**Positive mental health as a predictor of problematic Internet and Facebook use in adolescents and young adults**

**Brief Article**

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**Abstract**

**Recent research on Problematic Internet Use and Problematic Facebook Use (PIU and PFU) has focused on the idea that people who engage in PIU or PFU are more likely to present with mental health problems. The goal of the present study was to examine the contribution of positive mental health (PMH) to PIU and PFU among adolescents and young adults.** A total of 1927 Italian adolescents and young adults participated in the study. Structural equation modeling showed that **PMH is negatively linked to both PIU and PFU, indicating that PMH may be an important antecedent for both PIU and PFU among adolescents and young adults.** In conclusion, dimensions of PMH may be taken into account by researchers and educational practitioners in preventing both PIU and PFU.

**Keywords:** Problematic Internet use; Problematic Facebook Use; Positive Mental Health; Adolescence; young adults.

**1. Introduction**

*1.1. Problematic Internet Use*

Over 3 billion people use the Internet worldwide (International Telecommunications Union 2015) for a variety of purposes, including sharing information, shopping, and socialising. Internet usage can be beneficial for the user; for example, a study by Cotten, Anderson, and McCullough (2013) of older adults showed Internet use decreased isolation and loneliness. However, concerns have arisen regarding a phenomenon variously termed problematic Internet use, Internet addiction, pathological Internet use, or Internet dependence (Spada 2014).

Problematic Internet Use (PIU) is a widely accepted term that describes an inability to control Internet use to the degree that it begins to cause harm to daily life (e.g., Spada 2014). A variety of terms have been employed to describe PIU, including “pathological internet use” (Davis 2001), “Internet dependence” (Scherer 1997), and “compulsive Internet use” (Meerkerk 2009). Because the Internet is a medium, rather than an activity, a distinction has been drawn between Internet use as a problem in itself and specific problematic activities that the Internet makes available (Griffiths et al. 2016). For example, problematic online gambling could be classed as compulsive gambling, not Internet addiction (Starcevic 2013). Similarly, problematic online shopping and problematic sexual behaviour could be excluded in a discussion of problematic Internet use; rather, these behaviours could be classed within already-established addictions/compulsive behaviours frameworks with widely accepted measuring metrics and evidence-based methods of treatment (Griffiths et al. 2016). It is also important to note that technology continues to change, so that the agreement on a definition or measure of PIU is becoming increasingly difficult.

Despite the widespread debate on the nature of PIU, scholars have been showing an increasing interest in attempting to assess and measure this construct (e.g. Siciliano et al. 2015; Lortie and Guitton 2013; Young 1998). For the purposes of the current study, the Short Problematic Internet Use Test (SPIUT), developed by Siciliano and colleagues (2015), was used. The SPIUT has been considered a particularly valuable tool because it was developed taking into account the main existing perspectives on this topic, such as the conceptualization of PIU as a behavioural addiction (Meerkerk et al. 2009), as well as key features of PIU which are seen to affect young people’s social, cognitive, and physical functioning, including loss of sleep due to Internet use late at night, compulsive symptoms, negligence of studying and real life social activities, and excessive time spent online (Siciliano et al. 2015).

Numerous previous studies have involved young people such as school aged or university students, for two key reasons: first, adolescents and young adults are more likely to use the Internet than either younger or older people (Office for National Statistics 2016). Second, adolescents are more likely to show addiction symptoms or impulsive/compulsive behaviour than other groups (e.g., Bernheim et al. 2015), and young adults tend to use the Internet extensively for a wide range of reasons, such as seeking information, passing time, and social connection, which expose them to higher risk of developing PIU (e.g. Ko et al. 2009). For this reason, adolescents and young adults have been included as the target groups and they have been compared in the current study.

