ORIGINAL RESEARCH

Autonomous motivation explains interprofessional education outcomes

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Abstract

Objectives: In response to the observations that interprofessional education (IPE) is seemingly atheoretical or under-theorised, this quantitative research seeks to uncover students' motivational mechanisms which could explain their behavioural and collaborative outcomes using self-determination theory (SDT). While SDT has been studied in various contexts, its applicability to IPE remains underexplored. This study aims to integrate a new perspective in understanding students' motivation in IPE by exploring how the fulfilment of a need for sense of autonomy, competence and relatedness is linked to desirable IPE outcomes.

Methods: Utilising quantitative methods, we involved 255 health care students in Hong Kong from the medical, nursing and pharmacy disciplines enrolled in IPE anticoagulation therapy module. They were invited to respond to the Psychological Need Satisfaction Questionnaire and other measures as part of the post-test.

Results: Sense of autonomy emerged as the strongest positive predictor of behavioural (collective dedication, behavioural engagement) and collaboration outcomes (team effectiveness, goal achievement). There were no significant program-level differences across these outcomes except for behavioural engagement for which nursing students had a higher perception than medicine students.

Conclusions: We were able to demonstrate that SDT is a meaningful framework in understanding behavioural and collaboration outcomes in IPE. The major theoretical contribution of this study refers to the ability of students' motivation to explain variance in their behavioural outcomes. That is, sense of autonomy consistently predicted team effectiveness, collective dedication, behavioural engagement and goal achievement. Autonomous motivation among a sample of health care students can explain behavioural outcomes. Theoretical, methodological and practical implications are discussed.
Interprofessional education (IPE) is a popular educational model designed to break down silos in education by training healthcare students to integrate their disciplinary expertise through learning with, from, and about each other. IPE’s popularity is shown by an increasing momentum in scholarship and publication on this topic over the last few decades. However, despite the significant development in IPE literature over the years, IPE studies have been criticised for seemingly falling short in terms of theoretical rigours of conceptualising research agenda from being atheoretical, under-theorised, to limited theory application\textsuperscript{1-5} suggesting a dire need to problematise IPE and practice activities.\textsuperscript{6} Paradis and Whitehead\textsuperscript{7,14-60} responded that ‘anchoring education for collaboration in more robust theories of how the professions actually come together will most certainly improve the empirical success of such programs’.

One helpful way to theorise or problematise IPE is by understanding the factors inherent to the students (ie motivation), in addition to contextual factors (eg program design, facilities), that may help explain IPE desirable outcomes. Theory and empirical studies demonstrate that motivation plays a pivotal role in students’ academic success and well-being which in turn affect patients’ outcomes.\textsuperscript{8} In fact, empirical studies demonstrate that beyond intelligence, motivation incrementally explained large variance in school achievement.\textsuperscript{9,10} In the classroom context, motivation is construed as the drive to accomplish specific learning activities\textsuperscript{11} and underpins students’ achievement gains.\textsuperscript{12} Motivation theories are useful in providing teachers with insights on how to manage students to optimise their achievement gains and learning experiences. From the lens of program development, attention to motivational factors which are linked to salubrious outcomes can lead to more targeted interventions in IPE. This is in line with Mann’s\textsuperscript{13,22} assertion where she stressed that ‘Understanding what motivates learners may help educators appreciate the complex environment in which motivations are formed, and the sometimes-hidden influences upon motivation that may explain learners’ attitudes and behaviours’.

Self-determination theory (SDT)\textsuperscript{14-16} is a popular contemporary theory of human motivation, which specifies three cross-culturally universal psychological needs: autonomy, competence and relatedness. An inherent assertion of SDT is that fulfilment of needs for autonomy (feeling of choice), competence (feeling of capability) and relatedness (feeling of belonging) is a precursor of self-determined motivation leading to salubrious outcomes.\textsuperscript{17} Interestingly, the SDT proponents make it explicitly clear that meeting only one or even two of the three needs will jeopardise individuals’ psychological health.\textsuperscript{18,19} As Ryan et al\textsuperscript{20}\textsuperscript{349} explained, sense of autonomy pertains to ‘a sense of willingness or volition when performing a task’. Research has consistently demonstrated that in the classroom, autonomous or volitional motivation prompts learners to engage in learning because of its inherent and gratifying values and not for external rewards (controlled motivation), they become more likely to attach meaning to their work and persist in challenging activities even in the absence of external rewards.

