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Research Article

APPLICATION OF EXPLANATORY SEQUENTIAL DESIGNOF MIXED METHODS RESEARCH IN CONCILIATING QUALITATIVE AND QUANTITATIVE FINDINGSON SOCIAL STRESSORSAND TO EXAMINE THE SOCIAL PROBLEMSOLVINGORIENTATION IN SUBSTANCE ABUSE POPULATION

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ABSTRACT

Substance abuse has been a problem with every society and across every generation. The increasing number of substance abusers in Hong Kong causes a huge impact to our healthcare system. With the consideration in the complexity of psychosocial nature of this population, the utility of both qualitative and quantitative research methods have been becoming increasingly accepted in health sciences. This is a pioneer project in Hong Kong that employed mixed methods research for substance abuse populations which incorporates evidence of pre-treatment individual characteristics and other specific-tailored treatment factors in promoting changes over time. This study aimed at developing a comprehensive understanding of how individual factors, different social stressors and social problem solving orientation in shaping their behavior. This study covered two phases. The first one was to collect quantitative data in subjects' ability in problem recognition, treatment readiness, social values and their orientation in social problem solving. A regression model of relapse prediction was constructed, in which, social problem solving was the most prominent factor, followed by treatment readiness, problem recognition and emotional problem. In the second phase of the study, individual semi-structure interview, and qualitative focus group activities of free-listing and pile-sorting were employed to collect qualitative data on the impact of various social stressors like stress from peers, from family, and from work or study. In the final step, we interpreted findings from these two subsets of quantitative and qualitative data. Results indicated stress from peers was the most prominent single stressor of substance abusers, which yielded similar impact as the combination of cross-product of stress from family and from work or study. Moreover, most subjects adopted negative orientation in their social problem solving, in which, stress from work or study noted with the highest response rate in negative orientation in their social problem solving.

INTRODUCTION

Substance Abuse has been a problem with every society (Austin, Macgowan & Wagner, 2005) and across every generation (Isaacson, Fleming, Kraus, Kahn & Mundt, 2008). It remains one of the major problems in Hong Kong (Yuen, 2001). The increasing number of substance abusers in Hong Kong causes a huge impact to our health care system, considering that the consumption of illegal drugs impacts both emotional and physical health, potentially causing long lasting damage (Yuen, 2001). It is important to identify specific needs (Russell, 2007), to determine appropriateness for treatment (Stevens, Schwebel & Ruiz, 2007) and to facilitate communication with healthcare providers and community partners which are providing rehabilitation services (Tevyaw & Monti, 2004). Social problem solving is the process of problem solving as it occurs in the real world (D'Zurilla, Nezu &

Maydeu-Olivares, 2002). This is a type of problem solving skills that was linked to psychological stress and moderated its links with personality and coping skills (D'Zurilla, Nezu & Maydeu-Olivares, 1996). It is crucial to note that social problem solving influences one's adaptive functioning in their real-life social environment. Previous studies of social problem solving dealt with problems that might affect a person's functioning, including impersonal problems (e.g. insufficient finances planning) as D'Zurilla& Chang (1995), personal or interpersonal problems (emotional, behavioral, cognitive or health problems) by Bronner & Rich (1988), interpersonal problems (e.g. relationships conflicts and family disputes) by Haugh (2006), as well as broader community and societal problems (e.g. crime) by D'Zurilla and Chang (1995). Social problem specifically concerns the conscious, rational, and effortful cognitive-affective-behavioral processes when selecting adaptive coping methods for solving real-life

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problems (D'Zurilla & Chang, 1995; D'Zurilla, Nezu, & Maydeu-Olivares, 2002).

