

Autonomous Forms of Motivation Underpinning Injury Prevention and Rehabilitation
among Police Officers: An Application of the Trans-Contextual Model

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1 Abstract

2 The present study applied the trans-contextual model (TCM) to understand the
3 motivational processes underpinning workers' injury prevention and rehabilitation intentions
4 and behavior. Full-time police officers ($N=207$; M age=37.24, $SD=9.93$) completed
5 questionnaire measures of the TCM variables. Covariance-based SEM for the full sample
6 revealed that the effect of autonomy support from supervisor on autonomous motivation for
7 injury prevention (M-injury) was fully mediated by autonomous work motivation (M-work),
8 and the effect of M-injury on intention was fully mediated by attitude and subjective norm.
9 Variance-based SEM for the 87 participants who had recent occupational injury showed that
10 the effect of autonomy support from supervisor on autonomous treatment motivation
11 (M-treatment) was partially mediated by M-work, and the effect of perceived autonomy
12 support from physician on treatment adherence was fully mediated by M-treatment. There was
13 no effect of treatment adherence on recovery length. Findings support the motivational
14 sequence of the TCM in an occupational context.

15

16 *Keywords:* self-determination theory; theory of planned behavior; occupational injury;
17 autonomy support; treatment motivation; intention

18

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2 among Police Officers: An Application of the Trans-Contextual Model

3 Physical injuries resulting from overuse, accidents, and environmental hazards frequently
4 occur in the workplace (Health and Safety Executive, 2010) ←use '&' instead of 'and'. The
5 increasing evidence that loss in life years and quality of life resulting from injury are
6 comparable to that of cancer, stroke, and heart disease has resulted in injury prevention and
7 rehabilitation receiving increased attention in national public health departments in recent years
8 (British Medical Association, 2001; PRC Standing Committee of the National People's
9 Congress, 2002). Although the public health sectors have put forward substantial financial
10 resources and legislation to reduce the environmental risk factors for injury and improve the
11 quality of medical services to treat injury (Corso, Finkelstein, Miller, Fiebelkorn, & Zaloshnja,
12 2006), workers' non compliance to safety guidelines (Laurence, 2005; Runyan, Dal Santo,
13 Schulman, Lipscomb, & Harris, 2006) and musculoskeletal injured patients' poor adherence to
14 prescribed treatment (Bassett & Prapavessis, 2007) are still frequently reported. **These**
15 non-compliant behaviors may eventually lead to higher risk of injury, re-injury, and
16 impaired/extended recovery. These social phenomena may imply that enhancing medical or
17 injury preventive resources, or setting up legislation for occupational safety, might not be
18 sufficient to ensure workers' full compliance to safety and medical recommendations, because
19 injury prevention and rehabilitation behaviors are relatively volitional actions that often require

1 great deal of self-discipline, compliance, and personal awareness to maintain (Burstyn, Jonasi,
2 & Wild, 2010; Chan, Lonsdale, Ho, Yung, & Chan, 2009). As such, it is important for
3 researchers to investigate the psychological factors that contribute to individuals' compliance
4 to health and safety guidelines with respect to injury (Gielen & Sleet, 2003).

5 Motivation is regarded as one of the crucial psychological factors impacting behavioral
6 engagement, compliance, and persistence for volitional behaviors in health and medical
7 contexts (Chan, et al., 2009; Rundmo & Hale, 2003; Williams, Lynch, & Glasgow, 2007) and
8 this factor has been central to many social psychological models adopted to explain behavior in
9 these contexts (Conner & Norman, 2005; Orbell, 2007). The present study applied the
10 trans-contextual model (TCM; Hagger, Chatzisarantis, Barkoukis, Wang, & Baranowski, 2005;
11 Hagger, et al., 2009) to understand the motivational dynamics and psychosocial factors (e.g.,
12 perceived autonomy support) that influence police officers' intentions for injury prevention and
13 rehabilitation adherence of occupational injury.

14 **The Trans-Contextual Model**

15 The central premise of the TCM is that motivation in one context (e.g., physical education)
16 can be transferred to motivation in another related context (e.g., leisure time physical activity;
17 Hagger & Chatzisarantis, 2009; Hagger, et al., 2005). The model was developed through the
18 integration of two prominent theories in social psychology: self-determination theory (SDT;

1 Deci & Ryan, 1985, 2008) and the theory of planned behavior (TPB; Ajzen, 1985, 1991). The
2 component theories and the bases for the integration within the TCM will be presented in the
3 next sections.

4 **Self-determination theory.** SDT is an organismic theory derived from humanistic
5 traditions that aims to explain human behaviors by motivation, trait characteristics,
6 psychological needs, and goal contents (Deci & Ryan, 1985, 2008). The TCM was derived
7 from a core premise of one of the sub-theories of SDT, the organismic integration theory, which
8 concerns the taxonomic organization of different human motives according to their level of
9 self-determination (Deci & Ryan, 2008). According to the theory, motivation is determined by
10 the reasons individuals perform behaviors. These motives are regarded as *behavioral*
11 *regulations* and their relative importance (i.e., strength) may determine the extent to which
12 people are motivated to pursue and persist with behaviors. Central to organismic integration
13 theory is the distinction between two forms of human motivation: autonomous and controlled.
14 *Autonomous motivation*¹ refers to engagement in behavior for internally-referenced reasons
15 that emanate from the self, whereas *controlled motivation*² refers to the engagement in behavior
16 for externally-referenced reasons and to attain goals based on contingencies perceived as
17 emanating from outside the individual (Deci & Ryan, 1985, 2008). Individuals citing
18 autonomous reasons for engaging in behavior are likely to perceive the behavior as volitional,
19 enjoyable, exciting, optimally challenging, and meaningful to their life values, as opposed to

1 those acting for controlling reasons who view their actions as determined by external demands
2 from social agents or to avoid externally-referenced outcomes such as guilt and shame.

3 Autonomous motivation is often referred as self-determined motivation because actions
4 are perceived to be self-initiated. According to Deci and Ryan (1985, 2000) it is more adaptive
5 than controlled motivation in facilitating behavioral compliance, long-term commitment, and
6 other positive motivational outcomes (e.g., general well-being) because this self-determined
7 form of motivation is more compatible with the human active nature of growth, integration, and
8 development. Thus, it is important to address the antecedents of autonomous motivation. In this
9 respect, it is proposed in SDT that if individuals perceive social agents (e.g., supervisors) in
10 their environment to be autonomy supportive, they are more likely to endorse autonomous
11 forms of motivation. In particular, *autonomy support* is characterized by social agents'
12 encouragement of choice and opportunity, consideration of feelings and opinions, and
13 emphasis of communication regarding the rationale behind the advisory behaviors (Deci,
14 Eghrari, Patrick, & Leone, 1994; Hagger et al., 2007).

15 The concept of autonomy support and its relationship with autonomous motivation and
16 behavior might be somewhat in agreement with the literature suggesting that various forms of
17 social support (e.g., emotional and instrumental support) from significant agents (e.g., medical
18 providers) play an important role on individuals' treatment adherence (Rundmo & Hale, 2003)
19 and compliance to safety guidelines (Burstyn, et al., 2010; Gielen & Sleet, 2003). In addition,

1 the commitment to, and perceived importance of, occupational safety actions have been found
2 to be important factors related to intentions to engage in safety behavior and actual compliance
3 (Rundmo & Hale, 2003). Research findings support the proposition, derived from SDT, that
4 when autonomously motivated workers who recognize injury preventive behavior as something
5 personally meaningful and worthy to enact, they would be more committed to safety
6 regulations. A study by Burstyn, Jonasi, and Wild (2010) among occupational safety inspectors
7 explored the potential effect of autonomy support on occupational safety. Results suggested
8 that autonomy-supportive inspectors tended to issue fewer severe safety compliance orders, and
9 were more efficient in resolving problems with safety compliance in the workplace. However,
10 Burstyn and colleagues (2010) did not investigate the impact of autonomy support on the
11 motivational consequences proposed by the SDT. With regards to rehabilitation compliance,
12 Chan, Lonsdale, Ho, Yung, and Chan (2009) conducted a preliminary investigation of the role
13 of autonomy support from physiotherapists on patients' motivation toward, and adherence to,
14 home-based physiotherapy exercise. Results were consistent with SDT such that autonomy
15 support from physiotherapists was positively associated with autonomous treatment motivation
16 and adherence. Moreover, it was found that the positive association between autonomy support
17 and treatment adherence was fully mediated by autonomous treatment motivation. Hence, the
18 tenets of SDT appear useful in identifying the motivational antecedents of rehabilitative
19 behaviors and may potentially help explain actions involving injury prevention.