*1.2. Problematic Facebook Use*

As mentioned above, there are compulsive behaviours that occur on and off the Internet and this can make it difficult to define PIU. Because of this, many researchers have begun to study problematic social media use, specifically Problematic Facebook Use (PFU), as this is a purely digital and *social* in nature compulsion. Whereas the majority of people tend to use Facebook wisely, and to experience positive consequences for well-being due to Facebook use (e.g. Ellison et al. 2007; Lenzi et al. 2015), concerns have arisen about the maladaptive Facebook use patterns displayed by a minority of young users (Marino et al. 2016a; Kuss and Griffiths, 2011). From a theoretical point of view, PFU falls in one of the five PIU categories, in accordance with the classification of different types of problematic behaviours on the Internet proposed by Young (1999), and later elaborated by Kuss and Griffiths (2011). Specifically, because of the main motivation to use Facebook to establish and maintain relationships with other people, PFU has been considered as a *cyber-relationship addiction* developed on the Internet (for a review on this topic see Kuss and Griffiths 2011). Form this viewpoint, PFU is characterized by its intrinsic *social* nature that differentiates PFU from other online addictions, such as behaviours belonging to the *net compulsions* category (i.e. online gambling and online shopping addiction; Young 1999). These different behavioural addictions appear to be characterized, for example, by the need to achieve individual rewards (e.g. Gaher et al. 2015; Rose and Dhandayudham 2014) rather than specific *social* purposes.

Therefore, as a problematic behaviour occurring on the Internet, PFU has been linked to PIU in several studies. For example, a study by Kittinger and colleagues (2012) using a variety of self-report metrics found that the use of Facebook may contribute to the severity of symptoms associated with Internet addiction. Studies about PFU also strongly corroborate one of the widely held assumptions about PIU – that people who have a tendency toward PIU have a preference for online social interaction rather than face-to-face interaction (e.g., Caplan 2005). A study by Orr and colleagues (2009) showed that shyness was significantly positively correlated with the amount of time spent on Facebook.

The current study uses Caplan’s Generalized Problematic Internet Use model (2010) adapted to the context of Facebook use (Marino et al. 2016a). This model has several key concepts: it includes a preference for online social interaction, using Facebook for mood regulation and mitigating the potential stress of face-to-face interaction, deficient self-regulation of Facebook use (diminished self-control), cognitive preoccupation (obsessive thoughts about Facebook), and compulsive Facebook use.

*1.3. The role of positive mental health in PIU and PFU among adolescents and young adults*

Whereas associations between PIU/PFU, negative mental health, and psychopathology have been broadly investigated (see Ho et al. 2014 for a meta-analysis; Koc and Gulyagci, 2013), recently scholars and practitioners have been paying increasing attention to positive mental health (PMH). PMH has been defined as the combination of psychological well-being, happiness, and social functioning, and thus more than the mere absence of mental illness (Gilmour 2014). PMH indicators have been also considered as protective factors against problematic behaviours among young people (Jones et al. 2013). Specifically, it has been found that high levels of PMH may reduce the risk to develop depression in adolescence (Pennel et al. 2015) and to experience psychological disorders among college students (Jones et al. 2013). From this perspective, the impact of PMH on two new potential psychological disorders like PIU and PFU might be worthy of investigation.

Previous studies have indicated that there is a negative association between PIU and some indicators of PMH, such as subjective happiness and vitality. For example, Akın (2012) found the correlations among these variables to range from -.35 to -.51 in a sample of university students. In contrast, Ha and Hwang (2014) reported that adolescents who experienced subjective happiness were at higher risk to be addicted to the Internet. With regards to the link between PFU and PMH, Satici and Uysal (2015) used four well-being dimensions – life satisfaction, subjective vitality, flourishing, and subjective happiness – and found that all four were negatively associated with PFU in a sample of university students. That is, the higher the participant scored in those four dimensions, the less likely he/she was to exhibit PFU, and vice versa. Specifically, the effect sizes reported in different studies ranged from -.03 for the association between satisfaction with life and PFU in a sample ranging from 12 to 58 years (Błachnio et al. 2016) to -.32 for the link between happiness and PFU (Satici and Uysal 2015) among university students. To our knowledge, most of the studies have focused on young adults only (e.g. Elphinston and Noller 2011; Uysal et al. 2013) and no studies have specifically investigated the relationship between PMH and PFU among adolescents. Moreover, from a theoretical point of view (Sugerman, 2003), adolescence and adulthood are two different developmental stages with specific developmental tasks – for example, establishing peer relationships and becoming more self-sufficient for adolescents (Bee, 1994), and professional choices and romantic relationships for young adults (Rice, 1995). Therefore, the transition from one stage to the subsequent constitute a crucial moment characterized by different levels of perceived well-being and behavioural patterns (Sugerman, 2003). In this view, it could be supposed that adolescents and young adults might tend to differ in the way they engage in Internet use. As an example, Griffiths sustained that adolescents tend to have more free time to use Internet applications and, thus, are more likely to develop a stronger attachment to the medium than older people who have to deal with more responsibilities (Griffiths, Davies, & Chappell, 2004).