Nezu, Nezu & D'Zurilla (2013) proposed two components of social problem solving skills, namely, two types of orientation (positive and negative) and three different styles (rational, avoidant, impulsive/careless). Problem solving skills referred to the cognitive and behavioral activities by which a person attempts to understand problem and find effective solutions or ways of coping with them (Nezu, Nezu & D'Zurilla, 2013). It composed of four major skills. Firstly, understand what the social problem is, i.e. problem definition and formulation. Secondly, make a plan to resolve the social problem, i.e. generation of alternative solutions. Thirdly, is decision making ability to solve the problem. Fourthly, look back and verify the social problem, i.e. solution implementation and verification.

People with better social problem-solving skills often suffer less from the negative effects of stress, such as hopelessness, anxiety, and depression (Bronner & Rich, 1988; Haugh, 2006; Nezu, 1986a, 1986b). In line with the results of past coping-strategies research and the links between social problem solving and psychological health, social problem solving might mediate or moderate the psychological distress.

It had long been believed that problematic social problem solving was one of the most prominent factors for substance abusers (Jacobson & Margolin, 1979; D'Zurilla & Chang, 1995; Haugh, 2006). It is believed that social problem solving in Chinese population is an interesting but unexplored area that needed to be work on further (Bronner & Rich, 1988, Allison, 1997). With the consideration in the complexity of psychosocial nature of this ever-growing group of population, the utility of mixed methods (qualitative and quantitative) research methods has been becoming increasingly accepted in health sciences (Creswell & Zhang, 2009). Nevertheless, substance abuse studies are yet to substantially benefit from such clinical research methods (Castro, Kellison, Boyd & Kopak, 2010).

METHODS

The purpose of this study is to measure rehabilitation needs and social problem solving style of substance abuse subjects through a series of modular sessions. This study endorsed the Treatment Process Model (TCU) by Simpson (2004), which incorporates evidence of pre-treatment factors; and specific-tailored treatment in promoting positive and sustainable changes over time.

In the first phase of study, The Chinese version of Treatment Needs and Motivation Assessment (Institute of Behavioral Research, Texas Christian University, 2008) was used to examine their ability in problem recognition, their desire for help, treatment readiness and their specific treatment needs. Drug Involvement Scale – DIS (Lam, Ng & Boey, 2002) was used to assess their problematic beliefs and values. To note for social problem capability, the Chinese Social Problem Solving Inventory (Siu & Shek, 2005a; 2005b) was adopted to assess for their orientations and styles in social problem solving.

In the second phase of study, explanatory sequential design (Figure1) was adopted. In this phase of study, qualitative data was collected through individual semi-structure interview sessions and in qualitative focus group activities. The impact of various social stressors like stress from peers, from family and from work or study were explored. The final step is to interpret findings from these two subsets of quantitative and qualitative data.
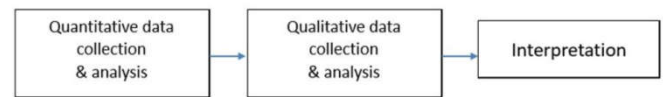

Figure 1. *Explanatory sequential design*

RESULTS

The first phase of study conducted from 2016 to 2017, forty male substance abusers whom were pre-discharged from a regional psychiatric hospital were recruited. All of them came from a modernizing district in the Eastern Part of New Territories of Hong Kong, which was once an idyllic village town. After years of rapid development, it has transformed into a modern town with apopulation of about 300 000. Presently, it has six public housing estates, over one hundred private housing estates and around 130 villages. This district has been regarded as the miniature of Hong Kong (Yu, Wong, Liu, Lee & Lloyd, 1997; Tai Po District, 2017).