1 **Theory of planned behavior.** The aim of the TPB is to explain the psychosocial factors
2 affecting human behavior, but focuses on the decision-making processes that lead to behavioral
3 engagement from a social cognitive perspective (Ajzen, 1985). A concept central to TPB is
4 *intention*, which represents the willingness and effort individuals plan to exert toward engaging
5 in a target behavior in the foreseeable future (Ajzen, 1985). Intention is proposed to be the most
6 proximal predictor of behavior and, according to TPB (Ajzen, 1985, 1991), is a function of
7 three social cognitive and belief-based constructs, namely, attitude, subjective norm, and
8 perceived behavioral control (PBC). *Attitude* reflects individuals' positive or negative
9 evaluation of a target behavior (Ajzen, 1985). *Subjective norm refers to the perceived*
10 *appropriateness or acceptability of the target behavior under the social environment*
11 *encompassed by all the significant agents of the individuals* (Ajzen, 1985). *PBC* represents how
12 confident or difficult individuals feel with regards their participation in the target behavior
13 (Ajzen, 1991). PBC is often regarded as synonymous to self-efficacy or confidence toward
14 engaging in a behavior (Bandura, 1998), but it has been argued that PBC may also represent
15 perceived control over external barriers (Rhodes & Courneya, 2003). Importantly, intention is
16 proposed as a mediator of the effects of attitudes, subjective norms, and PBC on behavior,
17 reflecting the reasoned, planned processes by which these factors influence action (Ajzen,
18 1991). According to TPB (Ajzen, 1991), however, PBC can also predict behavior directly

1 independent of intentions should it adequately reflect real barriers or limits to control over the
2 behavior.

3 TPB has been recognized as one of the important theories that practitioners should
4 consider when implementing behavior change interventions for injury prevention (Gielen &
5 Sleet, 2003; Hardeman et al., 2002). However it has only been tested in a few studies in the
6 areas of occupational safety and students' injury preventive behavior. For example, in a
7 prospective study of fire safety training among university staff, participants who reported
8 higher attitude, subjective norm, and PBC were more likely to have higher intentions to attend a
9 fire training course and heightened intentions predicted course attendance over a three-month
10 period (Sheeran & Silverman, 2003). In addition, Lajunen and Resänän (2004) applied the TPB
11 to predict teenagers' intentions for the use of bicycle helmet. They found that the intention to
12 use a helmet was positively predicted by attitude and subjective norm. Such findings highlight
13 the utility of the TPB in explaining variance in behavior in safety and injury prevention
14 contexts.

15 **Trans-contextual model.** The key theoretical concepts from SDT and TPB are integrated
16 in the TCM. Such theoretical integration between SDT and TPB was consolidated in the TCM
17 to provide a more comprehensive understanding about motivated behaviors (Hagger, et al.,
18 2005; Hagger, Chatzisarantis, et al., 2009). SDT is an organismic theory of motivation and
19 provides detail on the origins of constructs from the social cognitive theories (e.g., the TPB;

1 Deci & Ryan, 1985). However, the belief systems and decision-making processes involving
2 human behavior are not explicitly outlined in the theory. In contrast, the processes by which
3 behavioral, normative, and control beliefs are related to behavior are outlined in the TPB
4 (Ajzen, 1985, 1991), but the fundamental motives behind these beliefs are not explained in the
5 model. For instance, a behavior initiated by either one's true sense of self (i.e., autonomous
6 reason), as opposed to a feeling of obligation (controlled reason), could lead to a very different
7 set of beliefs, which would further impact on the implementation of the behavior. Incorporating
8 the two theories could therefore offer a reasonable framework for these motivational
9 consequences. As a result, it was proposed in the TCM that autonomous motivation is a distal
10 and formative factor that influences the proximal belief-oriented factors of behaviors from the
11 TPB.

12 In particular, the social-environmental and motivational predictors of behaviors based on
13 SDT are included in the TCM. In the model it is explicitly proposed that autonomy support and
14 autonomous motivation are related to behavior positively and in a motivational sequence:
15 autonomy support → autonomous motivation → behavior. However, the proximal decisional
16 processes leading to behavior are further specified in the TCM through the introduction of the
17 four variables as mediators of the relationship between motivation and engagement in future
18 behavior. Particularly, it is proposed that the attitude, subjective norm, and PBC (i.e., constructs
19 from the TPB) mediate the relationship between autonomous motivation and intention, and the

1 effects of these three variables on behavior are, in turn, mediated by intention. This means that
2 motives to engage in behavior are important in the development of belief-based factors that lead
3 to future behavior.

4 Furthermore, hypotheses from the hierarchical model of motivation (Vallerand, 1997) are
5 incorporated in the TCM such that the endorsement of motivational regulations are governed by
6 the three inter-connected levels of generality (Hagger, Chatzisarantis, et al., 2009), including
7 the global level (personality or trait-like variables), contextual level (event or social
8 environment-related variables), and situational level (time-specific variables). According to
9 Vallerand (1997), the endorsement of motivation in a given situation is dependent not only on
10 global-level motivation, but also on the motivation from other related contexts. As such, the
11 TCM hypothesizes that motivation in one context can be transferred onto motivation of another
12 related context (Hagger, Chatzisarantis, et al., 2009). Such hypothesis was initially proposed in
13 regards to school pupils' exercise motivation (Hagger, Chatzisarantis, Culverhouse, & Biddle,
14 2003).

15 Specifically, according to the premises of the TCM (Hagger, et al., 2003), autonomy
16 support from teachers of physical education (PE), a social environmental factor that influence
17 autonomous forms of motivation toward physical activity among school children in PE at the
18 contextual level, can influence autonomous motivation toward exercise in another context (i.e.,
19 leisure time). Furthermore, autonomous motivation toward leisure-time physical activity at the

1 contextual level is proposed to influence intentions to engage in physical activity in the future,
2 which reflects situational motivation toward physical activity. Tests of the TCM support these
3 key hypotheses. In an initial test of the model, students' autonomous motivation in PE was
4 found to positively predict autonomous motivation for physical activity in leisure-time (Hagger,
5 et al., 2003). Furthermore, the effect of perceived autonomy support from PE teachers on
6 students' autonomous motivation in leisure-time was fully mediated by students' autonomous
7 motivation in PE (Hagger, et al., 2003). The main premises for the TCM was further supported
8 in samples from Singapore, Estonia, Hungary, Finland, and Greece (Hagger, et al., 2005;
9 Hagger, Chatzisarantis, et al., 2009). These data provide a robust support for the validity of
10 TCM, and have initiated an attempt to test the basic tenets of the model in other contexts (e.g.,
11 injury rehabilitation; Chan, Hagger, & Spray, 2011).

12 **Application of TCM in an Injury Context**

13 Chan, Hagger, and Spray (2011) reported two studies investigating the relationships
14 between autonomous sport motivation and autonomous treatment motivation among sport
15 players of different levels of ability who had experienced a variety of moderate to severe
16 physical injuries in sport. Findings for both recreation-level and professional players
17 consistently showed that sport participants who endorsed higher autonomous motivation in
18 sport, in contrast to controlled motivation, were more likely to be autonomously motivated to
19 undergo treatment for their sport injuries. In addition, the authors reported that autonomous

1 treatment motivation was a strong positive predictor of intentions for adhering to the prescribed
2 treatment of sport injury in the future. With this promising finding in the sport context, Chan
3 and colleagues (2011) proposed that TCM may potentially be applied to explain individuals'
4 motivation and behavior in other injury-related contexts such as occupational injury. Indeed, no
5 studies have tested whether autonomous motivation at work can be transferred into motivation
6 to prevent or rehabilitate from occupational injury.

