Multiple Expressions of Addiction: Psychosocial Correlates and Clinical Trajectories of Treatment Seekers

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Abstract

This paper describes the first of its kind research protocol and initial findings of a prospective study focusing on a cohort of treatment seekers at the Integrated Centre on Addiction Prevention and Treatment, Tung Wah Group of Hospitals. This project established a systematic study protocol that has been woven into the Centre’s standard clinical services. This protocol reflects the project’s overall goal of establishing an epidemiology of treatment seekers and advancing current knowledge about the addiction syndrome and its treatment. These goals diverge into four interconnected lines of scientific enquiry: (1) establishing the extent of psychiatric comorbidity among addiction treatment seekers; (2) exploring the psychosocial and treatment trajectory correlates among different expressions of addiction; (3) evaluating the change in addiction severity and related psychosocial functioning throughout treatment; and (4) identifying the addiction, psychosocial, and treatment variables that influence clinical outcome. The focus on investigating local treatment seekers allow for ample opportunities to derive clinically meaningful findings, which would substantially improve evidence-based and culturally-sensitive clinical service. Recommendations that would improve addiction treatment, based on the initial findings, are discussed.
Introduction

Traditional addiction treatment models view different expressions of addiction as distinct disorders (e.g., opioid dependence, alcohol abuse, pathological gambling, etc.), even though addictive behaviors are highly comorbid with each other and with associated mental health problems (Regier et al., 1990). To address their multi-dimensional problems, clinicians often refer treatment-seeking individuals to various other clinical services. Consequently, among treatment seekers, their clinical experience can be confusing and fragmented. In a number of developed countries, clinicians have begun to conceptualize addiction as an amalgamated condition, best addressed by an integrated continuum of addiction services. We brought this contemporary addiction treatment ideology to Hong Kong by establishing the Integrated Centre on Addiction Prevention and Treatment (ICAPT) at the Tung Wah Group of Hospitals (TWGHs). Being a one-stop treatment centre, the ICAPT provides comprehensive treatment packages to people with multi-addiction problems. We also strive to facilitate the science of addiction and frontline staff’s treatment competence by engaging in empirical research and professional training activities. Ultimately, we seek to spearhead a paradigm shift for addiction treatment, where integrated clinical services are offered to treatment seeking individuals on a normative basis.

Multiple expressions of addiction: the syndrome model of addiction

Observers of addiction have held the conventional view that the cause and consequences of addiction result from drug specific effects (e.g., nicotine addiction; alcohol addiction, opioid addiction, etc.). During the last decade, however, there is growing recognition that various behaviors also can become the object of addiction (e.g., gambling, gaming, sex, etc.). Recently, the newly revised Fifth Edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM; American Psychiatric Association, 2013) included the first behavioral addiction disorder (i.e., gambling disorder). The body of evidence providing support for changing the nosology of addiction and including gambling disorder with substance use disorders within the diagnostic class of addictive behaviors come from a compendium of evidence revealing a variety of similarities between gambling and psychoactive substance use. For example, gambling and substance use disorders tend to evidence psychiatric comorbidity (Kessler et al., 2008; Korn & Shaffer, 1999; Langenbucher, Bavly, Labouvie, Sanjuan, & Martin, 2001; LaPlante & Shaffer, 2002; Nelson, Belkin, LaPlante, Bosworth, & Shaffer, 2015; H. J. Shaffer, 1999, 2003), personality traits (AP Blaszczynski, Buhrich, & McConaghy, 1985; Eysenck, 1997; MacLaren, Fugelsang, Harrigan, & Dixon, 2011), neurocognitive functioning (Goudriaan, Oosterlaan, De Beurs, & Van Den Brink, 2006; Lawrence, Luty, Bogdan, Sahakian, & Clark, 2009; Leeman & Potenza, 2012), and neurobiological responses (Potenza, 2008; Reuter et al., 2005).

Given the corresponding comorbidities across various expressions of addiction, scientists have postulated that the genesis of different addictive behaviors might be the result of common etiological roots. This hypothesis forms the theoretical basis of the syndrome model of addiction (H. J. Shaffer et al., 2004; H. J. Shaffer, LaPlante, & Nelson, 2012a, 2012b; H. J. Shaffer & Shaffer, 2016). This model conceptualizes various forms of addiction (i.e., chemical or behavioral) as opportunistic expressions of common etiological vulnerabilities. The Syndrome Model is an over-arching theoretical framework that encompasses all forms of experience-shifting behaviors. At its theoretical core, the syndrome model hypothesizes that disparate expressions of addictive behaviors
are the opportunistic outcomes of common distal and proximal biopsychosocial antecedents; they also share overlapping biopsychosocial consequences that result from the addictive behaviors. Although there are unique consequences of addiction to specific objects or activities (e.g., gambling debt; alcohol related liver cirrhosis), there are more shared consequences (e.g., guilt, deceit, shame, comorbidity).

The syndrome model identifies key shared features of addiction that cross behavioral and substance-related expressions of addiction. There are common characteristics across the variety of expressions of addiction. For example, the following three characteristics are hallmark features of addiction: (1) experiencing a craving or compulsion to engage in the addictive behavior; (2) lack of control over the addictive behavior; and (3) continued engagement in the addictive behavior despite negative consequences. Behavioral and substance-related addiction is also associated with a desirable subjective shift while engaging in the addictive behavior. This desirable shift differentiates the ego syntonic experience of engaging in addictive behaviors from other dysregulated but non-addictive behaviors (e.g., antecedent ego dystonic experience associated with obsessive-compulsive disorder) (H. J. Shaffer et al., 2004; H. J. Shaffer et al., 2012a, 2012b). These characteristics represent a parsimonious understanding of the addiction experience and are closely related to various existing descriptions of addiction expressions (Alex Blaszczynski & Nower, 2002; Garcia & Thibaut, 2010; Griffiths, 2005; Schulte, Grilo, & Gearhardt, 2016; Young, 1998).

The theoretical assumptions of the syndrome model provide for the possibility that any object or activity – substance or behavior – can become the focus of addiction; this model assumes that addictive potential lies in the interaction between a person and the object of addiction, rather than in the object alone. Yet, several behaviors are known to have the potential to reliably stimulate desirable subjective shifts; these activities are more prone to manifest as addiction. Besides the diagnostically acknowledged substance use and gambling disorders, these behaviors include sexual activities, Internet use, eating, spending, and stealing behaviors. These are the common clinical manifestations for which people seek treatment in non-restrictive addiction services (i.e., those that accept addiction sufferers beyond the “conventional” problems of substance misuse and intemperate gambling). Whether these clinical expressions of addiction share similar abnormality, as in the case of overlapping biopsychosocial problems between substance use and gambling disorders, remains to be empirically and systematically studied. To refine service delivery, it is also important to identify the clinical subgroup(s) that are most affected by the addiction syndrome. The addiction syndrome model suggests that people with co-morbid problems would suffer more or evidence more severe psychosocial functioning deficits and, therefore, might require more specialized treatment.

The overlapping biopsychosocial problems that commonly emerge across addiction expressions are wide-ranging. These problem areas can include emotional states, obsessiveness, personality traits, coping styles, interpersonal functioning, neurocognitive competence, and general health status. Selecting the specific biopsychosocial constructs to examine the extent of shared variance across addiction expressions requires clinical wisdom and thoughtful considerations of the existing literature. Depression and anxiety – the “common cold” of mental illness – are the prime candidates for the emotional turmoil experienced by people with addiction (B. F. Grant et al., 2004). Despite important differences between addictive disorders and obsessive-compulsive disorders (H. J. Shaffer et al., 2004; H. J. Shaffer et al., 2012a, 2012b), certain overlaps between addiction and obsession have prompted suggestions that an
underlying obsessiveness can stimulate addictive behaviors (Leedes, 2001). Closer examination about obsessive thought processes (Taylor et al., 2006) might help to clarify the role of obsession in the etiology and experience of addiction. In terms of enduring personality characteristics, there is an early debate about whether an “addiction personality” exists (Craig, 1979a, 1979b). Although little empirical evidence supported a demoralizing personality description of addiction, there is now substantial evidence that people with addiction are generally more impulsive, sensation seeking, and alexithymic (G. L. Cheng et al., 2015; Ersche, Turton, Pradhan, Bullmore, & Robbins, 2010; Thorberg, Young, Sullivan, & Lyvers, 2009; Zuckerman & Kuhlman, 2000) than people without addiction. Different personality profiles reflect different styles of psychological coping (Carver & Connor-Smith, 2010; Connor-Smith & Flachsbart, 2007). Also relevant in the consideration of multi-dimensional difficulties associated with addiction is interpersonal functioning, such as the extent of perceived social support, family functioning, and empathic capacity (Havassy, Hall, & Wasserman, 1991; Rhodes & Jason, 1990). Neurocognitive deficiency, either as the neurotoxic sequelae of addiction (Rapeli et al., 2006) or vulnerability (Ersche et al., 2012) for addiction, is an important but often neglected treatment consideration (Weinstein & Shaffer, 1993). Neurobiological studies examining the dysexecutive syndrome associated with drug addiction (Fernández-Serrano, Pérez-García, Rio-Valle, & Verdejo-García, 2010; Rapeli et al., 2006; Selby & Azrin, 1998) evidence deficits in decision making, inhibition, working memory, and fluency among other things, corroborates drug-related frontal dysfunctions (Goldstein & Volkow, 2011). General health and wellbeing also are important factors associated with understanding the impact of addiction holistically, especially in light of the re-emerging suggestions of an accelerated aging process for people with a history of substance abuse (G. Cheng et al., 2013; Ersche, Jones, Williams, Robbins, & Bullmore, 2013; Reece, 2007). Investigating how any of the above biopsychosocial domains cut across various addiction expressions will contribute to refining and specifying the postulations of the syndrome model.

