

SYMPTOMS OF PROLONGED SOCIAL WITHDRAWAL, PROBLEMATIC INTERNET USE, AND PSYCHOTIC-LIKE EXPERIENCES IN EMERGING ADULTHOOD: A MODERATION MODEL

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Abstract

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Objective: Prolonged social withdrawal (PSW) or *hikikomori* and problematic internet use (PIU) have attracted the attention of mental health experts worldwide. The scientific literature suggests a complex relationship between these conditions and psychotic-like experiences (PLEs) or disorders. In the present cross-sectional study, we tested the role of PIU symptoms as a moderator of the relationship between symptoms of PSW and PLEs in a sample of 238 Italian emerging adults.

Method: Data was collected using the 25-item Hikikomori Questionnaire, the Internet Disorder Scale, the Brief Prodromal Questionnaire, and the Brief Symptom Inventory. In addition, lifetime psychological disorders and drug and alcohol use during the last month were explored. No participant reported a lifetime episode of schizophrenia or other psychotic disorder.

Results: Symptoms of PSW and PIU were significantly associated with PLEs total distress and PLEs total number of symptoms endorsed, after adjustment for age and symptoms of depression and anxiety. Further, PIU symptoms moderated the relationship between symptoms of PSW and PLEs total distress ($b = 2.745$, $s.e. = 1.089$, $p = 0.012$). However, PIU symptoms did not moderate the relationship between PSW and PLEs total symptoms ($b = 0.615$, $s.e. = 0.349$, $p = 0.078$). This study is limited because the participants were most likely university students and because of the cross-sectional design.

Conclusions: Findings from this study partially support the role of high symptoms of PIU as a risk factor in the relationship between symptoms of PSW and PLEs. Future longitudinal research is needed to confirm our findings examining the temporal relationship between PSW, PIU, and PLEs using both dimensional and categorical approaches.

Key words: hikikomori, hidden youth, social isolation, social avoidance, technological addictions

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Introduction

In the last two decades, researchers and clinicians have studied and debated the existence and the validity of two possible emerging psychiatric diagnoses, prolonged social withdrawal or *hikikomori* and the broad category of technological addictions (e.g., internet, videogame, smartphone, social network) (Amendola et al., 2020; Block, 2008; Griffiths, 1995; Griffiths et al., 2016; Kato et al., 2011, 2019; Pan et al., 2020; Petry et al., 2014; Stip et al., 2016; Teo & Gaw, 2010). The term hikikomori refers to a psychological condition characterized by prolonged social withdrawal and isolation in one's room or home, for a period of at least six months, associated with significant impairment or distress (Kato et al., 2019, 2020). Despite being

initially encountered in Japan, hikikomori cases have been described worldwide (Amendola et al., 2021; Chauliac et al., 2017; Frankova, 2019; Kato et al., 2012; Malagón-Amor et al., 2015; Teo et al., 2015). Technological addictions refer to non-chemical (behavioural) addictions which involve human-machine interactions (Grant et al., 2010; Griffiths, 1995). Conditions like problematic internet use (PIU) or internet addiction and problematic videogame use or gaming disorder have stimulated a reasonable debate (Petry et al., 2018).

Stip et al. (2016) compared hikikomori and internet addiction highlighting that both conditions represent a dissociative response to painful emotional states, in accordance with other authors (Lai et al., 2017; Schimmenti & Caretti, 2017; Taylor, 2006). Further,

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the authors wondered if the two diagnostic labels refer to the same condition conceptualized as and identified with internet addiction in Western countries and hikikomori in Eastern countries. Indeed, similarities exist between the proposed criteria for the two conditions. Hikikomori and internet addiction share a loss of interest in other activities (such as school or work) and functional impairment (Stip et al., 2016). However, symptoms of tolerance and withdrawal are specific to internet addiction and the behaviours are egodystonic in the case of internet addiction while egosyntonic in the case of hikikomori (Stip et al., 2016). Saito (2013) questioned the unique egosyntonic nature of hikikomori noting that living in hikikomori generally leads to anguish and suffering. According to the author, if the condition is egosyntonic, it would be a sign of a more serious hikikomori, requiring additional screening for other psychiatric and personality disorders. Kondo et al. (2013) demonstrated that approximately 22% of hikikomori did not feel distressed due to the withdrawal condition. An important additional difference between internet addiction and hikikomori refers to the withdrawal behaviour itself that results from being absorbed in the internet in internet addiction (Suwa & Suzuki, 2013). Whereas in hikikomori, social withdrawal is voluntary and intentional. However, in many cases of hikikomori, it is possible to diagnose internet addiction as a comorbid condition (Stip et al., 2016).

It has been noted that the hikikomori phenomenon precedes the advent of the internet (Suwa & Suzuki, 2013). According to some authors (Furlong, 2008; Kato et al., 2011; Suwa & Suzuki, 2013), hikikomori may represent a consequence of a modern lifestyle and a globally interconnected society. Kato et al. (2019) with the bio-psycho-socio-cultural model of hikikomori hypothesized that the development of information technology, based on indirect communication, may have influenced the mental health of individuals and the emergence of hikikomori. Specifically, the prevailing forms of child play have changed from direct to indirect with an impact on children's development (Kato et al., 2019). The time spent using technologies (e.g., video games, the Internet, social networks) has replaced that of other activities. For example, adolescent gamers spend less time reading, doing homework, and with parents and friends (Cummings & Vandewater, 2007).

Significant associations between PIU and hikikomori or its symptoms have been recently demonstrated (Amendola et al., 2022a; Hamasaki et al., 2021; Lee et al., 2013; Tateno et al., 2019) with few exceptions (Amendola et al., 2021; Teo et al., 2015). Lee et al. (2013) explored differences in technology use between 41 adolescents with hikikomori referred to mental health centres and psychiatric clinics and 236 adolescent students in Korea. The authors showed a significant difference in daily time spent using the computer: the adolescents with hikikomori spent around five hours a day using their computers compared to around two hours reported by the adolescent students without hikikomori. Moreover, 55% of hikikomori adolescents were at risk for internet addiction while 10% were addicted (Lee et al., 2013). Similarly, Hamasaki et al. (2021) compared the time spent using the internet reported by 20 adolescents in hikikomori and that reported by 88 adolescents without hikikomori in Japan. The authors' results demonstrated that adolescents with hikikomori spent more than three hours a day using the internet compared to the two and a half hours of those without hikikomori, a statistically significant group difference. Finally, Tateno et al. (2019)

showed significant associations between symptoms of hikikomori, PIU, and problematic smartphone use in a sample of 478 Japanese university students. Taken together, these results suggest an association between the two conditions despite a non-significant association has been found by two studies (Amendola et al., 2021; Teo et al., 2015).

Hikikomori and Psychotic Disorders

Hikikomori is generally considered different from a psychotic condition mainly due to the absence of positive or negative symptoms of schizophrenia (Kato et al., 2019). Behavioural oddity and other negative symptoms in addition to social isolation are not necessarily present in hikikomori (Stip et al., 2016). However, the hikikomori condition may include schizophrenia before a definitive diagnosis (Kato et al., 2019). A recent study (Yasuma et al., 2021) demonstrated a relationship between psychotic experiences, especially delusion, and lifetime hikikomori in a community sample of Japanese adults. Withdrawal is one of the primary symptoms of psychosis (Cullen et al., 2011; Mäki et al., 2014; Matheson et al., 2013) and, in accordance, psychotic episodes or disorders may lead to a hikikomori-like condition. However, even the opposite trajectory for which hikikomori would be a risk factor for subsequent psychosis cannot be excluded, according to the current state of knowledge (Kato et al., 2019).