7 In addition, Chan and colleagues (2011) did not examine whether the attitude, subjective
8 norm, and PBC from the TPB were mediators of the relationships between autonomous
9 treatment motivation and treatment intention as stipulated by the TCM. Such mediators are
10 essential constructs of the TCM because behaviors or intention predicted by self-determined
11 motivation alone does not take into account of individuals' proximal processing (i.e., belief
12 systems, decision-making, intention formation) regarding the target action (Chatzisarantis,
13 Hagger, Smith, & Sage, 2006; Hagger & Chatzisarantis, 2009). A recent meta-analysis by
14 Hagger and Chatzisarantis (2009) summarized the findings of the relationships between SDT
15 and TPB variables in previous studies (36 studies) on health behavior (e.g., exercise, dieting,
16 breast feeding, and condom use). The results showed that autonomous motivation exerted a
17 significant medium-sized effect on intentions for the health behavior ($r = .52$), but the effect
18 was fully mediated by attitude, subjective norm, and PBC. No previous study has applied an
19 integrated model adopting SDT and TPB to understand individuals' engagement in injury

1 prevention. When attitude, subjective norm, and PBC are proposed to be the antecedents of
2 individuals' intentions for injury prevention (Lajunen & Resänän, 2004; Sheeran & Silverman,
3 2003), it is important to investigate whether they mediate the effect of self-determined
4 motivation on intention to engage in injury-preventive behaviors in order to provide a
5 comprehensive picture about the social cognitive processes underpinning safety actions.

6 **The Present Study**

7 The present study applied the TCM in a workplace context to explain the psychological
8 and motivational factors influencing prevention of, and rehabilitation from, occupational injury.
9 The purpose of the study was two-fold. First, we examined the relationship between the
10 autonomous motivation for work and injury prevention, and investigated whether attitudes,
11 subjective norms, and PBC mediate the relationship between autonomous motivation and
12 intentions for injury prevention. Second, we examined the predictive validity of autonomous
13 work motivation in explaining variance in autonomous treatment motivation, treatment
14 adherence, and recovery length of a recent occupational injury. Police officers were chosen as
15 our target population because the training and field work of police officers usually involves
16 intensive physical activity, handling of dangerous or heavy equipment (i.e., weapons,
17 protective gear), and long duration or night-shift working hours, where occupational injuries
18 are more likely and prevalent in comparison to that of typical white-collar workers (Violanti,
19 Vena, & Marshall, 1996). Also, from a theoretical perspective, police officers are more suitable

1 than typical blue collar workers (e.g., workers in factories or mines) because under the support
2 of the government, inadequate resources for injury prevention (e.g., education, training,
3 protective kits) and rehabilitation are unlikely to be the reason affecting their injury preventive
4 intention and rehabilitation behaviors. As a consequence, we were able to test the effect of the
5 psychological variables in the TCM on the outcome variables while minimizing the potentially
6 confounding impact of instrumental resources, which could be highly inconsistent in
7 commercial industries.

8 Based on the findings of previous studies on the TCM, SDT, and TPB (Chan, et al., 2011;
9 Chan, et al., 2009; Hagger & Chatzisarantis, 2009), we drew the following hypotheses for the
10 TCM applied to injury prevention and injury rehabilitation (Figure 1 depicts the two
11 hypothesized models). In the TCM for injury prevention, we hypothesized that the direct effect
12 of autonomy support from supervisors on autonomous motivation for injury prevention would
13 be positive and mediated by autonomous work motivation, and the relationship between
14 autonomous motivation for injury prevention and injury preventive intention would be positive
15 and mediated by attitude, subjective norm, and PBC. In the TCM for injury rehabilitation, we
16 speculated that the direct effect of autonomy support from supervisors on autonomous
17 treatment motivation would be positive and mediated by autonomous work motivation, the
18 effect of the autonomy support from physicians on treatment adherence would be positive and
19 mediated by autonomous treatment motivation, and the effect of autonomous treatment

1 motivation on length of recovery would be negative and mediated by treatment adherence. **The**
2 **TPB components of the TCM, namely attitude, subjective norm, and PBC, were not tested in**
3 **the recovery model due to the cross-sectional and retrospective nature of the study.** Lastly, as
4 perceived severity of health problems was found to facilitate the internalization of treatment
5 among alcohol-addicted patients (i.e., greater autonomous motivation; Ryan, et al., 1995),
6 perceived injury severity served as a control variable in the prediction of autonomous treatment
7 motivation, treatment adherence, and length of recovery.

8 **Method**

9 **Participants and Procedures**

10 Participants were full-time police officers recruited from three police stations in the
11 Sichuan province of China. Ethical approval for study protocol and measures was obtained
12 from the Institutional Review Board of the University of [University omitted for masked
13 review]. Two-hundred and thirty nine participants returned and signed informed consent forms
14 after being supplied with preliminary information regarding the study and agreed to participate.
15 In order to reduce the length of questionnaire and avoid the problem of common method
16 variance (Doty & Glick, 1998), participants were instructed to complete two sets of
17 questionnaires on two consecutive occasions, one week apart. The first questionnaire included
18 scales measuring demographic variables (gender, age, work years, injury history), autonomous

1 work motivation, and perceived autonomy support from supervisors. The second questionnaire
2 comprised items to measure motivation and TPB variables with respect to injury prevention.
3 Those who reported experiencing an occupational injury that required medical attention were
4 directed to an additional section comprising measures of treatment motivation, treatment
5 adherence, and perceived autonomy support from physicians at the time of injury. Responses to
6 this section were used to test the TCM for injury rehabilitation.

7 After omitting the data from 32 participants who either did not complete the second
8 questionnaire or had more than 80% missing data, our final sample comprised 207 police
9 officers (82.80% male; M age = 37.24, SD = 9.93; M years in police force = 14.56, SD = 16.12)
10 Over half of the respondents (66.4%) reported experiencing an occupational injury. Six months
11 prior to the first data collection, participants experienced an average of 0.56 (SD = 1.32)
12 occupational injuries, and reported an average of 3.07 (SD = 11.50) days absence, an average of
13 9.69 (SD = 30.06) days of impaired work performance, and an average of 6.36 (SD = 22.58)
14 days when they were required to modify their normal working routine as a consequence of their
15 injury. Eighty-seven (42.03%) participants reported having occupational injuries with an
16 average lag of 1.45 years (SD = 1.79), including skeletal fracture (20.00%), swelling or
17 contusion (16.40%), joint sprain or dislocation (10.90%), tear or rupture of ligament or tendon
18 (10.90%), and others (30.90%; e.g., gun wounds, head injury), where physicians were involved
19 in the treatment process. These participants were therefore eligible to, and completed, the

1 second questionnaire containing additional questions regarding the treatment experiences of
2 their injuries. Data from these participants (89.7% male; M age = 38.27, SD = 9.94; M years in
3 police force = 14.82, SD = 10.06) were therefore used to test the TCM for injury rehabilitation.

4 **Measures**

5 **Perceived autonomy support.** The Health Care Climate Questionnaire (HCCQ;
6 Williams, Grow, Freedman, Ryan, & Deci, 1996) was used to measure perceived autonomy
7 support from participants' physician and supervisor. HCCQ is a single dimension scale that has
8 been frequently used to measure the perceived autonomy support from significant others such
9 as physicians (Chan, Lonsdale, Ho, Yung, & Chan, 2008), physiotherapists (Chan, et al., 2011),
10 supervisors{Baard, 2004 #903}, and teachers (Hagger, et al., 2003). The scores of the 6-item
11 version of HCCQ used in this study for the assessment of autonomy support from both
12 physician (e.g., "I feel that my physician has provided me choices and options") and supervisor
13 (e.g., "I feel understood by my supervisor") had reliability coefficients (Cronbach, 1951) of .91
14 and .92 respectively.

15 **Autonomous motivation for treatment and injury prevention.** Participants'
16 autonomous motivation for injury prevention and treatment was assessed by the Treatment Self
17 Regulation Questionnaire (TSRQ; Williams et al., 1996). The TSRQ has been previously
18 adapted for measuring patients' motivation in physiotherapy treatment (Chan, et al., 2009) and

1 was found to be reliable across different behavioral contexts including smoking cessation,
2 dieting, and exercise (D'Angelo, Reid, & Pelletier, 2007; Williams, Cox, Kouides, & Deci,
3 1999; Williams, et al., 1996). In order to measure autonomous treatment motivation, we used
4 the five items (e.g., "I remained in treatment and carry out rehabilitation exercise because I felt
5 like it's the best way to help myself") from the physiotherapy-version of TSRQ (Chan, et al.,
6 2009). In order to assess autonomous motivation for injury prevention, we adapted six items
7 (e.g., "I want to prevent or avoid injury because it is an important choice I really want to make")
8 from the autonomous treatment motivation subscale of the smoking cessation version of TSRQ
9 (Williams, et al., 1999). The Cronbach alphas of the scores of autonomous motivation for injury
10 prevention and treatment were .76 and .77 respectively.

