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Chapter 5

THE MENTAL HEALTH LITERACY OF INTERNET ADDICTION AMONG ADOLESCENTS: AN INITIAL MEASURE DEVELOPMENT AND VALIDATION

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ABSTRACT

This study aims to describe the initial development and to investigate the psychometric properties of an instrument for measuring the Mental Health Literacy (MHL) of Internet Addiction (IA). The formation of the items was based on the Australian National Survey of Mental Health Literacy and Stigma Youth Survey. It was designed as a vignette-based questionnaire depicting behavioural characteristics of a severe problem with Internet usage. These symptomatic behaviours were based on the description in the Young Internet Addiction Test (IAT). This newly developed instrument was administered to 348 adolescents aged between 15-18 years randomly recruited from high schools in a large city. Responses on the recognition of the problem from the vignette with the

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recognition of another vignette depicting depression were compared. The convergent validity of the intended action to seek help was investigated using the Self-Stigma of Seeking Help Scale (SSOSH), and the personal identification of the problem by the IAT. The results of this study provided supporting evidence for the validity of the MHL of IA measure. As the unique measure of the MHL of IA, this could play an important role in understanding the level of MHL in the population of an emerging area of psychiatric problem.

Keywords: mental health literacy, internet gaming disorder, internet addiction, assessment, psychometric, validity, reliability

INTRODUCTION

Mental Health Literacy (MHL) is a term defined by Jorm as the "knowledge and beliefs about mental disorders which aid their recognition, management or prevention" [1]. This was based on the concept of health literacy established by the US Institute of Medicine (IoM) in 2004 and subsequently enriched by the World Health Organisation (WHO) in 2007 [2-3]. To provide a comprehensive concept of MHL, Jorm also included six main characteristics, namely: 1) the ability to recognise specific disorders; 2) the knowledge of how to seek mental health-related information; 3) the knowledge about risk factors and causes of mental health disorders; 4) the knowledge about how to self-treat and of the availability of professional help; 5) the attitudes that promote the recognition of mental health problems; and 6) the attitudes that promote seeking appropriate help [1].

In terms of the measurement and assessment of MHL, Jorm designed and utilised a vignette-based method to examine the ability of individuals to recognise mental disorders or problems in the national population survey in 1995 [1]. He also reported the use of rating scales to assess respondents' perceptions of a list of pharmacological and non-pharmacological treatments related to the vignettes [1]. Since then, this approach of MHL assessment has been further developed to include questions on other important aspects of the MHL concept. These include: intention to seek help; belief and intention about first aid; belief about intervention and prevention [4]. This assessment approach has been widely adopted in many studies in the area of MHL for Depression, Depression with suicidal thought, Psychosis/early Schizophrenia,

Social phobia, Depression and Substance abuse, and Post Traumatic Stress Disorder [5-11].

Excessive use of the Internet is a form of human interaction with information and communication technologies that has, for many years, been viewed as problematic [12]. Different terms have been used to describe such behaviour including: "compulsive computer use"; "pathological Internet use (PIU)"; "Internet addiction (IA)"; and "Internet dependency" [13-16]. Internet Gaming Addiction (IGA) has been listed as an emerging disorder worthy of further investigation in the latest version of the Diagnostic and Statistical Manual of Mental Disorders V (DSM-V), while a condition called "Internet addiction" (IA) is still yet to be recognised as an established disorder, with the controversial debate is still on-going [17-18]. In this study PIU and IA are used interchangeably.

The mental health outcome of PIU has been well documented and reported in the literature, particularly depression among adolescents 19-24]. In the most recent review of studies on the relationship between pathological Internet use and psychopathological co-morbidities, it was reported that depression had the most significant and consistent association with PIU among a number of the different psychopathologies investigated [19]. However, the review was not able to draw any conclusion on the causality of the relationship owing to the fact that all, but one, were cross-sectional studies [19]. In a recent longitudinal study on healthy young people aged between 13 and 18 years who were depression free, it was found that after 9 months of exposure to the Internet, moderate and severe problematic users were about 2.5 times more likely to develop depressive symptoms and scored high enough on the Zung Depression Scale to return clinically meaningful scores in comparison to normal users [25]. Other longitudinal studies conducted subsequently also yielded similar results [26-27]. These studies suggested a potentially causal relationship between PIU and depression. These finding further suggested that PIU per se could be considered as a mental health problem.