The voluntary and intentional nature of the withdrawn behaviour may help to differentiate the social withdrawal of individuals at risk for psychotic disorders from that of individuals with hikikomori. The withdrawn behaviours of individuals at risk for psychosis seem mainly due to peer or social exclusion or rejection (Bjornestad et al., 2021; Engel et al., 2016; Killaspy et al., 2014; Lincoln et al., 2021; Reinhard et al., 2020; Zahid & Best, 2021). In contrast, individuals with hikikomori actively and voluntarily disengage themselves from social life and contact. They are not necessarily at risk for psychosis but may develop psychotic symptoms or disorders because of the hikikomori condition.

Symptoms of Prolonged Social Withdrawal (PSW), Psychotic-Like Experiences (PLEs), and Problematic Internet Use (PIU)

The present study builds on previous research (Daniel et al., 2014; Mason & Brady, 2009) to explore the relationship between symptoms of hikikomori or prolonged social withdrawal (PSW) and psychotic-like experiences (PLEs). Specifically, we aimed to test a specific effect, that is, whether PLEs increase with increasing symptoms of PSW or not. According to the psychosis proneness persistence-impairment model, PLEs refer to the existence of a psychosis continuum that implies levels of psychotic symptoms or experiences well below the clinical manifestation (van Os et al., 2009; van Os & Linscott, 2012). PLEs such as perceptual disturbances, unusual thinking, suspiciousness, grandiosity, and disorganized communication are prevalent among the general population (Preti et al., 2018; van Os et al., 2001) and are not necessarily associated with the presence of a disorder (van Os et al., 2009). Nevertheless, if frequent and/or they cause psychological distress, PLEs constitute markers for a wide range of psychiatric symptoms and may help in identifying emerging adults at high clinical risk for psychosis (van Os et al., 2009;

Wu et al., 2021).

Mason and Brady (2009) demonstrated that healthy university students may develop PLEs if exposed to a brief period (15 minutes) of complete physical isolation and sensory deprivation. In particular, the authors compared the effect of physical isolation and sensory deprivation in highly hallucination-prone and non-hallucination-prone groups. Greater psychotomimetic experiences taking the form of perceptual disturbances, paranoia and anhedonia were found across both groups when under sensory deprivation (Mason & Brady, 2009). These results were replicated by two studies (Daniel et al., 2014; Daniel & Mason, 2015).

Moreover, initial studies with samples of young people found that symptoms of PIU and PLEs are associated (Lee et al., 2019; Pelletier-Baldelli et al., 2015; Santesteban-Echarri et al., 2020; Vadlin et al., 2016). Mittal et al. (2013) followed 170 young adults divided into those showing a steady/improved course of PLEs and those showing an exacerbation in PLEs over two months. The findings of the authors showed that the former group showed a longitudinal decline in PIU while the latter group reported a constant level of PIU over time. Importantly, case reports (Angane et al., 2021; Bell et al., 2005; Kalbitzer et al., 2014; Lerner et al., 2006; Mendhekar & Chittaranjan, 2012; Nitzan et al., 2011; Paik et al., 2014; Tan et al., 1997; Tzang et al., 2015) seem to suggest that PIU and problematic use of new technologies, when associated with symptoms of PSW, may constitute an important stressor able to unmask psychotic vulnerability or foster the emergence of psychotic symptoms. A recent study tested the proposed hypothesis in a sample of secondary school students, discovering a non-significant interaction effect between symptoms of PIU and PSW on PLEs (Amendola et al., 2022b).

The Aim of the Study

In light of the above findings, the present study aimed to explore the relationship between symptoms of PSW, PLEs, and PIU in emerging adulthood. Specifically, we tested the interaction effect between symptoms of PSW and PIU in predicting PLEs to answer the following research question: does the association between symptoms of PSW and PLEs vary according to symptoms of PIU? In other words, we aimed to examine whether PIU was a risk factor moderating the relationship between symptoms of PSW and PLEs.

Materials and Methods

Participants

A final convenience sample of 238 emerging Italian adults (25.2% males, $n=60$) with an age ranging from 19 to 30 years (mean= 24.68, standard deviation= 3.22) participated in the study. The inclusion criterion was age between 19 and 30 years whereas a lifetime diagnosis of schizophrenia or other psychotic disorder was an exclusion criterion.

Procedure

Survey participation was proposed to classes of university students of the Faculty of Medicine and Psychology (Sapienza - University of Rome, Italy) and advertised using social media platforms. Participants were asked to voluntarily participate in the study and to

disseminate the link for participating in the study with their contacts. Informed consent of participants was obtained online by reading and approving an informed consent, before proceeding to the online compilation of the questionnaires using Google Forms. To limit response bias, the study was not presented as a survey on social withdrawal and hikikomori but rather a survey on mental health and technology use in general. Research data was encoded and stored on a password-protected drive to ensure respect for data protection and privacy. This study was approved by the Ethics Committee of the Department of Dynamic and Clinical Psychology, Sapienza - University of Rome.

Measures

To exclude participants with a lifetime diagnosis of schizophrenia or other psychotic episodes the following question with two possible answer choices (no/yes) was used: “Do or did you suffer from a psychological disorder diagnosed by a mental health professional?”. If the answer was “yes”, participants were asked to specify the type of disorder.

Further, drugs (i.e., “During the past month, have you regularly taken (one or more times a week) drugs?”) and alcohol (i.e., “During the past month, have you regularly taken (one or more times a week) quantities of alcohol that most people would consider above average?”) consumption were explored with dichotomous questions (no/yes).

The *25-item Hikikomori Questionnaire (HQ-25)* (Amendola et al., 2022a; Teo et al., 2018) was used to evaluate symptoms of PSW. The HQ-25 is a self-report questionnaire including 25 items that evaluate typical psychological features and behavioural patterns of the hikikomori syndrome, such as socialization difficulties, isolation, emotional support, and a sense of alienation from society, over the preceding six months. Participants respond on a 5-point Likert scale (from 0= “strongly disagree” to 4= “strongly agree”). The HQ-25 has a score range of 0–100 with higher values indicating higher symptomatology. The authors demonstrated that a cut-off score of 42 was able to discriminate between individuals at risk for hikikomori and those not at-risk in a Japanese sample (Teo et al., 2018). In the present study, Cronbach’s alpha was 0.92.

The *Internet Disorder Scale (IDS-15)* (Monacis et al., 2018; Pontes & Griffiths, 2017) was administered to explore the severity and impact of PIU by focusing on users’ online leisure activity from any device with internet access over the past year. The respondents rated each item (15 in total) on a 5-point Likert scale (from 1 = “strongly disagree” to 5 = “strongly agree”). The total score may range from 15 to 75, with higher scores being an indication of higher degrees of PIU. In the present study, Cronbach’s alpha for the scale was 0.86.

Two subscales of the *Brief Symptom Inventory (Derogatis, 1975)* were used to examine symptoms of depression and anxiety during the last seven days. Respondents rated each item on a 5-point Likert scale (from 0 = “never” to 4 = “always”). The reliability of the BSI dimensions of interest proved to be good in a sample of Italian adults (Adawi et al., 2019). In the present study, Cronbach’s alpha of the two dimensions was 0.90 for anxiety and 0.88 for depression.