11 **Autonomous work motivation.** Autonomous work motivation was assessed using 12
12 items from an adapted version of the autonomous motivation sub-dimensions of the Behavioral
13 Regulation in Sport Questionnaire (BRSQ; Lonsdale, Hodge, & Rose, 2008). We adapted items
14 from the BRSQ, a sport domain questionnaire, rather than the typical measure of
15 self-determined motivation in the work domain (i.e., the Blais Inventory of Motivation; Blais,
16 Briere, Lachance, Riddle, & Vallerand, 1993) for a number of reasons. First, the nature of
17 police officers' job is unlike that of typical workers, and a major portion of their job duty
18 involves the execution or training of physical tasks in the field, so the core content of the BRSQ
19 appeared to better fit the job description of our target sample. Second, the BRSQ was developed

1 to measure the full complement of behavioral regulations, so its items covered all the
2 sub-dimensions of autonomous motivation¹ of the self-determination continuum, including
3 intrinsic motivation, integration, and identification (Lonsdale, et al., 2008). Third, the BRSQ
4 has demonstrated equal or superior internal reliability and predictive validity than other
5 psychological instruments (e.g., the Sport Motivation Scale; Pelletier, et al., 1995) for
6 measuring behavioral regulations from SDT (Lonsdale, et al., 2008), and, more importantly, its
7 Chinese version has been shown to be reliable among participants from mainland China (Chan,
8 et al., 2011).

9 In order to fit with the police force context, the terms “sport” or “participate in sport” in the
10 BRSQ were replaced by “work”, “job”, or “work in the police force”. The measure included
11 four items for each of the intrinsic regulation (e.g., “I work for the police force because I enjoy
12 it”), integrated regulation (e.g., “I work for the police force because it’s a part of who I am.”),
13 and identified regulation (e.g., “I work for the police force because I value the benefits of my
14 job”) subscales. For analyses, four indicators of an autonomous work motivation scale were
15 formed by taking the average of each of the intrinsic, integrated, and identified regulation items.
16 Responses for all the above scales were made on seven-point Likert scales with anchors ranging
17 from “very true” (7) to “not at all true” (1). The internal consistency **coefficient** (Cronbach,
18 1951) for **the scores of the autonomous work motivation scale was .87.**

1 **TPB variables.** Items assessing the TPB variables were developed according to Ajzen's
2 (2002) recommendations. Items measuring attitude toward safety procedures was preceded by
3 the common stem, "Following all the required safety procedures to reduce the likelihood or
4 severity of injury in the forthcoming month is..." and participants' responses were made on six
5 seven-point semantic differential scales with the following bi-polar adjectives: "valuable -
6 worthless", "beneficial - harmful", "pleasant - unpleasant", "enjoyable- unenjoyable", "good -
7 bad", and "virtuous - not virtuous". Measures of subjective norm (three items; e.g., "The people
8 in my life whose opinions I value would approve of me following all the required safety
9 procedures to reduce the likelihood or severity of injury in the forthcoming month"), PBC (five
10 items; e.g., "I have complete control over following all the required safety procedures to reduce
11 the likelihood or severity of injury in the forthcoming month"), and intention (three items; e.g.,
12 "I intend to carry out all the required safety procedures to reduce the likelihood or severity of
13 injury in the forthcoming month") were rated on seven-point Likert-type scales ranging from
14 "strongly agree" (7) to "strong disagree" (1). The **scores** of attitude, subjective norm, PBC, and
15 intention obtained **reliability coefficients (Cronbach, 1951) of .91, .79, .87, and .87 respectively.**
16 Full details for the psychometric properties of the TPB measure of injury prevention can be
17 obtained from the first author.

18 **Treatment adherence.** We derived six items to measure self-reported treatment
19 adherence based on a measure from a previous study on treatment adherence for home-based

1 physiotherapy treatment (Chan, et al., 2009). Chan and colleagues (2009) developed two items,
2 one for assessing the *completion* of treatment and one for measuring the *effort* patients invest in
3 their rehabilitation. In order to enhance the internal reliability of the test scores and coverage of
4 the scale, we developed two further items for each of the completion (e.g., “I took the treatment
5 prescribed by physicians”) and effort (e.g., “I invested effort in following the recommendations
6 offered by my physician”) scales. The items for completion and effort were assessed on
7 seven-point scales with scale endpoints ranging from “complete all” (7) to “complete none” (1)
8 and “maximum effort” (7) to “minimum effort” (1) respectively. The test scores of the resulting
9 six-item scale had a Cronbach’s alpha of .86.

10 **Length of recovery.** Participants receiving medical treatment for their injury were
11 required to recall the length of their recovery by indicating the number of days it took to recover
12 completely from the injury.

13 **Injury severity.** We assessed perceived severity of the injury by adapting five items (e.g.,
14 “I feared that this injury would affect my long-term career”) from the severity subscale of the
15 Sports Injury Rehabilitation Beliefs Survey (SIRBS; Taylor & May, 1996). Responses were
16 made on seven-point Likert-type scales ranging from “strongly agree” (7) to “strongly disagree”
17 (1). One reversed-scaled item (i.e., “I would think that the injury was a minor interruption to
18 my work”) was omitted from the scale because it had low inter-item correlations and the scores
19 of the remaining scale exhibited an internal consistency coefficient (i.e., α) of .79.

1 **Translation.** All questionnaires were translated from English to Chinese (the first
2 language of the participants) apart from the physiotherapy-version of TSRQ which was
3 originally developed in Chinese (Chan, et al., 2009). The translation was conducted by three
4 English-Chinese bilinguals based on the back-translation procedures of Hambleton (2005).

5 **Analysis**

6 We employed covariance-based structural equation modeling (CB-SEM)³ using the EQS
7 6.1 statistical software (Bentler, 2004) to test the hypothesized relationships of the TCM for
8 injury prevention in the full sample (N = 207). To protect the model against any violation of
9 CB-SEM's assumption on normality, we used robust maximum likelihood estimation method
10 (Satorra & Bentler, 1988). In addition, CB-SEM analysis is heavily dependent on sample size to
11 ensure adequate statistical power (i.e., .80 or higher), so we also computed the statistical power
12 of the model (MacCallum, Browne, & Sugawara, 1996).

13 A sample size of 100 is usually the lowest boundary for CB-SEM analysis and some recent
14 research recommended a minimum sample size of 200 to protect the robustness of the model
15 against non-convergence and estimation biases (Boomsma & Hoogland, 2001). Since only 87
16 participants were categorized as having a previous work-related injury, we employed
17 variance-based structural equation modeling to test the premises of the TCM for injury
18 rehabilitation in this subsample (VB-SEM; also named partial least squares path analysis) using

1 the SmartPLS 2.0 statistical software (Ringle, Wende, & Will, 2005). Similar to CB-SEM,
2 VB-SEM can also force measurement error to zero by forming latent variables (Henseler,
3 Ringle, & Sinkovics, 2009). However, to estimate the latent factor scores and the relationships
4 between the factors, VB-SEM relies on a partial least squares algorithm, which is theoretically
5 distribution-free (Henseler, et al., 2009). A number of simulation studies revealed that
6 VB-SEM analysis displayed superior consistency, robustness, and accuracy than CB-SEM
7 analysis for studies with small sample sizea (e.g., $N = 20$) and non-normal data (Reinartz,
8 Haenlein, & Henseler, 2009; Ringle, Wilson, & Götz, 2007).

9 The “model fit” of VB-SEM analysis can be revealed by a number of indices about the
10 convergent validity and discriminant validity of the measurement model. Convergent validity is
11 typically regarded as acceptable when the Cronbach’s alpha and the composite reliability of
12 each dimension are higher than .70 (Barclay, Thompson, & Higgins, 1995), the average
13 variance extracted (AVE) for each factor is higher than 0.50 (Chin, 1998), and the factor
14 loading of each items on its corresponding factor is higher than .70 (Komiak & Benbasat, 2006).
15 Discriminant validity is generally considered adequate when the loading of an item on its own
16 construct is higher than its loadings on the other constructs (Komiak & Benbasat, 2006) and the
17 square-root of the AVE of any construct is higher than its correlation with other constructs
18 (Chin, 1998). Furthermore, we utilized bootstrapping resample technique with 1000
19 replications to reveal the significance level of the path estimates.

