

Tbilisi I. Javakhishvili State University

Faculty of Medicine



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**Role of Resilience between Parental Psychological Control,
Youth Problematic Internet Use and Depression: Mediation
and Moderation Analyses**

Annotation

For the Dissertation presented to achieve the degree of Doctor
of Philosophy in Medicine

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Dissertation has been accomplished at Tbilisi I. Javakhishvili
State University, faculty of Medicine, department of
Psychiatry

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General characteristics of the Research thesis

Scientific novelty of the reserach

- ✓ It has been studies first time Problematic Internet Use(PIU) by Georgian students.
- ✓ Within the study process it has been translated and adapted 4 questionnaires.
- ✓ It has been revealed underlying mechanisms of PIU by mediation and moderation analyses during Parental Psychological Control(PPC).
- ✓ In order to reduce PIU in students and plan efficient interventionsit is crucial to consider symptoms of depression

Theoretical and practical significance of the thesis

In the research of PIU there are many cross-sectional studies about risk factors. There are not many studies about protective factors that show the role of moderator factor as buffer on the relationship between predictor-outcome variables. In the model presented in this study depression is a predictor of PIU in the students who undergo the Parental Psychological control. Also resilience(which is expressed in high scores of resilience) could reduce symptoms of depression and in this way could reduce PIU. This data confirms the compensatory models of PIU, and

protective-stabilizing role of resilience (Fergus S, Zimmerman MA., 2005; Garmezy N, Masten AS, 1984).

Interestingly resilience acts as mediator and moderator at the same time between PPC and depression. It explains the relationship between dependent and independent variables and at the same time can change the strength of such an impact in specific group of individuals.

Although it was different in the case of PIU. Resilience acts as mediator in the path between PPC and PIU but change in it's scores doesn't change the strength of this relationship.

By distinguishing these models we aim not only to enhance one particular factor but to understand more clearly the processes of coping with challenges in youth. The results of the present study show that in order to reduce PIU it is reasonable to consider also existence of the symptoms of depression.

It is well established clinical value of mediation or moderation models. It's obvious that in the interaction between human organisms and environment different factors are intertwined. The relationship between organism and environment is impacted by the complex chain of factors. In order to understand outcome variables it is reasonable to study this chain and the mechanisms of development of these phenomena in specific groups. In present study it has been examined the development of

PIU in the relationship between environmental and protective factors.

To conclude, establish the mediating variable could help us to design intervention strategies, in order to prevention or early detection. Also to examine moderating factor provides us the information about the specific groups which undergo the environmental stressor's impact(Kraemer, H. C. et al., 2008). In the present study such group were presented by the students who expressed the symptoms of depression.

Structure of the Research thesis

Present thesis consists of 171 printed page, 5 chapters, reference list and Appendix. These parts are:

1. Introductory part, with actuality, objectives, hypotheses.
2. Literature review.
3. Methods. In this chapter it is described the study methodology. Research stages are presented by the order they were conducted. This chapter contains the description of the selection and adaptation of the research tools. Description of the sampling methods, data analysis and statistical analysis methods.
4. Results' chapter presents study results by the stages. Every data is represented by the tables and figures. Thesis contains 15 tables and 14 figures.

5. In the discussion and conclusion chapter interpretation of the results and the main conclusions are given.

In the final part of the thesis there are list of reference and the appendix with all four research tools.

Approbation and publication of the results of present study:

1. Adolescents Problematic Internet Use: Family factors Systematic review. Translational and Clinical Medicine, Vol 5, No 2 (2020), 33-51. Biannual Medical Journal of Ivane Javakhishvili Tbilisi State University and Georgian Medical Association, Tbilisi,2020.
2. Adaptation and Psychometric Properties of Georgian Version of the 10-item Connor-Davidson Resilience Scale. Georgian medical news, (332), 36–43.
3. Resilience Role Between Parental Psychological Control, Youth Problematic Internet Use and Depression: Mediation and Moderation Models”, WPA thematic congress congressbook, Tbilisi, Georgia, 2022, Ep-05.

The results of the present study were presented at the thematic congress of World Psychiatric Association as e-poster presentation as well as at the students scientific conference at the TSU, 2023.

Content of the Thesis

Chapter 1, Introduction

Topicality of the study. According to the Unicef 2021 study, conducted among 7 State University students in Georgia, age range 18-24 about mental health and accessibility of the mental health services it is revealed that youth are one of the most vulnerable age group. The prevalence of anxiety among students is 15%, moderate to severe depression - 18%, panic disorder - 15%. Symptoms of depression were higher in females, 33% of students have been experienced suicidal ideation at least once.

Apart from depression last 20-25 years' scientific research shows that adolescents' internet use and the psycho-social risks linked to it increased significantly (Islam, M. A., & Hossin, M. Z. 2016). It is well documented that major problematic internet users are youth, adolescents and students. Some study evidenciates that 98-99% of youth are using internet (Kuss DJ, Griffiths 2013; Anderson, 2017; Balhara, 2019; Cetynskaia, 2019; Prievara, 2019; *Probierz, E., & Pindych, A. 2018*). Because of this some scholars consider PIU as potential significant thread to youth mental health.