Beyond happiness and life satisfaction, another recognized model to operationalize PMH is the “covitality model” (Furlong et al. 2013), developed for measuring “the synergistic effect of positive mental health resulting from the interplay among multiple positive-psychological building blocks” (Furlong et al. 2014, p.3). Covitality looks at four domains: (i) belief-in-self, which refers to beliefs about the self in terms of self-efficacy, self-awareness, and persistence, drawing from the social-emotional learning literature; (ii) belief-in-others, which refers to social support and adjustment in terms of school support, peer support, and family coherence and it is grounded in the resilience literature; (iii) emotional competence, in terms of emotional regulation skills, empathy, and behavioural regulation and control, according to the social-emotional learning literature; and (iv) engaged living, which comprises positive psychological constructs, including gratitude, zest, and optimism (Renshaw et al. 2014). This study uses this approach because these four domains are taken together to form the overlying concrete metric called “covitality”. Hence this construct is used as a proxy for the measure of PMH among young people as it indicates the overall level of positive mental, emotional, and social health, reflecting all the dimensions included in the definition of PMH (Marino et al. 2016b; Gilmour 2014).

*1.4.Aim of the Current Study*

As mentioned above, several studies have investigated the relationship between different aspects of well-being and PIU/PFU. To our knowledge, no attempt has been made to specifically link PMH to PIU/PFU among adolescents and young adults simultaneously. Therefore, the first aim of the current study is to test a model designed to assess the effect of PMH, operationalized as “covitality”, on both PIU and PFU among adolescents and young adults. It is important to note that there is no consensus on whether mental health is the cause or the consequence for PIU/PFU (e.g. Błachnio et al. 2015). Much research has focused on the idea that people who suffers from PIU or PFU are more likely to have co-occurring psychopathology. For example, a study by Aboujaoude and colleagues (2006) found that “individuals with problematic Internet use are highly likely to suffer from mood and anxiety disorders”. On the other hand, other studies (e.g. Koc and Gualaci 2013) sustain the idea that depression and anxiety may be positive predictors for PFU.

However, most people are “normal” – that is, they do not suffer from diagnosed psychological problems, and have average or high levels of covitality (You et al. 2014). Therefore, the current study takes a large sample from a “normal”, (i.e., non-clinical) population of young people, to test whether PMH may constitute a protective factor for both PIU and PFU among adolescents and young adults. For the purpose of this study, the perspective of PMH as predictor of PIU/PFU has been taken because it appears more practical from a preventive point of view (see paragraph 4). Even if the cross-sectional nature of the study would not allow definitive conclusions about the direction of this relationship, it is hypothesized that high levels of covitality might be associated with a lower probability of using the Internet and Facebook in a problematic manner.