1 For both the CB-SEM and VB-SEM analyses, we conducted a mediation analysis
2 according to Baron and Kenny's (1986) and Zhao, Lynch, and Chen's (2010) criteria⁴ to test the
3 hypothesized mediation relationships in the TCM. Detailed structures of the models analyzed
4 by CB-SEM (i.e., the TCM of injury prevention) and VB-SEM (i.e., the TCM of injury
5 rehabilitation) are summarized in Figures 2 and 3 respectively.

6 Results

7 TCM for Injury Prevention

8 CB-SEM revealed that the TCM for injury prevention yielded acceptable fit with the data
9 ($df = 187$; Satorra-Bentler $\chi^2 = 375.02$; TLI = .903; CFI = .917; RMSEA = .070; SRMR = .075)
10 and obtained very good statistical power of .957. The descriptive statistics of the variables and
11 the standardized path coefficients in the model are displayed in Table 1 and Figure 2
12 respectively. In line with our hypotheses, autonomous work motivation was positively
13 predicted by autonomy support from supervisors ($R^2 = .18$) and was a positive predictor of
14 autonomous motivation for injury prevention ($R^2 = .14$). Autonomous motivation for injury
15 prevention was positively associated with attitude ($R^2 = .29$), subjective norm ($R^2 = .52$), and
16 PBC ($R^2 = .40$). Intention ($R^2 = .65$) for injury prevention was predicted positively by attitude
17 and subjective norm as hypothesized, but its expected relationship with PBC was not
18 significant.

1 Mediation analysis demonstrated that work motivation fully mediated the relationship
2 between autonomy support from supervisors and autonomous motivation for injury prevention,
3 which is in line with our hypothesis. In a similar vein, the effect of autonomous motivation for
4 injury prevention on intention was fully mediated by attitude and subjective norm, but not by
5 PBC because its relationship with intention was not significant. Details of the mediation
6 analyses are shown in Table 2.

7 **TCM for Injury Rehabilitation**

8 The VB-SEM analysis for the TCM for injury rehabilitation revealed satisfactory
9 goodness-of-fit indicators, which supported the convergent and discriminant validity of the
10 model. First, acceptable Cronbach alphas (range = .769 to .926), composite reliability scores
11 (range = .843 to .942), AVEs (range = .521 to .754), and mean item-to-corresponding-factor
12 loadings (range = .717 to .867) were found for all latent factors. Second, the
13 item-to-corresponding-factor loadings were higher than the item-to-other-factor loadings for all
14 items with a mean difference of .646 (range = .519 to .826), and the \sqrt{AVE} of each construct
15 was higher than the construct's correlations with other latent factors (mean (\sqrt{AVE} – highest
16 factor correlation) = .332, range = .003 to .627). Table 1 also presents the descriptive statistics
17 of the variables in this model.

1 Standardized path coefficients for the VB-SEM of the TCM for injury rehabilitation are
2 depicted in Figure 3. Similar to the results of the CB-SEM analysis of the TCM for injury
3 prevention, autonomous work motivation was positively predicted by autonomy support from
4 supervisor ($R^2 = .16$). As expected, autonomous treatment motivation ($R^2 = .25$) was positively
5 associated with autonomous work motivation and autonomy support from physicians after
6 controlling for the effect of perceived injury severity. Congruent with our hypothesis,
7 autonomous treatment motivation was a strong positive predictor of treatment adherence (R^2
8 $= .51$). However, treatment adherence was not significantly associated with length of recovery
9 ($R^2 = .08$) when controlling for the effect of perceived injury severity.

10 Mediation analyses confirmed the hypothesized mediation effects in the TCM for injury
11 rehabilitation. The only exception was the mediation of the relationship between autonomous
12 treatment motivation and length of recovery by treatment adherence, which was not supported.
13 The effect of autonomy support from supervisor on treatment motivation was partially
14 mediated by autonomous work motivation. The relationship between autonomy support from
15 physicians and treatment adherence was fully mediated by treatment motivation. Details of the
16 mediation analyses are shown in Table 3.

17 **Discussion**

1 The present study applied the trans-contextual model (Hagger & Chatzisarantis, 2009;
2 Hagger, et al., 2005; Hagger, Chatzisarantis, et al., 2009) to understand motivational factors
3 associated with workers' compliance to safety and rehabilitation guidelines. We tested the
4 predictive validity of the model in workers' intentions for injury prevention and treatment
5 adherence for occupational injury. Indeed, the hypothesized pattern of effects in the TCM was
6 generally supported in data from a sample of police officers, including those who had
7 experienced a recent occupational injury.

8 **Effects of Autonomous Work Motivation**

9 In agreement with our hypotheses, autonomous work motivation was positively associated
10 not only with workers' autonomous motivation for injury prevention, but also with the
11 autonomous treatment motivation of workers who had experienced an occupational injury. This
12 is consistent with previous research (Chan, et al., 2011) and the hypotheses of the TCM
13 (Hagger & Chatzisarantis, 2009; Hagger, et al., 2005; Pihu, Hein, Koka, & Hagger, 2008).

14 This pattern of effects addresses an important issue in behavioral regulation research in the
15 workplace. The endorsement of autonomous work motivation has been a frequently-cited
16 reason for workers' work intention, perseverance, job satisfaction, job performance, and
17 psychological well-being in the work place (Grant, 2008; Millette & Gagné, 2008; Otis &
18 Pelletier, 2005), as this form of motivation is incorporated within human nature for growth and

1 optimal functioning and well-being (Deci & Ryan, 1985). However, our findings suggest that
2 the predictive power of autonomous work motivation is not limited to performance-related
3 behaviors and adaptive well-being within the work context, but it may also extend to the
4 prevention and rehabilitation of occupational injury. Thus, autonomous work motivation might
5 be an extremely important factor indirectly related to the intentions for injury prevention among
6 police officers and other workers with dangerous working conditions and duties (e.g.,
7 construction workers, coal-mine workers, and soldiers). Enhancing workers' enjoyment at
8 work, increasing their sense of belonging to work, making work consistent with their life,
9 values, and goals, and supporting their psychological needs (i.e., competence, relatedness, and
10 autonomy; Deci & Ryan, 1985), were suggested to be feasible means to facilitate workers'
11 autonomous motivation at work (Lynch, Plant, & Ryan, 2005). Further research should test
12 whether these strategies may also enhance workers' autonomous motivation for injury
13 prevention and rehabilitation. Some recent research suggests that non-compliant behavior
14 could be the result of the depletion of behavioral energy (i.e., ego energy), but such depletion
15 could plausibly be slowed down by autonomous motivation (Hagger, Wood, Stiff, &
16 Chatzisarantis, 2009, 2010)(Hagger, 2010), so it might be interesting to investigate the effects
17 of ego-energy depletion on injury preventive and rehabilitation behavior, and how autonomous
18 motivation in the associated aspects can moderate such effects.

19 **Autonomous Motivation for Injury Prevention and the TPB**

1 Consistent with our hypothesis, autonomous motivation for injury prevention was a
2 positive predictor of attitude, subjective norm, and PBC, and the percentage of variance
3 explained for each variable was comparable to the corresponding effect sizes from Hagger and
4 Chatzisarantis' (2009) meta-analysis. In other words, the more autonomous reasons (i.e.,
5 pleasure, values, life goals, and personal achievement) the workers endorse for engaging in
6 preventive behavior, the more likely the injury preventive behavior is highly valued, perceived
7 to be highly recommended by their significant others (e.g., family, friends, and colleagues), and
8 perceived to be achievable regardless of difficulties. According to TPB, these personal beliefs
9 may further lead to increased intention to engage in corresponding preventive and rehabilitative
10 behaviors in the future (Ajzen, 1985, 1991).

11 Nevertheless, our expected positive predictions of intention were only observed for
12 attitude and subjective norm, which was in line with previous studies that have applied the TPB
13 to explain safety behaviors (Lajunen & Resänän, 2004; Sheeran & Silverman, 2003). No such
14 prediction was found for PBC. However, it is important to note that the prediction of PBC on
15 intention to perform safety actions has been inconsistent across studies. Quine, Rutter, and
16 Arnold (1998) found a significant positive relationship between PBC and intentions for the use
17 of cycling helmets among school-aged children (aged 11 to 15 years). In contrast, Lajunen and
18 Resänän (2004) found a negative relationship between PBC and intentions for the use of
19 cycling helmets among adolescent cyclists (aged 12 to 19 years) who owned cycling helmets.