The *Brief Prodromal Questionnaire (PQ-B)* (Loewy et al., 2011; Pelizza et al., 2018; Preti et al., 2018; Scazza et al., 2018) was administered to evaluate the presence of PLEs over the last months. The PQ-B is a self-report questionnaire of 21 items with a dichotomous response

(no/yes) used to screen individuals for positive symptoms of psychosis. For each endorsed item, the respondent is asked to specify the associated distress or impairment (from 1= “strongly disagree” to 5= “strongly agree”). The PQ-B has been adopted as a screening tool using the total number of items endorsed (“symptom total score”), the number of items that are identified as distressing (“distressing item total score”) (both range 0-21), and the “total distress score” (range 0-105) (Scazza et al., 2018). The latter method is generally recommended (Savill et al., 2018). Thus, for the present study, the total distress score was used. Nevertheless, for the sake of completeness, all analyses were also conducted using the symptom total score. In the present study, Cronbach’s alpha values were 0.84 and 0.86 for the symptoms total score and the total distress score, respectively.

Statistical analysis

Initially, five participants out of a total of 243 were excluded from the study due to incomplete responses, i.e., more than 20% of data from at least one questionnaire were missing. Subsequently, to account for missing data (less than 1%) in the final sample (N= 238), we performed multiple imputations by generating 10 imputed data sets, the results of which were combined to produce estimates. Descriptive statistics (frequency, means, and standard deviations) were used to examine the characteristics of the sample. The distributional assumptions of univariate normality were tested by inspecting whether skewness and kurtosis parameters were within the bounds of ± 1.5 and by visual inspection using Q-Q plots and histograms. To explore the relationship between the variables of interest, Pearson correlation analyses were performed. Further, group differences according to risk for hikikomori on the variables of interest were tested using analysis of variance (ANOVA) and Chi-squared test of independence and reporting values of eta squared (η^2) and Cramer’s *V*, respectively, as estimates of effect size. The examination of group differences based on the HQ-25 cut-off proposed in the original study by Teo et al. (2018) was exploratory in nature considering that an appropriate cut-off value for the Italian version of the HQ-25 has not yet been determined. Effect sizes were interpreted according to Cohen (1988). Finally, two moderation models were employed to test whether the relationship between symptoms of PSW and PLEs (total symptoms and total distress) varied depending on PIU. Important

confounders such as anxiety and depressive symptoms and drug and alcohol use (Amendola et al., 2021; Calvo et al., 2021; Fonseca-Pedrero et al., 2019; Lanthier-Labonté et al., 2020; Ramón-Arбуés et al., 2020) were considered to avoid or limiting spurious relationships between the constructs of interest. Consequently, only variables significantly associated with symptoms of PSW, PIU, and PLEs were included in the models.

Results

Table 1 shows the descriptive statistics of the sample. No participant was excluded based on the eligibility criteria. Indeed, all participants reported an age between 19 and 30 years and no lifetime diagnosis of schizophrenia or other psychotic disorder. Eight participants (3.4% of the sample) reported a lifetime psychological disorder, i.e., depression (n= 5, 2.1%), eating disorder (n= 1, 0.4%), anxiety (n= 1, 0.4%) and anxiety and depression (n= 1, 0.4%). During the past month, 12.6% of the sample regularly consumed (one or more times a week) quantities of alcohol that most people would consider above average and 5.9% used drugs (one or more times a week). According to the cut-off score of the HQ-25 indicated by the authors, 20.2% (n= 48) of the sample was at risk for PSW. Participants reported on average, five PLEs (4.75 ± 4.10).

Table 1. Descriptive statistics of the total sample (N= 238)

	M (SD)
Alcohol use n (%)	30 (12.6)
Drug use n (%)	14 (5.9)
PSW symptoms	25.97 (16.68)
Risk for PSW	48 (20.2)
PIU symptoms	36.76 (9.88)
PLEs total symptoms	4.75 (4.10)
PLEs total distress	12.64 (12.99)
Depression symptoms	1.26 (0.96)
Anxiety symptoms	1.01 (0.91)
Psychological disorder n (%)	8 (3.4)

Note. M: mean, SD: standard deviation, PIU: problematic internet use, PLEs: psychotic-like experiences, PSW: prolonged social withdrawal.

Table 2. Differences between participants at risk for prolonged social withdrawal and those not at risk

	At risk (n= 48) M (SD)	Not at risk (n= 190) M (SD)	F(1,236)	p	η^2 /Cramer’s V
Age	24.25 (3.21)	24.79 (3.22)	1.078	0.30	0.01
Male n (%)	11 (22.9)	49 (25.8)	($\chi^2(1)$) 0.168	0.68	0.03
Alcohol use n (%)	6 (12.5)	24 (12.6)	($\chi^2(1)$) 0.001	0.98	0.00
Drug use n (%)	1 (2.1)	13 (6.8)	($\chi^2(1)$) 1.567	0.21	0.08
PIU symptoms	41.83 (11.16)	35.48 (9.13)	18.869	< 0.001	0.07
PLEs total symptoms	6.48 (4.44)	4.32 (3.90)	11.153	0.001	0.05
PLEs total distress	19.37 (16.10)	10.94 (11.53)	17.245	< 0.001	0.07
Depression symptoms	1.82 (0.88)	1.12 (0.93)	22.295	< 0.001	0.09
Anxiety symptoms	1.12 (0.90)	0.97 (0.91)	0.838	0.361	0.00
Psychological disorder n (%)	2 (4.2)	6 (3.2)	($\chi^2(1)$) 0.120	0.73	0.02

Note. M: mean, SD: standard deviation, η^2 : eta squared, PIU: problematic internet use, PLEs: psychotic-like experiences.

Differences between Participants at Risk and Not at Risk for Prolonged Social Withdrawal (PSW)

Participants at risk for PSW and those not at risk did not show significant differences in age, gender, alcohol, and drug use and symptoms of anxiety (table 2). Between-groups differences emerged in symptoms

to-large effect size (approaching $r = 0.5$) was reported for the associations between PLEs and symptoms of PSW, and PLEs and anxiety. Furthermore, age and PLEs were negatively associated: as age increased, PLEs total symptoms and distress decreased. The presence of a lifetime psychological disorder was not associated with the other variables.

Table 3. Significant differences in psychotic-like experiences according to risk for prolonged social withdrawal (PSW)

	At risk (n= 48) n (%)	Not at risk (n= 190) n (%)	$\chi^2(1)$	Cramer's V
1. Surroundings seem strange	13 (27.1)	25 (13.2)	5.538*	0.15
6. Difficulty getting to the point	24 (50)	53 (27.9)	8.556**	0.19
12. Worry that something is wrong with your mind	34 (70.8)	66 (34.7)	20.494***	0.29
15. Beliefs that are unusual or bizarre	28 (58.3)	68 (35.8)	8.092**	0.18
16. Feels that your body has changed	15 (31.3)	31 (16.3)	5.481*	0.15
21. Hard to understand what you are saying	23 (47.9)	45 (23.7)	11.026**	0.22

Note. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

of depression, PIU, and PLEs, higher in participants at risk for PSW compared to those not at risk for PSW.

Further, participants at risk for PSW were more likely to show specific PLEs compared to those not at risk, as reported in table 3. These effect sizes were large (i.e., $\eta^2 > 0.14$).

