The Influence of Students' Perceptions of Learning Environment on Coping with Academic Challenges: A Structural Equation Modeling Study

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Theory: Self-compassion has been identified as a promising interventional target enabling medical learners to respond effectively to stressors and challenges of medical training. Determining factors in the learning environment that support self-compassion is critical for developing such interventions. What is already known in terms of environmental or contextual factors is that learning environments that are supportive of students' basic psychological needs for autonomy, competence, and relatedness result in better learning and wellbeing outcomes. As such, satisfaction of basic psychological needs in the learning environment was tested for potential effects on self-compassion among medical students.

Hypothesis: It was hypothesized that medical students who perceived their needs for autonomy, competence, and relatedness were supported in the learning environment would be more likely to respond to stressors and challenges by means of positive processes of self-compassion (common humanity, mindfulness, self-kindness) and less likely by means of negative processes of self-compassion (isolation, over-identification, self-judgment). Two models were tested: Model 1 contained the effects of the needs for autonomy, competence, and relatedness on two factors of self-compassion that comprise three positive and three negative processes, respectively. Model 2 contained the direct effects of the psychological needs on six individual processes of self-compassion.

Method: Using two online surveys, authors collected data from medical students (*n*=195) at a large Canadian university. The authors used the 12-item basic psychological needs scale to measure the degree of satisfaction of students' needs for autonomy, competence, and relatedness in the learning environment, as perceived by students. The 12-item self-compassion scale was

used to measure the degree of compassion students exhibited toward themselves in challenging times in the medical program. The authors used structural equation modeling (SEM) to test the hypothesized relationships between basic psychological needs satisfaction and self-compassion.

Results: The SEM results for Model 2 indicated an improved model fit over Model 1; however, not all the hypothesized effects were determined to be significant in the two models. In the better fitting model (Model 2), significant effects were observed between the needs for competence and relatedness and the three negative processes of self-compassion (isolation, over-identification, self-judgement). Specifically, the need for relatedness had comparable effects on all three negative processes of self-compassion. The need for competence had a significant effect only on isolation. The need for autonomy had no effects on self-compassion. None of the effects involving the positive processes of self-compassion (common humanity, mindfulness, self-kindness) were significant.

Conclusions: Satisfaction of medical students' needs for competence and relatedness in the learning environment appears to reduce the negative processes of self-compassion. Future research is needed to determine why basic psychological needs satisfaction appears to have no effects on the positive processes of self-compassion and what factors are likely to foster these beneficial processes among medical students.

Keywords: medical students, learning environment, basic psychological needs, self-compassion

Introduction

Although failure and errors are inherent to learning, those who have taught in medical school would agree that pressure to succeed and fear of failure are significant stressors among medical students, with published research providing further empirical evidence.[1-4] As the odds of being academically the best in the program become harder to achieve[1] (see also social comparison research, e.g. the big-fish-little-pond effect),[5] adaptive coping with stressors such as these is critical for medical student wellbeing and quality of learning.[3]

Self-compassion, as an adaptive way of coping, has shown promise in enabling individuals to respond effectively to challenges such as failure and errors.[6-8] Self-compassion encompasses six components or processes: common humanity versus isolation, mindfulness versus overidentification, and self-kindness versus self-judgement.[6] Common humanity involves recognizing that all people fail and make mistakes, that one's experiences are not isolating and that others also encounter similar challenges. Mindfulness involves being aware of one's thoughts and feelings as they are and keeping them in a balanced manner, rather than suppressing, avoiding or excessively reacting to them. Self-kindness involves being understanding and accepting towards oneself in times of challenges, as opposed to being overly self-critical and highly judgmental. Empirical research indicates positive relationships between self-compassion and better transition to college, coping with academic failure, emotional resilience, and psychological wellbeing.[8-14] Our research with medical students and practicing physicians indicates that self-compassionate students and practitioners experience greater engagement and feel less emotionally, physically, and cognitively exhausted due to school and work challenges than their less self-compassionate peers.[15,16]