1 This discrepancy might be due to a number of situational factors. The difficulty of performing
2 safety action may vary across different situations. For instance the situational factors affecting
3 the wearing of cycling helmets among school-aged cyclists (e.g., Quine, et al., 1998; Lajunen &
4 Resänän, 2004) versus wearing bullet-proof vests by police officers are likely to be
5 fundamentally different. In addition, the age/experience, education/ training background, and
6 socioeconomic status, and availability of other safety supporting resources may plausibly affect
7 how individuals' form intentions for the injury prevention behaviors that they felt were under
8 their control. Thus, it is important to investigate these factors as moderators of the
9 PBC-intention relationship in future studies.

10 On the other hand, it is noteworthy that subjective norm was the strongest predictor of
11 intention, which also accounted for most of the indirect effect of autonomous motivation for
12 injury prevention on intention. This pattern was not in line with typical findings in TPB
13 (Hardeman, et al., 2002) and its theoretical integration with SDT (Hagger & Chatzisarantis,
14 2009)(Hagger, 2009), which have indicated that PBC and attitude should be more important.
15 However, research has indicated that individual differences in the value attached to normative
16 factors may affect the extent to which intentions are based on subjective norms relative to
17 attitudes and PBC. For example, Trafimow and Finlay (1996) found that the predictive power
18 of subjective norm on intention would be inflated for some normative-based behaviors and
19 individuals. Similarly, research has found that control-orientated individuals, who tended to act

1 for external contingencies (e.g., money, deadlines), are more likely to adopt a normative
2 identity style; a style characterized by being more influenced by beliefs and values shared by
3 significant others (Soenens, Berzansky, Vansteenkiste, Beyers, & Goossens, 2005). This is
4 likely to mean that intentions are formed on the basis of normative rather than personal beliefs.
5 Also, in the police force, injury prevention is likely to be a behavior which is predominantly
6 influenced by normative beliefs because behavioral and control beliefs of injury prevention
7 might be less important for police officers who are supposed to have sufficient training,
8 education, and instrumental support for injury prevention. Alternatively, a salient collective self
9 (i.e., thoughts and the perception of self derived from social membership), which is commonly
10 endorsed by people from collectivistic countries like China (the population from which the
11 current samples were drawn) has been suggested as a trait which could strengthen the
12 association between subjective norm and intention (Trafimow & Finlay, 1996)(Hagger et al.,
13 2007). Therefore, although our findings for the subjective norms variable supported the view
14 that normative factors might be more strongly related to intentions for safety maintenance than
15 personal factors (e.g., attitudes, PBC), individual difference factors like personality traits (e.g.,
16 normative-based individuals, control causality orientation) and cultural differences (e.g.,
17 collectivist norms) should be considered in the future studies of injury prevention.

18 **Autonomous Treatment Motivation, Treatment Adherence, and Recovery Length**

1 In line with Chan and colleagues' (2009) study, autonomous treatment was a positive
2 predictor of treatment adherence and explained substantial amount of its variance. A number of
3 studies have reported a positive relationship between autonomous motivation and treatment
4 adherence (e.g., D'Angelo, et al., 2007; Milne, et al, 2008), but most of these studies focused on
5 the beneficial effect of autonomous treatment motivation in the treatment of various health
6 problems (e.g., heart disease, cancer). To our knowledge, the present study is the first attempt to
7 test the relationship between autonomous treatment motivation and adherence to treatment in
8 the context of occupational injury. The findings indicate that workers with occupational injury
9 are more likely to invest effort and fully comply with prescribed treatment when autonomously
10 motivated toward their rehabilitation.

11 However, treatment adherence was not significantly related to the length of recovery after
12 controlling for perceived injury severity, which is in contrast to our hypothesis. Although the
13 effect of treatment adherence on recovery length could potentially be masked by the effects of
14 other external factors (e.g., effectiveness of treatment, body capacity to recover, and type of
15 injury) and attenuated by the social desirability of self-report measures and memory loss, the
16 effect appeared to be negative, which was in line with our prediction. This implied that better
17 adherence may be associated with the speed of recovery to some extent. Further studies with
18 intervention designs such as randomized controlled trials or longitudinal designs like reciprocal
19 effects models may help to test whether the reduction of recovery length is caused by

1 heightened autonomous treatment motivation (Chan, et al., 2011; Chan, et al., 2009; Williams,
2 et al., 2007).

3 **Autonomy Support from Supervisor and Physician**

4 Realizing the adaptive role of autonomous motivation in work and rehabilitation, it is
5 important to highlight their antecedents. Consistent with our hypothesis and the tenets of SDT
6 (Deci & Ryan, 1985, 2008), autonomy support from supervisors and physicians was positively
7 related to autonomous work motivation and autonomous treatment motivation respectively.
8 These patterns were consistent with studies that have applied SDT in occupational (Burstyn, et
9 al., 2010; Lynch, et al., 2005; Otis & Pelletier, 2005) and health settings (Chan, et al., 2011;
10 Chan, et al., 2009; Milne, et al., 2008). Therefore, autonomy-supportive actions such as the
11 provision of choice, providing a rationale for safety advice, and taking individuals' feelings and
12 opinions into consideration with minimal pressure could have a profound effect on facilitating
13 workers' autonomous motivation in injury prevention and autonomous treatment motivation
14 for those who suffered from occupational injury (c.f., Chatzisarantis, Hagger, & Brickell, 2008;
15 Chatzisarantis, Hagger, & Smith, 2007) (McLachlan & Hagger, 2010).

16 **Limitations and Future Directions**

17 We must acknowledge a number of limitations of the present study. The cross-sectional
18 design of the injury prevention model precludes evidence for the predictive validity of TCM

1 with regard to future injury-preventive behavior. Our injury rehabilitation model included a
2 behavioral measure, but the retrospective design prohibited the inclusion of the TPB variables,
3 which are hypothesized as predictors of future behavior. As a result, the full TCM model could
4 not be scrutinized in a single analysis. Further studies should test the prediction of all the TCM
5 variables among injured workers who are currently undertaking treatment and use longitudinal
6 or diary methods (Bolger, Davis, & Rafaeli, 2003) to assess their rehabilitation or injury
7 preventive behavior over an extended period of time (i.e., greater than one month). Also, the
8 effect of controlling environment and controlled motivation on individuals' health behaviors
9 has received more attention in recent years (Bartholomew, Ntoumanis, & Thøgersen-Ntoumani,
10 2010; Halvari, Halvari, Bjornebekk, & Deci, 2010), and these constructs might plausibly
11 represent the motivational consequences triggered by legislation and coercion (e.g., fines or
12 other penalties) for safety in the workplace, so it is worthwhile for future studies to develop
13 corresponding measures and investigate their impact on injury prevention relative to that of
14 autonomy support and autonomous motivation.

15 In addition, the use of self-report measures and retrospective recall methods may be
16 subject to social desirability and memory bias. Yet, these factors are unlikely to increase type-I
17 error because the magnified error variance and restricted true variance may attenuate rather
18 than inflate the path estimates in the models (Chan, et al., 2009; Williams, et al., 1996).
19 Likewise, this initial study made use of a number of adapted instruments (e.g., TSRQ) which

1 were not originally designed to measure the psychological constructs in the context of
2 occupational safety. Although these adapted instruments displayed good convergent and
3 predictive validity in this study, we should stress the importance of further development and
4 examination of these measures for face validity and test-retest reliability within the context of
5 occupational injury. This is because some environmental features and cultures within injury
6 prevention or rehabilitation contexts could be unique and vary from one occupation to another.
7 These factors might influence the operationalization of the psychological constructs, and also
8 plausibly affect their relationships with behaviors. For instance, we had a majority of male
9 police officers in our sample. Although this reflected the typical gender distribution within this
10 this occupational context in China, it could be a potential confounding factor that impaired the
11 generalizability of our findings across both genders. Future studies with samples from various
12 occupations **and cultural backgrounds**, and with a more even gender distribution, may control
13 for these confounding variables, including objective measures of injury risk, injury severity,
14 and the effectiveness of safety facility and medical resources.