Through the years of the research there are accumulated data about the association of PIU with different psychological problems as : ADHD, Depression, impulsivity, obsession of (Anderson, 2015; Ko, Liu, et al., 2009, Fontana, A., 2022; Balhara Y, 2014; Dahl, 2020; Cetinskaya L, 2019; Griffiths M,

2000; Ferrante L, 2021; Kojima R, 2021; Ko et al., 2012; Kozybska, M., Kurpisz, 2022; Lozano-Blasco, Raquel and Cortés-Pascual, 2020). Although there is not enough data about the direction and mechanisms of such associations. We need still additional studies in this direction. It isn't well known are there independent parallel processes or is there causality between them(Dahl, 2020). For example some study indicates that PIU could aggravate depressive symptoms and other mental conditions. Another group of research showed that depression could act as a predictor of (Anderson, 2015; Ko, Liu, et al., 2009, Fontana, A., 2022.),

Study aims and objectives

Present study aims to investigate the relationship between parental psychological control(PPC) and problematic internet use(PIU) and underlying mechanisms, specifically, the role of resilience in developing of PIU in students in order to design efficient intervention strategies(Zhou, 2018. Wang, 2021).

Considering this we aimed to explore the role of resilience in developing PIU in Georgian students which suffer from the PPC. PPC here can be considered as a chronic prolonged stressor.

Hypotheses

We suggest that students with low functioning resilience because of the Parental Psychological Control, develop internalized and externalized problems, such as depression and PIU.

Also we suggest that resilience could mitigate the negative impact of PPC. From the above we developed several hypotheses:

H1. the effect of PPC on PIU is mediated via resilience (model 1)

H2 the effect of PPC on Depression is mediated via resilience(model 2)

H3. resilience moderates the path between PPC and PIU (model 3)

H4. Resilience moderates the path between PPC and depression(4)

H5. resilience mitigates the effect of PPC on PIU (model 5)

We developed respective theoretical models to test our hypotheses.

Chapter 2 Literature review

Dissertation thesis presents review of list of 243 publications. On their basis literature review has been made and results discussed.

In the review chapter have been analyzed main studies as well as the most recent studies. Among them new epidemiological, neurological, psycho-social research data about youth mental health; Data related youth depression, PIU, diagnostic, pathological models, research tools. Literature review contains also discussion about resilience and parental psychological control, conceptual models and their roles in the development of psychopathology and prevention.

Chapter 3. Methods

Study objects and methods: Study consists of 2 parts: 1) adaptation of questionnaires 2) Main analysis.

Part I represents translation and adaptation of 4 questionnaires, establishes their reliability and validity.

Part II main study, mediation and moderation analysis, in order to answer scientific questions and hypotheses.

Adaptation of questionnaires has been conducted in accordance with International Test Commission guidelines. There were accomplished two pilot study, restandardization, Exploratory and confirmatory factor analysis. All 4 questionnaires have demonstrated good psychometric properties.

Second part of the study was conducted in January of 2022.

Study design and participants. A purposive sampling method was performed in students of Tbilisi State University. Students were asked to complete demographic form and 4 instruments:

Depression Scale, Resilience Scale, PIU Questionnaire and Parental Psychological Control Scale. Demographic form was developed by the researchers to obtain information about participants personal information including sex, age, education, Internet use profiles including years of use internet, most common Internet use type, and information about Covid-19 and related limitations impact on the participants.

Participants were informed about the purpose of the study, voluntarily participation and confidentiality. Institutional Review Board approval was obtained from the Ethics Committee of Center for Mental Health and Prevention of Addiction.

A total of 1349 participants were recruited. The participants with missing values were excluded. There were 1170 participants for the main analysis.

Chapter 4 Results

Present Chapter represents data analysis and results. As well as demographic data of the participants.

I Part: Adaptation of questionnaires

Demographic Information of Participants

The majority of participants were female 77,8% ($n=854$),

while 22.2% participants were male ($n=244$). **Table 1** shows the complete details of participants' demographic preliminary information.

Table 1. Participants' Demographic Preliminary Information ($n=1098$)

	Demographic Information	Frequency	Percentage
Gender			
Male	Male	244	22.2%
	Female	854	77.8%
Most Often use of the Internet			
36	Study / work	534	48,36%
	social network	365	33,3%
	Watching music videos and movies	140	12.8%
	Other	31	2,8%
	Games	27	2,46%
	Shopping	1	0,18%

Reliability Analysis

Reliability analysis was conducted through internal consistency Cronbach alpha. The Cronbach alpha coefficients for current scales were ranging from 0.82 to 0.95 which indicated that all scales were reliability to measure the respective constructs.

Table 3. Cronbach's Alpha Reliability of Variables

Scale	Number of Items	Cronbach's Alpha
Problematic Internet Use (PIUQ)	9	0.84
Depression Scale (KADS)	6	0.87
Psychological Control Scale (Dependency)	10	0.91
Psychological Control Scale (Achievement)	10	0.95
Psychological Control Scale (Overall)	20	0.95
Resilience scale(CD-RISC-10)	10	0.87

Exploratory Factor Analysis Result Analysis

A series of Exploratory Factor Analysis (EFA) were run to determine the underlying latent traits of the five major

scales: *Dependency Oriented Psychological Control (DPC)* scale with 10 items, *Achievements oriented Psychological Control (APC)* scale with 10 items, *Problematic Internet Use Questionnaire (PIUQ-9)* with 9 items, *Connor-Davidson Resilience Scale 10 (CD-RISC-10)* with 10 items, and *Kutcher Adolescent Depression (KADS)* with 6 items. The results of each scale's EFA are presented below. All EFA analysis were performed using maximum likelihood extraction method. The Kaiser rule (Eigen value greater 1) was applied to determine the possible number of factors.