Although a single, general self-compassion factor was shown to underlie the six

components of self-compassion,[6,17] a recent study with university students and community dwelling individuals in the Netherlands revealed a hierarchical structure with two factors to underlie three positive and three negative components of self-compassion, respectively.[12] Specifically, the common humanity, mindfulness and self-kindness components are shown to represent the positive processes of self-compassion. The isolation, overidentification, and self-judgement components are shown to represent the negative processes of self-compassion or self-criticism. In our factorial validation study with medical students, the two-factor hierarchical structure was confirmed, providing evidence in support of the positive and negative processes of self-compassion.[18]

With self-compassion identified as a promising interventional target for medical trainees,[13,14,19] the question arises as to what factors in the learning environment may support self-compassion and discourage excessive self-criticism among medical trainees. What is already known in terms of environmental factors is that learning environments that are supportive of students' basic psychological needs for autonomy, competence, and relatedness result in better learning and wellbeing outcomes (see self-determination theory research).[20-23] The need for autonomy concerns people's desire to have control over their lives, having a choice, and being able to make decisions. The need for competence concerns people's desire to acquire new knowledge and skills and apply them in solving problems. The need for relatedness concerns people's desire to belong and feel connected with others. It is important to note that although educators strive to create optimal learning environments, the effectiveness of such efforts depends on students' perceptions of their learning environment, namely whether students perceive they have a choice, progress in their learning, and feel connected with others in the program. The three needs are shown to be equally important and "lacking autonomy,

competence, or relatedness in any activity or domain of activity has detectable costs for both quality of motivation and well-being".[24(pp.217-218)]

In light of the importance of psychological needs satisfaction in the environment[20-24] and drawing on the empirical evidence of the positive and negative processes of self-compassion,[12,18] we hypothesized that the ongoing support of students' psychological needs in the medical program (as perceived by students) would enable the self-compassionate way of coping with academic stressors and challenges and discourage the self-critical way of coping. Specifically, if students perceived their learning environment as supportive of their basic psychological needs, they would be more likely to respond to academic stressors by means of self-kindness, common humanity, and mindfulness and less likely to respond by means of self-judgement, isolation, and overidentification. As such, two models were tested with student data. Model 1 contained the effects of the needs for autonomy, competence, and relatedness on two factors of self-compassion that comprise three positive and three negative processes, respectively (Figure 1, left panel). Model 2 contained the direct effects of the psychological needs on six individual processes of self-compassion (Figure 1, right panel). In case of a better fit, the latter model could provide nuanced evidence on the effects of psychological needs satisfaction in the learning environment on each of the six processes of self-compassion and guide the development of future self-compassion interventions for medical students.

Methods

This study is part of a larger research project investigating antecedents and outcomes of self-compassion among medical students and physicians[15,16] and establishing psychometric properties of the self-compassion scale in these populations.[18] While the existing research has focused on the relationships of self-compassion with learning and professional outcomes among medical

students and physicians (e.g., exhaustion, engagement, professional satisfaction), the focus of the present study is on antecedents, specifically satisfaction of medical students' basic psychological needs in the learning environment, and their influence on self-compassion.

Setting and data collection

The study was conducted at a large Canadian university. Ethics approval (#Pro00066510) was granted by the Research Ethics Board (REB 2) at the University of Alberta, Canada, prior to data collection. In the 2016–2017 academic year, there were 640 students in all four years of the medical program; 267 (42%) students agreed to participate in the study. Using online surveys, quantitative data were collected at two time points during one academic year (Time 1: September – October 2016, beginning of the school year; Time 2: February 2017, midpoint of the school year). Students' perceptions of the medical program in terms of psychological needs satisfaction were assessed at both times, with students' perceptions at the beginning of the school year used as the baseline in the analyses. For students to be able to meaningfully reflect on their coping with academic stressors and challenges in the program, self-compassion was assessed at the second time point.

