

# Impact of Personality and Loneliness on Life: Role of Online Flow Experiences

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**Abstract**—The present study examines the mediating effect of online flow experience on the relationship between extraversion-introversion, locus of control and loneliness, and depression and satisfaction with life. The data was obtained using a structured questionnaire prepared by adapting standardized scales available from a sample of 102 engineering students from different technical institutions at Bhubaneswar, India. The results indicate that there is a positive significant relationship between introversion, external locus of control, loneliness, depression and online flow experience, and extraversion, internal locus of control and satisfaction with life. The results also suggest that online flow experience mediates the relationship between the aforementioned variables.

**Keywords**—Life satisfaction and depression, loneliness, online flow experience, personality.

## I. INTRODUCTION

WE are living in exponential times. Internet use has grown very rapidly in recent years. India's total number of internet users is 81 million and India becoming the third largest internet user in the world (Internet World Stats, 2011). Initially, the internet was developed as a technology for providing access to information. Internet users were perceived as information seekers and the phrase 'to browse' the net was introduced. Currently, the internet is also considered to be a social technology providing its users human support and a sense of belonging. Individuals go to the internet for information, entertainment, relationships and support. In today's world, it is a necessary condition for the development of the digital proficiency required of modern citizens. In spite of the widely perceived merits of this tool, psychologists and educators have been aware of the negative impacts of its use, especially the over or misuse and the related physical and psychological problems. Internet overuse is a raising phenomenon affecting people with varying frequency around the world and has produced negative impacts on the academic, relationship, financial, and occupational aspects of many lives [1]. Life in cyberspace is affected by an individual's personality variables, loneliness, online flow experiences, depression and satisfaction with life. the life in cyberspace.

Personality is an individual's unique and relatively stable patterns of behaviour, thoughts and emotions [2]. Personality variables like extraversion and introversion, and locus of control have a considerable impact on the life of individuals. The extrovert is a friendly person who seeks company, desires excitement, takes risks, and acts on impulse, whereas the introvert is a quiet, reflective person who prefers his or her own company and does not enjoy large social events; he or she does not crave excitement and may be seen by some as distant and remote [3]. Locus of control structure shows a distribution on dimensions of internal-external locus of control in a way it was bound to individual perceives degree of their own responsibilities for events [4].

Individuals with a high internal locus of control believe that events result primarily from their own behavior and actions. Those with a high external locus of control believe that powerful others, fate, or chance primarily determine events. Loneliness is an unpleasant feeling and a subjective experience in which a person experiences a strong sense of emptiness and solitude resulting from inadequate levels of social relationships plays a role in an individual's use of the internet [6]. Two components of loneliness can be distinguished. Research [7] differentiated between emotional loneliness, stemming from the absence of an intimate relationship or a close emotional attachment, and social loneliness, stemming from the absence of a broader group of contacts or an engaging social network. Flow is the state occurring during network navigation which is characterized by a seamless sequence of responses facilitated by machine interactivity, intrinsically enjoyable, accompanied by a loss of self-consciousness, and self reinforcing [8].

People identify themselves on the net when they are in a state of flow. Depression, a mood disorder in which individuals experience extreme unhappiness, lack of energy, and several related symptoms (DSM – IV) lowers down for those individuals who experience online flow. Satisfaction with life is an overall assessment of feelings and attitudes about one's life at a particular point in time ranging from negative to positive is enhanced during online flow experiences [9].

## II. LITERATURE REVIEW

### A. Main Effects

The personality dimensions of extraversion and introversion to the symptoms of depression and anxiety was investigated in the general population [10].

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A random general population sample (age 20–70 years) was surveyed with the Eysenck Personality Inventory (EPI), Beck Depression Inventory (BDI), and Beck Anxiety Inventory (BAI). In addition, questions regarding diagnosed lifetime mental disorders, health care use for psychiatric reasons in the past 12 months, and history of mental disorders in first-degree relatives were posed. Among the 441 subjects who participated, extraversion correlated negatively with symptoms of depression and anxiety, self-reported lifetime mental disorder and health care use for psychiatric reasons in the past 12 months. And introversion correlated positively with depressive symptoms in the urban general population.

Locus of control orientation is related to depression. Two personality constructs, desire for control and locus of control, were related to depression among college students. Measures of levels of depression, desire for control, and locus of control were taken from subjects. Approximately six months later 71% of these subjects returned a questionnaire concerning their experiences with depression during that six-month period. It was found that locus of control scores, particularly the extent to which subjects perceived that their lives were controlled by chance, were significantly related to the depression levels. It was also found that high desire for control subjects who held external perceptions of control were most likely to seek nonprofessional help for depression. In addition, high desire for control subjects who perceived their lives as generally controlled by chance were most likely to have suicidal thoughts [11].

The extent to which loneliness is a unique risk factor for depressive symptoms was determined in 2 population-based studies of middle-aged to older adults, and the possible causal influences between loneliness and depressive symptoms were examined longitudinally in the 2nd study. In Study 1, a nationally representative sample of persons aged 54 and older completed a telephone interview as part of a study of health and aging.