EFA of Dependency Oriented Psychological Control (DPC)

An exploratory factor analysis was conducted to determine the underlying factors of dependency oriented psychological control scale. There are total 10 items in this scale with unidimensional factor. It was found that these set of items emerged in four factors as hypothesized. The one-factor solution produced 55% of total variance. The Eigen value of the first factor was 5.50. The KMO and Bartlett's test was performed and the corresponding Kaiser- Meyer-Olkin value for sampling adequacy was .926. The factor loadings were ranging from 0.53 to 0.86 with the average loading value of 0.70. The factor loading for one-factor solution of 10 items are presented in table 4.

Table 4*Factor Loadings of Dependency Oriented Psychological Control*

Item	Factor
	1
DPC1	0.529
DPC2	0.659
DPC3	0.570
DPC4	0.717
DPC5	0.780
DPC6	0.840
DPC7	0.714
DPC8	0.683
DPC9	0.653
DPC10	0.859

EFA of Achievements Oriented Psychological Control (DPC)

There are total 10 items in this scale with unidimensional factor. It was found that these set of items emerged in four factors as hypothesized. The one-factor

solution produced 68*% of total variance. The Eigen value of the first factor was 6.79. The KMO and Bartlett's test was performed and the corresponding Kaiser- Meyer-Olkin value for sampling adequacy was .95. The corresponding chi-square value for Bartlett's Test of Sphericity was approximately 11333 (45), $p < .001$. The factor loading values were relatively higher and ranging from 0.70 to 0.92 with the average loading value of 0.80. The factor loading for one-factor solution of 10 items are presented in table 5.

Table 5 *Factor Loadings of Achievement Oriented Psychological Control*

Item	Factor
	1
APC1	0.762
APC2	0.767
APC3	0.726
APC4	0.812
APC5	0.695
APC6	0.870
APC7	0.915
APC8	0.908

APC9 0.696

APC10 0.806

EFA of Problematic Internet Use Questionnaire (PIUQ-9)

Another exploratory factor analysis was performed to assess the factor structure of *Problematic Internet Use Questionnaire (PIUQ-9)*. This scales contains 9 items. The 9-item has emerged into two factor solution using Kaiser rule (Eigen value greater than 1). The first factor is accounted for 44.74% variance and second factor accounted for 13.58% of total variance. The overall 2- factor solution is accounted for 58.32% of total variance. The Eigen values for first and second factors were 4.03 and 1.22, respectively. The KMO and Bartlett's test statistics value was 0.86, and the corresponding chi-square value for Bartlett's Test of Sphericity was approximately 4342.28 (36), $p < .001$. Three items were loaded on factor 1 and six items were loaded on factor two. The loading values for factor 1 ranging from 0.71 to 0.78, with the average loading value of

0.75. While, the loading for factor 2 ranging from 0.40 to 0.80, with the average loading value of 0.55. The factor loading for two-factor solution of 9 items PIUQ are presented in table 6.

Table 6. *Factor Loadings of Problematic Internet Use Questionnaire (PIUQ-9)*

	Factor	
	1	2
PIUQ1		0.700
PIUQ2		0.510
PIUQ3	0.757	
PIUQ4		0.795
PIUQ5		0.408
PIUQ6	0.779	
PIUQ7		0.402
PIUQ8		0.411
PIUQ9	0.711	

EFA of Kutcher Adolescent Depression (KADS)

The Kutcher Adolescent Depression scale contains six items. These six items were based on one hypothetical factor. The EFA analysis also indicated that these 6 items loaded into one factor. The one-factor solution produced 61.39% of total variance. The KMO and Bartlett's test statistics value was 0.89, and the corresponding chi-square value for Bartlett's Test of Sphericity was approximately 3945.33(15), $p < .001$. The factor loading values were ranging from 0.48 to 0.85, with the average loading value of 0.73. The factor loading for one-factor solution of 6 items KAD scale is presented in table 7.

Table 7 *Factor Loadings of Kutcher Adolescent Depression Scale*

Item	Factor
	1
KADS1	0.847
KADS2	0.773
KADS3	0.744
KADS4	0.747
KADS5	0.778
KADS6	0.481

EFA of Connor-Davidson Resilience Scale 10 (CD-RISC-10)

Connor-Davidson Resilience Scale contains 10 items with one hypothesized factor. The EFA analysis also indicated that these 10 items have emerged into one factor. The one-factor solution produced 46.50 of total variance. The KMO and Bartlett's test statistics value was 0.91, and the corresponding chi-square value for Bartlett's Test of Sphericity was approximately 4909.62 (45), $p < .001$. The factor loading values were ranging from 0.39 to 0.75, with the average loading value of 0.63. The factor loading for one-factor solution of 10 items CDRS presented in table 8.

Table 8 *Factor Loadings of Connor-Davidson Resilience Scale*

Item	Factor
	1
RS1	0.595
RS2	0.753
RS3	0.392
RS4	0.543
RS5	0.606
RS6	0.746
RS7	0.652

RS8	0.731
RS9	0.616
RS10	0.674

Confirmatory Factor Analysis Results for Connor-Davidson Resilience Scale

CFA was run to examine the validity of the Resilience Scale. It is usually used to study construct validity (Said, Hamdan & Badru, B.B. & Shahid, M., 2011; Sarmiento, Rui & Costa, Vera., 2019; Wang, Xuequn; French, Brian F.; and Clay, Paul F., 2015). Construct validity can be examined by definition of factor loading as shown in the table 9.