**Treatment processes: formulating an empirically-derived clinical model**

Because addiction is a chronic disorder, treating addiction usually involves a long-term process. Addiction treatment often is complicated by treatment unresponsiveness, treatment drop-outs, relapses, and co-morbidity with a wide range of mental illnesses (Brorson, Arnevik, Rand-Hendriksen, & Duckert, 2013; Kelly, Daley, & Douaihy, 2012; Najt, Fusar-Poli, & Brambilla, 2011; Rollins, O'Neill, Davis, & Devitt, 2005). To evaluate the efficacy and impact of clinical effort, it is important to monitor treatment progress prospectively. This involves continuously identifying patterns of change throughout treatment that are relevant to addiction severity and related psychosocial functioning. Moreover, to evaluate the utility of specific treatment strategies, it is crucial to identify the variables that influence treatment outcome. Potential treatment-influencing variables encompass both client-specific factors (e.g., baseline addiction severity and related psychosocial functioning) and the client-therapist relationship (i.e., therapeutic alliance).

Investigators have identified the relationship between a client and therapist, typically termed the therapeutic alliance, as a robust predictor of treatment outcome for many forms of psychopathology, including substance use disorders (Gibbons et al., 2010; Havens, 1986; Meichenbaum & Turk, 1987; Meier, Barrowclough, & Donmall, 2005; H. J. Shaffer, 1994). Clinicians widely accept the therapeutic alliance as the “common...
ingredient” underlying the effectiveness of a wide array of treatment modalities (Hubble, Duncan, & Miller, 1999). Despite the key role that the therapeutic alliance plays during psychosocial interventions, our knowledge about this foundational treatment component primarily comes from western research programs; further, other than the important role of motivational interviewing (Brown & Miller, 1993; Hettema, Steele, & Miller, 2005; Hodgins, Currie, & el-Guebaly, 2001; W. R. Miller, 1996; W. R. Miller & Rollnick, 1991; H. J. Shaffer, 1994), there is little evidence about the broader role of the therapeutic alliance during the treatment of addiction. There are suggestions that ethnic culture influences the formation of a therapeutic relationship (Vasquez, 2007). For example, Confucianism, a strong influence on Chinese culture, places high value on interpersonal harmony. This cultural consideration suggests that therapists working with Chinese families should focus on establishing a positive therapist-client relationship during the early stages of treatment; a positive therapeutic relationship is associated with an increased likelihood of clients returning for additional therapy sessions (Lei & Duan, 2014). This cultural value also might influence clients’ expectations of the client-therapist relationship. However, a paucity of literature has examined the nature and impact of the therapeutic alliance within eastern treatment setting (Tsui & Schultz, 1985), and none of which is related to addiction treatment. Unraveling such therapeutic processes within the local context would advance and refine the development of culturally-sensitive intervention strategies.

**Present study: At the addiction syndrome treatment centre**

Although thorough empirical understanding about the addiction syndrome is a worthy and necessary scientific endeavor, human suffering is current and requires immediate action. Precisely for this reason, we formulated and developed the Integrated Centre for Addiction Prevention and Treatment (ICAPT) at the Tung Wah Group of Hospitals (TWGHs). Our goal was to aide those who present with addiction-related problems that are ill-suited for mainstream addiction or mental health facilities in Hong Kong. Based on the syndrome model of addiction, the clinical service at ICAPT provides integrated treatment services for people with multiple and comorbid addiction and mental health problems.

To evaluate and guide our ongoing clinical efforts, it is crucial to engage in rigorous research that can evaluate and refine or revise the utility of the syndrome model. To establish a comprehensive prospective protocol for evaluating treatment seekers, we established collaboration between faculty at Harvard Medical School and the Cambridge Hospital’s Division on Addiction. Through this partnership, we developed a systematic research protocol and weaved it into the standard clinical services at ICAPT. We designed this research protocol to fill existing empirical knowledge gaps associated with the syndrome model of addiction. Specifically, there is a need for more empirical data from clinical environments to test the syndrome model (H. J. Shaffer et al., 2012a, 2012b). Moreover, the few existing studies (e.g., (Dannon et al., 2004; J. E. Grant & Kim, 2005; H. W. Lee et al., 2012; Raviv, 1993; Yen et al., 2008; Zhou, Zhu, Li, & Wang, 2014)) typically have compared one relatively well-established expression of addiction (e.g., substance use or gambling) and one relatively ill-studied expression (e.g., Internet use or sexual activities). There is a dearth of study that has examined several expressions of addiction within a single investigative framework, thus limiting our current knowledge about the extent of shared variance across different expressions of addiction.
The overall goal of this program of research is to explore and identify the overlapping psychosocial and treatment variables across multiple expressions of addiction. This research will contribute to elucidating the core features of the addiction syndrome among treatment seekers and the unique experiences associated with specific addiction expressions. To this end, we established a cohort of addiction treatment seekers and sampled them about a broad spectrum of psychosocial and treatment-related constructs. In keeping with the syndrome model, we hypothesized that various addiction expressions would share overlapping patterns of pathology and treatment experience. We also hypothesized that people with multiple expressions of addiction and/or co-occurring mental health problems would evidence greater psychosocial functioning deficits.

This paper describes the overall research methodology for this ambitious longitudinal study and summarizes its initial findings. These results provide evidence to support the momentum to continue collecting data and following the established cohort, paving the way for in-depth examination of specific hypotheses related to the syndrome model, as well as identifying and supporting recommendations for improving clinical service.

Methods

Overview of research design

We are collecting data from three clinical services locations. The main clinical service (i.e., the Integrated Centre for Addiction Prevention and Treatment, or ICAPT) acts as a research hub, which coordinates this research project. The ICAPT specializes in the treatment of multiple expressions of addiction, including but not limited to alcohol, nicotine, illicit or prescriptive psychotropic substances, gambling, sexual behaviors, online gaming and Internet use, spending, stealing, and eating. The other two partner centres are the Even Centre (EC), a treatment centre for problem gambling, and the Alcohol Abuse Prevention and Treatment (AAPT) service, a treatment service for alcohol abuse. The Tung Wah Group of Hospitals, the largest non-governmental organization in Hong Kong that offers medical, social, and educational services, manages all three treatment centers.

We invited consecutive treatment seekers at these treatment centres to participate in this research project. Those who agreed to participate and provided consent were subjected to a comprehensive series of assessments that covered a wide range of psychosocial measures. Using a prospective design, we scheduled research assessments at the clinical intake session, after every 6 months during treatment, at treatment completion, and every 6 months post-treatment. In addition to the sparse schedule of comprehensive research assessment, data about primary clinical variables (i.e., addiction severity) and therapeutic alliance were obtained on a regular basis throughout treatment. The schedule for collecting these measurements was during each of the first three treatment sessions, and then every third treatment session thereafter.

The ICAPT research ethics committee, consisting of members who were not involved in the daily operation of the treatment centres, reviewed and approved the study procedures.
Participant recruitment and inclusion criteria

We invited every eligible treatment seeker at ICAPT to participate in the study. Due to practical constraints at the EC and AAPT (e.g., limited staffing resources for the research project), we recruited eligible treatment seekers who were assigned to three randomly determined therapists at these partner centres. Eligibility for this study is based on the following inclusion criteria: (1) age between 18 and 65 years; (2) a reasonable level of literacy and expressive capacity deemed sufficient to participate in the study; (3) fluency in Cantonese Chinese; and (4) ability to understand the nature of the study and provide written informed consent. Treatment seekers who presented with immediate suicidal risk or active psychotic symptoms were excluded from participation. In such cases, the responsible therapist would trigger the established management plan immediately (i.e., suicidal management or referrals to psychiatric management).

Based on the same inclusion criteria, we recruited control participants from other service units at Tung Wah Group of Hospitals. Examples of services these participants might have received include interest classes and generic community support. These control participants represent a comparison group of individuals who do not report a history of addiction or other mental health problems.

Ongoing recruitment of participants at the treatment centres is underway. For the purpose of this initial study, we included participants who sought treatment between 22 October 2015 and 2 July 2016. Within this period, there were 150 consecutive treatment seekers, of which 127 met the above inclusion criteria. Among the eligible individuals, 83 treatment seekers consented for research participation (consent rate of 65.35%). Figure 1 is a flowchart describing this initial research recruitment process. Reviewing the rates of consent on a monthly basis, it was evident that the consent rates increased over time (see Table 1). This improvement in participant recruitment may be related to the training provided to therapists over the intervening time. The training focused on enhancing their understanding of the research implications and the developing communication skills they could use to explain the study objectives to eligible treatment seekers.

**Figure 1. CONSORT diagram illustrating participant recruitment and consent rate for initial treatment seeker cohort.**

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**Clinical case intake**

150 treatment seekers underwent intake interviews between 23 October 2015 and 2 July 2016.

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**Excluded from research participation**

- We excluded 23 treatment seekers due to at least one of the following: language (non-Chinese speaking), low literacy, below age 18 years, over age 65 years, or having suicidal risk that required immediate intervention.

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**Eligibility for research**

127 treatment seekers met inclusion criteria for research participation.