SDT is a popular empirically supported motivation framework which has been widely used to understand the motivational processes of individuals across various life contexts: sports,\textsuperscript{21,22} language learning and communication,\textsuperscript{23-25} math,\textsuperscript{26,27} health,\textsuperscript{28-32} organisational management,\textsuperscript{33,34} religion\textsuperscript{35} and parenting.\textsuperscript{36,37} Surprisingly, despite its significance in understanding students’ achievement, motivation has not received commensurate attention in the context of IPE.\textsuperscript{8} Thus, aiming to understand the antecedents of engagement and achievement in their involvement to IPE, we decided to investigate SDT which may offer a useful framework within which we could initiate a discussion on factors that explain engagement or disengagement and success or failures in IPE to yield sustained favourable attitude towards interprofessional team health care management. Understanding students’ motivation in IPE is important given that motivation is a fluid and malleable construct which could be influenced by instructional input. In this regard, it is interesting to note that the qualitative study of Visser et al\textsuperscript{38} distinguished the elements of IPE in a clinical ward which influenced students’ sense of autonomy, competence and relatedness. Their pioneering study serves an implicit invitation to medical education researchers to help initiate a conversation on how motivation accounts for students’ achievement in IPE.

The integration of SDT to inform IPE design, which can also be construed as a research area, is important as it provides a context where sense autonomy, competence and relatedness can be explored. This research area is significant in theorising the factors that explain students’ engagement and achievement in IPE. Interestingly, the relationship of IPE-intended learning outcomes and the three basic psychological needs can be established by meeting the basic psychological needs as a means to achieve the IPE-intended learning outcomes. For example, the outcome ‘Appreciate the collective contribution of Medicine, Nursing, and Pharmacy’ and ‘Demonstrate mutual respect and appreciation of the unique skills, knowledge and competencies that each discipline brings to an interprofessional team’ are in line with the achievement of sense of relatedness. The outcome ‘Formulate interprofessional health care management plan’ is in line with achieving the need for sense of competence. Finally, the outcome ‘Apply shared decision-making process from deliberation to choice/consensus’ can be a demonstration of provision for sense of autonomy. This possible relationship between IPE-intended learning outcomes and basic psychological needs is a good invitation to IPE curriculum designers to examine closely how motivational theories can inform instructional designs.

To understand the effect of autonomous motivation (autonomy, competence, relatedness), by contrast with controlled motivation, on students’ engagement outcomes in IPE, we designed an IPE for Anticoagulation Therapy module utilising SDT as intervention. Following the assumption definitive to SDT that the three psychological needs must be fulfilled,\textsuperscript{18} we creatively designed IPE activities aiming to meet the needs for autonomy, competence and relatedness (Table 1).
The case-based and team-based IPE model

The IPE program was conceptualised with emphasis on case-based learning (CBL) and team-based learning (TBL) as pedagogies to achieve its desired learning outcomes. CBL underscores the use of authentic clinical cases to link the application of theory to practice. CBL emphasises collaborative learning through case by allowing students to apply their theoretical knowledge to real-world scenarios thereby promoting higher order thinking skills (eg evaluation, synthesis) through team-based learning (TBL). TBL is a small group strategy designed to develop teamwork and collaboration.