A confirmatory factor analysis was run to validate the results of exploratory factor analysis for resilience scale. The CFA was run on AMOS using maximum likelihood estimation. The overall the factor loadings were good in all items ranging from 0.39 to 0.75 with average standardized loading value was 0.63. The standardized factor loading and unstandardized factor loadings are reported in table 9.

Table 9 *Confirmatory Factor Analysis Results Resilience Scale*

Factor	Items	Unstandardized Beta Estimate	Standardized Beta Estimate	S.E.	P	Cronbach's Alpha
Resilience	RS1	1	0.553			0.87
	RS2	1.231	0.718	0.054	<.001	
	RS3	0.824	0.388	0.068	<.001	
	RS4	1.048	0.536	0.067	<.001	
	RS5	1.269	0.638	0.074	<.001	
	RS6	1.260	0.730	0.067	<.001	
	RS7	1.333	0.659	0.074	<.001	
	RS8	1.345	0.691	0.073	<.001	
	RS9	1.127	0.652	0.066	<.001	
	RS10	1.311	0.694	0.071	<.001	

Hypothesis testing

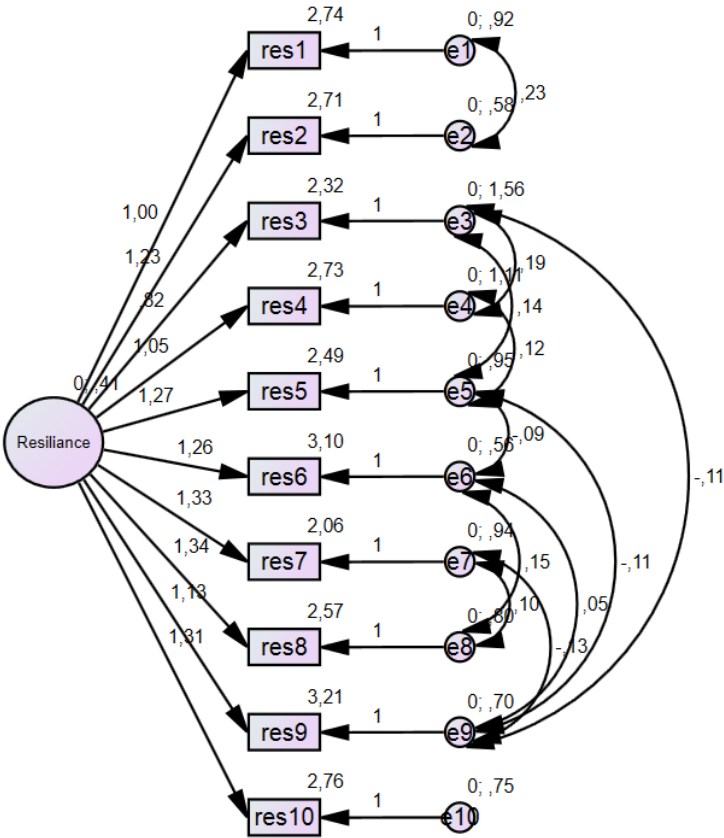
There are several fit indices values to determine the model fit. According to **Table 10**, the CMIN value and RMR fit indices values were in acceptable range. The GFI, NFI, and RMSEA value was good fit

index value. Overall, the model fits well with one factor model as suggested by the EFA results. The CFA model for resilience scale along with standardized estimates is shown in **figure 1**, and model fit indices shown in the Table 10.

Table 10. CFA Model Fit Indices of the Resilience Scale

Compliance Criteria	Good Fit*	Acceptable Harmony**	M
CMIN (χ^2/df)	$0 \leq \leq 2$	1-5	3.0
GFI	$0.95 \leq GFI \leq 1$	$0.90 \leq GFI \leq 0.95$	0.0
CFI	$0.97 \leq CFI \leq 1$	$0.95 \leq CFI \leq 0.97$	0.0
NFI	$0.95 \leq NFI \leq 1$	$0.90 \leq NFI \leq 0.95$	0.0
RMR	$0 \leq RMR \leq 0.05$	$0.05 \leq RMR \leq 0.08$	0.0
RMSEA	$0 \leq RMSEA \leq 0.05$	$0.05 \leq RMSEA \leq 0.08$	0.0

Figure 7. Final CFA model and standardized estimation of Resilience Scale



Part II

Mediation and moderation analyses

A total of 1349 participants were recruited. However, there were 134, 36, 69 and 34 missing values in some of the items of the parental psychological control, depression, resilience, and problematic internet use questionnaires, respectively. The participants with missing values were excluded. There were 1170 participants for the main analysis.

Table 11 shows the descriptive statistics and their relationships with problematic internet usage and depression. The mean age was 19.49 (SD=1.73) years, and 78.2% were females. The majority of participants (49.1%) used networks for study or work, followed by social networking (33.0%) and musical videos/films (12.6%). The average scores for parental psychological control, resilience, depression and problematic internet use were 36.68 (SD=18.05), 26.65 (SD=8.12), 15.96 (SD=4.85), and 24.91 (SD=7.70), respectively. Further, 11.6% of participants had high-risk problematic internet usage (Table 12). Females had significantly higher mean scores for problematic internet usage and depression compared to males. Participants who used the internet for social networking, watching music videos, or films had significantly higher mean scores of problematic internet usage compared to the participants who used the internet for study/work. However, there was no significant difference between the purpose of internet usage and depression.

Table 11. Descriptive statistics and their relationships with problematic internet usage and depression.