Moreover, adolescents and young adults have been two of the most targeted groups in previous studies (e.g. Ko et al. 2009). Nevertheless, literature shows that there is a wide range of different measures used to assess PMH across the two groups (e.g. happiness or satisfaction with life) covering the definition of PMH only partially (Gilmour 2014). Furthermore, some results appear to be inconsistent, and there is a lack of evidence for the association between PMH and PFU among adolescents (see paragraph 1.3). Taken together, these facts indicate the need to deepen the understanding of such relationships among both adolescents and young adults. Because adolescents have different developmental demands compared to young adults (e.g. Ko et al. 2009), and they may tend to display different patterns of Internet and Facebook use and well-being (e.g. Marino et al. 2016a; Marino et al. 2016c; Jones et al. 2013), it would be interesting to compare the associations between PMH and PIU/PFU across the two groups. Indeed, there is a lack of studies assessing the potential differences or similarities in the link between PMH and PIU/PFU among adolescents and young adults using a sole measurement method. Therefore, as a secondary aim, this study compared such relationships among the two groups.

**2. Method**

*2.1. Participants*

Participants were 2,180 Italian adolescents and young adults (43% males, 57% females, Mage 19.12 years, SD=2.68, range 14-29) recruited from a variety of secondary public schools in southern and northern Italy, and at the University of Padova (Italy). The heads of the schools and parents gave their written consent for adolescents to complete the study, while students of age provided their own consent. Anonymous questionnaires were filled in during regularly scheduled classes or university classes, and participation was voluntary. Only participants with a Facebook account and participants who completed the entire batch of questionnaires were included in the study; the final sample included 1927 Italian adolescents (52.7%) and young adults (47.3%) (41.1% boys, 58.9% girls, Mage=19.30 years, SD=2.63, range 14-29 years).

*2.3. Self-Report Instruments*

*Problematic Internet Use.* PIU was assessed with the Short Problematic Internet Use Test (SPIUT), validated for Italian adolescents (Siciliano et al. 2015). The scale comprised six items rated on a five-point scale (1=“never” to 5=“very often”). Items covered several criteria for PIU described by Meerkerk and colleagues (2009): loss of control (e.g., “Do you find that you are staying online longer than you intended?”); preoccupation/salience (e.g., “Have you neglected homework because you are spending more time online?”); conflict (“Have you been reprimanded by your parents or your friends about how much time you spend online?”); and withdrawal symptoms and coping (“Do you feel nervous when you are offline and is that feeling relieved when you do go back online?”). Higher scores on the scale indicate higher levels of PIU. The Cronbach’s alpha for the SPIUT was .74 (95% CI .72-.76) in the present study.

*Problematic Facebook Use.* The Problematic Facebook Use Scale (PFUS; Marino et al., 2016a) comprised fifteen items slightly adapted from the Generalized Problematic Internet Use 2 scale developed and validated by Caplan (2010). In this adaptation, the word “Internet” was replaced with the word “Facebook” when necessary. Participants were asked to rate the extent to which they agreed with each of the fifteen items on an 8-point scale (from (1) “definitely disagree” to (8) “definitely agree”). The scale included five subscales, of three items each: (i) preference for online social interaction (e.g., “I prefer online social interaction over face-to-face communication”); (ii) mood regulation (three items, e.g., “I have used Facebook to make myself feel better when I was down”); (iii) cognitive preoccupation (three items, e.g., “I would feel lost if I was unable to access Facebook”); (iv) compulsive use (three items, e.g., “I have difficulty controlling the amount of time I spend on Facebook”); (v) and negative outcomes (three items, e.g., “My Facebook use has created problems for me in my life”). Taken together, these factors give an overall index score for the construct of PFU. Higher scores on the scale indicate higher levels of PFU. The Cronbach’s alpha for the scale was: .87 (95% CI .86-.88).

*Positive Mental Health.* Positive Mental Health (PMH) was assessed using the Social and Emotional Health Survey (SEHS; Furlong et al. 2013). The SEHS has 12 subscales, each of which is assessed by three items and represent a PMH construct that contributes to four positive mental health domains. The first domain, belief-in-self, is comprised of three subscales: self-efficacy, self-awareness, and persistence. The second domain, belief-in-others, consists of three subscales: school support, peer support, and family coherence. The third domain, emotional competence, consists of three subscales: emotional regulation, empathy, and behavioural regulation. The last domain, engaged living, is comprised of three subscales: gratitude, zest, and optimism. The questionnaire contains 36 items rated on a 4-point or 5-point scale (from (1) “not at all true” to (4) “very much true” for belief-in-self and belief-in-others; from (1) “not at all like me” to (4) “very much like me” for emotional competence; from (1) “not at all” to (5) “extremely” for engaged living). Taken together, these factors give an overall index score for the construct of “covitality”. Higher scores indicate higher levels of PMH. The Cronbach’s alpha for the scale was: .89 (95% CI .88-.90).