Correlation Analyses

Correlation analyses (table 4) showed statistically significant associations between symptoms of PSW, PIU, depression, anxiety, and PLEs. A medium effect size was observed for the associations between PLEs and PIU, and PLEs and depression. Whereas a medium-

Moderation Effect of Problematic Internet Use (PIU) on the Relationship between Symptoms of Prolonged Social Withdrawal (PSW) and Psychotic-Like Experiences (PLEs)

To investigate whether symptoms of PIU play a moderator role in the relationship between symptoms of PSW and PLEs, we performed two moderation models considering PLEs total symptoms and PLEs total distress as dependent variables one at a time. Table 5 shows the results for the two models. PIU was positively associated with PLEs total distress ($b = 2.704$, $s.e. = 1.084$, $p = 0.013$) and moderated the effect of PSW

Table 4. Results of correlation analyses between the variables of interest

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Female gender (1)	1									
Age (2)	0.024	1								
Alcohol use (3)	-0.217**	-0.021	1							
Drug use (4)	-0.143*	-0.092	0.174**	1						
PSW symptoms (5)	-0.035	-0.102	0.022	-0.04	1					
PIU symptoms (6)	-0.012	-0.044	-0.037	-0.114	0.342***	1				
PLEs total symptoms (7)	-0.054	-0.171**	0.079	0.002	0.385***	0.273***	1			
PLEs total distress (8)	0.008	-0.150*	0.031	-0.051	0.467***	0.326***	0.918***	1		
Depression symptoms (9)	0.132*	-0.02	0.039	-0.061	0.366***	0.371***	0.276***	0.343***	1	
Anxiety symptoms (10)	0.142*	0.01	0.038	-0.043	0.204**	0.241***	0.340***	0.451***	0.739***	1

Note. PIU: problematic internet use, PLEs: psychotic-like experiences, PSW: prolonged social withdrawal, s.e.: standard error.

Table 5. Moderation effect of problematic internet use on the relationship between symptoms of prolonged social withdrawal and psychotic-like experiences

	Dependent variable: PLEs total distress			
	Unstandardized b	s.e.	Standardized B	p
Intercept	6.843	5.720	0.528	0.232
Age	-0.458	0.204	-0.113	0.025
Depression symptoms	-2.928	1.013	-0.217	0.004
Anxiety symptoms	6.989	1.147	0.490	< 0.001
PSW symptoms	6.805	1.146	0.349	< 0.001
PIU symptoms	2.704	1.084	0.137	0.013
<i>Interaction</i>				
PSW symptoms * PIU symptoms	2.745	1.089	0.115	0.012

	Dependent variable: PLEs total symptoms			
	Unstandardized b	s.e.	Standardized B	p
Intercept	4.695	2.228	1.149	0.035
Age	-0.179	0.077	-0.140	0.021
Depression symptoms	-0.621	0.345	-0.146	0.072
Anxiety symptoms	1.572	0.360	0.349	< 0.001
PSW symptoms	1.747	0.405	0.284	< 0.001
PIU symptoms	0.751	0.356	0.121	0.035
<i>Interaction</i>				
PSW symptoms * PIU symptoms	0.615	0.349	0.082	0.078

Note. PIU: problematic internet use, PLEs: psychotic-like experiences, PSW: prolonged social withdrawal, s.e.: standard error.

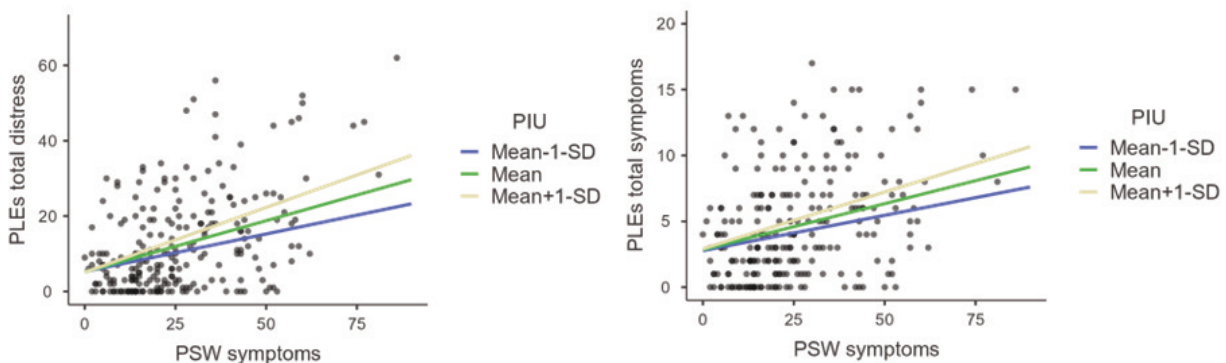
symptoms on PLEs total distress (b= 2.745, s.e.= 1.089, p= 0.012). R² of this model was 0.41. Simple slopes analysis showed that for low levels of PIU (- 1 standard deviation), the effect of symptoms of PSW on PLEs total distress was positive and significant (b= 4.060, s.e.= 1.746, B= 0.234, p= 0.020). For high levels of PIU, the relationship between symptoms of PSW and PLEs total distress was strengthened (b= 9.549, s.e.= 1.395, B= 0.465, p< 0.001). Accordingly, it seems that high levels of PIU may constitute a risk factor and increase the effect of PSW symptoms on PLEs total distress (figure 1a).

Likewise, symptoms of PIU were associated with

PLEs total symptoms (b= 0.751, s.e.= 0.356, p= 0.035) but higher or lower levels of PIU did not significantly increase or decrease the effect of PSW symptoms on PLEs total symptoms since the p-value for the interaction effect was borderline significant (b= 0.615, s.e.= 0.349, p= 0.078) (table 5, figure 1b). R² of this model was 0.27.

As requested during the review process, we retested the regression models including gender as a covariate, despite gender did not correlate with PIU, PSW or PLEs. The results obtained (not reported) did not change from those presented in the manuscript.

Figure 1. Moderation effect of levels of problematic internet use (PIU) on the relationship between symptoms of prolonged social withdrawal (PSW) on a. total distress and b. total symptoms of psychotic-like experiences (PLEs)



Discussion

Overall, the findings of the present study demonstrate substantial relationships between symptoms of PSW, PIU, and PLEs. Participants at risk for PSW were more likely to show PLEs, i.e., worry that something is wrong with their mind, others sometimes find it hard to understand what they are saying, difficulty getting to the point, beliefs that are unusual or bizarre, altered perception of familiar surroundings and feeling that their body has changed, compared to participants not at risk for PSW. These results are in accordance with those of Yasuma et al. (2021). The authors showed significant associations between lifetime hikikomori and psychotic experiences. Specifically, any delusional experience was significantly associated with hikikomori, even after adjustment for socio-demographic factors and occurrence of mental disorders in the past twelve months, and autism spectrum disorder trait. Taken together, the results suggest that participants at risk for hikikomori may also show an increased risk for psychotic episodes or disorders (Kato et al., 2019) although the hikikomori condition is generally considered different from a psychotic condition primarily due to the absence of positive and/or negative symptoms of schizophrenia and to the voluntary nature of the social withdrawal. Furthermore, regression models demonstrated significant associations between PLEs, symptoms of PSW and PIU after adjustment for age, symptoms of depression and anxiety. Consequently, our results suggest that, in presence of emerging adults with high symptoms of PSW or hikikomori, clinicians need to evaluate and possibly include PIU and PLEs in the therapeutic process.