The IPE pre-clinical simulation was comprised of 3.5 hours of face-to-face session and around two hours of pre-class preparation. Informed by CBL and TBL, we designed readiness assurance process and application exercise with peer evaluation to develop the essential collaboration skills (eg respectful communication, collaborative decision making, negotiation and respect, teamwork and collaboration;
Figure 1). Using self-determination theory, we especially targeted autonomous motivation through meeting the needs for autonomy, competence and relatedness throughout the program. In particular, we encouraged the students to exercise autonomy in representing their disciplinary expertise in all team tasks. We provided activities to achieve cohesiveness in teams. For example, the activities ‘name your team’, ‘e-meet your team’ and ‘human bingo’ were in line with achieving the need for relatedness. We provided the teams with complex and challenging activities which necessitate the application of their clinical and collaboration skills. These included answering the team readiness assurance test and interprofessional health care management planning based on clinical case.

1.2 | The present study

This study is in response to the observation of the seemingly atheoretical approach to understanding students’ IPE experiences. In this study, we examined the application of SDT in IPE and investigated how the satisfaction of students’ psychological needs is related to behavioural and collaboration outcomes. In particular, our first aim is to clarify whether the basic psychological needs (autonomy, competence and relatedness) can explain students’ IPE behavioural outcomes (collective dedication and behavioural engagement) and collaboration outcomes (team effectiveness and goal achievement). We hypothesised that the satisfaction of these needs in the context of IPE would be positively linked to theoretically IPE-relevant outcomes. We based this hypothesis on previous literature suggesting the positive effect of autonomous motivation to collaboration outcomes in IPE (team effectiveness, collective dedication and behavioural engagement) and behavioural outcomes (behavioural engagement and goal achievement). Our second aim is to examine program-level (medicine, nursing, pharmacy) differences in students’ IPE outcomes. We hypothesised that there would be no significant differences in these outcomes by program.

2 | METHODS

2.1 | Participants and procedure

We involved 255 pre-licensure health care students (38% males and 62% females) from a government-subsidised University in Hong Kong. These students were from three programs: medicine (n = 117), nursing (n = 108) and pharmacy (n = 30) and were in their Year 3 (108) and Year 4 (147) in their respective curricula (Table 2). The average age was 21.3 (SD = 1.4). These students were randomly formed into interprofessional teams composed of five to seven members following team formation principles of team-based learning. In each team, we aimed to have two medicine students, two nursing students and one pharmacy student. The students completed the survey questionnaires, as part of a cross-faculty Interprofessional Education and Collaborative Practice (IPECP) program, after the 3.5 hours of face-to-face session of IPE Anticoagulation Therapy module. The learning outcomes for the IPECP program and the said module are the following:

<table>
<thead>
<tr>
<th>TABLE 2</th>
<th>Demography</th>
<th>Medicine (N = 117)</th>
<th>Nursing (N = 108)</th>
<th>Pharmacy (N = 30)</th>
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<tr>
<td>Age (in years)</td>
<td></td>
<td></td>
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<tr>
<td>28-30</td>
<td>3 (3%)</td>
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<td></td>
</tr>
<tr>
<td>25-27</td>
<td>0 (0%)</td>
<td>6 (6%)</td>
<td>0 (0%)</td>
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</tr>
<tr>
<td>22-24</td>
<td>35 (30%)</td>
<td>19 (18%)</td>
<td>9 (30%)</td>
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<tr>
<td>19-21</td>
<td>76 (64%)</td>
<td>78 (72%)</td>
<td>21 (70%)</td>
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<tr>
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<td>5 (4%)</td>
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</tr>
<tr>
<td>Gender</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
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<td>59 (50%)</td>
<td>30 (28%)</td>
<td>10 (33%)</td>
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</tr>
<tr>
<td>Female</td>
<td>58 (50%)</td>
<td>78 (72%)</td>
<td>20 (67%)</td>
<td></td>
</tr>
<tr>
<td>Year level</td>
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<tr>
<td>Year 3</td>
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<td>108 (100%)</td>
<td>0 (0%)</td>
<td></td>
</tr>
<tr>
<td>Year 4</td>
<td>117 (100%)</td>
<td>0</td>
<td>30 (100%)</td>
<td></td>
</tr>
</tbody>
</table>