**2.4. Analyses**

First, the associations between the variables of interest were tested through correlation analyses. Second, the pattern of relationships specified by our theoretical model (presented in Figure 1) was examined through structural equation modelling (SEM) and a Maximum Likelihood method was used to test the model, using the Lavaan package (Rosseel 2012) of the software R (R Core Team 2013). To evaluate the fit of a model, the following criteria are commonly considered: Chi-square (χ2; good fit: non-significant *p-*value); Comparative-Fit Index (CFI; acceptable fit ≥ .90); the goodness-of-fit index (GFI; acceptable fit ≥ .90); and Root Mean Square Error of Approximation (RMSEA; acceptable fit ≤.08) (e.g., Browne and Cudeck, 1993; Hu and Bentler, 1999). **The model was tested including in the SEM the variables of interest: PMH as a latent independent identified by four latent variables made of observed scores; and PFU and PIU as latent dependents made of observed scores. As a first step, the model was tested on the whole sample, and then tested independently for both groups (i.e., adolescents vs. young adults) to establish configural invariance (van de Schoot et al. 2012).** As a second step, a multi-group SEM was performed to examine measurement invariance of the model across groups, as a prerequisite to conducting meaningful between-group comparisons following standard procedures (e.g., Meredith 1993; van de Schoot et al. 2012; Vandenberg and Lance 2000). A hierarchical approach was adopted by successively constraining model parameters and comparing changes in model fit (Steenkamp and Baumgartner 1998). Configural, metric, and scalar models were estimated. Measurement invariance is established when: (i) the change in values for fit indices (ΔCFI, ΔRMSEA) is negligible (that is, ΔCFI smaller than 0.01 and change smaller than .015 in RMSEA; Cheung and Rensvold 2002); and (ii) the multi-group model fit indexes indicate a good fit (Beaujean et al. 2012). Finally, after establishing measurement invariance, equality of the path coefficients across the two groups was tested (Guenole and Brown 2014).

**3. Results**

***3.1. Correlations***

**Table 1 shows the bivariate correlations among the variables of interest included in the model. PIU and PFU were found to be positively correlated. Moreover, covitality was negatively correlated with both PIU and PFU. Finally, females appeared to show slightly higher PIU scores.**

***3.2. SEM Analyses***

**Results of the SEM for the model using the whole sample indicated an adequate fit to the data: χ2(1515)= 6082.746, *p*<.001; CFI=.905, GFI=.899, RMSEA=0.040 [90% CI: .039, .041]. Results shows that PMH negatively predicts both PIU (βSTANDARDIZED= -.28) and PFU (βSTANDARDIZED= -.26).**

Before testing for measurement invariance, the model was estimated separately in both adolescents and young adults. Results (see Table 2) demonstrated that the model fit was adequate to excellent for both age groups (adolescents: **χ**2(1515) = 3717.969, CFI = .904, RMSEA = .038 [**90%** CI: .037-.040]; and young adults: **χ**2(1515) = 3879.577, CFI = .903, RMSEA = .041 [**90%** CI: .041-.043]). Next, measurement invariance of the model was tested on age groups through multi-group analysis (van de Schoot et al. 2012). The fit indices of the unconstrained multi-group model demonstrated the configural invariance of the model across age groups (**χ**2(3030) = 7597.546, CFI=.904, RMSEA=.040 [**90%** CI: .038-.041]), suggesting that the factor structure is similar across age groups (Figure 1). A subsequent metric model testing for invariance of all factor loadings was established. All item loadings were constrained to equality and it did not lead to a significant reduction in model fit (ΔCFI= .002, ΔRMSEA< .000), suggesting that the model assesses similar underlying factors across both adolescents and young adults. All the item intercepts were then constrained across age groups to test for scalar invariance. Results demonstrated that scalar invariance across age groups was confirmed (ΔCFI= .016, ΔRMSEA= .003). Finally, all the regression coefficients were constrained across age groups to test for relational invariance (Guenole and Brown 2014). Results showed that paths for adolescents and young adults are similar (ΔCFI< .000, ΔRMSEA< .000).