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**Consent for research participation**

83 participants provided consent (65.35% of eligible treatment seekers).
Table 1. Consent rate by month during initial study period.

<table>
<thead>
<tr>
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<th>2015</th>
<th>2016</th>
<th>Total</th>
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<tbody>
<tr>
<td></td>
<td>Oct</td>
<td>Nov</td>
<td>Dec</td>
</tr>
<tr>
<td>No. of treatment</td>
<td>2</td>
<td>18</td>
<td>22</td>
</tr>
<tr>
<td>seekers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. of eligible</td>
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<td>17</td>
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<tr>
<td>participants</td>
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<tr>
<td>No. of consenting</td>
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</tr>
<tr>
<td>participants</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consent rate (%)</td>
<td>100.0</td>
<td>35.7</td>
<td>52.9</td>
</tr>
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</tr>
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a covers the period between 23 October 2015 and 31 October 2015.
b covers the period between 1 July 2016 and 2 July 2016.

Procedures

The treatment centers’ supervisors assigned treatment seekers to therapists in accordance to their specialties and caseloads. During the initial face-to-face contact with a treatment seeker (i.e., the “intake session”), the therapist obtained clinical information on the treatment seeker’s presenting problems and psychosocial background using a standardized semi-structured interview format. The information obtained included: demographic information, past and current addictive behaviors, past psychiatric diagnoses, trauma experience, aggression to self or others, addiction or mental health treatment experience, medical and legal problems, social and family functioning, and family history of addiction or mental health problems. A doctoral level clinical psychologist trained all therapists to conduct the semi-structured interview. The intake sessions took between 90 and 120 minutes to complete and were guided by a paper assessment packet. Towards the end of the intake session, following a script detailed with study descriptions and procedures, the therapists invited eligible treatment seekers to participate in the study. Upon verbal consent for participation, the treatment seekers were then contacted by research staff for arrangement of a separate session for research assessment, scheduled within one month of the intake session or before the follow up session with the therapist.

Research staff provided participants with further explanation of the study procedures and incentives for their participation. Participants received supermarket vouchers for completing the first research assessment and each successive assessment every six months. The vouchers for the first assessment were worth HKD $200, and afterwards each voucher was worth HKD $100 more than the previous one (e.g., $300 for the second assessment and $400 for the third). Research staff reassured participants that they could withdraw from the study at any time during the process and that their withdrawal would not affect any service they received. In addition to written informed consents, research staff asked participants to provide the name and contact of three people with whom they have kept contact with for the past 10 years. Research staff informed the participants that these people would only be contacted in case the participants themselves could not be reached for long term follow up data collection. The comprehensive research assessment consisted of two parts: self-reported questionnaires (required roughly 60 minutes) and a short battery of neuropsychological tests (roughly 20 minutes). Research staff members
conducted the neuropsychological testing. A clinical psychologist trained these research staff members in the administration of these tests.

Additionally, the participants rated on measures of addiction severity and therapeutic alliance immediately after each of the first three treatment sessions and at intervals of every three sessions thereafter until treatment completion. The therapists also completed the clinician version of the therapeutic alliance at the same time points. To minimize the effect of social desirability on these ratings, research staff instructed the participants to seal the completed questionnaire in an envelope and put it into a questionnaire collection box located at the centre, which was locked and accessible only to research staff. Research staff also instructed both the participants and therapists not to discuss these ratings with each other.

**Measures**

We can broadly categorize the participant data as coming from three sources: (1) during the semi-structured intake interview; (2) continuous ratings about addiction severity and the therapeutic alliance; and (3) comprehensive research assessment soon after the intake session and every six months thereafter. All assessment scales were in the Chinese language. For psychometric scales without a readily available Chinese version, we employed a professional translation service to translate (using back translation procedures) the original English version into Chinese. The research team, comprised of a doctoral level clinical psychologist, a counseling supervisor, and social workers, then refined the translated versions for clinical accuracy.

**Demographic and clinical information from intake interview**

The information obtained from the semi-structured interview was wide-ranging (see Procedures). Most of the data was made quantifiable or coded. The data included age, gender, years of formal education (from primary school), sources of referral (self-referred, by friend or family, or by professionals), addiction expressions and their ages of onset, presence of previously established psychiatric diagnoses, age of onset of co-morbid mental health problems, presence of trauma experience, prior addiction or mental health treatment experience, presence of significant or chronic physical health problems, age of onset of physical health problem, presence of addiction-related illegal behavior, and family history of addiction or mental health problem.

Based on the clinical information obtained from the clinical interview, therapists rated the participants on their recent psychosocial functioning using the Personal and Social Performance scale (PSP; Morosini, Magliano, Brambilla, Ugolini, & Pioli, 2000). The rating is based on four main areas of personal and social functioning: (1) Socially useful activities, including work and study; (2) Personal and social relationships; (3) Self-care; and (4) Disturbing and aggressive behaviors. The overall rating ranges from 1 to 100, with higher scores representing higher psychosocial functioning in daily life.

**Continuous ratings on addiction severity and therapeutic alliance**

**Addiction severity and distress**

To capture the extent and change of the addiction problem, regardless of actual addictive behavior, the research team constructed an “addiction characteristics rating scale” (ACRS). This scale consists of four items on a 10-point Likert scale. The four items are the core addiction characteristics highlighted in the syndrome model, i.e., craving for the addictive behavior, feeling of loss of control over the addictive behavior,
continued engagement in the addictive behavior despite negative consequences, and sense of subjective desirable shift when engaging the addictive behavior. The participants completed this scale for each addiction expression they presented for treatment. To supplement these ratings, they rated on two other items also on a 10-point Likert scale. These were the generic subjective unit of distress (SUD) and the subjective unit of addiction distress (SUAD), the latter of which required participants to rate on the extent of distress they experienced from their addiction problem.

**Therapeutic alliance**

We used the Scale to Assess Therapeutic Relationships in Community Mental Health Care (STAR; McGuire-Snieckus, McCabe, Catty, Hansson, & Priebe, 2007) to measure the quality of therapeutic alliance. There is a client version and a clinician version, both consists of 12 items.

**Comprehensive research assessment**

As we described earlier, our research involves assessing an array of biopsychosocial variables commonly associated with addictive behaviors. We grouped these variables into four primary domains: (1) the psychological processes domain includes depression and anxiety (B. F. Grant et al., 2004), obsessive thought processes (Leedes, 2001), psychological coping (Carver & Connor-Smith, 2010; Connor-Smith & Flachsbart, 2007), and personality characteristics such as impulsivity, sensation seeking, and alexithymia (G. L. Cheng et al., 2015; Ersche et al., 2010; Thorberg et al., 2009; Zuckerman & Kuhlman, 2000); (2) the interpersonal functioning domain considers clients’ perceived social support, family functioning, and empathic capacity (Havassy et al., 1991; Rhodes & Jason, 1990); (3) the neurocognitive functioning domain comprises of decision making, cognitive inhibition, working memory, and frontal fluency (Rapeli et al., 2006; Selby & Azrin, 1998); and (4) the general health domain includes physical and mental wellbeing (G. Cheng et al., 2013; Ersche et al., 2013; Fernández-Serrano et al., 2010; Reece, 2007).

**Psychological processes**

As we described before, the following psychological processes commonly are associated with addictive behaviors: depression, anxiety (B. F. Grant et al., 2004), problems with coping (Carver & Connor-Smith, 2010; Connor-Smith & Flachsbart, 2007), obsessiveness (Leedes, 2001), alexithymia, impulsivity, and problems with sensation-seeking (G. L. Cheng et al., 2015; Ersche et al., 2010; Thorberg et al., 2009; Zuckerman & Kuhlman, 2000). Thus, we have incorporated corresponding screens and scales into the data collection process. For similar reasons, our data collection procedures include series of items that measure different aspects of interpersonal functioning (e.g., perceived social support, family functioning, and empathic capacity (Havassy et al., 1991; Rhodes & Jason, 1990)) and neurocognitive deficiency (e.g., decision making, inhibition, working memory, and fluency (Goldstein & Volkow, 2011), and general health (G. Cheng et al., 2013; Ersche et al., 2013; Reece, 2007)).

**Depression**

The Beck Depression Inventory version II (BDI-II; Beck, Steer, & Brown, 1996) is a 21-item self-report instrument for the assessment of depression. The total score ranges from 0 to 63. Previous research has translated the BDI-II into Chinese and demonstrated satisfactory internal consistency reliability (α = 0.94) (Byrne, Stewart, & Lee, 2004).
State and Trait Anxiety
We used the State-Trait Anxiety Inventory (STAI-Y; Spielberger, 1983) to assess state and trait anxiety of participants. The trait scale taps the extent of anxiety that participants generally feel, whereas the state scale taps the extent of anxiety participants feel at the time completing the questionnaire. Each scale consists of 20 items that are rated on a 4-point Likert scale. Both the trait and the state scores range from 20 to 80, with a higher score indicating a higher anxiety level. Factor analysis conducted by Shek (1988) demonstrated validity of the measurement. Previous study also has reported satisfactory test-retest reliability with $\alpha = 0.87$ (Chau, Chang, & Chang, 1998).

Psychological coping
The Brief COPE Inventory (BCI) (Carver, 1997) is a shortened version of the COPE Inventory developed by Carver, Scheier, and Weintraub (1989). The BCI consists of 28 items measuring coping response and strategies that people might use in various difficult situations. There are a total of 14 subscales with 3 subscales on problem-focused coping, 3 subscales on emotional-focused coping; 2 subscales on adaptive coping; and 6 subscales on maladaptive coping. Each subscale consists of 2 items and participants rated on each of the 28 items with a 4-point Likert scale. In Carver (1997), the Cronbach’s alpha of subscale scores ranged from 0.50 to 0.90.