The ages of the participants ranged from 18 to 48 years old (*Mean* = 28.2, *SD* = 5.1), majority (78%) were between 21 and 30 years old. All subjects showed their understanding on the adversity of substance abuse (t = 4.5, p < .01). Duration of substance abuse yielded no significant difference in their knowledge on adversity of substance abuse as shown in Table 1. It is worthy to note that subjects with shorter history of substance abuse showed better problem recognition (p<.01), treatment needs (p<.001), desire for help (p<.05), and treatment readiness (p<.05) than long duration subjects as shown in Table 2.Moreover, younger subjects (with age less than 30 years old) showed better confidence to avoid drugs (p<.05), while experienced subject showed higher intention in drug taking (p<.01), emotional problem (p< .001) and compulsivity of drugs (p < .001)

Table 1. *Comparison of Problematic Values, Knowledge of Substance Abuse and Attitude of Substance Abuse between Years of Experience (with Age as the Covariate)*

Variables	Less than 3 years (n = 25)		3 years or more (n = 15)		F
	Mean	SE	Mean	SE	
Drug Involvement Scale (to assess problematic beliefs and values)	52.12	14.32	65.32	7.01	5.49 **
Knowledge	15.23	2.21	14.33	2.12	.82
Attitude	8.78	1.21	8.67	1.79	.74

Note. p< .05, ** p< .01, *** p< .001.

Table 2. *Comparison of Treatment Needs between No. of years with Substance Abuse, with Age as the Covariate*

Treatment Needs & Motivation	Less than 3 years (n = 25)		3 years or more (n = 15)		F
	Mean	SE	Mean	SE	
Problem Recognition	10.32	3.21	7.52	2.65	3.21 **
Treatment Needs	13.81	2.23	9.89	2.11	3.22 ***
Pressure for Treatment	12.22	2.31	13.23	3.22	1.23
Desire for Help	13.22	2.32	11.21	1.27	2.43 *
Treatment Readiness	10.23	2.43	7.23	1.23	4.21 *

Note. * p< .05, ** p< .01, *** p< .001.

Table 3. *Comparison of Stimulant Relapse Risk between No. of years with Substance Abuse, with Age as the Covariate*

Variables	Less than 3 years (n = 25)		3 years or more (n = 15)		F
Stimulant Relapse Risk					
Intention to Use Drugs	12.32	4.11	16.54	6.25	5.89 **
Emotional Problem	7.52	3.21	11.32	2.65	6.21 **
Compulsivity for Drugs	9.89	2.23	17.81	2.11	7.22 ***
Positive Expectancies for Drugs	13.23	2.31	12.22	3.22	1.23
Impetus and Confidence to Avoid Drugs	14.21	2.32	11.22	1.27	3.43 *
Lack of Control over Drugs	7.23	2.23	14.23	1.23	4.21 *

Note. $p < .05$, ** $p < .01$, *** $p < .001$.

In this first phase of study, subjects showed to have avoidance ($p < .01$), negative problem orientation ($p < .001$), impulsiveness ($p < .05$) and impulsivity or carelessness ($p < .05$) in their social problem solving. Alike the findings from Simpson & Joe (1993), motivation for treatment like problem recognition, desire for help and treatment readiness, is closely tied to positive problem orientation ($r = .55$, $r = .67$ and $r = .78$, $p < .01$) as shown in Table 4 and Table 5. Moreover, acknowledgement of personal and social problems (e.g., depression, anxiety, hostility, risk taking) is negatively correlating with stimulant relapsing ($r = -.58$, $p < .05$). Positive problem orientation and rational problem solving showed significant correlation with subjects' confidence to avoid drugs ($r = .78$, and $r = .71$ respectively, $p < .01$).

Table 4. *Correlation between Social Problem Solving and Treatment Needs (N= 40)*

Treatment Needs & Motivation	Social Problem Solving Inventory (Pearson r)				
	Positive Problem Orientation (PPO)	Negative Problem Orientation (NPO)	Rational Problem Solving (RPS)	Avoidance (AS)	Impulsivity or Carelessness (ICS)
Problem Recognition	.55 *	-.26*	.51 *	-.26	-.31 *
Treatment Needs	.42 *	-.28*	.26**	.27	- .27 *
Pressure for Treatment	.32	.32	.31	-.25	-.25
Desire for Help	.67 *	-.52	.63*	.32	-.32 *
Treatment Readiness	.78 *	-.44	.71*	.29	- .29 **

Note. $p < .05$, ** $p < .01$, *** $p < .001$.