2.2 | Generic IPE-related Learning Outcomes

1. Appreciate the collective contribution of Medicine, Nursing and Pharmacy
2. Demonstrate mutual respect and an appreciation of the unique skills, knowledge and competencies that each discipline brings to an interprofessional team
3. Listen respectfully to the ideas of other disciplines to complement one’s disciplinary knowledge
4. Provide constructive and non-judgmental feedback to other member’s ideas
5. Respect difference and diversity among professions
6. Realise that interprofessional collaboration promotes creativity, motivation and productivity
7. Apply shared decision-making process from deliberation to choice/consensus
8. Formulate interprofessional health care management plan

2.3 | Content-related learning outcomes

1. Determine when anticoagulation should be initiated, continued or discontinued
2. Determine a patient’s appropriate duration of anticoagulant therapy
3. Assess a patient’s risk for thromboembolism and complications of anticoagulant therapy including bleeding
4. Effectively interview a patient receiving anticoagulant therapy to monitor for efficacy and safety
5. Discuss management considerations when adjusting warfarin therapy.
6. Identify alternatives to pain medications that may interfere with anticoagulant therapy.
7. Summarise the efficacy and safety issues of newer anticoagulants and explain their current role in therapy.
8. Describe key clinic resources and processes in managing patients receiving anticoagulant therapy.
9. Discuss the value of cognitive screening tests in caring for patients receiving anticoagulation therapy.
10. Apply the principles of motivational interviewing in caring for patients receiving anticoagulation therapy and possible alcohol abuse.
11. Explain how the stages of change model help clinicians to understand where to focus their efforts on helping individuals with alcohol abuse.
12. Describe the harm reduction versus abstinence approaches of behavioural treatment of substance abuse.

Data collection was carried out with the approval of the Human Research Ethics Committee for Non-Clinical Faculties of the University where data collection took place. Appropriate consent procedure was followed. We explained to the students that their participation was voluntary and guaranteed the confidentiality of their responses.

2.4 | Measures

We used various scales to collect the data on the study variable (Figure 2).

2.4.1 | Autonomy, competence and relatedness

We used the Basic Psychological Need Satisfaction in General (BPNS49) to measure the basic psychological need. This scale is composed of 21 items measuring the following: autonomy (7 items), competence (6 items) and relatedness (8 items). To adapt the scale into the context of interprofessional team learning, we introduced slight modification to the items. For example, for autonomy item 17 ‘I feel like I can pretty much be myself when I’m with my team’; competence item 5 ‘People I know tell me I am good at what I do’ was modified to ‘People in my IPE team tell me I am good at what I do’; and relatedness item 2 ‘I really like the people I interact with’ was modified to ‘I really like my team mates I interact with in my IPE team’. Participants indicated their agreement with the items ranging from 1 (not at all true) to 7 (very true). Responses to the nine negatively stated items (eg ‘Often, I do NOT feel very competent in my IPE team’) were reverse scored. The current data obtained satisfactory reliability: autonomy = 0.85, competence = 0.736 and relatedness = 0.73.

2.4.2 | Team effectiveness.

This subscale indicates the perception of team members about the performance of the team after the intervention which is the IPE (eg ‘I am satisfied with the performance of my team’). This scale has a response scale from 1 (strongly disagree) to 5 (strongly agree). All the data used in the analyses were collected as post-test.

2.4.3 | Collective dedication

This subscale was assessed using the Engagement Questionnaire. This is composed of four items (eg ‘My group was involved in the task’) with a response format of 1 (never) to 5 (most of the time).

2.4.4 | Behavioural engagement

This refers to how the students are engaged behaviourally in an activity. This is composed of four items adapted to IPE (eg ‘I pay attention in IPE class’) from The Delaware Student Engagement Scale.

2.4.5 | Goal achievement

This refers to the perception of the team members about how the program enabled them to attain interprofessional competencies. Specific to the project IPECP, this scale is composed of five items (eg ‘After attending the Online IPE, to what extent are the following competencies developed in you as future health professionals: respectful communication and collaborative decision making?’). The scale has a response scale of 1 (to the least extent/not at all) to 5 (to the highest extent).