Of 267 medical students, 195 (73%) completed both surveys. The responses from these students were used in data analysis. Four students did not report their gender and/or age. Of those students who provided their demographic information, the majority (95.4%) of the respondents were younger than 30 years of age and 60.4% were female, which is representative of the student population of the medical school where this study was conducted. With respect to the year in the program, 24.1% of the respondents were in year 1, 28.7% in year 2, 20.5% in year 3, and 26.7% in year 4 of the medical program.

The 12-item basic psychological needs scale[25] was used to measure the degree of satisfaction of each basic psychological need as perceived by medical students. Using a Likert-type scale (1–strongly disagree; 6–strongly agree), students were asked to indicate their agreement with each item as it relates specifically to their medical program (see Table 1 for items and Table 2 for internal consistency values). According to scale developers, higher average scores on each need measure are indicative of greater satisfaction of the respective need.[25] In samples of employees from various occupations in Canada and France, the three need measures are shown to have good internal consistency values (Cronbach α ≥ 0.84) and nomological validity across samples.[25]

The 12-item self-compassion scale–student form[17] was used to measure the degree of compassion medical students exhibited toward themselves when experiencing academic stressors and challenges in their program. Using a 5-point rating scale (1–almost never; 5–almost always), students were asked to indicate how often they behaved in a certain way in the medical program (see Table 1 for items and Table 2 for internal consistency values). The self-compassion scale contains six subscales (two items each) that, according to scale developers, can be added following the reverse-coding of negatively framed items to obtain a total self-compassion score.[17] Until recently researchers have been using this score as an indicator of self-compassion. In samples of university students in Belgium and the USA, good psychometric properties for the self-compassion scale were reported across samples, with internal consistency values for the full scale being ≥ 0.86 and for all but one subscale (self-kindness) being ≥ 0.60, which are generally deemed acceptable internal consistency values for use in groups.[17]

Analyses

Descriptive analyses were performed in SPSS 25.0 (SPSS, Chicago, IL). Using R 3.5.1 (R Foundation for Statistical Computing, Vienna, Austria), structural equation modeling (SEM) was performed to test the hypothesized relationships among the latent variables of basic psychological needs and self-compassion (Models 1 and 2 in Figure 1). Individual items on the basic psychological needs and self-compassion measures were used as indicators of their respective latent variables in the SEM analysis. We followed a two-step strategy[26] recommended for performing SEM: confirmatory factor analysis (CFA) was performed first to evaluate relationships between the latent variables and their respective indicators (the measurement model); SEM analysis was performed next to test the hypothesized relationships among the latent variables (the structural model). For the basic psychological needs instrument, CFA was performed to evaluate the measurement model over two time points (first separately for each time point and then two time points tested together). Both factor structure invariance and factor loading invariance were tested as these two types of invariance are required in longitudinal data analysis.[27] The CFA results for the self-compassion instrument in this sample are reported elsewhere[18] as part of the investigation of psychometric properties of the scale for its use with medical students. In CFA factor structure invariance and SEM analyses, model fit was assessed using the χ^2/degrees of freedom (df) ratio, the root mean square error of approximation (RMSEA), the standardized root mean square residual (SRMR), and the comparative fit index (CFI). A χ^2/df $\leq$ 3, RMSEA $\leq$ 0.08, SRMR $\leq$ 0.06, and CFI $\geq$ 0.90 are established cut-offs for an acceptable model fit.[27-30] For CFA factor loading invariance, χ^2 difference test was used, with a non-significant χ^2 difference supporting factor loading invariance.[27]