Higher levels of loneliness were associated with more depressive symptoms, net of the effects of age, gender, ethnicity, education, income, marital status, social support, and perceived stress. In Study 2, detailed measures of loneliness, social support, perceived stress, hostility, and demographic characteristics were collected over a 3-year period from a population-based sample of adults' ages 50–67 years. Loneliness was again associated with more depressive symptoms, net of demographic covariates, marital status, social support, hostility, and perceived stress. Latent variable growth models revealed reciprocal influences over time between loneliness and depressive symptomatology [12].

The data on loneliness and depressive symptoms from older adults aged 60–98, residing in two age-segregated independent living facilities was examined [13]. Overlap between those scoring in the depressed range on the Geriatric Depression Scale and those scoring more than one standard deviation above the mean on the UCLA Loneliness Scale was less than 50%, although zero-order correlation of the two continuous scores was moderately high.

Potential risk and resilience factors were regressed on the continuous scores of the two scales in separate hierarchical multiple regression analyses. Depression was predicted by being older, number of chronic health conditions, grieving a recent loss, fewer neighbor visitors, less participation in organized social activities and less church attendance. Grieving a recent loss, receiving fewer visits from friends, and having a less extensive social network predicted loneliness.

In addition, loneliness scores explained about 8% of the unique variance in depression scores, suggesting it is an independent risk factor for depressive symptoms. Loneliness scores were seen to be more widely dispersed in these respondents, with less variance explained by the available predictors.

Personality dispositions such as extraversion-introversion, neuroticism, and self-esteem can markedly influence levels of life satisfaction and subjective well being. Personality can explain a significant amount of the variability in life satisfaction and subjective well being, life circumstances also influence long-term levels.

Extraversion is positively correlated with life satisfaction and subjective well being, while introverts were found to have lower levels of satisfaction with life and subjective well being. Cultural variables explain differences in mean levels of subjective well being and appear to be due to objective factors such as wealth, to norms dictating appropriate feelings and how important life satisfaction and subjective well being is considered to be, and to the relative approach versus avoidance tendencies of societies [14].

Life satisfaction is thought to be the subjective part of quality of life, i.e., the feelings of the persons concerned about their functioning and circumstances. The relationship between life satisfaction, physical status, emotional health, social support and locus of control in the frail elderly was examined [15]. A random sample of 99 low-income, frail elderly living in the community was interviewed. Almost 40% of participants reported high levels of life satisfaction. Multiple regression analysis identified four significant predictors of life satisfaction: Perceived physical health, social support, emotional balance, and locus of control. People with internal locus of control had higher life satisfaction than people with external locus of control.

The relationship between loneliness and life satisfaction in 121 residents was examined using the Satisfaction with Life Scale and the Revised UCLA Loneliness Scale [16]. A high inverse correlation was found between loneliness and life satisfaction.

The relationship between online flow and personality variables was studied [17]. An individual's action in the flow state is experienced "as a unified flowing from one moment to the next, in which he is in control of his actions, and in which there is little distinction between self and environment, between stimulus and response, or between past, present, and future" [18]. In the state of flow, individuals' self-consciousness disappears, sense of time becomes distorted, and the resulting state of mind is extremely gratifying [19].

Research [20] examines how the personality characteristics of the user affect the meaning and importance of Internet social interaction in comparison with "real life," face-to-face interactions. Forty subjects all of whom were familiar with using "chat" participated in this study. After a "chat" session, they were instructed to answer several questionnaires. It was found that introverted people locate their "real me" on the Internet, while extroverts locate their "real me" through traditional social interaction.

A study on consumer control in online environments was carried out [21]. Results showed that internal locus of control is positively correlated with number of years on the internet and satisfaction with their internet skills, goal-directed usage of the internet, and negatively correlated with web use substituting for other activities and with beliefs that internet content should be regulated through filter use or the government. External locus of control is negatively correlated with number of years on the internet and satisfaction with their internet skills, experiential usage of the internet and positively correlated with web use substituting for other activities and with beliefs that the government should regulate internet content.

A study gathered data from a convenient sample using a combination of online and offline methods [22]. The respondents comprised 722 Internet users mostly from the Net-generation. Results indicated that the higher the tendency of one being addicted to the Internet, the shyer the person is, the less faith the person has, the firmer belief the person holds in the irresistible power of others, and the higher trust the person places on chance in determining his or her own course of life. There exists a positive relationship between external locus of control and Internet use. Moreover, people who are addicted to the Internet make intense and frequent use of it both in terms of days per week and in length of each session, especially for online communication via e-mail, ICQ, chat rooms, newsgroups, and online games.

Loneliness has been associated with increased internet use. It has been observed that lonely individuals may be drawn online more than the non-lonely individuals because of the increased potential for companionship, the changed social interaction patterns online, as a way to modulate negative moods associated with loneliness, and for emotional support. It was also seen that they were more likely to report making online friends and heightened satisfaction with their online friends. For some lonely individuals, loneliness may lead to increased internet use, and even to the development of internet-related problems in their lives. And other lonely individuals may use the Internet as an escape: to reduce stress and alleviate negative feelings that are associated with loneliness. Internet use for those who are lonely appear to be vulnerable to developing problems in their lives from internet use such as work, school or social disruption [6].