The development of Mental Health Literacy measures for other disorders and mental health problems are emerging in the literature. These include Autism Spectrum disorders, Conduct disorders, personality disorders, and Eating disorders [28-32]. However, for PIU there has not been a single study examining MHL and PIU. As Internet Gambling Addiction has been identified as a potential disorder to be further investigated in the DSM-V, the Mental Health Literacy aspect of PIU will soon become an important issue for exploration. The immediate question is whether there is a suitable measuring instrument for assessing the MHL of PIU. So far, there is none in the PIU

literature. The aim of this study is to bridge this gap by attempting an initial development and validation of an instrument for measuring the MHL of PIU, particularly among adolescents.

MATERIAL AND METHODS

Sample and Procedure

The sample was generated using a two-stage random clustering sampling technique. First, two high schools were randomly selected from the list of high schools in a large city of Southern China. Second, four classes were selected randomly from each school with all students in the class recruited in the sample. As a result, a sample of adolescents aged between 15-18 years was included in this development and validation study. The survey was conducted on campus at different schools within the same week. Selected students were invited to participate in the study by school principals and teachers, and were encouraged to fill in a self-reported questionnaire designed specifically for the study. Consent was implicated by a voluntarily response to the questionnaire. Institute ethics approval for the study was granted by the Human Ethics committee of the Hong Kong Institute of Education.

Materials

The conceptualisation of the instrument and the formation of the items were based on the Australian National Survey of Mental Health Literacy and Stigma Youth Survey designed and developed by Reavley and Jorm [33]. The MHL Youth assessment includes all the aforementioned six domains of MHL. Recognition of disorders was assessed using a vignette-based question that presented a young person with symptoms characteristic of a disorder such as depression. The respondent was then asked the question: "What, if any, do you think is wrong with the young person?" Recognition of the disorder was indicated by the respondent's answer from a list of multiple-choices. Adopting the same format, the domain for disorder/problem recognition for the MHL of PIU was also designed as a vignette-based question presenting a young person with behaviours characteristic of an individual who might have a severe problem with Internet usage. These symptomatic behaviours were based on the

description depicted in the Yong Internet Addiction Test (IAT) [34]. The IAT was designed by Young as a 20 item self-reported scale in accordance to the behavioural diagnostic criteria of pathological gambling detailed in the DSM-IV but applied to the scenario of the Internet usage [34]. It included questions that reflect typical behaviours of addiction. After reading the vignette description, the respondent was asked to select an answer from a list of possible disorders or mental health problems.

At this initial developmental stage of the instrument, not all six domains of MHL were included in the design of the MHL of PIU. Included in this instrument were questions covering areas of intended action to seek help, perceived barriers, and exposure to the disorder/problem. Questions in these domains were all formatted after the original questions presented in the Mental Health Literacy and Stigma Youth Survey with minor modification to adapt to local cultural and language requirements. For example, for the intended help seeking action, the respondent was asked: "If you had a problem right now like the young person described above, would you seek help?" If the answer to the question is affirmative, then it would be followed by another question asking the respondent to indicate from whom he/she would seek the help.

Psychometric Analyses

Owing to the fact that the design of the original MHL instrument included vignette-based questions and other questions with multiple-choice answers, the conventional approach of psychometric analyses that mostly applied to numeric scales might not be appropriate in this situation. Hence, other approaches were adopted to examine the psychometric properties, including the validity and reliability of the newly developed instrument. To investigate the construct validity of the MHL of PIU, particularly discriminant validity, questions on the same three domains of the MHL of depression were also included in the study questionnaire. Respondents were also asked to answer those questions for the MHL of depression. It was assumed that PIU and depression were two different disorders/problems therefore they were of two different constructs. Hence, the recognition of these separate mental health problems should be independent of each other. In other words, the correct recognition of the problem should only be dependent on the behavioural characteristics depicted in the vignette itself, but not on the description of the other vignette. As a result, there should be a significant discordance between the correct recognition responses elicited from PIU and that from depression.