Variable	n =1170	Problematic internet usage		Depression	
		Mean (SD)	Mean difference (95% CI)	Mean (SD)	Mean difference (95% CI)
Age, mean (SD)	19.49 (1.73)				
Sex, %					
Male	21.8	21.89 (7.02)	Ref 3.86 (2.81, 4.90)	14.06 (4.78)	Ref 2.43 (1.77, 3.09)
Female	78.2	25.75 (7.67)		16.50 (4.73)	
Purpose of internet usage, %					
Study/work	49.1	23.66 (7.50)	Ref -0.48 (-4.54, 3.58)	15.66 (4.97)	Ref -0.21 (-2.82, 2.38)
Gaming	2.3	23.18 (6.74)	3.19 (1.83, 4.54)	15.44 (4.96)	0.64 (-0.22, 1.51)
Social networking	12.6	26.85 (7.78)	2.10 (0.20, 4.00)	16.30 (4.62)	1.10 (-0.12, 2.31)
Music videos/films	3.0	25.76 (7.29)	-2.12 (-5.71, 1.47)	16.76 (4.73)	0.12 (-1.34, 1.09)
Shopping and other		21.54 (7.37)		14.31 (5.06)	

SD: standard deviation; CI: confidence interval Ref: reference.

Mean differences and 95% confidence intervals for sex were derived from independent samples t-test, and for the purpose of internet usage were derived from analysis of variance (ANOVA) with post-hoc test Tukey. Bold results were significant.

Table 12. Descriptive statistics of predictors, mediators/moderators and outcomes

Variables	N=1170
Parental psychological control, mean (SD)	36.68 (18.05)
Resilience, mean (SD)	26.65 (8.12)
Depression, mean (SD)	15.96 (4.85)
Problematic internet use, mean (SD)	24.91 (7.70)
High-risk problematic internet usage (35-45), %	11.6

SD: standard deviation

Association of COVID-19 related restrictions and worries with problematic internet usage and depression

Table 3 shows the associations of the effects of COVID-19 related restrictions and worries with problematic internet usage or depression. The COVID19 related restrictions significantly affected the problematic internet usage and depression. Specifically, the participants with changes in the frequency of fast-food intake, sleep regime, frequency of physical activity, frequency of alcohol intake, tobacco and substance use had significantly higher mean scores in problematic internet usage and depression than those without such changes. Next, compared to the participants who had severely worsened economic and financial

conditions due to COVID-19, the participants with less and moderately worsened/no change or improved economic and financial conditions had significantly lower mean scores in problematic internet usage and depression. Further, participants very much worried about maintaining social connections, discontinuation of the learning process, domestic violence or aggression, and limiting fun and other recreation activities had significantly higher mean scores in problematic internet usage compared to the participants who did not worry about such areas of life. However, the participants who were little/quite and very much worried about domestic violence or aggression had higher mean scores in depression compared to the participants without such worries.

Mediation analysis

Figure 8 shows the statistical diagram of model 1. It shows whether the effect of parental psychological control on problematic internet usage was mediated via resilience. There was a positive direct effect of parental psychological control on problematic internet usage ($\beta=0.105$, 95% CI 0.082, 0.128; 88% of the total effect), and a positive indirect effect of parental psychological control on problematic internet usage mediated via resilience ($\beta=0.014$, 95% CI 0.007, 0.022; 12% of the total effect).

This model indicated that parental psychological control increased problematic internet usage directly and indirectly via resilience. Specifically, with regard to indirect effect, the parental psychological control increased problematic internet usage through its effect on the reduction of resilience (because 'a' was negative, meaning those with higher parental psychological control scores had lower resilience scores), which in turn was related to increased problematic internet usage scores (because 'b' was negative; those with low resilience scores had higher problematic internet usage scores).

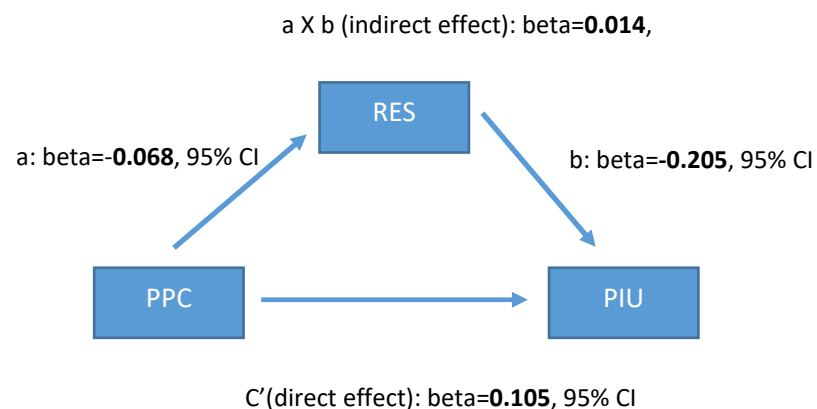


Figure 8. Statistical diagram of model 1-mediation analysis: parental psychological control (PPC) as a continuous predictor, problematic internet usage (PIU) as a continuous outcome, and resilience (RES) as a continuous mediator. Bold results were significant.

Figure 9 shows the statistical diagram of model 2. It shows whether the effect of parental psychological control on depression was mediated via resilience. There was a positive direct effect of parental psychological control on depression ($\beta=0.092$, 95% CI 0.078, 0.105; 87% of the total effect), and a positive indirect effect of parental psychological control on depression mediated via resilience ($\beta=0.014$, 95% CI 0.008, 0.021; 13% of the total effect).