Obsessive beliefs
We used the Obsessive Beliefs Questionnaire-20 (OBD-20; Moulding et al., 2011) to measure the participants’ obsessive cognitions. The questionnaire consists of 20 items rated on a 7-point Likert scale. The OBQ-20 has 4 subscales: Control of Thoughts, Perfectionism, Threat, and Responsibility. The total score is the sum of the ratings of all 20 items.

Alexithymia
We assessed the participants’ degree of alexithymia with the 20-item Toronto Alexithymia Scale (TAS-20-C; Bagby, Parker, & Taylor, 1994; Zhu et al., 2007), which was rated on a 5-point Likert scale. Three subscales may be derived: difficulty identifying feelings, difficulty describing feelings, and externally-oriented thinking. Previous study has shown the TAS-20-C to be a reliable and valid measure of alexithymia among Chinese clinical and community samples (Zhu et al., 2007).

Impulsivity
We employed the Barratt’s Impulsivity Scale Version 11 (BIS-11) (BIS-11; Patton & Stanford, 1995; Yao et al., 2007) to assess participants’ personality construct of impulsiveness. The BIS-11 is a widely used instrument and is composed of 30 items describing common impulsive or non-impulsive behaviors and preferences on three subscales: attentional impulsiveness, motor impulsiveness, and non-planning impulsiveness. Each item is rated on a 4-point Likert scale. The BIS-11 has satisfactory internal reliability with a Cronbach’s alpha of 0.80, a test-retest reliability $r$ of 0.70, and demonstrated external validity among the Chinese population (Yao et al., 2007).

Sensation Seeking
We used the 40-item Zuckerman’s Sensation Seeking Scale Form V (SSS; Zuckerman, Eysenck, & Eysenck, 1978) to measure participants’ sensation seeking trait in four dimensions: thrill and adventure seeking, experience seeking, disinhibition and
boredom susceptibility. Previous research has demonstrated the SSS to be a valid measure among the Chinese population (Wang et al., 2000).

**Interpersonal functioning**

**Perceived social support**

We assessed participants’ perception of being loved, respected, and involved with family and friends using the Social Support Appraisals Scale (SSAS; Vaux et al., 1986) was used to measure. It consists of 15 items, each rated on a 4-point Likert scale. Seven items measure perceived family support and 8 items measure perceived peer support. Previous research has demonstrated that the Chinese version of the SSAS has good internal consistency (i.e., Cronbach’s alpha: α = 0.85; family social support α = 0.81; peer social support α = 0.90) (C. Cheng, 1997).

**Family functioning**

The general functioning subscale (12-item) of the McMaster Family Assessment Device (FAD; Epstein, Baldwin, & Bishop, 1983) measured participants’ perceived family functioning. The general functioning subscale asked participants to rate how well they agree or disagree overall health/pathology of his or her family (e.g., planning family activities is difficult because we misunderstand each other; we can express feelings to each other) on a 4-point Likert scale.

**Empathy capacity**

The Interpersonal Reactivity Index (CIRI; Davis, 1983; Siu & Shek, 2005) assessed participants’ empathy capacity. It is a 28-item questionnaire consisting of four subscales, including Fantasy, Perspective Taking, Empathetic Concern, and Personal Distress. Participants rated on each item on a 5-point Likert scale ranging from 0 (does not describe me well) to 4 (describes me very well). The CIRI demonstrated acceptable to good internal consistency and test-retest reliability (Siu & Shek, 2005).

**Neurocognitive functioning**

**Decision making**

We employed the Iowa Gambling Task (IGT; Bechara, Damasio, Tranel, & Damasio, 2005) to measure participants’ decision-making performance. The IGT assessed participants’ adaptive decision-making by measuring the extent of preferential choices for options associated with smaller short-term gain and larger long-term gain, over choices for the reversed outcome pattern. We computed the IGT net score by subtracting the number of cards the participant selected from the disadvantageous options by the number of cards the participant selected from the advantageous options. We used a computerized version of IGT and supplemented it with Chinese instructions, which requested participants to try to achieve the highest overall score possible. We did not give any actual monetary rewards to participants based on the outcome of this task.

**Cognitive inhibition**

The Chinese Stroop Color-Word Test-Victoria version (CST) measured participants’ cognitive inhibition (CST; T. M. Lee & Chan, 2000). The CST is a translated version from the original Color-Word Stroop Test – Victoria Version (Regard, 1981). The CST consists of three subtests: color dots (D), color of non-color words (W), and color words that conflict with the color in which they are presented (C). Research staff administered
the test and recorded reaction times and accuracy for each subtest. We calculated the interference index by computing the difference between the reaction times in subtests C and D as a function of reaction time in subtest D.

**Frontal fluency**

We assessed participants’ extent of frontal fluency using the modified semantic verbal fluency test. Research staff asked participants to generate, in 1 minute, as many exemplars as they could for the categories “animal” and “vegetable and fruits,” (T. M. Lee, Yuen, & Chan, 2002). We computed the total score by counting the number of correct items produced (i.e., exclusive of repeated items and incorrect items).

**Working memory**

The modified Backward Digit Span test measured participants’ working memory (T. M. Lee et al., 2002). This task requires the retention and mental manipulation of the digits as research staff asked participants to express digits presented to them in a backward order. The task difficulty is incremental, with more able participants completing more challenging items.

**General health**

**Physical and mental health**

The Chinese (HK)-specific Short Form Health Survey Version 2 (SF-12v2) measured health-related quality of life of the participants (Lam, Tse, & Gandek, 2005). The Chinese (HK) SF-12v2 consists of 12 items with eight subscales: Physical Functioning, Role Physical, Bodily Pain, General Health, Vitality, Social Functioning, Role Emotional, and Mental Health; and Physical Component Summary (PCS) and Mental Component Summary (MCS) which scored between 0 and 100. Lam et al. (2005) has validated the SF-12 with a Hong Kong Chinese population and demonstrated criterion validity when compared with the SF-36.

**Health attitude**

The 5-item Health Consciousness Scale (Dutta-Bergman, 2004) assessed participants’ attitude toward health. Participants responded to the items using a 5-point Likert scale. Higher summed score indicates higher level of health consciousness. The Cronbach’s alpha for the scale was 0.72.

**Data analysis**

For different analyses, we assigned the participants to different subgroups. The control participants were those who volunteered for the study but were not seeking treatment for addiction. For some analyses, based on the primary reason for seeking treatment, we assigned participants seeking addiction treatment to either a chemical expression group (e.g., alcohol, opioid, stimulant, hallucinogen use) or a behavioral expression group (e.g., sexual activities, gambling, online gaming). For other analyses, we separated treatment seekers into those seeking treatment for one expression of addiction (i.e., singular expression group) and those who were seeking treatment for multiple expressions (i.e., multiple expression group).

For the purposes of initial exploration, we limited the current analysis plan to four preliminary sets of analyses. The first set of analyses contains descriptive statistics about the participants’ demographic and clinical information, as evidenced by the semi-
structured assessment interview. For numerical demographic variables, such as age and years of education, we calculated the mean and standard deviation for the treatment seekers. Where applicable, we calculated corresponding means and standard deviations for the control participants. For categorical variables, such as gender and source of referral, we calculated percentages for each category.

The second set of analyses includes comparisons of psychosocial status between the control participants, the chemical expression group, and the behavioral expression group. We conducted ANCOVA analyses using the participant group as the main effect, age as the covariate, and the BDI-II, STAI-Trait, and STAI-State scores as dependent variables. We then calculated Pearson coefficients represent associations between the psychosocial status (e.g., BDI-II, STAI-Trait, STAI-State, BCI, OBQ-20, BIS-11, SSS, TAS-20-C, SSAS, CIRI and FAD) and the primary clinical variables (i.e., subjective unit of distress, subjective unit of addiction distress, craving, loss of control, continued engagement despite negative consequences, desirable subjective shift).

The third set of analysis contains daily functioning comparisons for the single and multiple expression groups. More specifically, we conducted an ANOVA with expression group as the independent variable and Personal and Social Performance Scale as the dependent variable.

The fourth and last set of analyses is an investigation of the change in addiction severity and therapeutic alliance across the initial treatment sessions. We used repeated measures to conduct trend analyses across the first three treatment sessions for each of the primary clinical variables and STAR scores. We computed the change for the primary clinical variables between the first and third sessions. Then, we calculated correlation coefficients between the changes in primary clinical variables and the STAR scores in the third session. We determined statistical significance of the above analyses by two-tailed tests with $p$-value less than 0.05. We computed all analyses using the Statistical Package for Social Sciences (SPSS, version 22.0) (IBM, 2013).

Results

Demographic and clinical background of participants

To obtain an overview of participants’ demographic and clinical background information, we computed summary statistics using the quantitative information derived from the semi-structured intake interviews with the treatment seekers. Because the control participants did not receive a clinical interview, they provided demographic and psychosocial background information by completing a questionnaire. Table 2 summarizes these results.