Table 5. *Correlation between Social Problem Solving and Relapse Risk (N = 40)*

Relapse Risk	Social Problem Solving Inventory (Pearson r)				
	Positive Problem Orientation (PPO)	Negative Problem Orientation (NPO)	Rational Problem Solving (RPS)	Avoidance (AS)	Impulsivity or Carelessness (ICS)
Intention to Use Drugs	-.35	.66 *	-.41	-.26	-.31 *
Emotional Problem	.22	.78 **	-.26*	.27	- .27
Compulsivity for Drugs	.32	.55 *	.31	-.25 **	-.25
Positive Expectancies for Drugs	.32	.52	.33	.32	-.31 *
Impetus and Confidence to Avoid Drugs	.78 **	-.44	.71**	.29	- .29 **
Lack of Control over Drugs	-.46	.68 **	-.34 *	.36 *	.36 *

Note. $p < .05$, ** $p < .01$, *** $p < .001$.

A regression analysis was conducted to predict subjects' relapse with those psychosocial measures as shown in Table 6. The regression model was able to predict a significant proportion of variance in avoiding drugs ($R^2 = .32$). Social problem solving cores contributed significantly to the regression model ($\beta = .21$), while treatment readiness contributed ($\beta = .11$) and problem recognition ($\beta = .10$) showed their significance. Moreover, in relapse risk, emotional problem ($\beta = .10$) showed significant contribution in prediction of avoid drugs.

Table 6. *Prediction of Impetus to Avoid Drugs (N = 40)*

Predictor Variables	B	SE	β	t
Social Problem Solving Inventory	6.32	.26	.21	2.1 *
Treatment Needs and Motivation				
Treatment Readiness	3.44	1.31	.11	1.23*
Problem Recognition	2.54	.79	.10	1.58 *
Relapse Risk				
Emotional Problem	1.45	.72	.10	.87*

Note. *$p < .05$, **$p < .01$, ***$p < .001$ [$R^2 = .32$]

Based upon the findings from the first phase of study, quantitative results showed social problem solving is a significant parameter. Results of the importance of social problem solving from the first phase study would be further rectified by semi-structure individual interview sessions and in qualitative focus group activities for subjects as in Figure 2.
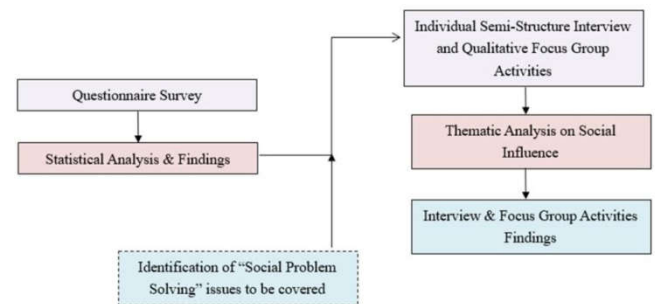

Figure 2. *Integration through design*

The second phase of study was conducted from Jul 2017 to January 2018. Explanatory sequential design was adopted. Semi-structured interviews were employed to analyses 20 substance abuse subjects, whom were just receiving their first session of aftercare counseling service in the western part of New Territories in Hong Kong. This district shared similar socio-demographic characteristics as Eastern New Territories of the first phase of study (Census and Statistics Department Hong Kong Special Administrative Region, 2016). To identify an explanatory model for social problem solving and its influence on substance abuse, ground theory was employed for findings analysis. To examine on cultural consensus, the technique of free-listing and pile-sorts in their social problem solving strategies and its influence were used for further analysis of these twenty recruited subjects.