Research showed the relationship between loneliness, internet self-efficacy and the use of the internet for entertainment purposes [23]. 150 undergraduates answered questions about their Internet usage and completed loneliness and an Internet self-efficacy questionnaire.

A factor analysis of the Internet usage items revealed three facets of online recreation, including, using the Internet for: computer-based entertainment, to facilitate offline entertainment, and for information about the entertainment world. Those who scored higher on loneliness were more likely to use the Internet for computer-based entertainment, as well as, use the Internet to obtain information about the entertainment world. Individuals higher in Internet self-efficacy were more likely to use the Internet for computer-based entertainment and to facilitate offline entertainment.

#### *B. Mediating Effects*

The concept of the "flow experience" describes a significant coping mechanism for people undergoing solitary ordeals [24]. In fact, limited, confined, and spartan circumstances can be well-suited for the creation of flow experiences for those "no self-conscious" individuals who do not dwell on themselves but, instead, try actively to become caught up in experiences in their limited worlds. Perhaps the problem many have in coping with adversity today is that they have such heightened awareness and concern with themselves as recipients of life's events rather than as agents that they are victims-in-potential, inclined to be "hassled" rather than challenged by life's ordinary difficulties, including the widespread problem of loneliness [25].

To the best of our knowledge, no research has been carried out to examine the mediating effect of online flow on the relationship between extraversion-introversion, locus of control and loneliness, and depression and satisfaction with life.

### III. RESEARCH GAP

The review of literature gives an exposition of the available literature regarding life in cyberspace relevant to the current research. As it is evident from literature, various studies have been conducted on extraversion-introversion, locus of control, loneliness, flow, depression and satisfaction with life. To the best of our knowledge, virtually no scholarly effort has been undertaken in Indian context to understand the combined relationship among the aforementioned variables. The present study attempts to find out the main and mediating effects of extraversion-introversion, locus of control, loneliness, online flow experiences, depression and life satisfaction of people. It is expected that this would lead to a subtle understanding of online behavior of individuals.

### IV. RESEARCH PROBLEM

Most of the people choose to live in a virtual world, a world of computers and internet, losing touch with the real world and its problems. An individual's personality and degree of loneliness influence his/her online flow experiences. Due to the excessive utilization of the computer and internet, the most affected areas of life are the mental, physical, emotional and social life, resulting in depression and dissatisfaction with life. As it is a new and emerging area, a deeper analysis and understanding of the life of virtual human becomes essential.

On the basis of the literature review and research gap, a conceptual framework was proposed to be tested empirically as shown in Figure 1.

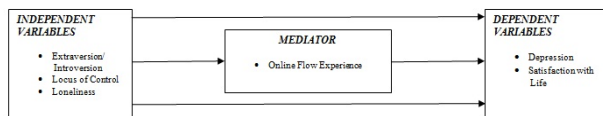


Fig. 1 Proposed conceptual framework

## V. OBJECTIVES

The specific research objectives of this study are as follows:

- To examine whether the effect of extraversion-introversion determine persons' depression, satisfaction with life and online flow experience.
- To examine whether the effect of locus of control determine persons' depression, satisfaction with life and online flow experience.
- To examine whether the effect of loneliness determine persons' depression, satisfaction with life and online flow experience.
- To examine the role of online flow experience in the relationship between extraversion-introversion, locus of control and loneliness, and depression and satisfaction with life.

## VI. HYPOTHESES

The following hypotheses are proposed for the present research:

H<sub>1.1</sub>: The higher the individual is on introversion and lower is on extraversion, the higher would be his/her depression.

H<sub>1.2</sub>: The higher the individual is on external locus of control and lower is on internal locus of control, the higher would be his/her depression.

H<sub>1.3</sub>: The higher the individual is on loneliness, the higher would be his/her depression.

H<sub>2.1</sub>: The higher the individual is on introversion and lower is on extraversion, the lower would be his/her satisfaction with life.

H<sub>2.2</sub>: The higher the individual is on external locus of control and lower is on internal locus of control, the lower would be his/her satisfaction with life.

H<sub>2.3</sub>: The higher the individual is on loneliness, the lower would be his/her satisfaction with life.

H<sub>3.1</sub>: The higher the individual is on introversion and lower is on extraversion, the higher would be his/her online flow experience.

H<sub>3.2</sub>: The higher the individual is on external locus of control and lower is on internal locus of control, the higher would be his/her online flow experience.

H<sub>3.3</sub>: The higher the individual is on loneliness, the higher would be his/her online flow experience.

H<sub>4.1</sub>: The effect of extraversion-introversion on depression will be mediated by online flow experience.

H<sub>4.2</sub>: The effect of locus of control on depression will be mediated by online flow experience.

H<sub>4.3</sub>: The effect of loneliness on depression will be mediated by online flow experience.