Another important aspect of the study is our test of the role of PIU levels as a risk factor moderating the relationship between symptoms of PSW and PLEs. A recent study (Amendola et al., 2022b) showed a non-significant interaction effect between symptoms of PIU and PSW on PLEs in adolescence despite previous reports of clinical cases supporting the explanation in which severe social withdrawal and PIU mutually reinforce each other over time, and concomitantly with a progressive abandonment of social and school/work activities, until symptoms or episodes of psychosis (generally of brief duration) emerge (Angane et al., 2021; Bell et al., 2005; Kalbitzer et al., 2014; Lerner et al., 2006; Mendhekar & Chittaranjan, 2012; Nitzan et al., 2011; Paik et al., 2014; Tan et al., 1997; Tzang et al., 2015). Our findings provide initial confirmation of the study hypothesis. The relationship between symptoms of PSW and PLEs total distress varied based on PIU levels. High levels of PIU increased the effect of symptoms of PSW on PLEs total distress. However, the interaction was borderline significant in the moderation model with PLEs total symptoms as the dependent variable. Therefore, it is necessary to focus attention on possible differences between PLEs total distress and total symptoms scores as well as on the characteristics of the study sample to better understand the slight difference in the results of the two moderation models.

The use of the PLEs total distress score is generally recommended because of its accuracy in identifying individuals at high clinical risk for psychopathology (Hanssen et al., 2003; Savill et al., 2018; Wu et al., 2021). Further, the intensity of symptoms and distress may be more important than the presence of symptoms in differentiating between psychosis risk and psychosis (Ising et al., 2012). To note, the PQ-B does not investigate PLEs frequency but only whether each symptom is present or absent during the past month. It

is thus possible that the PLEs total distress score also captures a part of the variability due to PLEs frequency. For example, an individual could show specific PLEs once a week rather than once a month and report higher distress (due to the symptom) in the first case than in the second. However, according to the PQ-B, in both cases, he/she would score the same on the “presence” of the symptom. It is plausible that PLEs as reported by participants on the PQ-B have some degree of variability in frequency (not examined by the PQ-B) other than in distress. Of note, no emerging adult who participated in the study reported a lifetime psychotic diagnosis. Considering the above, a possible explanation for our findings suggests that the PLEs total symptom score reflects a more stable or less susceptible trait to the influence of the variables considered in the present study, while the PLEs total distress reflects a less stable or more susceptible trait to the influence of the variables considered that concur to the distressing perception of PLEs, at least in this sample. This explanation fits well with the findings of previous clinical cases (Angane et al., 2021; Mendhekar & Chittaranjan, 2012; Nitzan et al., 2011; Paik et al., 2014; Tan et al., 1997) that showed the emergence of psychotic symptoms and episodes in individuals with severe social withdrawal and PIU, generally followed by full recovery or symptom remission in a brief period (on average in a week/month). The chronological development of symptoms and modifying the environment may help in distinguishing which condition came first and triggered the other (Stip et al., 2016) as well as aid in planning an effective treatment in the acute phase. Additional studies are needed to confirm our findings and explore possible differences between PLEs total symptoms and PLEs total distress scores as measured by the PQ-B.

Some aspects should be considered in interpreting the findings of the present study. First, the results cannot be generalized to other groups (e.g., adolescents or older adults) or populations (e.g., clinical samples) given that emerging adults, most likely university students due to the sampling procedure, participated remotely (i.e., online survey) in the study. Second, data were collected using only self-report measures. Third, the cross-sectional design of the study does not provide the opportunity to demonstrate the temporal link between the variables of interest. For these reasons, predictive conclusions cannot be made. Finally, the cut-off of the original version of the HQ-25 was used. Consequently, differences between groups should be interpreted with some caution. An optimal cut-off to improve the clinical validity of the Italian version needs to be tested. Nonetheless, despite the above limitations, in our opinion, the present findings expand the scientific knowledge on the relationships between symptoms of PSW, PIU, and PLEs in emerging adulthood.

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References

- Adawi, M., Zerbetto, R., Re, T. S., Bisharat, B., Mahamid, M., Amital, H., Del Puente, G., & Bragazzi, N. L. (2019). Psychometric properties of the Brief Symptom Inventory in nomophobic subjects: Insights from preliminary confirmatory factor, exploratory factor, and clustering