**In sum, regarding our main hypotheses on the relationship between PMH, PIU, and PFU, PMH had negative effect on PIU for both adolescents (βSTANDARDIZED= -.36) and young adults (βSTANDARDIZED= -.23). Moreover, PMH had similar negative effect on PFU for both adolescents (βSTANDARDIZED=-.29) and young adults (βSTANDARDIZED= -.24) and the relationship we controlled for between PIU and PFU appears to be similar for the two groups.**

**4. Discussion**

**The goal of the present study was to examine the contribution of PMH to PIU and PFU among adolescents and young adults. Structural equation modelling revealed that PMH is negatively linked to both PIU and PFU, finding effect size in line with previous studies (e.g. Satici and Uysal 2015). Moreover, as expected, PIU and PFU appeared to be strongly associated but not overlapping concepts. These results are consistent with our main hypotheses that low levels of PMH, operationalized as covitality, may be an important antecedent for both PIU and PFU among young people. Specifically, c**ovitality is an indicator of the interplay of several positive psychological indicators for non-clinical youth that represent the counterpart of comorbidity for clinical samples (Furlong et al. 2013). **From this perspective, in our model, covitality may constitute a protective factor for PIU and PFU among youths: that is, the interplay of different positive psychological blocks, such as self-perception, social support, emotional skills, and happiness, may prevent young people from developing problematic behaviours like PIU and PFU.**

**The negative relationship between covitality and PIU may be explained by the idea that, in general, positive emotional well-being is negatively associated with compulsive behaviours. For example,** Silvera and colleagues (2008) found that impulse buying, another compulsive behaviour, was negatively correlated with subjective well-being; this link is confirmed by previous empirical studies specific to social media use, such as Vangeel and colleagues’ study (2016) of adolescent students in Belgium that found that psychological well-being explained variance in levels of compulsive social networking use more than age or gender. It seems that the more young people report low levels of PMH, the more likely they are to problematically use the Internet in order, for example, to compensate for their perceived lack of personal and interpersonal resources. This is further supported by Chong and colleagues (2014), who found a relationship between social-emotional regulatory competence and compulsive Internet use amongst adolescents. Nevertheless, existing literature also showed the detrimental effects of PIU on psychological well-being (e.g. Van Rooij and Prause 2014; Kim et al. 2009; Gross et al. 2002), suggesting that the link between PMH and PIU is likely bidirectional. For example, Kim and colleagues (2009) observed that people with high levels of loneliness tend to develop stronger compulsive use which in turn negatively affects their social and emotional well-being.

**With regard to the negative association between covitality and PFU,** our findings showed that problematic Facebook users seem to have low levels of PMH. It can be supposed that Facebook is used to attempt to mitigate these feelings of dissatisfaction and low self-worth, as in the study by Rae and colleagues (2015) that showed that low levels of life satisfaction led to higher quantities of Facebook use and, subsequently, even lower levels of psychological well-being. The effect is likely bidirectional as Kross and colleagues (2013) found that the more participants used Facebook, the more their life satisfaction levels declined. It is possible that users prone to PFU begin with a generally lower level of PMH, use Facebook to attempt to mitigate those feelings, and through overuse of Facebook end with lower levels of PMH than when they began.