H<sub>4.4</sub>: The effect of extraversion-introversion on satisfaction with life will be mediated by online flow experience.

H<sub>4.5</sub>: The effect of locus of control on satisfaction with life will be mediated by online flow experience.

H<sub>4.6</sub>: The effect of loneliness on satisfaction with life will be mediated by online flow experience.

## VII. METHOD

### A. Sample

A total of 102 participants from various engineering colleges participated in the study. Out of them, 23 were first-year BTech students, 26 were second-year students, 25 were third-year students and 28 were fourth-year students.

Seventy-one percent of the participants were males and the remaining twenty nine percent were females. All the students were between 17 and 23 years of age.

### B. Measures

The items used to measure the constructs in the study were adapted from existing standardized scales used in previous studies.

#### i) Extraversion-Introversion

Extraversion-introversion was measured using Eysenck Personality Questionnaire Revised (EPQ-R) developed by Eysenck and Eysenck [3] to assess the personality traits of a person. It contains 12 items relating to the construct.

The responses are measured on a binary scale of Yes (1) and No (0). Scores range from 0-12. A high score indicates extraversion while a low score indicates introversion.

#### ii) Locus of Control

The Locus of Control is a 13 item questionnaire developed by Rotter [4]. It measures generalized expectancies for internal versus external control of reinforcement. Scores range from 0 to 13. A low score indicates an internal control while a high score indicates external control.

#### iii) Loneliness

The measure of loneliness was adapted from a 6-item scale for Overall, Emotional and Social Loneliness [5]. The items are measured on a 6-point Likert Scale ranging from 'very strongly disagree' (1) to 'very strongly agree' (6). A high score indicates higher loneliness.

#### iv) Online Flow Experience

The measure of online flow experience was adapted from Srivastava, et al [17] it is a three-item scale where the items are measured on a 6-point Likert Scale ranging from 'very strongly disagree' (1) to 'very strongly agree' (6). A high score indicates higher online flow experience.

#### v) Depression

Depression was measured by Zung Self-Rating Depression Scale [26] to assess the level of depression for individuals. It is a self administered 20-item scale. There are ten positively worded and ten negatively worded questions. The items are measured on a 6-point Likert Scale ranging from 'never' (1) to 'always' (6). A higher score indicates higher level of depression.

#### vi) Satisfaction with Life

The measure of satisfaction with life, Satisfaction with Life Scale (SWLS) was developed by Diener et al. [14] to assess specific to a particular domain of life. SWLS is a global measure of life satisfaction. The SWLS consists of 5-items that are completed by the individual whose life satisfaction is being measured. The items are measured on a 6-point Likert Scale ranging from 'very strongly disagree' (1) to 'very strongly agree' (6). A high score indicates higher life satisfaction.

#### C. Procedure

Permission for participation of the engineering students was obtained from the respective head of the various technical institutions. The students voluntarily participated in the study.

There was a guarantee of confidentiality that their identity would be anonymous in the completion of the questionnaire. The study was carried out in two phases. In the first phase of the study, the data were collected using a questionnaire which measured the independent variables and dependent variables. After the first phase was over, and before the second phase, the participants were asked to do network navigation for at least three to four hours a day for a period of one month. During that time, they were asked to browse their favorite websites for which they were provided incentives.

Then after one month, the same participants were tested for the second phase of the study. The data were collected using a questionnaire measuring online flow experience and all the dependent variables.

#### D. Statistical Analysis

To test the proposed framework empirically, analyses was done using regression analysis to determine the relationship between extraversion-introversion, locus of control, loneliness, online flow experience, depression and satisfaction with life. It tested the significant relationships and differences for the main effects and mediating effects. These analyses were carried out using SPSS v. 18.

### VIII. RESULTS AND DISCUSSION

In this section, we examine the results of the model estimation and draw conclusions regarding the relative strength of each of these hypothesized effects.

#### A. Main Effects

To study the relationship between independent variable and dependent variables, regression analysis is used.  $H_{1.1}$  deals with the main effects of extraversion-introversion on depression,  $H_{1.2}$  deals with the main effects of locus of control on depression and  $H_{1.3}$  deals with the main effects of loneliness on depression.

The regression equations to test the effect of extraversion-introversion, locus of control and loneliness on depression are:

$$Dep = \beta_0 + \beta_1 EI$$

$$Dep = \beta_0 + \beta_1 LOC$$

$$Dep = \beta_0 + \beta_1 Lon$$

Where,  $\beta$  = Regression Coefficient, Dep = Depression, EI = Extraversion-Introversion, LOC = Locus of Control, Lon = Loneliness

TABLE I  
REGRESSION ANALYSIS TO MEASURE THE EFFECT OF EXTRAVERSION-INTROVERSION, LOCUS OF CONTROL AND LONELINESS ON DEPRESSION