- analyses in a sample of healthy Italian volunteers. *Psychology Research and Behavior Management*, 12, 145–154. <https://doi.org/10.2147/PRBM.S173282>
- Amendola, S., Cerutti, R., Presaghi, F., Spensieri, V., Lucidi, C., Silvestri, E., Di Giorgio, V., Conti, F., Martorelli, A., Izzi, G., & Teo, A. (2021). Hikikomori, problematic internet use and psychopathology: Correlates in non-clinical and clinical samples of young adults in Italy. *Journal of Psychopathology*, 27, 106–114. <https://doi.org/10.36148/2284-0249-412>
- Amendola, S., Presaghi, F., Teo, A. R., & Cerutti, R. (2022a). Psychometric properties of the Italian version of the 25-item Hikikomori Questionnaire. *International Journal of Environmental Research and Public Health*, 19(20), 13552. <https://doi.org/10.3390/ijerph192013552>
- Amendola, S., Presaghi, F., Teo, A. R., & Cerutti, R. (2022b). Psychometric properties of the Italian version of the 25-item Hikikomori Questionnaire for adolescents. *International Journal of Environmental Research and Public Health*, 19(16), 10408.
- Amendola, S., Spensieri, V., Biuso, G. S., & Cerutti, R. (2020). The relationship between maladaptive personality functioning and problematic technology use in adolescence: A cluster analysis approach. *Scandinavian Journal of Psychology*, sjop.12664. <https://doi.org/10.1111/sjop.12664>
- Angane, A., Keshari, P., Mane, A., & Nayak, A. (2021). Psychosis unmasked by gaming: A case series. *Annals of Indian Psychiatry*, 5(1), 89. https://doi.org/10.4103/aip.aip_84_20
- Bell, V., Grech, E., Maiden, C., Halligan, P. W., & Ellis, H. D. (2005). 'Internet Delusions': A Case Series and Theoretical Integration. *Psychopathology*, 38(3), 144–150. <https://doi.org/10.1159/000085845>
- Bjornestad, J., Tjora, T., Langeveld, J. H., Stain, H. J., Joa, I., Johannessen, J. O., Friedman-Yakoobian, M., & Velden Hegelstad, W. (2021). Exploring specific predictors of psychosis onset over a 2-year period: A decision-tree model. *Early Intervention in Psychiatry*, eip.13175. <https://doi.org/10.1111/eip.13175>
- Block, J. J. (2008). Issues for DSM-V: Internet Addiction. *American Journal of Psychiatry*, 165(3), 306–307. <https://doi.org/10.1176/appi.ajp.2007.07101556>
- Calvo, E. M., Ered, A., Maxwell, S. D., & Ellman, L. M. (2021). Behavioural inhibition system sensitivity is no longer associated with psychotic-like experiences after controlling for depression and anxiety symptoms. *Early Intervention in Psychiatry*, 15(5), 1217–1223. <https://doi.org/10.1111/eip.13067>
- Chauliac, N., Couillet, A., Faivre, S., Brochard, N., & Terra, J.-L. (2017). Characteristics of socially withdrawn youth in France: A retrospective study. *International Journal of Social Psychiatry*, 63(4), 339–344. <https://doi.org/10.1177/0020764017704474>
- Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences* (2nd ed.). Routledge. <https://doi.org/10.4324/9780203771587>
- Cullen, K., Guimaraes, A., Wozniak, J., Anjum, A., Schulz, S., & White, T. (2011). Trajectories of Social Withdrawal and Cognitive Decline in the Schizophrenia Prodrome. *Clinical Schizophrenia & Related Psychoses*, 4(4), 229–238. <https://doi.org/10.3371/CSRP4.4.3>
- Cummings, H. M., & Vandewater, E. A. (2007). Relation of Adolescent Video Game Play to Time Spent in Other Activities. *Archives of Pediatrics & Adolescent Medicine*, 161(7), 684. <https://doi.org/10.1001/archpedi.161.7.684>
- Daniel, C., Lovatt, A., & Mason, O. J. (2014). Psychotic-Like Experiences and Their Cognitive Appraisal Under Short-Term Sensory Deprivation. *Frontiers in Psychiatry*, 5. <https://doi.org/10.3389/fpsy.2014.00106>
- Daniel, C., & Mason, O. J. (2015). Predicting Psychotic-Like Experiences during Sensory Deprivation. *BioMed Research International*, 2015, 1–10. <https://doi.org/10.1155/2015/439379>
- Derogatis, L. R. (1975). *Brief Symptom Inventory*. Clinical Psychometric Research.
- Engel, M., Fritzsche, A., & Lincoln, T. M. (2016). Anticipation and experience of emotions in patients with schizophrenia and negative symptoms. An experimental study in a social context. *Schizophrenia Research*, 170(1), 191–197. <https://doi.org/10.1016/j.schres.2015.11.028>
- Fonseca-Pedrero, E., Lucas-Molina, B., Pérez-Albéniz, A., Inchausti, F., & Ortuño-Sierra, J. (2019). Psychotic-like Experiences and Substance Use in College Students. *Adicciones*, 32(1), 41. <https://doi.org/10.20882/adicciones.1149>
- Frankova, I. (2019). Similar but Different: Psychological and Psychopathological Features of Primary and Secondary Hikikomori. *Frontiers in Psychiatry*, 10, 558. <https://doi.org/10.3389/fpsy.2019.00558>
- Furlong, A. (2008). The Japanese Hikikomori Phenomenon: Acute Social Withdrawal among Young People. *The Sociological Review*, 56(2), 309–325. <https://doi.org/10.1111/j.1467-954X.2008.00790.x>
- Grant, J. E., Potenza, M. N., Weinstein, A., & Gorelick, D. A. (2010). Introduction to Behavioral Addictions. *The American Journal of Drug and Alcohol Abuse*, 36(5), 233–241. <https://doi.org/10.3109/00952990.2010.491884>
- Griffiths, M. (1995). Technological addictions. *Clinical Psychology Forum*, 75, 14–19.
- Griffiths, M. D., Rooij, A. J., Kardefelt-Winther, D., Starcevic, V., Király, O., Pallesen, S., Müller, K., Dreier, M., Carras, M., Prause, N., King, D. L., Aboujaoude, E., Kuss, D. J., Pontes, H. M., Lopez Fernandez, O., Nagygyorgy, K., Achab, S., Billieux, J., Quandt, T., ... Demetrovics, Z. (2016). Working towards an international consensus on criteria for assessing internet gaming disorder: A critical commentary on Petry et al. (2014). *Addiction*, 111(1), 167–175. <https://doi.org/10.1111/add.13057>
- Hamasaki, Y., Pionnié-Dax, N., Dorard, G., Tajan, N., & Hikida, T. (2021). Identifying Social Withdrawal (Hikikomori) Factors in Adolescents: Understanding the Hikikomori Spectrum. *Child Psychiatry & Human Development*, 52(5), 808–817. <https://doi.org/10.1007/s10578-020-01064-8>
- Hanssen, M. S. S., Bijl, R. V., Vollebergh, W., & Van Os, J. (2003). Self-reported psychotic experiences in the general population: A valid screening tool for DSM-III-R psychotic disorders? *Acta Psychiatrica Scandinavica*, 107(5), 369–377. <https://doi.org/10.1034/j.1600-0447.2003.00058.x>
- Ising, H. K., Veling, W., Loewy, R. L., Rietveld, M. W., Rietdijk, J., Dragt, S., Klaassen, R. M. C., Nieman, D. H., Wunderink, L., Linszen, D. H., & van der Gaag, M. (2012). The Validity of the 16-Item Version of the Prodromal Questionnaire (PQ-16) to Screen for Ultra High Risk of Developing Psychosis in the General Help-Seeking Population. *Schizophrenia Bulletin*, 38(6), 1288–1296. <https://doi.org/10.1093/schbul/sbs068>
- Kalbitzer, J., Mell, T., Bermphof, F., Rapp, M. A., & Heinz, A. (2014). Twitter Psychosis: A Rare Variation or a Distinct Syndrome? *Journal of Nervous & Mental Disease*, 202(8), 623. <https://doi.org/10.1097/NMD.0000000000000173>
- Kato, T. A., Kanba, S., & Teo, A. R. (2019). Hikikomori: Multidimensional understanding, assessment and future international perspectives. *Psychiatry and Clinical Neurosciences*, pcn.12895. <https://doi.org/10.1111/pcn.12895>
- Kato, T. A., Kanba, S., & Teo, A. R. (2020). Defining pathological social withdrawal: Proposed diagnostic criteria for hikikomori. *World Psychiatry*, 19(1), 116–117. <https://doi.org/10.1002/wps.20705>