Results

Means, standard deviations, inter-correlations and internal consistency (Cronbach α) values for

the study variables are shown in Table 2. The psychological needs measures had acceptable internal consistency values at both time points ($\alpha \geq 0.72$). The internal consistency values of the six self-compassion subscales were ≥ 0.60, except for the self-kindness subscale ($\alpha = 0.46$). The lower values for the self-compassion subscales were likely due to the small number of items in each subscale (two items per subscale). The CFA results for the basic psychological needs instrument at Time 1 and Time 2 indicated a good model fit, with items loading on their respective factors (i.e., needs; Time 1: $\chi^2/df = 104.129/51 = 2.04$, RMSEA = 0.062, SRMR = 0.053, CFI = 0.948; Time 2: $\chi^2/df = 132.098/51 = 2.59$, RMSEA = 0.076, SRMR = 0.050, CFI = 0.939). The test of overtime measurement invariance supported factor structure invariance (χ^2/df = 253.369/225 = = 1.13, RMSEA = 0.025, SRMR = 0.048, CFI = 0.985) and factor loading invariance (χ^2 diff. = 3.037, df = 6, $p = 0.80$).

The SEM results for Model 1 (Figure 1, left panel) indicated a good model fit with the data ($\chi^2/df = 860.560/561 = 1.53$, RMSEA = 0.052, SRMR = 0.066, CFI = 0.902); however, not all the hypothesized relationships among the latent variables were determined to be significant. The left panel of Figure 2 shows only significant effects ($p < 0.05$); the full set of coefficients for this model is provided in Appendix 1. Significant effects were observed between the needs for competence and relatedness and the negative processes of self-compassion ($\beta = -0.269$, $p = 0.021$ for the effect of competence and $\beta = -0.292$, $p = 0.001$ for the effect of relatedness, where β is the standardized coefficient). None of the three psychological needs had significant effects on the positive processes of self-compassion. Overall, the model explained 17% of the variance in the negative processes of self-compassion and 11% of the variance in the positive processes of self-compassion.

The SEM results for Model 2 (Figure 1, right panel) indicated an improved model fit

over Model 1 (χ^2/df = 809.355/537 = 1.51, RMSEA = 0.051, SRMR = 0.064, and CFI = 0.911); however, not all the hypothesized effects were determined to be significant. The full set of coefficients for this model is provided in Appendix 2. The right panel of Figure 2 shows only significant effects ($p < 0.05$), which were between the needs for competence and relatedness and the three negative processes of self-compassion. Specifically, satisfaction of the need for competence had a significant negative effect on isolation ($\beta = -0.281$; $p = 0.029$). Satisfaction of the need for relatedness had significant negative effects on isolation ($\beta = -0.282$; $p = 0.002$), overidentification ($\beta = -0.331$; $p < 0.001$) and self-judgement ($\beta = -0.215$; $p = 0.010$). The need for autonomy had no significant effects on any of the six self-compassion processes. Overall, the model explained 18.8% of the total variance in isolation, 15.2% in self-kindness, 14.9% in overidentification, 10.3% in self-judgement, 7.4% in common humanity, and 6.5% in mindfulness components of self-compassion.

Discussion

This study examined the relationship of basic psychological need satisfaction in the learning environment and the use of self-compassion by medical students as an adaptive way of coping with academic stressors and challenges. A key finding of the study is that students' perceptions of the learning environment in terms of needs satisfaction had significant effects only on the negative processes of self-compassion. Students who perceived their learning environment was less supportive of their psychological needs were more likely to feel isolated, overidentify with setbacks, and act in a highly self-judgmental way upon encountering challenges in the program. In case studies of medical students' personal experience of failure, social isolation has been identified both as a cause and a sequela of failing academic performance.[31] The results of this study further indicate that the isolation process of self-compassion appears to be attributed to

students' perceptions of low satisfaction of their needs for competence and relatedness in the program. Cognitive distortions and problematic mindsets, such as all-or-nothing thinking and maladaptive perfectionism that many students develop during their education prior to medical school,[34] are potential contributors to students' perceptions of low satisfaction of the needs for competence and relatedness or 'not being the smartest' in the program.[1] Limiting competition and promoting cooperation among students, introduction of collaborative 'learning communities', increased social interaction among students and improved access to faculty mentors and professional role models are shown to be effective in addressing unjustified perceptions of incompetence and increasing feelings of relatedness amongst students.[3,35]