Twenty-two participants were in the chemical expression group. They consisted of seventeen treatment seekers with alcohol abuse, one treatment seeker with stimulant abuse, one treatment seeker with sedative abuse, and three treatment seekers with nicotine abuse. Sixty-one participants were in the behavioral expression group. They consisted of twenty-four treatment seekers with gambling addiction, twenty-one treatment seekers with sexual addiction, six treatment seekers with uncontrolled stealing behavior, one treatment seekers with excessive Internet or gaming, four treatment seekers with over-eating problems, and five treatment seekers with over-spending problems.

Of special note: the initial group of control participants were older than the addiction treatment seekers (i.e., control: mean = 50.8, SD = 6.24; treatment seekers: mean = 38.5,
SD = 10.8; \( t(92) = 3.70, p < 0.001 \). Consequently, we have taken into account the potential effect of age in subsequent analyses: when we compare treatment seekers and controls, we statistically control for the potential effects of age.

**Table 2. Mean or percentage of demographic and clinical background information among treatment seekers and control participants.**

<table>
<thead>
<tr>
<th></th>
<th>Treatment seekers ((n=83))</th>
<th>Control participants ((n=11))</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Demographic background</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>38.5 (SD = 10.8)</td>
<td>50.8 (SD = 6.2)</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>84.3% (70/83)</td>
<td>100% (11/11)</td>
</tr>
<tr>
<td>Female</td>
<td>15.7% (13/83)</td>
<td>---</td>
</tr>
<tr>
<td>Years of education</td>
<td>12.6 (SD = 4.0)</td>
<td>13.5 (SD = 4.1)</td>
</tr>
<tr>
<td><strong>Presenting problems and addiction treatment history</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Source of referral</td>
<td></td>
<td>---</td>
</tr>
<tr>
<td>Self-referred</td>
<td>48.2% (40/83)</td>
<td></td>
</tr>
<tr>
<td>By family or friends</td>
<td>21.7% (18/83)</td>
<td></td>
</tr>
<tr>
<td>By professionals</td>
<td>25.3% (21/83)</td>
<td></td>
</tr>
<tr>
<td>Primary addiction expression for treatment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chemical</td>
<td>26.5% (22/83)</td>
<td></td>
</tr>
<tr>
<td>Behavioral</td>
<td>73.5% (61/83)</td>
<td></td>
</tr>
<tr>
<td>Age of onset of primary addiction expression</td>
<td></td>
<td></td>
</tr>
<tr>
<td>27.5 (SD = 11.2)</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>Presence of multiple presenting problems</td>
<td></td>
<td></td>
</tr>
<tr>
<td>45.8% (38/83)</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>Received addiction treatment in the past</td>
<td></td>
<td></td>
</tr>
<tr>
<td>31.3% (26/83)</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td><strong>Mental health background</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Presence of mental health diagnosis (other than addiction-related diagnoses)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30.1% (25/83)</td>
<td>0% (0/11)</td>
<td></td>
</tr>
<tr>
<td>Age of onset of mental health problem</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30.7 (SD = 12.5)</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>Received non-addiction mental health treatment in the past</td>
<td></td>
<td></td>
</tr>
<tr>
<td>33.7% (28/83)</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td><strong>Psychosocial background</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Past trauma experience</td>
<td>25.3% (21/83)</td>
<td>9.1% (1/11)</td>
</tr>
<tr>
<td>Past or current self-harm</td>
<td>45.8% (38/45)</td>
<td>---</td>
</tr>
<tr>
<td><strong>Major or chronic physical health problem</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>28.9% (24/83)</td>
<td>9.1% (1/11)</td>
<td></td>
</tr>
<tr>
<td>Age of onset of physical health problem</td>
<td></td>
<td></td>
</tr>
<tr>
<td>35.8 (SD = 17.0)</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>Engaged in illegal actions related to addictive behavior</td>
<td></td>
<td></td>
</tr>
<tr>
<td>44.6% (37/83)</td>
<td>0% (0/11)</td>
<td></td>
</tr>
<tr>
<td>Engaged in illegal actions related to addictive behavior that had been prosecuted or sentenced</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24.1% (20/83)</td>
<td>0% (0/11)</td>
<td></td>
</tr>
<tr>
<td><strong>Family background</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Presence of known family history of addiction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>34.9% (29/83)</td>
<td>9.1% (1/11)</td>
<td></td>
</tr>
</tbody>
</table>
Treatment seekers | Control participants
--- | ---
(n=83) | (n=11)
(Mean or percentage) | (Mean or percentage)
Presence of known family history of mental health problem | 25.3% (21/83) | 9.1% (1/11)

**Expressions of addiction: mental health correlates**

We investigated the extent of mental health problems in relation to addiction using analysis of covariance (ANCOVA), with group membership (i.e., control, chemical expression, or behavioral expression) as the independent factor and age as the covariate. Where there was a significant main effect, we conducted post-hoc analysis using estimated marginal means with Bonferroni correction for multiple comparisons.

We observed significant differences in the Beck Depression Inventory scores (BDI-II) in the three cohorts \(F(1,88) = 6.00, p < 0.01\). More specifically, post-hoc contrast analyses revealed significant differences between scores of the control group (estimated mean = 7.97, SE = 3.93) and the chemical expression group (estimated mean = 19.9, SE = 2.69, \(p < 0.05\)) and between the control group and the behavioral expression group \((p < 0.01)\). There was no significant difference between the BDI-II scores of the chemical expression group and the behavioral expression group (estimated mean = 22.8, SE = 1.59, \(p > 0.05\), 95% CI: 4.34–25.3). The effect of age on BDI-II score was also not significant \((F(1,88) > 0.633, p > 0.05)\).

We observed significant differences in trait anxiety in the State-Trait Anxiety Inventory (STAI-Trait) \((F(2,87) = 11.8, p < 0.001)\). More specifically, post-hoc contrast analyses revealed significant differences between scores of the control group (estimated mean = 37.9, SE = 3.63) and chemical expression group (estimated mean = 50.1, SE = 2.19, \(p < 0.05\), 95% CI: 1.76–22.7) and between the control group and behavioral expression group \((p < 0.001, 95\%\ CI: 8.51–27.6)\). There was no significant difference between the STAI-Trait scores of the chemical expression group and behavioral expression group \((p > 0.05)\). The effect of age on STAI-Trait score was also not significant \((F(1,87) = 0.091, p > 0.05)\).

We observed significant differences in state anxiety in the State-Trait Anxiety Inventory (STAI-State) \((F(2,88) = 7.93, p = 0.001)\). More specifically, post-hoc contrast analyses revealed significant differences between scores of the control group (estimated mean = 42.9, SE = 4.25) and behavioral expression group (estimated mean = 55.4, SE = 1.65, \(p < 0.05\), 95% CI: 1.31–23.7); and chemical expression group (estimated mean = 44.9, SE = 2.72) and behavioral expression group \((p < 0.01, 95\%\ CI: 2.81–18.3)\). There was no significant difference between the STAI-State scores of the control group and chemical expression group \((p > 0.05)\). The effect of age on STAI-State was also not significant \((F(1,88) = 2.72, p > 0.05)\).

To explore the inter-relatedness between psychosocial status and addiction severity, we conducted Pearson correlation analyses. We observed that the subjective unit of addiction distress (i.e., the extent of distress they experienced from their addiction problem) was significantly related to higher scores of BDI-II, STAI-Trait, STAI-State, OBQ-20, attentional impulsiveness and non-planning impulsiveness subscale of BIS-11, personal distress subscale of CIRI, and lower scores of thrill-seeking subscale of SSS. Table 3 summarizes these correlation coefficients.
Table 3. Pearson correlation coefficients of bivariate correlations between psychosocial status and primary clinical variables.