**The results of the current study results showed no significant differences between adolescents and young adults. The use of a sole measurement method to assess the study variables allowed to highlight that the pattern specified in our model is similar for both groups. Nevertheless, the strongest observed link is between covitality and PIU among adolescents. It could be argued that because adolescents tend to have lower self-esteem than young adults (e.g., Frost and McKelvie 2004), this is reflected in their overall PMH and thus could lead to higher prevalence of PIU. In addition, adolescents may have specific motives for using social media, such as social adjustment, or making social connections (Yang and Brown 2013); these motives may be associated with self-image and self-esteem and therefore more likely to be related to lower PMH and increased PIU.**

Some limitations of the present study must be highlighted. First, the sample was not randomly selected and the use of data from a self-report questionnaire may be influenced by recall bias and answer accuracy. Second, the cross-sectional design does not allow definitive statements about causality. Future studies should employ longitudinal designs and examine the specific PMH aspects involved in PIU and PFU among young people. Specifically, an integrated view of the mechanisms through which PMH and PIU/PFU impact each other would clarify the causal direction between PMH and PIU/PFU or/and vice versa. Moreover, further studies are warranted in order to test the role of other covariates relevant for the relationship between PMH and PIU/PFU, such as personality traits, shyness, and self-esteem.

Despite these limitations, results of this study have potentially important implications for developing prevention and intervention programmes for young adults. First, recent studies have shown the efficacy of evidence-based interventions tailored to improve PMH, such as Conley and colleagues (2013) evaluative review that found mental health promotion and prevention programmes for higher education students generally demonstrated strong benefit for that population. Second, while there is an emerging literature demonstrating the effectiveness of therapy in treating PIU in clinical samples (King et al. 2011), less is known about the specific aspects to address in prevention intervention for the general population. Therefore, developing and evaluating interventions taking into account the PMH aspects that lead to PIU and PFU might be of value.

In conclusion, the results from the current study provide an addition to the literature on PIU and PFU, suggesting the importance of interventions on PMH targeted for “normal” people in order to reduce potential harmful behaviour among young people connected to the Internet.

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**Figure 1: Tested Model through multi-group analysis in the two age groups (adolescents/young adults).**



Notes: All coefficients are **significant below the 0.001 level; Covitality= measure of PMH; PIU= Problematic Internet Use; PFU= Problematic Facebook Use; for visual clarity, only latent variables are represented.**

**Table 1: Descriptive statistics and** correlations among the study variables for adolescents (above the diagonal; N=999) and young adults (below the diagonal; N=928)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Mean (SD) |  |  |  |  |
|  | Adolescents | Young adults | 1 | 2 | 3 | 4 |
| 1. PIUa | 2.15 (.71) | 2.14 (.66) | - | .47\*\* | -.23\*\* | .07\* |
| 2. PFUb | 1.62 (.69) | 1.90 (.90) | .54\*\* | - | -.18\*\* | -.04 |
| 3. PMHc | 3.01 (.40) | 2.93 (.37) | -.15\*\* | -.20\*\* | - | -11\*\* |
| 4. Gender | - | - | -.02 | .06 | .07\* | - |

**Notes: \**p*<0.05; \*\**p*<0.01;** a=Problematic Internet Use; b= Problematic Facebook Use; c= Positive Mental Health; Gender= (1) male, (2) female.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Model | N | **χ**2 | Df | CFI | ΔCFI | RMSEA | ΔRMSEA |
| Adolescents (14-19 y) | 999 | 3717.97\* | 1515 | .904 | - | .038 | - |
| Young adults (20-29 y) | 928 | 3879.58\* | 1515 | .903 | - | .041 | - |
| Configural invariance | 1927 | 7597.55\* | 3030 | .904 | - | .040 | - |
| Metric invariance | 1927 | 7760.50\* | 3084 | .901 | .002 | .040 | .000 |
| Scalar invariance | 1927 | 8561.90\* | 3117 | .885 | .016 | .043 | .003 |
| Relational invariance | 1927 | 8571.98\* | 3119 | .885 | .000 | .043 | .000 |

Table 2: Fit indices for measurement invariance tests on the tested model.

Note: \**p*<.001. An non-significant **χ**2 indicates a good fit of a model. Nevertheless, because this is a statistical significance test, it is sensitive to sample size, it nearly always rejects the model (that is, it is statistically significant) when using large samples (Hooper et al. 2008).