This model indicated that parental psychological control increased depression with its direct effects and indirectly via resilience. Specifically, with regard to indirect effect, the parental psychological control increased depression through its effect on the reduction of resilience (because 'a' was negative, meaning those

with higher parental psychological control scores had lower resilience scores), which in turn was related to increased depression scores (because 'b' was negative; those with low resilience scores had higher depression scores).

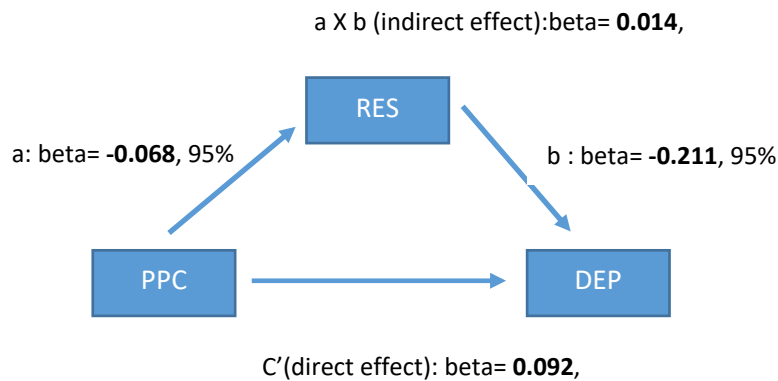


Figure 9. Statistical diagram of model 2-mediation analysis: parental psychological control (PPC) as a continuous predictor, depression (DEP) as a continuous outcome, and resilience (RES) as a continuous mediator. Bold results were significant.

Figure 10 shows the statistical diagram of model 3. It shows whether the effect of parental psychological control on problematic

internet usage was mediated via depression. There was a positive direct effect of parental psychological control on problematic internet usage (beta= 0.046, 95% CI 0.023, 0.070; 39% of the total effect), and a positive indirect effect of parental psychological control on problematic internet usage mediated via depression (beta= 0.072, 95% CI 0.060, 0.085; 61% of the total effect).

This model indicated that parental psychological control increased problematic internet usage with its direct effects and indirectly via depression. Specifically, with regard to indirect effect, the parental psychological control increased problematic internet usage through its effect on the increase of depression (because 'a' was positive, meaning those with higher parental psychological control scores had higher depression scores), which in turn was related to increased problematic internet usage scores (because 'b' was positive; those with higher depression scores had higher problematic internet usage scores).

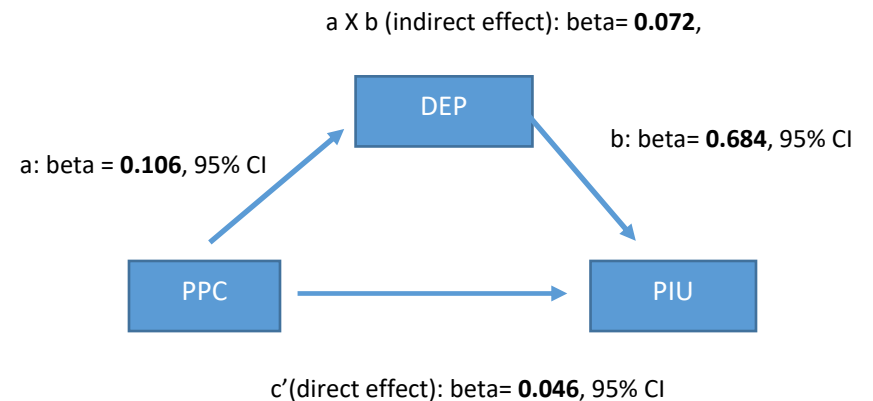


Figure 10. Statistical diagram of model 3-mediation analysis: parental psychological control (PPC) as a continuous predictor, problematic internet usage (PIU) as a continuous outcome, and depression (DEP) as a continuous mediator. Bold results were significant.

Moderation analysis

Figure 11 shows the statistical diagram of model 4. It shows whether resilience moderated the effect of parental psychological control on depression. The parental psychological control significantly increased the depression (Beta=0.050, 95% CI 0.009, 0.091). The parental psychological control X resilience interaction term was significant (beta= 0.002, 95% CI 0.001, 0.003). Further, the conditional effect of parental psychological control on depression was significant at all the levels of resilience (mean-1 SD = 18.53: beta= 0.079, 95% CI 0.062, 0.097; mean = 26.65: beta= 0.092, 95% CI 0.079, 0.105; mean + 1 SD = 34.77: beta= 0.105, 95% CI 0.087, 0.123).

Therefore, the model indicated that parental psychological control significantly increased depression. Further, resilience moderated the effect of parental psychological control on depression. Interestingly, the magnitude of the moderation effect of resilience was increased with the level of resilience. Specifically, individuals with higher resilience scores (mean+1SD) had lower depression scores for the same parental psychological control scores compared to individuals with lower resilience scores (mean-1SD) (Figure 12).

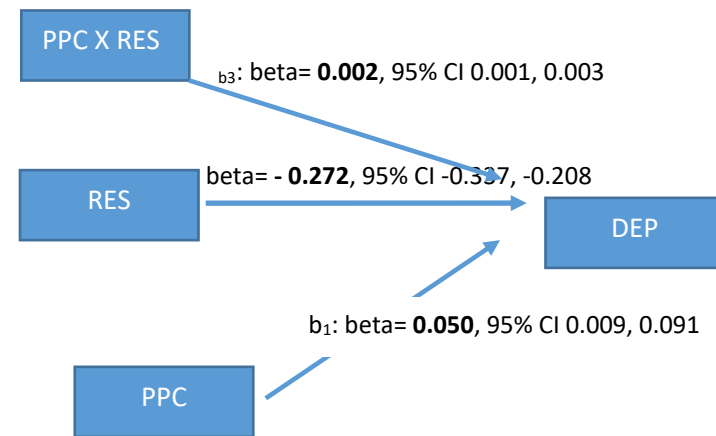


Figure 11. Statistical diagram of model 4-moderation analysis. Parental psychological control (PPC) as the predictor, depression as the outcome (DEP), and resilience (RES) as the moderator. Bold results were significant.