2.5 | Statistical analysis

We performed series of hierarchical regressions to examine the efficacy of sense of autonomy, competence and relatedness as predictors (independent variables) of IPE engagement outcomes: team...
effectiveness, collective dedication, behavioural engagement and goal achievement (dependent variables) controlling for the individual level effects of age, gender and year level. As discussed earlier, the outcome variables identified in this study are collaboration outcomes in IPE (eg team effectiveness, collective dedication, behavioural engagement and goal achievement).

The technique where we controlled for the effects of demographic variables in the present study is similar to that of previous studies to adjust for the confounding effects of other variables. While others treated the SDT psychological needs as independent multidimensional constructs, other studies also used aggregate scores on autonomy, competence and relatedness to represent the general needs satisfaction. In this study, we treated the psychological needs as multidimensional constructs and therefore we used the independent scores of sense of autonomy, competence and relatedness as independent predictors of behavioural and collaboration outcomes in IPE.

We performed one-way multivariate analysis of variance (one-way MANOVA) to compare the IPE engagement outcomes of three programs: (medicine, nursing and pharmacy) on four dependent variables: team effectiveness, collective dedication, behavioural engagement and goal achievement. A series of ANOVAs with Scheffe post hoc comparison were used to identify program differences. We used the Statistical Package for Social Sciences (SPSS, version 26) for the entire analysis.

3 | RESULTS

3.1 | Preliminary analyses

The assumptions in conducting parametric analysis were met. Skewness ranged from −0.67 to 0.07 while kurtosis ranged from −2.85 to 0.05. As suggested by Byrne, data are deemed normal if skewness and kurtosis are between −2 to +2 and between −7 to +7, respectively.

We report the basic statistics, reliability coefficients and correlations among study variables in Table 2. SDT subscales had alpha values ranging from 0.72 to 0.96. Outcomes variables had alpha values ranging from 0.73 to 0.96 (Table 3). Sense of autonomy (M = 4.6), team effectiveness (M = 4.1) and goal achievement (M = 4.1) obtained the highest mean scores. These were followed by total need satisfaction (M = 3.9), sense of relatedness (M = 3.9) and behavioural engagement (M = 3.9). The variables that obtained the lowest scores were sense of competence (M = 3.8) and collective dedication (M = 3.8).

3.2 | Regression analyses

To examine the relationships between sense of autonomy, competence and relatedness to indices of engagement outcomes, we performed four hierarchical regression analyses. At step 1, to control for the potential effects of students’ demographic variables, we entered age, gender and year level. These variables accounted for a negligible amount of variance, 0.03 < ΔR² < 0.05. At step 2, we entered the SDT variables (autonomy, competence and relatedness). These three variables explained a significantly higher amount of variance across the four outcomes, from 19.8% to 31.1%. Based on the beta weights, sense of autonomy consistently emerged as the strongest predictor across the four outcomes: team effectiveness (β = 0.54), collective dedication (β = 0.43), behavioural engagement (β = 0.58) and goal achievement (β = 0.48). This was followed by sense of competence negatively predicting team effectiveness (β = −0.49), behavioural engagement (β = −0.33) and goal achievement (β = −0.38). Sense of relatedness predicted two outcomes: team effectiveness (β = 0.43) and

| TABLE 3 Correlation among study variables (n = 255) |
|-----------------|-----|-----|-----|-----|-----|-----|-----|-----|
|                | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   |
| 1. Sense of autonomy | −   | 0.50*** | 0.54*** | 0.78*** | 0.45*** | 0.41*** | 0.50*** | 0.48*** |
| 2. Sense of competence | −   | 0.77*** | 0.91*** | 0.09  | 0.15  | 0.10  | 0.17  |
| 3. Sense of relatedness | −   | 0.92*** | 0.23*  | 0.24** | 0.21*  | 0.29** |       |
| 4. Total need satisfaction | −   | 0.29**  | 0.31** | 0.31** | 0.36*** |       |       |
| 5. Team effectiveness | −   | 0.73*** | 0.60*** | 0.42*** |       |       |       |
| 6. Collective dedication (BO) | −   | 0.53*** | 0.47*** |       |       |       |       |
| 7. Behavioural engagement (BO) | −   |       |       | 0.58*** |       |       |       |
| 8. Goal achievement | Mean | 4.6  | 3.8  | 3.9  | 3.9  | 4.1  | 3.8  | 3.9  | 4.1  |
| SD               | 0.39 | 0.39 | 0.38 | 0.54 | 0.55 | 0.55 | 0.59 | 0.24 |
| Cronbach’s alpha | 0.85 | 0.73 | 0.72 | 0.85 | 0.77 | 0.73 | 0.80 | 0.96 |