Variable	B	SE (B)	$\beta$	$R^2$	$\Delta R^2$	F	t	Tolerance
$Dep = \beta_0 + \beta_1 EI$								
EI	-.931	.036	-.931	.867	.867*	654.241*	-25.578*	1.000
$Dep = \beta_0 + \beta_1 LOC$								
LOC	.938	.035	.938	.879	.879*	726.943*	26.962*	1.000
$Dep = \beta_0 + \beta_1 Lon$								
Lon	.965	.026	.965	.931	.931*	1358.662*	36.860*	1.000

N=102, \*p<.05, Dep=Depression, EI=Extraversion-Introversion, LOC=Locus of Control, Lon=Loneliness

Table I exhibits the results of regression analysis for extraversion-introversion, locus of control and loneliness. As a determinant of depression, scores on extraversion-introversion accounted for 87% of variance ( $\Delta R^2 = .867$ ,  $F = 654.241$ ,  $t = -25.578$ ,  $p < .05$ ). Extraversion has a negative effect on depression as  $\beta = -.931$ .

Therefore, the hypothesis is accepted. Loneliness has a positive effect on depression as  $\beta = .965$ . Therefore, the hypothesis is accepted. These results support the hypotheses  $H_{1.1}$ ,  $H_{1.2}$  and  $H_{1.3}$ .

$H_{2.1}$  deals with the main effects of extraversion-introversion on satisfaction with life;  $H_{2.2}$  deals with the main effects of locus of control on satisfaction with life and  $H_{2.3}$  deals with the main effects of loneliness on satisfaction with life.

The regression equations to test the effect of extraversion-introversion, locus of control and loneliness on satisfaction with life are:

$$SL = \beta_0 + \beta_1 EI$$

$$SL = \beta_0 + \beta_1 LOC$$

$$SL = \beta_0 + \beta_1 Lon$$

where,  $\beta$  = Regression Coefficient, SL = Satisfaction with Life, EI = Extraversion-Introversion, LOC = Locus of Control, Lon = Loneliness

TABLE II

REGRESSION ANALYSIS TO MEASURE THE EFFECT OF EXTRAVERSION-INTROVERSION, LOCUS OF CONTROL AND LONELINESS ON SATISFACTION WITH LIFE

Variable	B	SE (B)	$\beta$	R <sup>2</sup>	$\Delta R^2$	F	t	Tolerance
$SL = \beta_0 + \beta_1 EI$								
EI	.925	.038	.925	.855	.855*	589.378*	24.277*	1.000
$SL = \beta_0 + \beta_1 LOC$								
LOC	-.936	.035	-.936	.876	.876*	706.311*	-26.577*	1.000
$SL = \beta_0 + \beta_1 Lon$								
Lon	-.956	.029	-.956	.914	.914*	1064.392*	-32.625*	1.000

N=102, \*p&lt;.05, SL=Satisfaction with Life, EI=Extraversion-Introversion, LOC=Locus of Control, Lon=Loneliness

Table II shows the results main effects of the regression analysis for the dependent variable, satisfaction with life. As a determinant of satisfaction with life, scores on extraversion-introversion accounted for 85% of variance ( $\Delta R^2 = .855$ ,  $F = 589.378$ ,  $t = 24.277$ ,  $p < .05$ ). Extraversion has a positive effect on satisfaction with life as  $\beta = .925$ . Therefore, the hypothesis is accepted. Locus of control also has an impact on satisfaction with life as the results are significant. Scores on locus of control accounted for 88% of variance ( $\Delta R^2 = .876$ ,  $F = 706.311$ ,  $t = -26.577$ ,  $p < .05$ ). External locus of control has a negative effect on satisfaction with life as  $\beta = -.936$ . Loneliness scores accounted for 91% of variance ( $\Delta R^2 = .914$ ,  $F = 1064.392$ ,  $t = -32.625$ ,  $p < .05$ ). Loneliness has a negative effect on satisfaction with life as  $\beta = -.956$ . Therefore, the hypothesis is accepted. These results support the hypotheses  $H_{2.1}$ ,  $H_{2.2}$  and  $H_{2.3}$ .

$H_{3.1}$  deals with the main effects of extraversion-introversion on online flow experience,  $H_{3.2}$  deals with the main effects of locus of control on online flow experience and  $H_{3.3}$  deals with the main effects of loneliness on online flow experience. Scores for online flow experience was collected in the second phase of the study.

The regression equations to test the effect of extraversion-introversion, locus of control and loneliness on online flow experience are:

$$FI = \beta_0 + \beta_1 EI$$

$$FI = \beta_0 + \beta_1 LOC$$

$$FI = \beta_0 + \beta_1 Lon$$

Where,  $\beta$  = Regression Coefficient, FI = Online Flow Experience, EI = Extraversion-Introversion, LOC = Locus of Control, Lon = Loneliness

TABLE III

REGRESSION ANALYSIS TO MEASURE THE EFFECT OF EXTRAVERSION-INTROVERSION, LOCUS OF CONTROL AND LONELINESS ON ONLINE FLOW EXPERIENCE