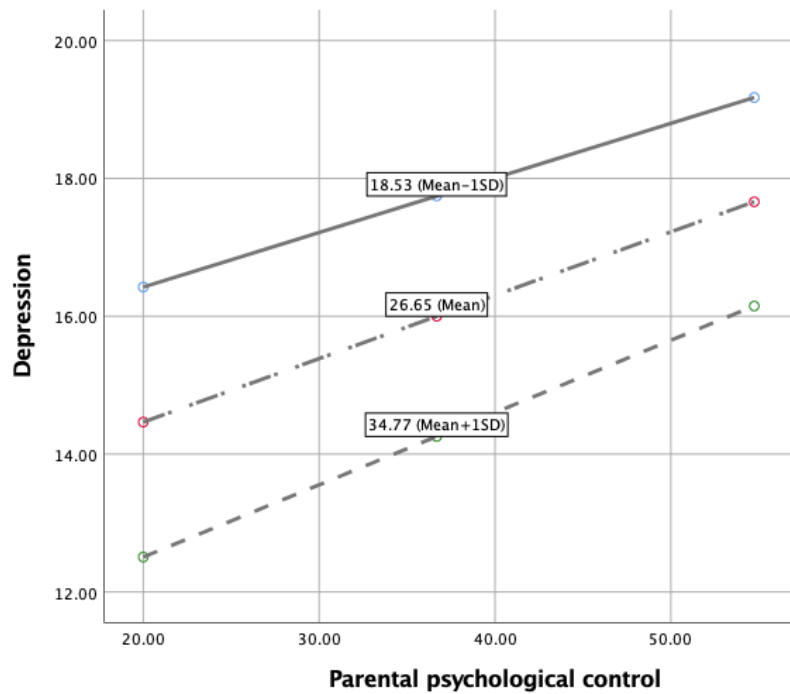


Figure 12. Simple regression lines of parental psychological control on depression under different resilience levels.

Figure 13 shows the statistical diagram of model 5. It shows whether resilience moderated the effect of parental psychological control on problematic internet use. The parental psychological control significantly increased the problematic internet use (beta= 0.092, 95% CI 0.020, 0.164). However, parental psychological control X resilience interaction term was not significant (beta= 0.005, 95% CI -0.002, 0.003).

Therefore, the model indicated that parental psychological control increased problematic internet usage, but resilience did not moderate the effect of parental psychological control on problematic internet use.

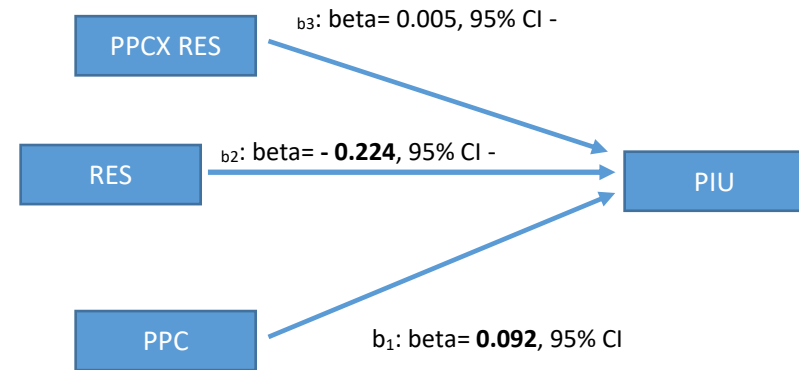


Figure 13. Statistical diagram of model 5-moderation analysis. Parental psychological control (PPC) as the predictor, problematic internet usage as the outcome (PIU), and resilience (RES) as the moderator. Bold results were significant.

Moderated mediation analysis

Figure 13 shows the statistical diagram of model 6. It shows the ability of depression to mediate the effect of parental psychological control on problematic internet usage with resilience moderating

the effect of parental psychological control on depression. There was a positive direct effect of parental psychological control on problematic internet usage ($\beta=0.046$, 95% CI 0.023, 0.070). The parental psychological control X resilience interaction term was significantly predicted the depression ($\beta= 0.002$, 95% CI 0.001, 0.003). There was a significant moderated mediation effect of parental psychological control on problematic internet usage via depression (index of moderated mediation: $\beta= 0.001$, 95% CI 0.001, 0.002). Further, the conditional indirect effects of parental psychological control on problematic internet usage were significant at all the levels of resilience (mean-1 SD = 18.53: $\beta= 0.054$, 95% CI 0.043, 0.066; mean = 26.65: $\beta= 0.063$, 95% CI 0.052, 0.074; mean + 1 SD = 34.77: $\beta= 0.072$, 95% CI 0.057, 0.087).

This model indicated that parental psychological control increased problematic internet usage directly and indirectly via depression. Specifically, with regard to indirect effect, the parental psychological control increased problematic internet usage through its effect on the increase of depression (those with higher parental psychological control scores had higher depression scores), which in turn was related to increased problematic internet usage scores (those with higher depression scores had higher problematic internet usage scores). However, the indirect effect of parental psychological control on problematic internet usage was moderated by resilience, by moderating the effect of parental psychological control on depression.