<table>
<thead>
<tr>
<th>Psychosocial Status</th>
<th>Subjective distress</th>
<th>Subjective addiction distress</th>
<th>Unit of Craving</th>
<th>Loss of control</th>
<th>Continued despite consequences</th>
<th>engagement negative</th>
<th>Desirable subjective shift</th>
</tr>
</thead>
<tbody>
<tr>
<td>BDI-II</td>
<td>0.426**</td>
<td>0.451**</td>
<td>0.289**</td>
<td>0.294*</td>
<td>0.216</td>
<td>0.161</td>
<td>0.141</td>
</tr>
<tr>
<td>STAI-Trait</td>
<td>0.410**</td>
<td>0.4108**</td>
<td>0.377**</td>
<td>0.406**</td>
<td>0.462**</td>
<td>0.247**</td>
<td>0.092</td>
</tr>
<tr>
<td>STAI-State</td>
<td>0.450**</td>
<td>0.459**</td>
<td>0.357**</td>
<td>0.238</td>
<td>0.295*</td>
<td>0.109</td>
<td></td>
</tr>
<tr>
<td>OBQ-20</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-Responsibility</td>
<td>0.117</td>
<td>0.261*</td>
<td>0.191</td>
<td>0.256*</td>
<td>0.036</td>
<td>0.036</td>
<td></td>
</tr>
<tr>
<td>-Perfectionism</td>
<td>0.221</td>
<td>0.307*</td>
<td>0.21</td>
<td>0.341**</td>
<td>0.214</td>
<td>0.305**</td>
<td></td>
</tr>
<tr>
<td>-Control of Thoughts</td>
<td>0.162</td>
<td>0.278*</td>
<td>0.057</td>
<td>0.185</td>
<td>0.028</td>
<td>0.074</td>
<td></td>
</tr>
<tr>
<td>-Threat</td>
<td>0.203</td>
<td>0.263*</td>
<td>0.117</td>
<td>0.247*</td>
<td>0.280*</td>
<td>0.178</td>
<td></td>
</tr>
<tr>
<td>BCI</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-Self-Distraction</td>
<td>0.262*</td>
<td>0.185</td>
<td>0.157</td>
<td>0.299*</td>
<td>0.266*</td>
<td>0.310</td>
<td></td>
</tr>
<tr>
<td>-Active Coping</td>
<td>0.171</td>
<td>0.079</td>
<td>0.104</td>
<td>0.162</td>
<td>0.182</td>
<td>0.213</td>
<td></td>
</tr>
<tr>
<td>-Denial</td>
<td>-0.092</td>
<td>-0.151</td>
<td>-0.185</td>
<td>-0.114</td>
<td>-0.076</td>
<td>0.199</td>
<td></td>
</tr>
<tr>
<td>-Substance Use</td>
<td>-0.021</td>
<td>-0.01</td>
<td>-0.008</td>
<td>-0.049</td>
<td>0.0177</td>
<td>0.021</td>
<td></td>
</tr>
<tr>
<td>-Using Emotional Support</td>
<td>0.126</td>
<td>0.002</td>
<td>-0.027</td>
<td>0.024</td>
<td>0.059</td>
<td>-0.049</td>
<td></td>
</tr>
<tr>
<td>-Using Instrumental Support</td>
<td>-0.052</td>
<td>-0.004</td>
<td>0.045</td>
<td>0.048</td>
<td>-0.088</td>
<td>0.012</td>
<td></td>
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<tr>
<td>-Behavioral Disengagement</td>
<td>0.037</td>
<td>-0.051</td>
<td>0.09</td>
<td>0.053</td>
<td>0.176</td>
<td>0.103</td>
<td></td>
</tr>
<tr>
<td>-Venting</td>
<td>0.076</td>
<td>0.14</td>
<td>0.071</td>
<td>0.104</td>
<td>0.032</td>
<td>0.083</td>
<td></td>
</tr>
<tr>
<td>-Positive Reframing</td>
<td>-0.006</td>
<td>-0.115</td>
<td>-0.101</td>
<td>-0.053</td>
<td>-0.044</td>
<td>-0.029</td>
<td></td>
</tr>
<tr>
<td>-Planning</td>
<td>0.089</td>
<td>0.044</td>
<td>0.086</td>
<td>0.066</td>
<td>0.124</td>
<td>0.086</td>
<td></td>
</tr>
<tr>
<td>-Humor</td>
<td>-0.196</td>
<td>-0.159</td>
<td>-0.08</td>
<td>-0.08</td>
<td>-0.055</td>
<td>0.156</td>
<td></td>
</tr>
<tr>
<td>-Acceptance</td>
<td>-0.048</td>
<td>-0.217</td>
<td>-0.031</td>
<td>-0.074</td>
<td>-0.011</td>
<td>-0.001</td>
<td></td>
</tr>
<tr>
<td>-Religion</td>
<td>-0.014</td>
<td>-0.08</td>
<td>-0.1</td>
<td>0.031</td>
<td>0.149</td>
<td>0.018</td>
<td></td>
</tr>
<tr>
<td>-Self-Blame</td>
<td>0.182</td>
<td>0.149</td>
<td>-0.039</td>
<td>0.137</td>
<td>0.093</td>
<td>0.081</td>
<td></td>
</tr>
<tr>
<td>BIS-11</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-Attentional Impulsiveness</td>
<td>0.270*</td>
<td>0.250*</td>
<td>0.155</td>
<td>0.187</td>
<td>0.273*</td>
<td>0.162</td>
<td></td>
</tr>
<tr>
<td>-Motor Impulsiveness</td>
<td>0.149</td>
<td>0.127</td>
<td>0.209</td>
<td>0.208</td>
<td>0.145</td>
<td>0.077</td>
<td></td>
</tr>
<tr>
<td>-Nonplanning Impulsiveness</td>
<td>0.247*</td>
<td>0.251*</td>
<td>0.273*</td>
<td>0.250*</td>
<td>0.272*</td>
<td>0.19</td>
<td></td>
</tr>
<tr>
<td>SSS</td>
<td></td>
<td></td>
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BDI-II = Beck Depression Inventory version II; STAI-Trait = State/ Trait Anxiety Inventory; BCI = Brief COPE Inventory; OBQ-20 = Obsessive Beliefs Questionnaire-20; BIS-11 = Barratt's Impulsivity Scale; SSS = Zuckerman's Sensation Seeking Scale; TAS-20-C = Toronto Alexithymia Scale; SSAS = Social Support Appraisals Scale; CIRI = Interpersonal Reactivity Index; FAD = General functioning subscale of the McMaster Family Assessment Device

*p < 0.05; **p < 0.01
Psychosocial functioning: multiple vs. single problems

To examine whether people who seek treatment for multiple problems suffered greater psychosocial functioning compared to those who seek treatment for a single addiction problem, we conducted an analysis of variance (ANOVA) with the Personal and Social Performance Scale score as dependent variable. The results revealed that treatment seekers with multiple problems (mean = 66.2, SD = 14.3) evidenced significantly lower psychosocial functioning scores than single problem treatment seekers (mean = 72.2, SD = 10.9, $F(1,78) = 4.78, p < 0.05$).

Therapeutic alliance and treatment progress

To delineate treatment progress and the change in therapeutic alliance over the initial treatment sessions, we conducted trend analyses across the first three treatment sessions (i.e. factor of “session”) using repeated measures ANOVAs. These analyses revealed significant change for each of the primary clinical variables and therapeutic alliance scores.

Specifically, for the primary clinical variables, there were significant main effects of session for the: subjective unit of distress ($F(2,96) = 10.2, p < 0.001$), with a significant linear trend ($F(1,48) = 21.4, p < 0.001$); subjective unit of addiction distress ($F(2,94) = 19.8, p < 0.001$), with a significant linear trend ($F(1,47) = 26.0, p < 0.001$); rating on craving ($F(2,104) = 20.9, p < 0.001$), with a significant linear trend ($F(1,52) = 33.0, p < 0.001$); rating on feeling loss of control ($F(2,104) = 28.8, p < 0.001$), with a significant linear trend ($F(1,52) = 37.3, p < 0.001$); rating on continued engagement despite negative consequences ($F(2,104) = 29.7, p < 0.001$), with a significant linear trend ($F(1,52) = 36.6, p < 0.001$); and rating on sense of subjective desirable shift ($F(2,104) = 22.5, p < 0.001$), with a significant linear trend ($F(1,52) = 38.7, p < 0.001$). Figure 2A illustrates these linear trends.

For the therapeutic alliance, there also were significant main effects of session on the STAR-Client ($F(2,102) = 10.5, p < 0.001$), with a significant linear trend ($F(1,51) = 15.5, p < 0.001$), and STAR-Therapist ($F(2,90) = 21.6, p < 0.001$), with a significant linear trend ($F(1,45) = 38.4, p < 0.001$). Figure 2B illustrates these linear trends.

To explore whether there was an association between treatment gains and therapeutic alliance, we computed bivariate correlations using change scores of primary clinical variables (i.e., Session 1 to Session 3) and measures of therapeutic alliance at Session 3. The findings revealed that the total score of STAR-Client correlated with the change in craving ($r = 0.28, p < 0.05$). Analyses with subscales scores revealed that the positive collaboration, as rated by treatment seekers, correlated with craving ($r = 0.31, p < 0.05$) and addiction distress ($r = 0.28, p < 0.05$). None of the STAR-Therapist scores correlated with the primary clinical outcome.
Figure 2. Plots showing the change in primary clinical variables (A) and therapeutic alliance (B) across the first three treatment sessions.

* $p < 0.05$; ** $p < 0.01$
Discussion

A scientist-practitioner model of clinical practice

There is burgeoning interest in the clinical relevance of the syndrome model of addiction, which recognizes various forms of addictive behavior as different manifestations of the same underlying vulnerabilities (H. J. Shaffer et al., 2004). At the same time, the need for addiction scientific information focusing on the syndrome model and urgency of clinical intervention reflect the need to integrate research and practice (H. J. Shaffer et al., 2012a, 2012b; H. J. Shaffer & Shaffer, 2016; P. M. Shaffer & Shaffer, in press). As an outpatient treatment centre for people suffering from multiple, concurrent expressions of addiction, the ICAPT represents the ideal setting for a scientist-practitioner model of clinical practice (Frank, 1984; Hofmann, 2013). On one hand, the treatment centre delivers direct clinical service for individuals whose presenting problems are ill-suited for mainstream treatment services – especially those with multiple expressions of addiction. On the other hand, ICAPT acts as a hub for other addiction treatment services and is leading the present research project, geared to generate empirical data for examining and refining the syndrome model.

Before we begin to discuss specific empirical findings, it is important to note that the data and experience from this initial study exploration and analyses reveals that it is feasible for ICAPT to implement a rigorous clinical study design. The overall study consent rate is 65% among eligible individuals, who were willing to participate in research despite the extra time (up to two hours) and demands inherent in any serious research project. The participation of a majority of treatment seekers indicates that incorporating a large-scale research protocol was realistic and administratively practical. Informal feedback from our counselors, who had to comply with new clinical procedures and adapt to a new approach to intake assessment, also was encouraging. Despite the initial adjustment needed for using the new approach, the common experience was that the semi-structured intake interview format was user-friendly and helpful in obtaining clinical information. These positive experiences are beneficial for frontline staff and encourage an empirically driven approach to treatment. In short, weaving a research protocol with clinical practice was useful for both generating research data and improving immediate service delivery.