In terms of the analysis this can be tested by using the McNemar Chi-squared test with correct/incorrect recognitions on the PIU and depression vignettes as responses.

To examine the convergent validity, particularly in the domain of the intended action to seek help, the Self-Stigma of Seeking Help Scale (SSOSH) was included in the questionnaire [35]. The SSOSH was designed to measure self-stigma associated with seeking professional psychological help. It was validated with a uni-dimensional structure and good reliability of 0.9,1 and a test-retest reliability of 0.72 [35]. A higher score on the SSOSH scale indicated a strong self-stigmatisation towards seeking professional psychological help and it was demonstrated that SSOSH was negatively and significantly associated with the intention to seek professional help [35]. In terms of the convergent validity for the domain of intended action to seek help, theoretically speaking, those who had indicated a positive intent to seek help should score lower than those who had indicated otherwise. This was tested by comparing the mean SSOSH scores between groups using an independent student's t-test. For the exposure to the problem, specifically on the question whether the respondent had ever had a similar problem as the person depicted in the vignette, the IAT was also included in the questionnaire as an objective assessment of the severity of PIU. Respondents who had indicated having experienced a similar problem should score higher on the IAT in comparison to those who did not have a similar experience. This was also examined by comparing the mean IAT scores between groups.

For the reliability of the MHL of PIU items, the test-retest reliability was examined with the same questionnaire re-administered to a randomly selected group of about 50 students at an interval of 2 weeks. Responses on the main MHL of PIU items were compared between the two test times. The agreement and the 95% Confidence Intervals of responses between the two test-times were calculated with the discordance examined using McNeMar Chi-squared tests. A significant level of 5% was used for testing all hypotheses.

RESULTS

The sample consisted of 348 young people with 150 (43%) males and 198 (57%) females and a mean age of 16.7 years (s.d. = 0.83). The demographic characteristics of the sample were summarised in Table 1. Of these, 127 (37%) were single children and the majority (n = 309, 89%) were living with both biological parents. Most of the parents received formal education up to

secondary or post-secondary levels with only 7% (n = 24) of fathers and 5% (n = 18) of mothers attaining university or higher education. As shown, there were no significant differences in the mean ages or the proportion distributions in any of the demographic characteristics between those who recognised PIU correctly and incorrectly.

The correct and incorrect recognition of PIU and depression responses were presented in Table 2. To confirm the construct validity of the MHL of PIU, particularly the discriminant validity, the discordance of these responses was tested with variables cross-tabulated for McNemar Chi-squared analysis. The results indicated that there was a significant discordance in the responses to the two vignettes (McNamar χ^2 $p < 0.001$). Information on other MHL items of the PIU and depression were also presented descriptively in Table 2.

Table 1. Frequency (%) or means (s.d.) of the demographics by recognition of PIU and results on comparisons (N = 348)

Variables	Total sample	Recognition of the problem		Results
		Yes (n = 203)	No (n = 145)	
Age	16.7 (0.83)	16.7 (0.81)	16.8 (0.86)	$t_{346} = -1.22$, $p = 0.223$
Sex Male Female	 150 (43%) 198 (57%)	 80 (39%) 123 (61%)	 70 (48%) 75 (52%)	 $\chi^2_1 = 2.71$, $p = 0.100$
Single child Yes No	 127 (37%) 221 (63%)	 77 (38%) 126 (62%)	 50 (35%) 95 (65%)	 $\chi^2_1 = 0.43$, $p = 0.510$
Living with biological parents Yes No	 309 (89%) 39 (11%)	 184 (91%) 91 (9%)	 125 (86%) 25 (14%)	 $\chi^2_1 = 1.67$, $p = 0.196$
Father's Education level University or above Secondary and Post-secondary Primary or below/deceased	 24 (7%) 261 (75%) 63 (18%)	 13 (6%) 155 (76%) 35 (18%)	 11 (8%) 106 (73%) 28 (19%)	 $\chi^2_2 = 0.49$, $p = 0.782$
Mother's Education level University or above Secondary and Post-secondary Primary or below/deceased	 18 (5%) 254 (73%) 763 (22%)	 9 (4%) 154 (76%) 40 (20%)	 9 (6%) 100 (69%) 36 (25%)	 $\chi^2_2 = 2.08$, $p = 0.353$