- Kato, T. A., Shinfuku, N., Sartorius, N., & Kanba, S. (2011). Are Japan's hikikomori and depression in young people spreading abroad? *The Lancet*, 378(9796), 1070. [https://doi.org/10.1016/S0140-6736\(11\)61475-X](https://doi.org/10.1016/S0140-6736(11)61475-X)
- Kato, T. A., Tateno, M., Shinfuku, N., Fujisawa, D., Teo, A. R., Sartorius, N., Akiyama, T., Ishida, T., Choi, T. Y., Balhara, Y. P. S., Matsumoto, R., Umene-Nakano, W., Fujimura, Y., Wand, A., Chang, J. P.-C., Chang, R. Y.-F., Shadloo, B., Ahmed, H. U., Lerthattasilp, T., & Kanba, S. (2012). Does the 'hikikomori' syndrome of social withdrawal exist outside Japan? A preliminary international investigation. *Social Psychiatry and Psychiatric Epidemiology*, 47(7), 1061–1075. <https://doi.org/10.1007/s00127-011-0411-7>
- Killaspy, H., White, S., Lalvani, N., Berg, R., Thachil, A., Kallumpuram, S., Nasiruddin, O., Wright, C., & Mezey, G. (2014). The impact of psychosis on social inclusion and associated factors. *International Journal of Social Psychiatry*, 60(2), 148–154. <https://doi.org/10.1177/0020764012471918>
- Kondo, N., Sakai, M., Kuroda, Y., Kiyota, Y., Kitabata, Y., & Kurosawa, M. (2013). General condition of hikikomori (prolonged social withdrawal) in Japan: Psychiatric diagnosis and outcome in mental health welfare centres. *International Journal of Social Psychiatry*, 59(1), 79–86. <https://doi.org/10.1177/0020764011423611>
- Lai, C., Altavilla, D., Mazza, M., Scappaticci, S., Tambelli, R., Aceto, P., Luciani, M., Corvino, S., Martinelli, D., Alimonti, F., & Tonioni, F. (2017). Neural correlate of Internet use in patients undergoing psychological treatment for Internet addiction. *Journal of Mental Health*, 26(3), 276–282. <https://doi.org/10.1080/09638237.2017.1294745>
- Lanthier-Labonté, S., Dufour, M., Milot, D.-M., & Loslier, J. (2020). Is problematic Internet use associated with alcohol and cannabis use among youth? A systematic review. *Addictive Behaviors*, 106, 106331. <https://doi.org/10.1016/j.addbeh.2020.106331>
- Lee, J.-Y., Ban, D., Kim, S.-Y., Kim, J.-M., Shin, I.-S., Yoon, J.-S., & Kim, S.-W. (2019). Negative Life Events and Problematic Internet Use as Factors Associated With Psychotic-Like Experiences in Adolescents. *Frontiers in Psychiatry*, 10, 369. <https://doi.org/10.3389/fpsy.2019.00369>
- Lee, Y. S., Lee, J. Y., Choi, T. Y., & Choi, J. T. (2013). Home visitation program for detecting, evaluating and treating socially withdrawn youth in Korea: Visitation program for withdrawn youth. *Psychiatry and Clinical Neurosciences*, 67(4), 193–202. <https://doi.org/10.1111/pcn.12043>
- Lerner, V., Libov, I., & Witztum, E. (2006). "Internet Delusions": The Impact of Technological Developments on the Content of Psychiatric Symptoms. *Israel Journal of Psychiatry and Related Sciences*, 43(1), 47–51.
- Lincoln, S. H., Johnson, T., Winters, A., & Laquidara, J. (2021). Social exclusion and rejection across the psychosis spectrum: A systematic review of empirical research. *Schizophrenia Research*, 228, 43–50. <https://doi.org/10.1016/j.schres.2020.11.056>
- Loewy, R. L., Pearson, R., Vinogradov, S., Bearden, C. E., & Cannon, T. D. (2011). Psychosis risk screening with the Prodromal Questionnaire—Brief Version (PQ-B). *Schizophrenia Research*, 129(1), 42–46. <https://doi.org/10.1016/j.schres.2011.03.029>
- Mäki, P., Koskela, S., Murray, G. K., Nordström, T., Miettunen, J., Jääskeläinen, E., & Veijola, J. M. (2014). Difficulty in making contact with others and social withdrawal as early signs of psychosis in adolescents – the Northern Finland Birth Cohort 1986. *European Psychiatry*, 29(6), 345–351. <https://doi.org/10.1016/j.eurpsy.2013.11.003>
- Malagón-Amor, Á., Córcoles-Martínez, D., Martín-López, L. M., & Pérez-Solà, V. (2015). Hikikomori in Spain: A descriptive study. *The International Journal of Social Psychiatry*, 61(5), 475–483. <https://doi.org/10.1177/0020764014553003>
- Mason, O. J., & Brady, F. (2009). The Psychotomimetic Effects of Short-Term Sensory Deprivation. *Journal of Nervous & Mental Disease*, 197(10), 783–785. <https://doi.org/10.1097/NMD.0b013e3181b9760b>
- Matheson, S. L., Vijayan, H., Dickson, H., Shepherd, A. M., Carr, V. J., & Laurens, K. R. (2013). Systematic meta-analysis of childhood social withdrawal in schizophrenia, and comparison with data from at-risk children aged 9–14 years. *Journal of Psychiatric Research*, 47(8), 1061–1068. <https://doi.org/10.1016/j.jpsychires.2013.03.013>
- Mendhekar, D. N., & Chittaranjan, A. C. (2012). Emergence of psychotic symptoms during Internet withdrawal: Letters to the Editor. *Psychiatry and Clinical Neurosciences*, 66(2), 163–163. <https://doi.org/10.1111/j.1440-1819.2011.02306.x>
- Mittal, V. A., Dean, D. J., & Pelletier, A. (2013). Internet addiction, reality substitution and longitudinal changes in psychotic-like experiences in young adults: Internet addiction and psychotic-like. *Early Intervention in Psychiatry*, 7(3), 261–269. <https://doi.org/10.1111/j.1751-7893.2012.00390.x>
- Monacis, L., Sinatra, M., Griffiths, M. D., & de Palo, V. (2018). Assessment of the Italian Version of the Internet Disorder Scale (IDS-15). *International Journal of Mental Health and Addiction*, 16(3), 680–691. <https://doi.org/10.1007/s11469-017-9823-2>
- Nitzan, U., Shoshan, E., Lev-Ran, S., & Fennig, S. (2011). Internet-Related Psychosis – A Sign of the Times? *Israel Journal of Psychiatry*, 48(3), 207–211.
- Paik, A., Oh, D., & Kim, D. (2014). A Case of Withdrawal Psychosis from Internet Addiction Disorder. *Psychiatry Investigation*, 11(2), 207. <https://doi.org/10.4306/pi.2014.11.2.207>
- Pan, Y.-C., Chiu, Y.-C., & Lin, Y.-H. (2020). Systematic review and meta-analysis of epidemiology of internet addiction. *Neuroscience & Biobehavioral Reviews*, 118, 612–622. <https://doi.org/10.1016/j.neubiorev.2020.08.013>
- Pelizza, L., Azzali, S., Paterlini, F., Scazza, I., Garlassi, S., Chiri, L. R., Poletti, M., Pupo, S., & Raballo, A. (2018). The Italian Version of the Brief 21-Item Prodromal Questionnaire: Field Test, Psychometric Properties and Age-Sensitive Cut-Offs. *Psychopathology*, 51(4), 234–244. <https://doi.org/10.1159/000490708>
- Pelletier-Baldelli, A., Ives, L., & Mittal, V. A. (2015). Increased Internet use and poorer ability to manage emotions in youth at high-risk for psychosis. *Schizophrenia Research: Cognition*, 2(4), 220–226. <https://doi.org/10.1016/j.scog.2015.08.002>
- Petry, N. M., Rehbein, F., Gentile, D. A., Lemmens, J. S., Rumpf, H.-J., Mößle, T., Bischof, G., Tao, R., Fung, D. S. S., Borges, G., Auriacombe, M., González Ibáñez, A., Tam, P., & O'Brien, C. P. (2014). An international consensus for assessing internet gaming disorder using the new DSM-5 approach: Internet gaming disorder. *Addiction*, 109(9), 1399–1406. <https://doi.org/10.1111/add.12457>
- Petry, N. M., Zajac, K., & Ginley, M. K. (2018). Behavioral Addictions as Mental Disorders: To Be or Not To Be? *Annual Review of Clinical Psychology*, 14(1), 399–423. <https://doi.org/10.1146/annurev-clinpsy-032816-045120>
- Pontes, H. M., & Griffiths, M. D. (2017). The development and psychometric evaluation of the Internet Disorder Scale (IDS-15). *Addictive Behaviors*, 64, 261–268. <https://doi.org/10.1016/j.addbeh.2015.09.003>
- Preti, A., Raballo, A., Kotzalidis, G. D., Scanu, R., Muratore, T., Gabbriellini, M., Tronci, D., Masala, C., Petretto, D. R., & Carta, M. G. (2018). Quick Identification of the Risk of Psychosis: The Italian Version of the Prodromal Questionnaire-Brief. *Clinical Practice &*