15 Lastly, the correlational design did not permit the inference of causal and temporal order
16 effects of the hypothesized predictors. Successful interventions based on TPB (Chatzisarantis,
17 Hagger, Smith, & Phoenix, 2004) (Chatzisarantis & Hagger, 2005) and SDT (Chatzisarantis &
18 Hagger, 2009; Williams, et al., 1999; Williams, et al., 2007) to enhance individuals'
19 engagement in health related behaviors, including occupational safety (Sheeran & Silverman,

1 2003), have been reported. Further studies should apply the principles of both theories to
2 implement an intervention and use the TCM to predict behaviors regarding injury prevention
3 and rehabilitation.

4 **Conclusion**

5 The present study extended the application of the trans-contextual model to an
6 occupational injury prevention and rehabilitation context. The results supported the model and
7 illustrated the importance of autonomous work motivation and autonomy support from
8 supervisors and health and safety professionals in workers' engagement of safety and
9 rehabilitation behaviors.

10

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Footnotes

¹There are three different forms of autonomous motivation in SDT (Deci & Ryan, 2000, 2008): (1) Intrinsic motivation, the most self-determined form of motivation, implies behavioral engagement for the inherent pleasure in the activity; (2) Integrated motivation, a less self-determined form of autonomous motivation than intrinsic motivation, is adopted when actions are coherent with life values or other structures within the self; (3) Identified motivation, the least self-determined form of autonomous motivation, represents performing acts for personally important values, which indeed are not fully emanated from the sense of self.

²There are two forms of controlled motivation in SDT (Deci & Ryan, 2000, 2008): (1) External motivation, the least self-determined form of controlled motivation, refers to behaviors executed merely for attainment of externally references rewards (e.g., money and promotion) or avoidance of negative consequences (e.g., punishment, fines); and (2) Introjected motivation, a controlled form of motivation which is somewhat more self-determined than external motivation, is adopted when we act for satisfying social obligations in order to avoid being guilty, shameful, or under-pressure.

³Model goodness of fit for the CB-SEM analyses was evaluated using multiple criteria including the Tucker-Lewis index (TLI), comparative fit index (CFI), root mean square error of approximation (RMSEA), and standardized root-mean square residual (SRMR). Values for the TLI and CFI greater than .90 were considered indicative of acceptable fit (Bentler, 1990), with

values greater than .95 preferable (Hu & Bentler, 1999). RMSEA and SRMR's values less than or equal to .06 were considered indicative of very good fit (Hu & Bentler, 1999), and values of .08 or less traditionally considered acceptable.

⁴According to Baron and Kenny (1986), mediation is confirmed if the mediator has significant associations with both the independent variable (IV) and dependent variable (DV), the IV predicts the DV independently (i.e., the direct effect model), and this path becomes non-significant when the DV is also predicted by the mediator (i.e., the combined effects model). Partial mediation is present when the strength of IV → DV is significantly reduced in the combined effects model and the indirect effect is significant but the direct effect remains significant. On the other hand, Zhao, Lynch, and Chen (2010) proposed mediation should be evidenced by significant direct and indirect effects of the IV on the DV.

Table 1

Cronbach's alphas, correlations, means and standard deviations of the TCM for injury prevention (N = 207) and the TCM for injury rehabilitation (N = 87) variables.

TCM for injury prevention variables	1	2	3	4	5	6	7
1. AS from supervisor	1	-	-	-	-	-	-
2. Auto work Mtv	.37*	1	-	-	-	-	-
3. Auto Mtv for injury prevention	.21*	.30*	1	-	-	-	-
4. Attitude	.22*	.17*	.44*	1	-	-	-
5. Subjective norm	.15*	.28*	.49*	.33*	1	-	-
6. Perceived behavioral control	.11	.31*	.41*	.37*	.67*	1	-
7. Intention	.15*	.23*	.45*	.47*	.72*	.56*	1
Cronbach's alpha	.96	.87	.76	.91	.79	.87	.87
Mean	4.36	3.86	4.74	5.34	4.28	4.39	4.20
Standard deviation	1.37	1.14	1.23	1.43	1.37	1.27	1.49
TCM for injury rehabilitation variables	8	9	10	11	12	13	14
8. AS from supervisor	1	-	-	-	-	-	-
9. AS from physician	.49*	1	-	-	-	-	-
10. Auto work Mtv	.37*	.18	1	-	-	-	-
11. Auto treatment Mtv	.33*	.50*	.37*	1	-	-	-
12. Perceived injury severity	-.18	.21	.05	.17	1	-	-
13. Treatment Adherence	.34*	.43*	.31*	.67*	.23*	1	-
14. Days of recovery	-.05	.17	-.03	.08	.14	-.04	1
Cronbach's alpha	.92	.91	.87	.77	.79	.86	-
Mean	4.31	4.17	3.89	4.03	3.42	4.18	40.0
Standard deviation	1.45	1.49	1.14	1.30	1.45	1.45	94.8

Note. AS = perceived autonomy support; Auto = autonomous; Mtv = motivation.

** $p < .01$ 2-tailed, * $p < .05$ 2-tailed.

Table 2

Results from the mediation analyses for the TCM for injury prevention

Paths	Mediator(s)	Direct effect (z-score)	Combined effects (z-score)	Indirect effect (z-score)	Total effect (t-value)	Indirect / Total effect	Type of mediation
AS → M-injury	M-work	.25*** (2.96)	.10 (1.11)	.08*** (3.27)	.14*** (2.75)	57.13%	Full
M-work → Attitude	M-injury	.19*** (2.52)	-.10 (-.37)	.18*** (3.83)	.20** (2.12)	92.63%	Full
M-work → Norm	M-injury	.31*** (3.91)	.02 (.30)	.16*** (4.03)	.27*** (3.82)	58.96%	Full
M-work → PBC	M-injury	.37*** (3.92)	.00 (.06)	.14*** (3.79)	.32*** (4.29)	44.68%	Full
M-injury → intention	Attitude, Norm, PBC	.81*** (5.78)	.02 (.26)	.58*** ^a (7.97)	.68*** (8.01)	85.86%	Full

Note. AS = autonomy support from supervisors; M-injury = autonomous motivation for injury prevention; M-work = autonomous motivation at work; Norm = subjective norm; PBC = perceived behavioral control. The indirect and total effects were computed by the resampling algorithm (replication = 5000) of Preacher and Hayes (2008). ^aThis indirect effect index represent the total indirect effect brought by the three mediators. The specific indirect effect by attitude (0.14, $p < .01$) subjective norm (0.40, $p < .01$), and perceived behavioral control (0.04, $p > .05$) Thus, perceived behavioral control was not a significant mediator.

*** $p < .01$ 2-tailed, ** $p < .05$ 2-tailed, * $p < .05$ 1-tailed.

Table 3

Results from the mediation analyses for the TCM for injury rehabilitation

Paths	Mediator(s)	Direct effect (t-value)	Combined effects (t-value)	Indirect effect (z-score)	Total effect (t-value)	Indirect / Total effect	Type of mediation
AS-supervisor → M-treatment	M-work	.40*** (3.16)	.28* (1.68)	.10** (2.19)	.29** (3.14)	32.84%	Partial
M-work → Adherence	M-treatment	.33*** (3.94)	.05 (0.59)	.32*** (3.39)	.40*** (2.98)	79.69%	Full
AS-physician → Adherence	M-treatment	.25** (2.08)	-0.04 (.62)	.32*** (4.14)	.42*** (4.17)	75.41%	Full
M-treatment → Recovery	Adherence	.13 (1.12)	.46 *** ^a (2.61)	-.03 (-.96)	.02 (.54)	164.85%	None

Note. AS-supervisor = perceived autonomy support from supervisor; AS-physician = autonomy support from physician; M-treatment = autonomous treatment motivation; M-work = autonomous motivation at work; Recovery = length of recovery. The indirect and total effects were computed by the resampling algorithm (replication = 5000) of Preacher and Hayes (2008).
^aBoth the significant combined effects of the IV on the DV was caused by suppression effect (MacKinnon, Krull, & Lockwood, 2000). Therefore, no mediation was presented in this path.