Table 2. Frequency and percentage[a] of responses to Mental Health Literacy items for PIU and Depression (N = 348)

MHL items	PIU	Depression	Comparison results
Recognition of disorder			
Correctly	203 (58%)	69 (20%)	McNamar χ^2 $p < 0.001$
Incorrectly	145 (42%)	279 (80%)	
Recognition of disorder			
Problematic Internet Use	203 (58%)	-	
Depression	14 (4%)	69 (20%)	
Schizophrenia/paranoid schizophrenia	3 (1%)	6 (2%)	
Psychosis/psychotic	-	-	-
Mental illness	2 (1%)	-	
Stress	14 (4%)	89 (26%)	
Nervous breakdown	2 (1%)	6 (2%)	
Psychological/mental/ emotional problems	88 (25%) -	147 (42%) 16 (5%)	
Has a problem			
Cancer	-	1 (0.3%)	
Other (specify)	10 (3%)	13 (4%)	
Nothing	6 (2%)	1 (0.3%)	
Don't know	6 (2%)	-	
Intended action to seek help			
Yes	191 (55%)	210 (60%)	McNamar χ^2 $p = 0.064$
No/Don't know	157 (45%)	138 (40%)	
Of those who seek help, seek help from			
Father	30 (16%)	28 (13%)	
Mother	46 (24%)	57 (27%)	
A family member	14 (7%)	14 (7%)	McNamar-Bowker[c]
My teacher	10 (5%)	8 (4%)	$\chi^2_3 = 0.8$, $p=0.064$
A school social worker or counsellor	3 (2%)	3 (1%)	
Friends met on the Internet	6 (3%)	5 (2%)	
Friends in school	65 (34%)	68 (32%)	
Others	11 (6%)	21 (10%)	
Don't know	6 (3%)	6 (3%)	
Barrier of seeking help(multiple responses)	65 (35%)	60 (29%)	McNamar χ^2 $p = 0.081$
Person might feel negatively about you			
What the person might say is wrong	41 (22%)	41 (20%)	$p = 1.000$
Other people think of you seeing the person	21 (11%)	27 (13%)	$p = 0.481$
Thinking that nothing can help	33 (18%)	48 (23%)	$p = 0.080$
Too embarrassed/shy	49 (27%)	49 (23%)	$p = 0.473$
Other	10 (5%)	11 (5%)	$p = 0.774$
Don't know	34 (18%)	57 (27%)	$p = 0.093$

MHL items	PIU	Depression	Comparison results
Exposure to the problem Family or friends had a similar problem Yes No/Don't know	 139 (39%) 213 (61%)	 -	
Did they receive professional help?[b] Yes No/Don't know	 14 (10%) 120 (90%)	 -	
Have you ever had a similar problem? Yes No/Don't know	 97 (28%) 251 (72%)	 -	
Did you receive professional help? [b] Yes No/Don't know	 16 (17%) 79 (83%)	 -	

[a] Percentage did not add up to 100% due to rounding; [b] Follow-up question only for those who answered yes in the previous question, [c] Categories were collapsed into father, mother, and others,

To examine the convergent validity for the intended action to seek help, the mean SSOSH scores between those who had indicated a positive intent to seek help and those who had indicated otherwise were compared (Table 3). There was a significant difference in the mean scores between groups (t_{346} = -4.14, $p < 0.001$). Those who had indicated a positive intent scored lower than who had indicated otherwise with mean SSOSH scores of 24.2 (s.d. = 4.62) and 26.1 (s.d. = 3.97) respectively. For the convergent validity of the question on the exposure to the problem, results also suggested a significant difference in the IAT scores between those who had experienced a similar problem and those who did not have similar experience (t_{346} = 6.66, $p < 0.001$). The mean scores of IAT for the former group were 48.6 (s.d. = 13.77) and 39.6 (s.d. = 10.68) of the latter.