Variable	B	SE (B)	$\beta$	R <sup>2</sup>	$\Delta R^2$	F	t	Tolerance
$FI = \beta_0 + \beta_1 EI$								
EI	-.641	.077	-.641	.411	.411*	69.735*	-8.351*	1.000
$FI = \beta_0 + \beta_1 LOC$								
LOC	.606	.080	.606	.367	.367*	57.987*	7.615*	1.000
$FI = \beta_0 + \beta_1 Lon$								
Lon	.646	.076	.646	.417	.417*	71.472*	8.454*	1.000

N=102, \*p&lt;.05, FI=Online Flow Experience, EI=Extraversion-Introversion, LOC=Locus of Control, Lon=Loneliness

Table III exhibits the results of regression analysis for extraversion-introversion, locus of control and loneliness for the dependent variable, online flow experience. As a determinant of online flow experience, scores on extraversion-introversion accounted for 41% of variance ( $\Delta R^2 = .411$ ,  $F = 69.735$ ,  $t = -8.351$ ,  $p < .05$ ). Extraversion has a negative effect on online flow experience as  $\beta = -.641$ . Therefore, the hypothesis is accepted. Locus of control also has an impact on online flow experience as the results are significant.

Scores on locus of control accounted for 37% of variance ( $\Delta R^2 = .367$ ,  $F = 57.987$ ,  $t = 7.615$ ,  $p < .05$ ). External locus of control has a positive effect on online flow experience as  $\beta = .606$ . Loneliness scores accounted for 42% of variance ( $\Delta R^2 = .417$ ,  $F = 71.472$ ,  $t = 8.454$ ,  $p < .05$ ). Loneliness has a positive effect on online flow experience as  $\beta = .646$ . Therefore, the hypothesis is accepted. These results support the hypotheses  $H_{3.1}$ ,  $H_{3.2}$  and  $H_{3.3}$ .

### B Mediating Effects

$H_{4.1}$  deals with the mediating effects of online flow experience on the relationship between extraversion-introversion and depression.  $H_{4.2}$  deals with the mediating effects of online flow experience on the relationship between locus of control and depression.  $H_{4.3}$  deals with the mediating effects of online flow experience on the relationship between loneliness and depression. To test the mediating effect of online flow experience on the relationship between extraversion-introversion, locus of control and loneliness, and depression, the following regression equations are employed:

For Extraversion-Introversion  $\longrightarrow$  Online Flow Experience  $\longrightarrow$  Depression

$$Dep = \beta_0 + \beta_1 EI$$

$$FI = \beta_0 + \beta_2 EI$$

$$Dep = \beta_0 + \beta_3 EI + \beta_4 FI$$

For Locus Of Control → Online Flow Experience →  
Depression

$$Dep = \beta_0 + \beta_1 LOC$$

$$Fl = \beta_0 + \beta_2 LOC$$

$$Dep = \beta_0 + \beta_3 LOC + \beta_4 Fl$$

For Loneliness → Online Flow Experience →  
Depression

$$Dep = \beta_0 + \beta_1 Lon$$

$$Fl = \beta_0 + \beta_2 Lon$$

$$Dep = \beta_0 + \beta_3 Lon + \beta_4 Fl$$

Where,  $\beta$  = Regression Coefficient, Dep = Depression, EI = Extraversion-Introversion, LOC = Locus of Control, Lon = Loneliness, Fl = Online Flow Experience

TABLE IV  
REGRESSION ANALYSIS SHOWING THE MEDIATING EFFECTS OF EXTRAVERSION-INTROVERSION, LOCUS OF CONTROL, LONELINESS AND ONLINE FLOW EXPERIENCE ON DEPRESSION

Variables	B	SE (B)	$\beta$	$R^2$	$\Delta R^2$	F	t	Tolerance
Depression								
$Dep = \beta_0 + \beta_1 EI$ (I)								
EI	-.928	.037	-.928	.861	.861*	618.746*	-24.875*	1.000
$Fl = \beta_0 + \beta_2 EI$ (II)								
EI	-.641	.077	-.641	.411	.411*	69.735*	-8.351*	1.000
$Dep = \beta_0 + \beta_3 EI + \beta_4 Fl$ (III)								
EI	-.840	.047	-.840	.872	.872*	336.946*	-17.927*	.589
Fl	.137	.047	.137				2.921*	.589
Depression								
$Dep = \beta_0 + \beta_1 LOC$ (I)								
LOC	.941	.034	.941	.886	.886*	778.284*	27.898*	1.000
$Fl = \beta_0 + \beta_2 LOC$ (II)								
LOC	.606	.080	.606	.367	.367*	57.987*	7.615*	1.000
$Dep = \beta_0 + \beta_3 LOC + \beta_4 Fl$ (III)								
LOC	.841	.039	.841	.904	.904*	463.881*	21.434*	.633
Fl	.166	.039	.166				4.231*	.633
Depression								
$Dep = \beta_0 + \beta_1 Lon$ (I)								
Lon	.965	.026	.965	.932	.932*	1365.845*	36.957*	1.000
$Fl = \beta_0 + \beta_2 Lon$ (II)								
Lon	.646	.076	.646	.417	.417*	71.472*	8.454*	1.000
$Dep = \beta_0 + \beta_3 Lon + \beta_4 Fl$ (III)								
Lon	.908	.033	.908	.936	.936*	729.367*	27.354*	.583
Fl	.089	.033	.089				2.696*	.583