Clinical characteristics of addiction treatment seekers

Using the standardized semi-structured interview for intake assessment, we obtained a range of addiction and related psychosocial background characteristics from the treatment seekers. We also collected the same psychosocial information from healthy controls using a self-reported questionnaire format. Reviewing these background characteristics helped to specify the demographic and clinical make-up of the treatment seekers. The vast majority of treatment seekers were males (84.3%) with various levels of secondary or tertiary education (mean = 12.6 years of education, SD = 4.0 years). The average age of 38.5 years (SD = 10.8 years) was representative of our sample, but not necessarily to treatment seeking individuals overall, because our research inclusion criteria required participants to be 18 to 65 years of age.

For the purposes of initial analyses, we defined treatment seekers broadly based on the chief problem associated with their chemical or behavioral expression of addiction. However, a closer assessment of the specific presentations and details of their chief problems revealed a wide range of addiction experiences, including addictions to alcohol,
nicotine, stimulants, sedative-hypnotics, gambling, sex, Internet use, spending, eating, and stealing. This variety of experiences suggested that people with various excessive and intemperate behaviors would find “addiction” to be a relatable phenomenon for their issue of concern. The syndrome model approach to addiction treatment opens the door for many individuals whose presenting problems previously would have been denied treatment from mainstream addiction services.

Addiction is well-known for its high co-morbidity rates with other mental health problems (e.g., Hasin, Stinson, Ogburn, & Grant, 2007; Kessler et al., 2008; Nelson et al., 2015; Petry, Stinson, & Grant, 2005; Shek, Chan, & Wong, 2012). For example, using a representative national sample from the US, the rate of psychiatric co-morbidity among those with a gambling disorder has been estimated to be as high as 75% (Kessler et al., 2008). In the current sample, just under one third of the recruited treatment seekers (30.1%) reported prior psychiatric diagnoses. Several important points of consideration are needed to explain the discrepancy between prior and current observations. First, Kessler et al. (2008) conducted comprehensive diagnostic interviews with participants to evaluate their mental health problems. However, our study relied on participants’ self-report of psychiatric diagnoses – that is, treatment seekers recalled and reported their recollections about their mental health status. Second, the treatment seekers with an established mental health problem were less likely to agree to participate in this research project. Understandably, their primary motive for entering a treatment centre was, most likely, to get addiction treatment rather than contribute to addiction research. Finally, perhaps the rate of co-morbid mental health problems was not a true reflection of the real problem. The low comorbidity rate identified in this study might be a gross underestimate due to a lack of access to mental health services. This third point of consideration suggests a risk that the fundamental difficulties confronted by treatment seekers might be under-recognized, especially when the service providers are not specialized or experienced in mental health assessment and treatment.

The psychosocial backgrounds of treatment seekers revealed a variety of complicated profiles. Many of these profiles contained details that were relevant when it came to planning treatment strategies and tactics. For example, a significant minority (25.3%) of treatment seekers reported a history of trauma, which included physical trauma, sexual trauma, psychological trauma, or neglect. This finding corroborates previous reports suggesting a connection between trauma and addiction (Khantzian & Albanese, 2008; S. C. Miller et al., 2013; Najavits, 2002). Trauma as a clinical problem can be very complicated and disabling. Treatment seekers often require intensive interventions for successful recovery from trauma and the associated expressions of addiction. The treatment seekers also reported significant medical (28.9%) and legal (44.6% addiction-related illegal actions, more than half of which led to actual prosecution or sentencing) issues that would put them at higher risk for significant distress, as they would need to manage multiple stressors concurrently.

Shared experience among chemical and behavioral addiction

A theoretical postulation of the syndrome model is that different addiction experiences would share common sequelae or experience. In this study, we found that while participants in the chemical expression and behavioral expression groups scored significantly higher on depression and trait anxiety relative to healthy controls, the two treatment seeking groups did not differ on their extent on both these emotional problems. The common issue of depression and trait anxiety among treatment seekers, regardless of
addiction expression, was in support of the syndrome model. This finding suggests a prominent function of self-medication in an addictive behavior (Khantzian, 1985, 1997). It may be the case that the common experience of an addictive behavior, regardless of expression, serves as a form of maladaptive coping to emotional distress. Another current finding further supports this interpretation: the extent of addiction severity was significantly associated with the extent of emotional problems. In other words, the greater the emotional problem, the more involved the addiction had to be in attempting to alleviate the distress. Future examination of age of onset of psychological/psychiatric symptoms and addictive behaviors will shed more light on whether depression and anxiety are antecedent or consequent to addictive behaviors.

The syndrome model also acknowledges the existence of unique experiences associated with each addiction expression. For instance, liver cirrhosis is often associated with alcohol addiction, while bankruptcy and debt are more often associated with gambling addiction. Although the range of unique experiences can be wide, the present findings indicate that state anxiety is a possible candidate for a type of experience unique to those suffering from behavioral expressions of addiction. Our results revealed that people with a behavioral addiction expression scored significantly higher than those with a chemical addiction expression on state anxiety. A possible explanation for this observation is that there is little public – or even professional – recognition accepting certain behavioral excesses as a manifestation of an addiction disorder (e.g., sex addiction). Therefore, the process of confronting this issue can be especially anxiety-provoking. It also is reasonable to expect that more intense levels of guilt and shame are associated with the experience of addiction. Internally, people with addiction might form and maintain an identity that their addiction problems were rooted in personal and moralistic failure, a traditional though outdated understanding of people with substance dependence (Albanese & Shaffer, 2012).

**Elevated functional deficits in treatment seekers with multi-problems**

The syndrome model stimulates a re-conceptualization of addiction. It therefore has far-reaching implications for clinical service delivery. In mainstream addiction intervention services, the treatment goals are generally to reduce the extent of specific addictive symptoms and actions (e.g., reducing the amount of alcohol consumption or reducing the time or money spent on gambling activities). While these mainstream services attempt to tackle the specific addiction manifestations without a sufficient consideration of the syndrome model, they do not always attend to the biopsychosocial antecedents that led to the addiction in the first place. The likely consequences for individuals dedicated to treatment at these services are that they either manifest a separate form of addictive behavior (known as addiction “hopping”), or enter a transient and unstable period free from addiction with a high risk of relapse. Moreover, the mainstream addiction services are ill-suited for people with multiple concurrent problems. At these services, treatment seekers are prone to ultimately accept a disjointed treatment package wherein they are referred to different treatment services for seemingly disparate addictive problems.

In the current study, the initial results indicate that treatment seekers with multiple expressions of addiction are indeed those with a higher need of treatment. Specifically, compared to those who present with a single addiction expression, those who report the presence of multiple addiction problems evidence greater impairment in daily psychosocial functioning. Treatment seekers with multi-problems were rated as less able
in their personal and social engagement in daily life. In other words, this is the group of treatment seekers whose lives are most consumed by addiction. For effective recovery to take place, treatment providers must be well-versed on how their multiple concurrent problems may be brought about by an underlying addiction syndrome.

**Evaluation of clinical outcome and treatment processes**

This research project employed a prospective design that tracks the treatment seekers over time. The present analyses revealed positive treatment gains even through the initial three treatment sessions (Figure 2A). The recovery from addiction appeared to span across each of the core addiction characteristics. Specifically, through the first three treatment sessions, there were significant reductions of ratings on craving for the addictive behavior, feeling loss of control over the addiction, continually engaging in the addiction despite negative consequences, and the extent of subjective desirable shift while engaging in the addictive behavior. These findings provide evidence that the treatment seekers were able to derive early benefits from the addiction treatment. It also suggests that a treatment mentality based on the syndrome model is effective in addiction service delivery.

Beyond evaluating for clinical outcome, it is also important to investigate the potential treatment factors that influence outcome. Owing to the insufficient understanding of etiological factors, there is no one clinical modality that currently stands out as the treatment-of-choice for people with different expressions of addiction. For this reason, treatment providers rely on a variety of intervention strategies, chosen in accordance to their own clinical expertise and suitability of individual treatment seekers. To identify the key variables that influence treatment outcome, with consideration to the multitude of treatment options, it would be most strategic to investigate the common treatment ingredients across different intervention modalities. A promising lead for revelation of such common treatment ingredients was identified from the existing psychotherapy literature on the therapeutic alliance (Goldfried, 2013), which was incorporated as a key treatment measure in this research project.

The present results on the therapeutic alliance revealed significant positive trends through the initial treatment sessions (Figure 2B). The positive trends were evident in the therapeutic alliance as rated by both the treatment seekers and therapists. Given the established link between the therapeutic alliance and treatment success, we carried out further analyses that examined this relationship. We observed that higher rating on the therapeutic alliance, as rated by the treatment seekers, was associated with a greater treatment gain at the third treatment session. This finding corroborated with the literature that attributes successful treatment outcome to a good alliance between client and therapist among a variety of clinical problems, including depression (Falkenström, Ekeblad, & Holmqvist, 2016; Krupnick et al., 1996), anxiety disorders (Creed & Kendall, 2005), eating disorders (Accurso et al., 2015; Constantino, Arnow, Blasey, & Agras, 2005), and substance abuse (Barber et al., 2001; Connors, Carroll, DiClemente, Longabaugh, & Donovan, 1997; Meier et al., 2005). The observation that treatment seekers’ ratings, but not therapists’ ratings, on the therapeutic alliance suggests a higher outcome predictive value in client ratings. In other words, how the clients perceive the therapeutic relationship appeared to be more important than the same perception from the therapists.