The test-retest reliability of the MHL of PIU items was investigated and the results were summarised in Table 3. As shown, the agreements of all MHL items between the two test-times were moderately high ranging from 70.6% to 84.3%. The test for discordance for each item did not yield any significant result, suggesting no obvious discordance of responses between the two test-times.

Table 3. Results on test-retest reliability and convergent validity of MHL items (N = 51)

MHL items	Test	Retest	Agreement in % (95%C.I.)	Results
Recognition of disorder Correctly Incorrectly	 27 (53%) 24 (47%)	 26 (51%) 25 (49%)	 70.6 (56.0-82.1)	 McNamar χ^2 p = 1.000
Intended action to seek help Yes No/Don't know	 30 (59%) 21 (41%)	 30 (59%) 21 (41%)	 84.3 (70.9-92.5)	 McNamar χ^2 p = 1.000
Exposure to the problem Family/friends had a problem Yes No/Don't know	 25 (49%) 26 (51%)	 23 (45%) 28 (55%)	 76.4 (50.0-77.2)	 McNamar χ^2 p = 0.815
You ever had a problem Yes No/Don't know	 17 (33%) 34 (67%)	 18 (35%) 33 (65)	 82.4 (68.6-91.1)	 McNamar χ^2 p = 1.000
	ITA scores		Results on comparison	
You ever had a problem Yes No/Don't know	 48.9 (13.77) 39.6 (10.68)		$t_{346} = 6.66$, $p < 0.001$	
SSOSH scores				
Intended action to seek help Yes No/Don't know	 24.2 (4.62) 26.1 (3.97)		$t_{346} = -4.14$, $p < 0.001$	

DISCUSSION

This study aims to examine the psychometric properties of a newly developed instrument for measuring the Mental Health Literacy of Problematic Internet Use. As aforementioned, this is the first attempt of the development of a Mental Health Literacy measure in the area of Problematic Internet Use. Previous studies have reported the development of MHL for other disorders [28-32], however according to Jorm's MHL concept for instrument design, MHL measures are disorder or problem specific. As a result, each vignette depicts one disorder and the MHL questions are referred to the same disorder described in the vignette. Hence, there are six different vignettes for six different disorders in the Mental Health Literacy and Stigma Youth Boost Survey [33].

The results of this study provide some supporting evidence for the validity of the MHL of PIU measure. The significant discordance in responses to the PIU and depression vignettes renders support for the hypothesis that the responses of correct recognition of the disorder depicted in the two vignettes are independent from each other and also vignette specific. This in turn also provides evidence that the vignettes clearly depict two different sets of symptom characteristics, and thus two distinct constructs. Applying the same logic to the test of discordance on data collect at two test times, the results also provide evidence for the concordance of responses at the two test times with moderately strong agreements on the main MHL items. These results suggest reasonably good test-retest reliability of these items. Other results on the comparison of the IAT and SSOSH scores between groups also give support to the validity of the MHL items on intended action to seek help and exposure to the problem.

The role of MHL in the prevention of mental health problems and the promotion of better mental health is undeniably important, as argued by Jorm [36]. The value of enhancing MHL in the community across all ages comes not only in an increase in the ability to recognise mental health disorders and problems, but also a better understanding of the risk factors of these disorder and problems, resulting in the reduction of negative attitudes and stigmatisation towards people who are suffering from these disorders. More importantly, a greater benefit could be gained by developing the ability to seek information on these problems, cultivating a more positive attitude towards seeking appropriate help, and possibly more knowledge in self-treatment or seeking professional help. It is through the early detection, and in turn early intervention, of the problem that the goal of primary and secondary prevention can be achieved [36]. As the onset of many mental health problems occurs during adolescence, it would be more important to develop and implement MHL programs for children. However, a recent study reviewing the available school-based MHL programs for adolescents in the literature yielded disappointing results. It was found that, on one hand the quality of the reviewed studies was far from promising, and on the other the quality of evidence for help-seeking behaviour and knowledge was very low [37]. This demonstrates a greater and urgent need to invest in research for better design and development of MHL programs based on strong and proven theoretical frameworks.