The regression analysis is used for testing the mediating effects of online flow experience on extraversion-introversion, locus of control and loneliness, and depression. The results of regression analysis are shown in Table 4. The results show that online flow experience mediated the relationship between extraversion-introversion, locus of control and loneliness, and depression. The analysis is done in three parts i.e. one for extraversion-introversion, another for locus of control and the last one for loneliness. Results indicated that extraversion-introversion predicted depression ( $\beta = -.928$ ;  $p < 0.05$ ; I) and online flow experience ( $\beta = -.641$ ;  $p < 0.05$ ; II).

Equation III for depression was also significant (EI  $\beta = -.840$ ;  $p < 0.05$  and Fl  $\beta = .137$ ;  $p < 0.05$ ).  $R^2 = .872$  of equation (III) for extraversion-introversion is greater than  $R^2 = .861$  of equation (I). Hence, online flow experience significantly mediated the relationship between extraversion-introversion and depression ( $H_{4.1}$  accepted). Similarly locus of control predicted depression ( $\beta = .941$ ;  $p < 0.05$ ; I) and online flow experience ( $\beta = .606$ ;  $p < 0.05$ ; II). Equation III for depression was also significant (LOC  $\beta = .841$ ;  $p < 0.05$  and Fl  $\beta = .166$ ;  $p < 0.05$ ) and  $R^2 = .904$  of equation (III) is higher than the  $R^2 = .886$  of equation (I).

Hence, online flow experience significantly mediated the relationship between locus of control and depression ( $H_{4.2}$  accepted). For loneliness, results indicated that loneliness predicted depression ( $\beta = .965$ ;  $p < 0.05$ ; I) and online flow experience ( $\beta = .646$ ;  $p < 0.05$ ; II). Equation III for depression was also significant (Lon  $\beta = .908$ ;  $p < 0.05$  and Fl  $\beta = .089$ ;  $p < 0.05$ ).  $R^2 = .936$  of equation (III) for extraversion-introversion is greater than  $R^2 = .932$  of equation (I). Hence, online flow experience significantly mediated the relationship between loneliness and depression. Therefore hypothesis  $H_{4.3}$  is accepted.

$H_{4.4}$  deals with the mediating effects of online flow experience on the relationship between extraversion-introversion and satisfaction with life.  $H_{4.5}$  deals with the mediating effects of online flow experience on the relationship between locus of control and satisfaction with life.  $H_{4.6}$  deals with the mediating effects of online flow experience on the relationship between loneliness and satisfaction with life.

To test the mediating effect of online flow experience on the relationship between extraversion-introversion, locus of control and loneliness, and satisfaction with life, the following regression equations are employed:

For Extraversion-Introversion → Online Flow Experience  
→ Satisfaction with Life

$$SL = \beta_0 + \beta_1 EI$$

$$FI = \beta_0 + \beta_2 EI$$

$$SL = \beta_0 + \beta_3 EI + \beta_4 FI$$

For Locus Of Control → Online Flow Experience  
→ Satisfaction with Life

$$SL = \beta_0 + \beta_1 LOC$$

$$FI = \beta_0 + \beta_2 LOC$$

$$SL = \beta_0 + \beta_3 LOC + \beta_4 FI$$

For Loneliness → Online Flow Experience → Satisfaction with Life

$$SL = \beta_0 + \beta_1 Lon$$

$$FI = \beta_0 + \beta_2 Lon$$

$$SL = \beta_0 + \beta_3 Lon + \beta_4 FI$$

Where,  $\beta$  = Regression Coefficient, SL = Satisfaction with life, EI = Extraversion-Introversion, LOC = Locus of Control, Lon = Loneliness, FI = Online Flow Experience

TABLE V  
REGRESSION ANALYSIS SHOWING THE MEDIATING EFFECTS OF EXTRAVERSION-INTROVERSION, LOCUS OF CONTROL, LONELINESS AND ONLINE FLOW EXPERIENCE ON SATISFACTION WITH LIFE