- Epidemiology in Mental Health*, 14(1), 120–131. <https://doi.org/10.2174/1745017901814010154>
- Ramón-Arбуés, E., Gea-Caballero, V., Granada-López, J. M., Juárez-Vela, R., Pellicer-García, B., & Antón-Solanas, I. (2020). The Prevalence of Depression, Anxiety and Stress and Their Associated Factors in College Students. *International Journal of Environmental Research and Public Health*, 17(19), 7001. <https://doi.org/10.3390/ijerph17197001>
- Reinhard, M. A., Dewald-Kaufmann, J., Wüstenberg, T., Musil, R., Barton, B. B., Jobst, A., & Padberg, F. (2020). The vicious circle of social exclusion and psychopathology: A systematic review of experimental ostracism research in psychiatric disorders. *European Archives of Psychiatry and Clinical Neuroscience*, 270(5), 521–532. <https://doi.org/10.1007/s00406-019-01074-1>
- Saito, T. (2013). *Hikikomori: Adolescence without end (J. Angles, Trans.)*. First published in Japan in 1998 by PHP Institute, Inc. [As Shakaiteki hikikomori: Owaranai shishunki]. University of Minnesota Press.
- Santesteban-Echarri, O., Goreis, A., Kafka, J. X., Scharinger, C., Addington, J., Felnhof, A., Mossaheb, N., Plener, P. L., & Kothgassner, O. D. (2020). T104. Psychotic-like experiences and problematic gaming behavior in online game forums. *Schizophrenia Bulletin*, 46(Supplement 1), S270–S270. <https://doi.org/10.1093/schbul/sbaa029.664>
- Savill, M., D'Ambrosio, J., Cannon, T. D., & Loewy, R. L. (2018). Psychosis risk screening in different populations using the Prodromal Questionnaire: A systematic review: SAVILL et al. *Early Intervention in Psychiatry*, 12(1), 3–14. <https://doi.org/10.1111/eip.12446>
- Scazza, I., Pelizza, L., Azzali, S., Paterlini, F., Garlassi, S., Chiri, L. R., Poletti, M., Fontana, F., Favazzo, R., Barbanti, S. V., Fabiani, M., Pensieri, L., Cioncolini, L., Semrov, E., & Raballo, A. (2018). Reliability of the Italian version of the Brief (21-item) Prodromal Questionnaire (IPQ-B) for psychosis risk screening in a young help-seeking population. *Journal of Psychopathology*, 24, 204–214.
- Schimmenti, A., & Caretti, V. (2017). Video-terminal dissociative trance: toward a psychodynamic understanding of problematic internet use. *Clinical Neuropsychiatry*, 14(1), 64–72.
- Stip, E., Thibault, A., Beauchamp-Chatel, A., & Kisely, S. (2016). Internet Addiction, Hikikomori Syndrome, and the Prodromal Phase of Psychosis. *Frontiers in Psychiatry*, 7, 6. <https://doi.org/10.3389/fpsy.2016.00006>
- Suwa, M., & Suzuki, K. (2013). The phenomenon of “hikikomori” (social withdrawal) and the socio-cultural situation in Japan today. *Journal of Psychopathology*, 19, 191–198.
- Tan, S., Shea, C., & Kopala, L. (1997). Paranoid schizophrenia with delusions regarding the Internet. *Journal of Psychiatry & Neuroscience*, 22(2), 143.
- Tateno, M., Teo, A. R., Ukai, W., Kanazawa, J., Katsuki, R., Kubo, H., & Kato, T. A. (2019). Internet Addiction, Smartphone Addiction, and Hikikomori Trait in Japanese Young Adult: Social Isolation and Social Network. *Frontiers in Psychiatry*, 10, 455. <https://doi.org/10.3389/fpsy.2019.00455>
- Taylor, M. (2006). Strategies of dissociation: A mimetic dimension to social problems in Japan. *Anthropoetics*, 12(1).
- Teo, A. R., Chen, J. I., Kubo, H., Katsuki, R., Sato-Kasai, M., Shimokawa, N., Hayakawa, K., Umene-Nakano, W., Aikens, J. E., Kanba, S., & Kato, T. A. (2018). Development and validation of the 25-item Hikikomori Questionnaire (HQ-25). *Psychiatry and Clinical Neurosciences*, 72(10), 780–788. <https://doi.org/10.1111/pcn.12691>
- Teo, A. R., & Gaw, A. C. (2010). Hikikomori, a Japanese Culture-Bound Syndrome of Social Withdrawal?: A Proposal for DSM-5. *The Journal of Nervous and Mental Disease*, 198(6), 444–449. <https://doi.org/10.1097/NMD.0b013e3181e086b1>
- Teo, A. R., Stufflebam, K., Saha, S., Fetters, M. D., Tateno, M., Kanba, S., & Kato, T. A. (2015). Psychopathology associated with social withdrawal: Idiopathic and comorbid presentations. *Psychiatry Research*, 228(1), 182–183. <https://doi.org/10.1016/j.psychres.2015.04.033>
- Tzang, R.-F., Chang, C.-H., & Chang, Y.-C. (2015). Adolescent’s psychotic-like symptoms associated with Internet addiction. *Psychiatry and Clinical Neurosciences*, 69(6), 384–384. <https://doi.org/10.1111/pcn.12243>
- Vadlin, S., Åslund, C., Hellström, C., & Nilsson, K. W. (2016). Associations between problematic gaming and psychiatric symptoms among adolescents in two samples. *Addictive Behaviors*, 61, 8–15. <https://doi.org/10.1016/j.addbeh.2016.05.001>
- van Os, J., Hanssen, M., Bijl, R. V., & Vollebergh, W. (2001). Prevalence of Psychotic Disorder and Community Level of Psychotic Symptoms: An Urban-Rural Comparison. *Archives of General Psychiatry*, 58(7), 663. <https://doi.org/10.1001/archpsyc.58.7.663>
- van Os, J., & Linscott, R. J. (2012). Introduction: The Extended Psychosis Phenotype--Relationship With Schizophrenia and With Ultrahigh Risk Status for Psychosis. *Schizophrenia Bulletin*, 38(2), 227–230. <https://doi.org/10.1093/schbul/sbr188>
- van Os, J., Linscott, R. J., Myin-Germeys, I., Delespaul, P., & Krabbendam, L. (2009). A systematic review and meta-analysis of the psychosis continuum: Evidence for a psychosis proneness–persistence–impairment model of psychotic disorder. *Psychological Medicine*, 39(2), 179–195. <https://doi.org/10.1017/S0033291708003814>
- Wu, J., Long, X., Liu, F., Qi, A., Chen, Q., Guan, X., Zhang, Q., Yao, Y., Shi, J., Xie, S., Yan, W., Hu, M., Yuan, X., Tang, J., Wu, S., Zhang, T., Wang, J., & Lu, Z. (2021). Screening of the college students at clinical high risk for psychosis in China: A multicenter epidemiological study. *BMC Psychiatry*, 21(1), 253. <https://doi.org/10.1186/s12888-021-03229-8>
- Yasuma, N., Watanabe, K., Nishi, D., Ishikawa, H., Tachimori, H., Takeshima, T., Umeda, M., & Kawakami, N. (2021). Psychotic Experiences and Hikikomori in a Nationally Representative Sample of Adult Community Residents in Japan: A Cross-Sectional Study. *Frontiers in Psychiatry*, 11, 602678. <https://doi.org/10.3389/fpsy.2020.602678>
- Zahid, A., & Best, M. W. (2021). Stigma towards individuals with schizophrenia: Examining the effects of negative symptoms and diagnosis awareness on preference for social distance. *Psychiatry Research*, 297, 113724. <https://doi.org/10.1016/j.psychres.2021.113724>