There are strengths and weaknesses in this study. The design of the PIU vignette is based on the conceptual framework embedded in the design of the Internet Addiction Test which is a well validated and widely used instrument

in many countries. The symptom characteristics depicted in the vignette are in line with Davis's concept of Generalised Problematic Internet Use [18]. The questions included in the instrument adopt the format of the original Mental Health Literacy and Stigma Youth Boost Survey that allow for comparisons of responses among different disorders. One obvious limitation of the instrument is that it only includes three main domains of MHL. Further studies are required to develop and to validate the remaining domains to complete the full MHL of PIU instrument.

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BIOGRAPHICAL SKETCH

Lawrence T. Lam

Lawrence Lam has received training in areas of Medical Sciences, Psychology, Public Health, Epidemiology and Medical Statistics. He worked as a hospital Epidemiologist and a Medical Statistician in the Royal Alexandra Hospital for Children, Sydney, Australia, for many years. During the period, he was also teaching Master classes in Epidemiology and Biostatistics at the School of Public Health, The University of Sydney. He was the Head of Epidemiology and Medical Statistics, as well as the Deputy Chair of the Population and Public Health Domain in the School of Medicine Sydney, the University of Notre Dame Australia during 2009-2012. He is also appointed a Fellow of the American College of Epidemiology.

Research Administration

In 2006, he established the Centre for Trauma Care, Prevention, Education, and Research (CTCPER) in conjunction with clinical colleagues of the Surgery Division of the Children's Hospital at Westmead. He was also appointed to the position of the Scientific Director of the centre with full responsibility of promoting and developing research program in the area of trauma care, management, and injury prevention. (http://www.kidsresearch.org.au/research/trauma-care/index.php)

Lawrence has been managing many different local and internal projects for a number of years. He was one of the founding members serving on the advisory committee at the onset of the DRIVE Study which is the world largest study on young drivers' risky behaviour and crash injuries. He has also served as members of the Research Committee of the School of Medicine Sydney and School of Nursing Sydney, the University of Notre Dame Australia while serving a faculty member. He is also a founder and a co-director of the Asia-Pacific Research Collaboration in Child and Adolescent Public Health based in the Chinese University of Hong Kong. More recently, he also established the Child and Adolescent Mental Health Research Collaboration group with colleagues in Hong Kong, China, Macau, and Singapore with a flagship multicentre project held in different cities within the region. He has been appointed as the Co-chair of the Scientific Committee of the Hong Kong Society of Behavioural Health, am affiliated member of the International Society of Behavioural Medicine. He has also been nominated as an in-coming Vice President of the society.

Research Profile

Being an Epidemiologist, a Statistician, and a research Psychologist in clinical and academic settings, Lawrence has experience in many different sub-specialties in Epidemiology and Medicine. These include Behavioural, Clinical, and Environmental Epidemiology. His works cover a range of research areas including Clinical Trauma Management and Injury Prevention, Paediatric and Adolescent Mental Health, Environmental Child Health, Risky Behaviours among young people particularly young people's Internet problematic behaviour and psychology, and Rehab of traumatic brain injury among children and young people. While serving at the School of Medicine Sydney as a faculty member, he also provided consultations to and collaborated with clinicians of the St Vincent's and Mater Hospitals Sydney, the Cunningham Centre for Palliative Care, as well as a member of the advisory committee of the ImPaCCT (Improving Palliative Care through

Clinical Trials) NSW. He has also taught Master classes in different universities including University of New South Wales, and the Chinese University of Hong Kong. Lawrence has been involving and leading many international collaboration.