Variables	B	SE (B)	$\beta$	R <sup>2</sup>	$\Delta R^2$	F	t	Tolerance
Satisfaction with Life $SL = \beta_0 + \beta_1 EI$ (I)								
EI	.885	.047	.885	.783	.783*	361.054*	19.001*	1.000
$FI = \beta_0 + \beta_2 EI$ (II)								
EI	-.641	.077	-.641	.411	.411*	69.735*	-8.351*	1.000
$SL = \beta_0 + \beta_3 EI + \beta_4 FI$ (III)								
EI	.988	.059	.988	.798	.798*	196.087*	16.813*	.589
FI	.161	.059	.161				2.745*	.589
Satisfaction with Life $SL = \beta_0 + \beta_1 LOC$ (I)								
LOC	-.899	.044	-.899	.809	.809*	423.541*	-20.580*	1.000
$FI = \beta_0 + \beta_2 LOC$ (II)								
LOC	.606	.080	.606	.367	.367*	57.987*	7.615*	1.000
$SL = \beta_0 + \beta_3 LOC + \beta_4 FI$ (III)								
LOC	-.969	.054	-.969	.817	.817*	221.517*	-17.950*	.633
FI	.115	.054	.115				2.129*	.633
Satisfaction with Life $SL = \beta_0 + \beta_1 Lon$ (I)								
Lon	-.918	.040	-.918	.842	.842*	534.354*	-23.116*	1.000
$FI = \beta_0 + \beta_2 Lon$ (II)								
Lon	.646	.076	.646	.417	.417*	71.472*	8.454*	1.000
$SL = \beta_0 + \beta_3 Lon + \beta_4 FI$ (III)								
Lon	-1.051	.048	-1.051	.867	.867*	323.265*	-21.916*	.583
FI	.206	.048	.206				4.304*	.583

The regression analysis is used for testing the mediating effects of online flow experience on extraversion-introversion, locus of control and loneliness, and satisfaction with life. The results of regression analysis are shown in Table 5. The results show that online flow experience mediated the relationship between extraversion-introversion, locus of control and loneliness, and satisfaction with life. The analysis is done in three parts i.e. one for extraversion-introversion, another for locus of control and the last one for loneliness. Results indicated that extraversion-introversion predicted satisfaction with life ( $\beta = .885$ ;  $p < 0.05$ ; I) and online flow experience ( $\beta = -.641$ ;  $p < 0.05$ ; II). Equation III for satisfaction with life was also significant (EI  $\beta = .988$ ;  $p < 0.05$  and FI  $\beta = .161$ ;  $p < 0.05$ ).  $R^2 = .798$  of equation (III) for extraversion-introversion is greater than  $R^2 = .783$  of equation (I). Hence, online flow experience significantly mediated the relationship between extraversion-introversion and satisfaction with life ( $H_{4.4}$  is accepted).

Similarly locus of control predicted satisfaction with life ( $\beta = -.899$ ;  $p < 0.05$ ; I) and online flow experience ( $\beta = .606$ ;  $p < 0.05$ ; II).

Equation III for satisfaction with life was also significant (LOC  $\beta = -.969$ ;  $p < 0.05$  and FI  $\beta = .115$ ;  $p < 0.05$ ) and  $R^2 = .817$  of equation (III) is higher than the  $R^2 = .809$  of equation (I). Hence, online flow experience significantly mediated the relationship between locus of control and satisfaction with life ( $H_{4.5}$  is accepted). For loneliness, results indicated that loneliness predicted satisfaction with life ( $\beta = -.918$ ;  $p < 0.05$ ; I) and online flow experience ( $\beta = .646$ ;  $p < 0.05$ ; II). Equation III for satisfaction with life was also significant (Lon  $\beta = -1.051$ ;  $p < 0.05$  and FI  $\beta = .206$ ;  $p < 0.05$ ).  $R^2 = .867$  of equation (III) for extraversion-introversion is greater than  $R^2 = .842$  of equation (I). Hence, online flow experience significantly mediated the relationship between loneliness and satisfaction with life ( $H_{4.6}$  is accepted).

## IX. CONCLUSION

Our day-to-day living has been profoundly influenced by technologies such as Internet. Most of the people choose to live in a virtual world, a world of computers and internet, losing touch with the real world and its problems.



So, the purpose of the present research was to examine whether online flow experience mediated the relationship between extraversion-introversion, locus of control and loneliness, and depression and satisfaction with life. This study has also contributed to the existing body of research. It provides empirical evidence to show that extraversion and internal locus of control have a negative effect on depression and online flow experience, and a positive effect on satisfaction with life. On the contrary, introversion, external locus of control and loneliness have a positive effect on depression and online flow experience, and a negative effect on satisfaction with life. In other words, if an individual is an introvert person having external locus of control and high degree of loneliness, he/she suffers from depression and is dissatisfied with his/her life. These individuals have high online flow experience compared to their counterparts. The introverts who are submissive and could not communicate with the real world spent more time online browsing their favorite websites. The individuals with external locus of control who always believe in fate, chance and luck involved more in network navigation as they thought that they are incapable of controlling the outcomes. The online behavior of lonely individuals was enhanced. They made more friends online rather than in the real world. They used the Internet to relieve their social isolation. As these individuals browsed the net for longer period of time, they experience flow in the web. This online flow experience lowers down their level of depression and their satisfaction with life is enhanced as they identify themselves on the net.

#### X. LIMITATION AND FUTURE RESEARCH

In this study, the interaction effects that may exist between extraversion-introversion, locus of control and loneliness were not examined. These relationships may have significant impacts on the dependent variables.

Future research should take into account the limitation of this study in order to advance our knowledge. Studies could explore interrelationship between the independent variables and the impact on life in cyberspace. Further research should also take into account additional variables, to get a richer insight into the online behavior of individuals. Personality variables life self-esteem and self efficacy should be studied to see their effects on dependent variables and online flow experience.

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