model by David Chantry, an integrative intervention, process-oriented, and broadly applicable model of human behavior that changes the psychological experience instead of the content of experiences should be the focus in optimizing intervention strategy for behavioral change. Specifically, to create an intervention focused on avoidance, acceptance, and harnessing processes and strengthening problem-focused coping on health and well-being challenges.

The results showed a positive linear relationship among variables indicating that in the event that perceived stress is high, participants with high psychological flexibility showed the highest well-being compared to those with moderate and low psychological flexibility. This implies that in regulating thoughts and emotions during stressful encounters, those who successfully employed psychological flexibility using acceptance and harnessing styles (problem-focused coping strategies) directly manage the stressor, eventually improving psychological well-being (Biggs et al.,2017). Overall, the graph manifested a predominant function of psychological flexibility in intervening perceived stress. Therefore, hypothesis 2 was also supported.

Despite these positive findings, given that the PSS, WHO-5 well-being index, and PPFI are self-report measures administered online during the previous month and weeks and which focused only on participant's psychological experiences during flexible learning, this study can pose a limitation that can have implications on the generalizability of findings. Therefore, future research may utilize multivariate study incorporating socio-demographic factors, personality, quality of teaching delivery, and a need to specify learning mode (online, offline, blended) to corroborate stress, well-being, and psychological flexibility findings.

5 Conclusion

Flexible learning goals have become central to the lives of university students in student-centered learning environment. Understanding how a change in pedagogy brought about by new normal modification affects students' overall psychological well-being is essential. The study examined how psychological flexibility influences the link between perceived stress and well-being in the context of flexible learning during the new normal among Caraga State University-Main Campus undergraduate students. The study explored the research question: Does psychological flexibility significantly moderate the relationship between perceived stress and well-being? The key findings highlighted that almost all of the participants showed high psychological flexibility and a few with low levels. These findings implied they could manage, adjust to difficult situations, adapt to the present context, and be mentally and emotionally flexible. Also, this study has established that perceived stress is significantly associated with well-being indicating a major influence to psychological well-being.

Psychological flexibility also has a significant moderating effect indicating that participants may have employed adaptive coping strategies and further showed how avoidance, acceptance, harnessing response in every learning challenge can influence various health-related outcomes. This also means that increasing psychological flexibility, stakeholders may help their students cope adaptively way in any adverse situation of life. In conclusion, the findings suggest that one of the best strategies to respond to distress is not to decrease stressors but to increase adaptive coping. During stressful life events like new learning adjustment, a pandemic, or any global crisis, psychological flexibility is a buffering factor for distress that increases well-being. At the height of the learning transition and the pandemic, students were tempted to resort to countless ways of escaping despair, such as dropping out, lowering motivation, and feeling lonely and helplessness in situations that led to anxiety and depression.

Psychological flexibility would be a highly considerable strategy in facilitating online learning goals. It enables problem-focused approaches where one finds solutions to existing problems, embraces negative emotions to come and go for chosen learning goals, and harnesses negative thoughts and feelings to achieve their desired online learning goal. Consequently, psychological flexibility is a skill that can be developed for university students who are at greater risk. Most importantly, the study's findings have a significant implication for determining learning and distress and psychological skill management programs concurrent with implementing the new learning modality and succeeding in learning modification in the future.

6 Implication

The study establishes psychological flexibility as a protective factor that buffers the negative effects of stress on student well-being in online learning environments. This highlights the importance of integrating resilience-building and psychosocial interventions into academic programs to prevent mental health challenges.

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