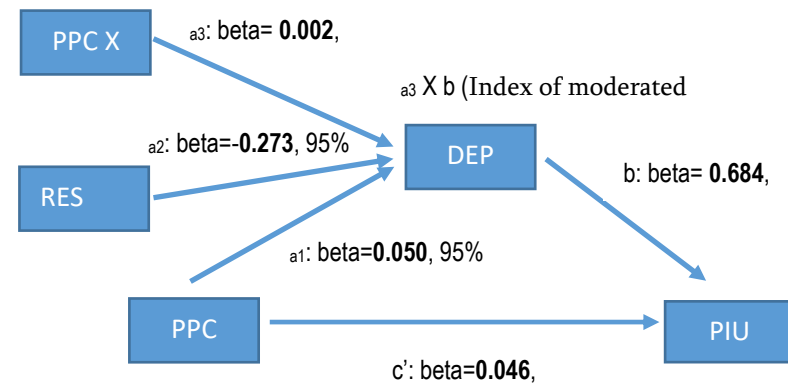


Figure 14. Statistical diagram of model 6 - moderated mediation analysis: parental psychological control (PPC) as a continuous predictor, problematic internet usage (PIU) as a continuous outcome, depression (DEP) as a continuous mediator, and resilience (RES) as a continuous moderator.

Table 4. Mediation analysis – mediating roles of resilience and depression on the associations between parental psychological control and different outcomes

Model	Predictor	Outcome	Mediator	Path coefficients		Direct effect (c')	Indirect effect (aXb)
				a Beta (95% CI)	b Beta (95% CI)		
Model 1	PPC	PIU	RES	-0.068 (-0.093, -0.042)	-0.205 (-0.257, -0.154)	0.105 (0.082, 0.128)	0.014 (0.007, 0.022)
Model 2	PPC	DEP	RES	-0.068 (-0.093, -0.042)	-0.211 (-0.241, -0.181)	0.092 (0.078, 0.105)	0.014 (0.008, 0.021)

Model 3	PPC	PIU	DEP	0.106 (0.092, 0.120)	0.684 (0.597, 0.771)	0.046 (0.023, 0.070)	0.072 (0.060, 0.085)
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PPC: parental psychological control; PIU: problematic internet usage; DEP: depression; RES: resilience.

Models were constructed using Ordinary least squares regression with path analysis to estimate direct effects of predictors and indirect effects of predictors through mediators on outcomes. 'a' shows the effect of predictor on mediator; 'b' shows the effect of mediator on outcome; 'a X b' indicates the indirect effect of predictor on outcome via mediator. 'c' shows the direct effect of predictor on the outcome. Bold results were statistically significant.

Table 5. Moderation analysis – moderating role of resilience on the associations between parental psychological control and depression, and problematic internet usage

Model	Predictor	Outcome	Moderator	Path coefficients		
				b ₁ Beta (95% CI)	b ₂ Beta (95% CI)	b ₃ (Predictor X Moderator interaction)
Model 1	PPC	PIU	RES	-0.068 (-0.093, -0.042)	-0.205 (-0.257, -0.154)	0.105 (0.082, 0.128)
Model 2	PPC	DEP	RES	-0.068 (-0.093, -0.042)	-0.211 (-0.241, -0.181)	0.092 (0.078, 0.105)

						<i>Beta (95% CI)</i>
Model 4	PPC	DEP	RES	0.050 (0.009, 0.091)	- 0.272 (-0.337, -0.208)	0.002 (0.001, 0.003)
Model 5	PPC	PIU	RES	0.092 (0.020, 0.164)	- 0.224 (-0.337, -0.112)	0.005 (-0.002, 0.003)

PPC: parental psychological control; PIU: problematic internet usage; DEP: depression; RES: resilience.

Models were constructed using Ordinary least squares regression to estimate direct effects of predictors and moderating effects (interaction) of predictors and moderators on outcomes. 'b₁' shows the effect of predictor on outcome; 'b₂' shows the effect of moderator on outcome; 'b₃ – predictorXmoderator' indicates the moderating/interaction effect of predictor and moderator on outcome. Bold results were statistically significant.

Chaptair 5 Conclusions

With present study we aimed to understand the role of resilience instudents who undergoe parental psychological control.

- 1) First of all, it's revealed that students who undergoe parental psychological control have major risk of developing PIU.
- 2) It is likely that resilience protects students from the risk of developing PIU. It is reasonable to consider enhancement on the resilience while planning intervention strategies. Which is possible by emphasis on emotion regulation, problem solving skills, social skills, social support, self-efficacy, spirituality.
- 3) Changes in the resilience level in those youth who have expressed the symptoms of depression could alter also the strength of the impact of the stressor. This means by considering symptoms of depression it is possible to reduce more effectively PIU in students.
- 4) It is important the high impact of PPC during late adolescence which seems to have also cultural reasons.
- 5) Data analysis shows that development of PIU in students who undergoe parental psychological control may occure by compensatory mechanisms. In this case depression acts as the PIU predictor.
- 6) Also, study demonstrated that majority of risky problematic internet users are females, and more risky users are among those students who use internet for social networking or for entertainment purposes.

- 7) Covid-19 pandemic and related restrictions had impact on the students behavior, specifically, it increased the risk of PIU and have shown less impact on the internalizing problems, specifically, depression.