*P < .05; **P < .01; ***P < .001.
<table>
<thead>
<tr>
<th>Variable</th>
<th>Team effectiveness</th>
<th>Collective dedication</th>
<th>Behavioural engagement</th>
<th>Goal achievement</th>
</tr>
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<tr>
<td></td>
<td>B</td>
<td>SE</td>
<td>β</td>
<td>B</td>
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<tr>
<td><strong>Step 1</strong></td>
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<td><strong>Step 2</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
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<td>Age</td>
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<td>-0.193</td>
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</tr>
<tr>
<td>Gender</td>
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<td>0.098</td>
<td>0.000</td>
<td>-0.088</td>
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<tr>
<td>Year level</td>
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<td>-0.495**</td>
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<td>1.458</td>
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<td></td>
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<td>0.198</td>
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<tr>
<td>$F$ for change in $R^2$</td>
<td>15.138***</td>
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<td>8.930***</td>
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<tr>
<td>Total $R^2$</td>
<td>0.314</td>
<td></td>
<td></td>
<td>0.238</td>
</tr>
</tbody>
</table>

*P < .05, **P < .01, ***P < .001.
and goal achievement ($\beta = 0.44$). The full block explained from 23.8% to 35% of the variance across the four outcome variables (Table 4).

We checked for the potential interactions of autonomy, competence and relatedness with year level but we did not find a significant effect.

### 3.3 Between-program comparison

We performed MANOVA with the program (medicine, nursing, pharmacy) as the independent variable and the four behavioural (collective dedication, behavioural engagement) and collaboration outcomes (team effectiveness, goal achievement). Results suggest difference in the three programs ($F(8, 216) = 1.933, P = 0.05$, Pillai’s $V = 0.134$; partial $\eta^2 = 0.07$) on behavioural engagement. Scheffe post hoc comparison indicated that nursing students were higher in behavioural engagement than medicine students (Table 5). There was no significant program difference in terms of team effectiveness, collective dedication and goal achievement (Figure 3).

### 4 DISCUSSION

Students’ motivation from the lens of self-determination theory (SDT) has been studied in education and psychology but the literature remains silent about its usefulness in understanding students’ achievement and engagement in IPE. The popularity of SDT can be evidenced by the adaptation of questionnaire to various contexts to assess the constructs nested within the theory. The goal of this investigation was to explore the factors that may help advance our understanding of what accounts for behavioural and collaboration outcomes in IPE. This is in response to the observation that IPE falls short in terms of the use of theories in advancing IPE literature. Our results indicated that students’ sense of autonomy in the context of IPE consistently predicted team effectiveness, collective dedication, behavioural engagement and goal achievement.

We wish to underscore that we identified IPE engagement outcomes which could be linked conceptually to the satisfaction of the basic psychological needs inherent to SDT: autonomy, competence and relatedness. These outcomes include the following: team effectiveness (perception about the performance of the team), collective dedication (perception of how dedicated the team is in performing the tasks), behavioural engagement (how the members are engaged behaviourally in IPE activities) and goal achievement (perception of attainment of interprofessional competencies). These outcomes are typical in group activities (eg 49, 50) for which we hope to pioneer its applicability in the context of IPE.