Therapeutic alliance is a multi-facet construct, broadly defined as the interpersonal processes between the treatment receiver and treatment provider (Elvins & Green, 2008).
In this study, the psychometric tool used for measuring the therapeutic alliance (the STAR, (Mcguire-Snieckus et al., 2007)) segregates this construct into three distinct factors: positive collaboration, positive clinician input, and non-supportive clinical input (in the client’s version of the scale) or emotional difficulties (in the therapist’s version). A closer examination of the present results revealed that the early treatment gains were specifically related to the degree of positive collaboration. This finding echoes the use of intervention styles that encourage the cultivation of partnership between clients and therapists, such as motivational interviewing (W. R. Miller & Rollnick, 1991).

**Limitations of the present study and future directions**

An important limitation of this study was the small sample size. Although the in-depth psychometric assessment in a clinical sample of 83 treatment seekers was somewhat respectable, this sample size only allowed us to examine treatment seekers in terms of the broad groups of chemical or behavioral addiction. Continually recruiting treatment seekers for research participation is critical for a refined categorization based on the specific addictive behaviors they present for treatment. Ideally, the extent of categorization will become finer with expanding sample sizes. For instance, for this study, we grouped people with Internet addiction together with others who suffer from other behavioral expressions of addiction. With a larger sample size, in a future study, it might be possible to treat those with Internet addiction as their own group, or partition them further into subgroups (e.g., internet gaming, social media) (Laconi, Tricard, & Chabrol, 2015). Additional recruitment of control participants is also required for better comparisons with the clinical groups.

The limited statistical power, due to the small sample size, also prevented us from undertaking a comprehensive analysis on the collected psychosocial data. For the purposes of this study, only the degree of depressive mood (BDI-II) and anxiety (STAI) were analyzed as an initial exploration. The results provided proof-of-principle evidence that both chemical and behavioral expressions of addiction could be related to a common attempt to self-medicate emotional distress. With a more reliable sample size, analyses would be able to unravel further commonalities (and differences) in finer grained psychosocial variables that were also measured. These variables include psychological processes (e.g., degree of alexithymia, obsessive beliefs), personality traits (e.g., impulsivity and sensation seeking traits), interpersonal support, health consciousness, and neurocognitive functioning (e.g., decision making processes, cognitive inhibition).

With the passage of time, this project will continue to benefit from its prospective longitudinal design, which is a valuable asset for any clinical study. Clinical outcome (i.e., in terms of addiction severity ratings) and therapeutic alliance should be continuously tracked across treatment sessions to detect any common trends or fluctuations. The comprehensive psychosocial information collected at baseline (i.e., onset of treatment) may prove to be predictors of clinical outcome and therapeutic alliance development. The plan is to collect the same psychosocial information every six months from the onset of treatment. This additional data should be valuable as we pursue an advanced understanding of the key psychosocial factors that contribute to addiction recovery.

This research project also can contribute to shaping the nosology of addiction as a broad category of mental disorder. Consistent with the research domain criteria (RDoC) approach focusing on transdiagnostic processes (Insel et al., 2010), the selection of psychosocial measures in this project has an emphasis on process level constructs rather than diagnostic level symptoms. With the increased statistical power associated with a larger
sample size, this project will begin to approach the ambitious tasks of using data-driven clinical approaches. For example, by using data reduction tools (e.g., principle components, factor analysis, cluster analysis), it is possible to identify key psychosocial variables that form meaningful superordinate latent constructs that reflect the commonality across addiction expressions. Cluster analyses also can contribute to an understanding of subtypes of addiction treatment seekers who share psychosocial deficits. These investigations will pave the way for the development of empirically-based assessment and guided interventions that will enhance the clinical effectiveness of addiction treatment services.

Finally, this project offers many and varied additional opportunities to advance the field of addiction treatment by focusing on the relationships between chemical and behavioral expressions of addiction. For example, this project provides an important opportunity to identify the correlates and consequences of various addiction clusters—combinations of various expressions of addiction—and the permutations of the expressions that comprise these clusters. Understanding how various expressions of addiction influence each other, by exacerbating and restricting excessive behavior patterns, is an essential step toward improving the science of addiction etiology and recovery.

Conclusions

Evolution in the scientific understanding of addiction is the key for a new milieu of addiction treatment. The conventional focus on substance dependence has been helpful for only a subset of individuals whose lives were plagued by addiction. With the emergent recognition of behavioral addictions, the syndrome model of addiction has a central role in guiding research and practice. A large-scale, prospective research design has been incorporated into a cutting-edge addiction syndrome treatment service in Hong Kong. Data generated from this project will make substantial and novel contributions to improving contemporary addiction treatment that is both evidence-based and culturally-sensitive. The initial findings supported the: (1) feasibility and practicality in utilizing a scientist-practitioner model of clinical practice; (2) function of self-medication as a common underlying process across various addictive behaviors; (3) unique challenges confronted by addicted individuals of a multi-problem nature; and (4) clinical benefit in using an addiction syndrome mentality to treatment. Ongoing efforts toward longitudinal data collection will prove crucial in unraveling the psychological and psychosocial dynamics in the clinical challenge of addiction.

Recommendations for service delivery

The findings from this study provide valuable insights for improving addiction treatment and advancing our scientific understanding of addiction syndrome. Four key recommendations emerge from this study and hold promise for improving future addiction treatment and research:

1. Broaden the scope of addiction treatment by offering integrated clinical services for people with multi-addiction problems. Our findings demonstrate clearly that treatment seekers with multiple expressions of addiction benefit from a syndrome model guided integrated intervention approach. Because individuals evidencing multiple expressions of addiction present more severe psychosocial problems, treatment providers should offer long-term and intensive treatment that addresses
their multiple biopsychosocial needs. An integrated addiction service should include treatment seekers presenting with a variety of addiction manifestations (i.e., any form of chemical and behavioral addiction expression).

2. Improve addiction treatment by enhancing service for co-morbid mental health problems. An important finding from this study is that addiction severity was intricately related to mental health. However, contrary to previous estimates that up to two-thirds of people with addiction qualify for a co-morbid diagnosis, less than one-third of treatment seekers had a known mental health problem. Due to the subtlety of some co-morbid problems, as demonstrated by the presence of “shadow syndromes” (e.g., Boudreau, LaBrie, & Shaffer, 2009), helping professionals without a specialization in the assessment and treatment of mental health problem may be less attuned to these mental health problems. With improved access to specialized mental health care, individuals seeking treatment for addiction will greatly benefit from more efficient and targeted interventions.

3. Tackle complicated clinical profiles with a well-trained multi-disciplinary team. Even though addiction had long been recognized as a clinical challenge, community-based services tended to focus on counseling support. This circumscribed approach to addiction intervention falls short on dealing with the evidently complex medical and psychosocial background presented by the treatment seekers. An integrated style of interventions, contributed by a cohesive team of qualified psychiatrists, clinical psychologists, psychiatric nurses, and addiction counselors, should prevent the less than ideal situation whereby treatment seeking individuals receive fragmented services for their multiple problems. Given the wide-ranging presentations of addictive behaviors and the unique problems associated with each presentation, the multi-disciplinary team should be equipped with a variety of intervention skills and knowledge by undergoing continuous training.

4. Facilitate a scientist-practitioner model of clinical practice by combining high-quality research with direct service delivery. With the fast-evolving understanding of addiction, service providers must be enabled to cultivate an empirical approach to clinical service. Frontline staff had been able to experience some early benefits while engaged in the present research project, which was designed for longitudinal tracking of individuals with addiction. Continuous follow ups to the current research project will be crucial for both the advancement in addiction understanding and maintaining frontline staff’s engagement in developing state-of-the-art addiction interventions.

**Future research directions**

This collaborative effort has laid the foundation for ongoing clinical research activities in ICAPT. With continuous data collection and further analyses, this program of research provides evidence that contributes to the scientific knowledge associated with the addiction syndrome and clinical practice. Taken together these findings encourage future research that holds the potential to advance our scientific understanding of addiction syndrome. Four key research suggestions emerge from this study.
1. Compare psychosocial correlates among chemical expression group (e.g., alcohol, opioid, stimulant, hallucinogen use) and behavioral expression group (e.g., sexual activities, gambling, online gaming, etc.).

2. Identify client-specific factors (e.g., addiction severity and psychosocial characteristics), treatment-specific factors (e.g., therapeutic alliance, number and types of treatment received), and therapist-specific factors (e.g., self-identified theoretical orientation, years of experience) that influence clinical outcomes. Specifically, we hope to identify mediators and moderators associated with positive clinical outcomes.

3. Examine counselor characteristics (e.g., age, gender, self-identified theoretical orientation, and years of experience, etc.) and treatment variables (e.g., number of treatment sessions received, types of treatment received, etc.) that contribute to the emergence and maintenance of a positive therapeutic alliance.

**Final Thoughts**

This prospective study is the first to incorporate a systematic research protocol into the clinical services of a clinic with such a diverse range of addiction services and clients. The results of the initial data collection and analysis serve as proof-of-concept showing that it is possible to incorporate a comprehensive research program into the day-to-day operations of a treatment facility. Longitudinal continuation of this research program will provide therapists and staff with important evidence that can inform and optimize treatment approaches so that future clients can experience improved long term outcomes. This outcome will accomplish the main goal of this project: to advance the understanding of addiction and the practice of addiction treatment, both at the Tung Wah Group of Hospitals and around the world.

**References**


## Appendix 1: List of measurements

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