Table 7. *Strategies for Second Phase of Study*

Strategy	Sample	Goal	Analysis
Semi-structured Interviews	Purposive sample of 20 adolescents	Identify an explanatory model for substance abuse	Grounded theory
Free Listing and Pile Sorts	Free listing as first stage, and pile sorts as the second stage.	Identify the domain of social influence and its characteristics	Cultural consensus

In free-listing, subjects were asked to "list all the source social situation that might cause you to substance abuse." Moreover, subjects were asked to "list all the social problem solving strategies that you tried to use." To maximize free-listing output, techniques on nonspecific prompting, reading back the list of free-listed items (allows subjects to review list and add items they thought had mentioned) and using free-listed items as semantic cues, were applied in this second phase of study. For the steps in analysis of proximity data, raw data would be converted into proximity matrices and to perform analysis.

In pile-sorting, the sources of social situation by looking for similarities among items was examined. Subjects would be introduced source of social situation cards one-by-one and to verify that subjects knows each of them. Then, lay all the cards out in front of subject and ask them to make groups of either stress from peers, family or work / study. Once groups are made, ask subject to explain/talk about each group. The same method applied in the pile sorting of social problem solving. A data profile matrix was produced with a table of cases and their associated variables. Each unit of analysis is profiled by a particular set of measurements on some variables. Proximity matrices contain measurements of relations or proximities between items. If the measurements in a proximity matrix tell how close things are to each other and to form a similarity matrix. If the measurements in a proximity matrix tell how far apart things are from each other, then to form a dissimilarity matrix. The direct similarity of items in a domain, item-by-item matrix was drafted as (or by rating similarity of all pairs presented *ad seriatum* and then creating the item-by-item matrix from those data.)

Table 8. *Proximity Matrix of Social Situation That Might Cause Substance Abuse (n =20)*

	Stress from Peers	Stress from Family	Stress from Work /Study
Stress from Peers	10	4	6
Stress from Family	4	6	10
Stress from Work /Study	6	10	4

Through qualitative research method and analyses rectified in social situation, nearly half of subjects in the proximity matrix showed stress from peers is the most prominent single stressor of substance abusers, which yields similar findings as the combination of cross-product of stress from family and from work or study in substance abusers as shown in Table 8. Moreover, most of the subjects adopted negative orientation in their social problem solving as shown in Table 9, in which, stress from work or study noted with the highest response rate in negative orientation in their social problem solving as in Table 10.

Table 9. *Orientation of Social Problem Solving in Social Situation That Might Cause to Substance Abuse (n =20)*

Orientation	Stress from Peers	Stress from Family	Stress from Work /Study
Positive Orientation	8	6	3
Negative Orientation	12	14	17

Table 10. *Styles of Social Problem Solving in Social Situation That Might Cause to Substance Abuse (n =20)*

Styles	Stress from Peers	Stress from Family	Stress from Work /Study
Rational	8	6	3
Avoidant	6	7	10
Impulsive / Careless	6	7	7

DISCUSSION

In the first phase of quantitative study, all forty participants showed they had adequate knowledge on the adversity of substance abuse. Moreover, all participants showed the correct attitudes towards quitting substance abuse. This result could be out of social desirability as suggested by Yuen (2001). Subjects with shorter history of substance abuse showed higher desire for help and treatment readiness can be attributed by their better expectation in abstinence than longer duration subjects. Results showed that younger subjects (with age less than 30 years old) showed better confidence to avoid drugs, in contrasting to older subjects showed higher intention in drug taking, emotional problem, and compulsivity of drugs. Humphreys (2004) pointed

out that was worthy to alleviate further damage and to make earlier possible correction for their own path of life (Stevens, Schwebel & Ruiz, 2007), and it was encouraged to take more immediate action for young substance abusers with relatively shorter duration and lesser experience in substance abuse (Friedman, 2006).

In this quantitative phase of study, positive problem orientation and rational problem solving showed significant correlation with subjects' confidence to avoid drugs. These findings shared similar opinion as in Russell (2007) that positive expectation and hope for future was one of the crucial pre-requisites in further avoiding substance abuses. Moreover, Nezu (1986) supported that positive social problem solving can be functioned as a moderating factor between negative life stress and depressive symptoms (Tevyaw & Monti, 2004). With consideration of this specificity, different strategies should be tailored for different styles of social problem solving in preventing further stimulant reinstatement.