We targeted the achievement of these outcomes by mapping activities into IPE program which were geared towards satisfying the need for autonomy, competence and relatedness. To name some activities, to meet the need for autonomy, we encouraged the students to freely represent their disciplinary expertise in achieving

<table>
<thead>
<tr>
<th>Outcome variables</th>
<th>Medicine (n = 117)</th>
<th>Nursing (n = 108)</th>
<th>Pharmacy (n = 30)</th>
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<tr>
<td>Score range</td>
<td>Mean</td>
<td>SD</td>
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<tr>
<td>Team effectiveness</td>
<td>3.9</td>
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<tr>
<td>Collective Dedication</td>
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<td>0.48</td>
<td>4.0</td>
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<tr>
<td>Behavioural Engagement</td>
<td>3.7</td>
<td>0.58</td>
<td>4.1</td>
</tr>
<tr>
<td>Goal achievement</td>
<td>3.9</td>
<td>0.40</td>
<td>4.1</td>
</tr>
</tbody>
</table>

TABLE 5 Mean scores on the outcome variables across the programs
team tasks. The various team building activities (eg name your team, e-meet your team, human bingo games) were designed to meet the need for relatedness. The need for competence was achieved by the IPE activities: readiness assurance test, application exercise and interprofessional care planning through concept mapping.

The first interesting result that is of theoretical importance in this study relates to autonomy as a strong and consistent predictor of engagement outcomes in IPE (team effectiveness, collective dedication, behavioural engagement and goal achievement). This finding confirmed our hypothesis indicating that students’ internal locus of control (eg sense of autonomy) was consistently a strong explanation for team engagement outcomes: effectiveness (‘I am satisfied with the performance of my team’), dedication (‘My team felt motivated to a good job’), engagement (‘When I am in IPE class, I enjoy so much’) and goal achievement (‘Collaborative decision making and problem solving can be achieved through collaboration’) in IPE. Like what we emphasised during the IPE program briefing, we challenged the students to act on meaningful choices to represent their discipline in all team activities. This less strict instruction was designed to stimulate sense of autonomy. We want to emphasise that we especially targeted their autonomous motivation when we explained the value of collaborative practice in providing patient-centred care. Our finding provides support to the qualitative study of Visser et al., demonstrating the importance of autonomous motivation through authentic activities including care planning and by understanding the differential contributions of members in patient management.

Similar to the study of Gagné et al., the negative relation obtained between sense of competence and various outcome measures was indeed surprising and counter-intuitive. Although this was unexpected, there is a strong reason to believe that this could be explained by the valued virtue of humility and modesty in the Chinese collectivist culture. Modesty is a self-presentation tactic described as politeness in response to compliments and not to look arrogant. Modesty is construed to be important in interpersonal relationships and group performance. If western individualist culture emphasises pride over success, Chinese students, despite their outstanding achievement, reported low ratings in competence appraisal. Sense of relatedness becomes an important predictor of two outcomes: team effectiveness and goal achievement. IPE is an ideal context to meet students’ need for relatedness where students from different backgrounds could develop sense of communion and develop close relationships.

For the IPE program implementers, making sure that participating programs perform equally well is important. Aiming to delineate potential program differences in behavioural and collaboration outcomes, we performed multivariate analysis of variance. Consistent to our hypothesis, our results suggest no significant between-program differences on three IPE outcomes: team effectiveness, collective dedication and goal achievement. However, nursing students were significantly higher in their perception of their behavioural engagement than medicine students. This provides support to the earlier studies suggesting differences in attitudes towards collaboration where nurses demonstrated a more favourable attitude towards collaboration than doctors.

Another interesting result of this study relates with the psychometric properties of Basic Psychological Need Satisfaction in General (BPNS) as adapted to IPE. Our data support the three-factor model of BPNS based on our basic statistics (mean, SD and q). We report the result of confirmatory factor analysis in a separate publication. Because the scale is adapted to IPE, we termed this as Basic Psychological Need Satisfaction in Interprofessional Education (BPNS—IPE, Appendix S1).