*** $p < .01$ 2-tailed, ** $p < .05$ 2-tailed, * $p < .05$ 1-tailed.

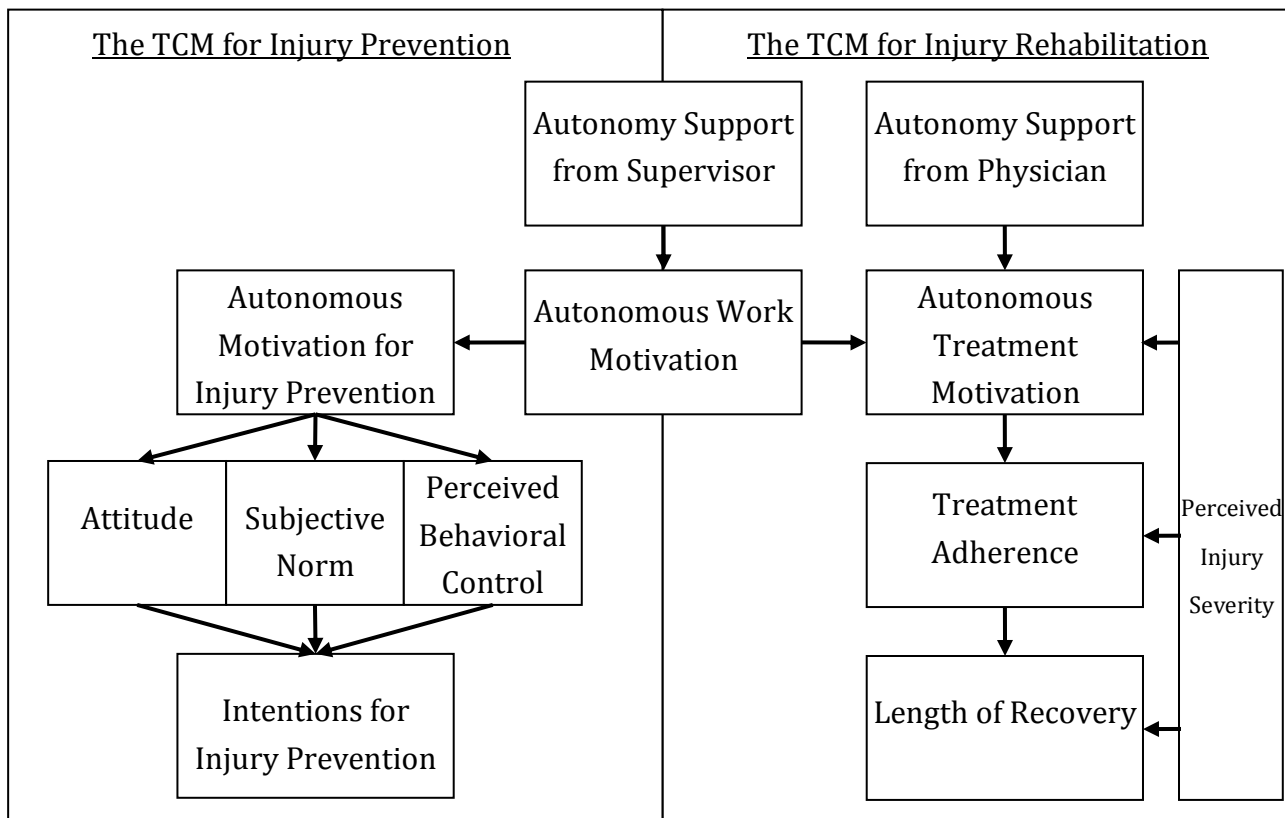


Figure 1. The hypothesized models of TCM in the present study. The relationship between treatment adherence and length of recovery was expected to be negative, while all other paths were proposed to be positive.

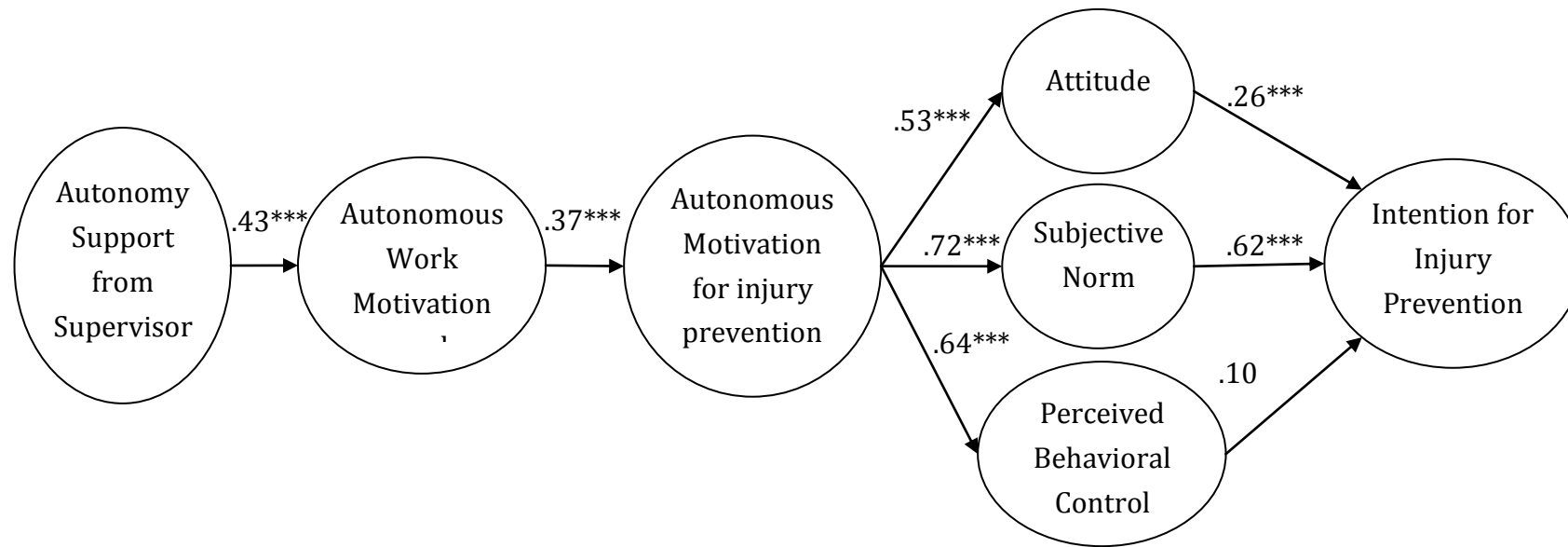


Figure 2. Path estimates for the TCM for injury prevention. Correlations between the disturbances of latent factors (attitude, subjective norm, and perceived behavioral control) are omitted from this figure. *** $p < .01$ 2-tailed, ** $p < .05$ 2-tailed, * $p < .05$ 1-tailed.

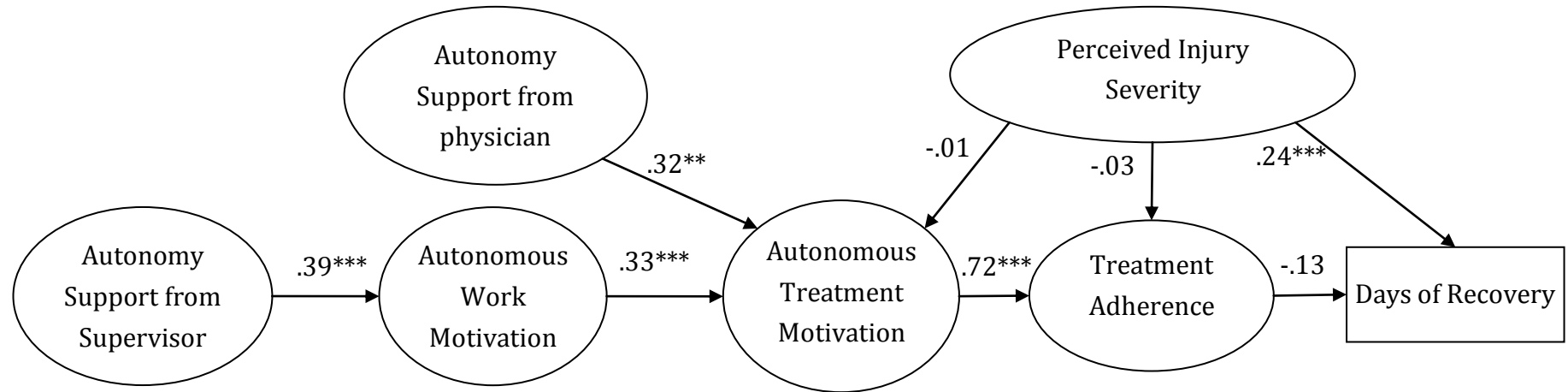


Figure 3. Path estimates for the TCM for injury rehabilitation. *** $p < .01$ 2-tailed, ** $p .05$ 2-tailed, * $p < .05$ 1-tailed.