In the second phase of qualitative study, most of the subjects also showed their intention in adopting negative orientation in their social problem solving. Through semi-structured interview, free-listing and pile-sorting activities, they rated most negative in social problem solving in work / study stress, while the least negative in stress from peers. This can be partially reflected from their strong influence in peer influence. On the one hand, this can be believed that their peer group would also be substance abused probe. On the other hand, they might consider that more "negative" in social problem solving in family and in work aspects. In order to break this viscous cycle, one should consider to widen their social circle with other normal community subjects. Moreover, it was suggested to enhance their rational social problem-solving skills (Stevens, Schwebel & Ruiz, 2007) and to re-direct their negative problem orientation and impulsiveness (Kelly, Myers & Brown, 2000). This had been achieved as reflected from a local study showed that cognitive-behavioral group intervention, introducing rational thinking, and coping skills, was effective in helping persons at risk of developing mental health problems in Hong Kong (Wong, Sun, Tse & Wong, 2002).

Though with it is a pioneer motive, it is worthy to note that social problem solving abilities might not be strongly encouraged in Chinese families (Allison, 1997), it might be difficult for them to adapt in learning such skills (Shek & Chan, 1998). Moreover, some reported commented that adolescents' social problem solving abilities were not strongly encouraged in Chinese families (Siu & Shek, 2005a), it might be difficult for them to adapt to learning such skills (Siu & Shek, 2005b). It has been suggested that social and medical professionals should try to change subjects' attitudes from negative and avoidance to active coping when facing problems (Haugh, 2006). There had been suggestions as from Siu and Shek (2005) in organizing workshops which could teach adolescents rational problem-solving skills such as problem identification and formulation, generation of alternative solutions, decision making, solution implementation and verification, as well as cultivate a positive problem orientation and introduce active coping strategies. Some researchers as Bronner and Bich (1988) and D'Zurilla and Chang (1995), had tried to use the performance test format, which presented the person with a specific problem-solving task that requires him or her to apply a specific skill or a set of skills (e.g. problem recognition, problem definition, generation of solutions, decision making).

In qualitative research method, the technique of free-listing and pile sorting were used for our substance abuse population. With clear instructions, it was believed that these techniques can address intracultural variation (Levin, Glass, Kushi, Schuck, Steele & Jonas, 1997), which cannot be easily achieved through quantitative methods. Moreover, these techniques are quantifiable and can find areas of consensus as to reflect the findings of social problem solving as in the phase one of quantitative study. However, these techniques should be applied with some considerations, for example this cannot be applied to illiteracy subject (Curry, Nembhard & Bradley, 2009). Operationally, respondents may fail to understand the instructions for how to do the task, if guideline was not clear.

Last but not the least, the weaknesses of convenience sampling in this study should be noted. Generalization of findings to entire substance abuse population should be made with further justification by using a larger sample size of subjects. Moreover, self-administered questionnaires were used and information collected was based on the informants only. With further use of multiple informants would give a clearer picture of their social problem solving problem areas.

CONCLUSION

With the consideration in the complexity of psychosocial nature of substance abusers, this is the pioneer study in employing mixed methods research for this study. Explanatory sequential design was adopted in developing a comprehensive understanding of how individual behaviors and social process shaped the behavior of substance abusers.

The first phase of quantitative study, correlation and regression analyses showed subjects' ability in problem recognition, treatment readiness and orientation in social problem solving were significant factors for subjects' tendency in relapse. Social problem solving was noted as the most significant predictors. By using qualitative methods like semi-structured interview, free-listing and pile-sorting. The second phase of qualitative study further validated the importance social problem solving in various stressors, namely stress from peers, from family and from work or study.

To merge quantitative and qualitative data helps us to develop a more complete and in-depth understanding of the substance abuse problem and its relation on social problem solving.

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