We noted some potential limitations of this study. First, in terms of outcome variables, our outcomes were purely affective and did not cover cognitive achievement (eg test results) specific to IPE Anticoagulation Therapy. Although we recognised that the primary aim of IPE is training students to be collaborative-practice ready, which suggests the importance of looking into the team interactional dynamics and processes (means), it may be important for future studies to examine the cognitive achievement (end) to complement the behavioural and collaboration outcomes. Second, in terms of participants, our sample was only composed of medicine, nursing and pharmacy students. A worthwhile direction for future studies to examine the cognitive achievement (end) to complement the behavioural and collaboration outcomes. Third, we had no control group to establish the comparison of experimental group. The inclusion of control groups will serve as a good basis to elucidate comparison of program effects. In addition, similar studies involving other Asian
sample may be considered to examine whether the relationship between the three needs and outcomes is consistent across other population.

Despite the limitations, it is important to reiterate that this study contributed in theorising motivation to explain outcomes in IPE. Our results in general illuminate the importance of understanding what factors may explain students’ engagement in IPE in addition to the growing motivation studies in medical education. Based on our findings, we are convinced that motivation is a classroom quality that has clear implications for student achievement. By understanding the factors that impact autonomous motivation in IPE, schools can design autonomy supportive learning climate to support students’ autonomous motivation and consequently better learning outcomes. As Ng et al, coined, ‘behaviour change is more effective and lasting when patients are autonomously motivated’.

This research contributes to the IPE literature in three important ways. Theoretically, this study represents an initial and exploratory initiative to integrate SDT framework in understanding the students’ motivation in IPE using quantitative design. We wish to acknowledge the importance of research agenda that aim to uncover the factors that shape engagement and achievement under the auspices of IPE. This is especially relevant given the observation that IPE needs more theorising to elucidate implications to how it is formulated, implemented, evaluated and studied. Additionally, while past studies utilised SDT to understand well-being outcomes, this study examined the association of need for autonomy, competence and relatedness with a new set of interprofessional team outcome variables: team effectiveness, collective dedication, behavioural engagement and goal achievement. These variables were chosen based on the alignment of SDT perspectives with adaptive team-level outcomes. Methodologically, while Basic Psychological Need Satisfaction in General (BNSG-S) has been adapted and used in various contexts, no attention is paid to adapt the BNSG-S to interprofessional learning in medical education. This makes it unjustifiable to make valid assumptions from the data collected using unvalidated scale. Hopefully, our effort to adapt the questionnaire to IPE will be useful to researchers showing similar interest in IPE and will consider the instrument in their future studies. Practically, our experiences suggest that it is doable to develop an IPE model that underscores the development of students’ autonomous motivation. By and large, we hope that this study will catch the researchers’ attention and be involved in enriching theory-based IPE research agenda.

5 | CONCLUSION

This study highlights how an online IPE design could benefit from applying motivational theory to inform its implementation. We were able to demonstrate that SDT is a meaningful framework in understanding behavioural and collaboration outcomes in IPE. The major theoretical contribution of this study refers to the ability of students’ motivation to explain variance in their behavioural outcomes. That is, sense of autonomy consistently predicted team effectiveness, collective dedication, behavioural engagement and goal achievement. Autonomous motivation among a sample of health care students can explain behavioural outcomes.

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CONFLICT OF INTEREST

The authors report no competing interest.

AUTHOR CONTRIBUTIONS

Dr Fraide A. Ganotice, Jr, and Dr George Tipoe worked together in conceptualizing, designing, and writing the discussion and implication parts of the manuscript. They also get involved in implementation of the programme. Dr John Tai Chun Fung helped in the collection of data, writing of the introduction, literature review, interpretation of the results. Dr Harinder Gill was in charged of analysis and interpretation, writing of the methodology part, and also get involved in the data collection. Miss Janet K. T. Wong helped in data collection, framing of the objectives of the study, discussion of the theory, and identification of variables in the study.

ETHICAL APPROVAL

Human Research Ethics Committee, EA1507012, The University of Hong Kong.

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REFERENCES