Important questions to consider are why psychological needs satisfaction in the learning environment had no effects on the positive processes of self-compassion and what is required to enable these beneficial processes amongst medical students. One of the possible explanations is that students seeking entrance to medical schools are typically high achievers, who have rarely encountered serious academic challenges (i.e., failure) and as such, have had limited opportunities to develop effective coping skills.[31,34] Furthermore, students' learning histories have likely primed them to avoid errors and the negative emotions that arise from errors (e.g., fear of failure).[31-33] Over time this systematic avoidance can lead to automatic responses. When acting automatically, however, one is more susceptible to engaging in habitual problematic and self-defeating behaviors in response to challenges in one's environment.[23,31] Past learning histories can make encountering challenges during medical training particularly difficult as it is at odds with students' prior experiences and their developing professional identity.[5,31] Because of what students have come to believe failure and errors indicate about their abilities (i.e., that they lack competence) as well as limited opportunity that they have had for developing effective

coping skills, they are unlikely to approach challenges such as these as valuable learning opportunities, even if they do perceive the learning environment as supportive. From this point of view, responding adaptively to academic stressors and challenges is not just a function of one's psychological needs being continuously satisfied in the environment. It is equally dependent on students' awareness of their habitual responses (e.g., avoidance vs. approach; performance vs. mastery),[36] personal beliefs (e.g., fixed vs. growth mindset),[37,38] and opportunities for learning how to frame challenges in constructive ways, leverage their skills and feel in control of their learning despite fluctuations in the learning environment.[39] In other words, perceptions of a supportive environment might be necessary but not sufficient to enable the positive processes of self-compassion.

A promising training method to enable the positive processes is explicit error management training (EMT).[40,41] It is based on the assumption that errors are a natural by-product of active learning and have an informative feedback function as they indicate where knowledge and skills need further improvement. Furthermore, EMT creates a learning environment in which errors are likely to occur and learners are encouraged to use errors as a source of information to think ahead and try new approaches in solving problems.[40] EMT is shown to be successful in emotion control, which is a skill particularly useful in early phases of skill acquisition as it helps to re-direct attention from the self and to the problem when one has encountered errors or setbacks.[40,42] EMT can be also considered as a form of cognitive reappraisal training,[43] because error management instructions reframe errors positively.[40] Future studies to pilot test the EMT approach in medical training are warranted to determine its feasibility and effectiveness in fostering the positive processes of self-compassion in medical learners.

Finally, contrary to theoretical propositions of the basic psychological needs research, and particularly, the equal importance of the three needs in learning and wellbeing outcomes, [22-24] the results of this study indicate that the need for autonomy had no significant effects on any of the six processes of self-compassion. In a U.S. study with medical students, despite students having more autonomy and flexibility in the program, wellness indices did not improve.[44] The authors concluded that autonomy without clearly defined limits can be detrimental for early learners and setting clear expectations and providing guidance and explanations for the established limits in the program would benefit students in the development of skills and professional behaviors.[44]

When interpreting our findings some limitations need to be acknowledged. The sample of students in this study came from one medical school in Canada. Although the school is representative of other medical schools in the country, our findings may not be generalizable to other schools and/or countries. Next, because the self-compassion scale that was used in this study is the only available self-report measure of self-compassion, the amount of bias in students' responses due to self-reporting remains unknown. However, the range of responses provided by the students in this study yields evidence in support of potentially minimal bias in student responses. Finally, participation in this study was voluntary; as such, it remains unknown whether students who chose not to participate in the study differed in their perceptions of the learning environment and self-compassion from the students who participated in the study.

In conclusion, research to date indicates that self-compassion contributes to emotional resilience, enabling people to move forward during challenging times. This past research, along with the findings of the present study, provides support for fostering self-compassion among medical students for their optimal academic engagement and professional wellbeing.

Disclosures

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Figure 1. Hypothesized relationships tested in the study

Model 1

Model 2
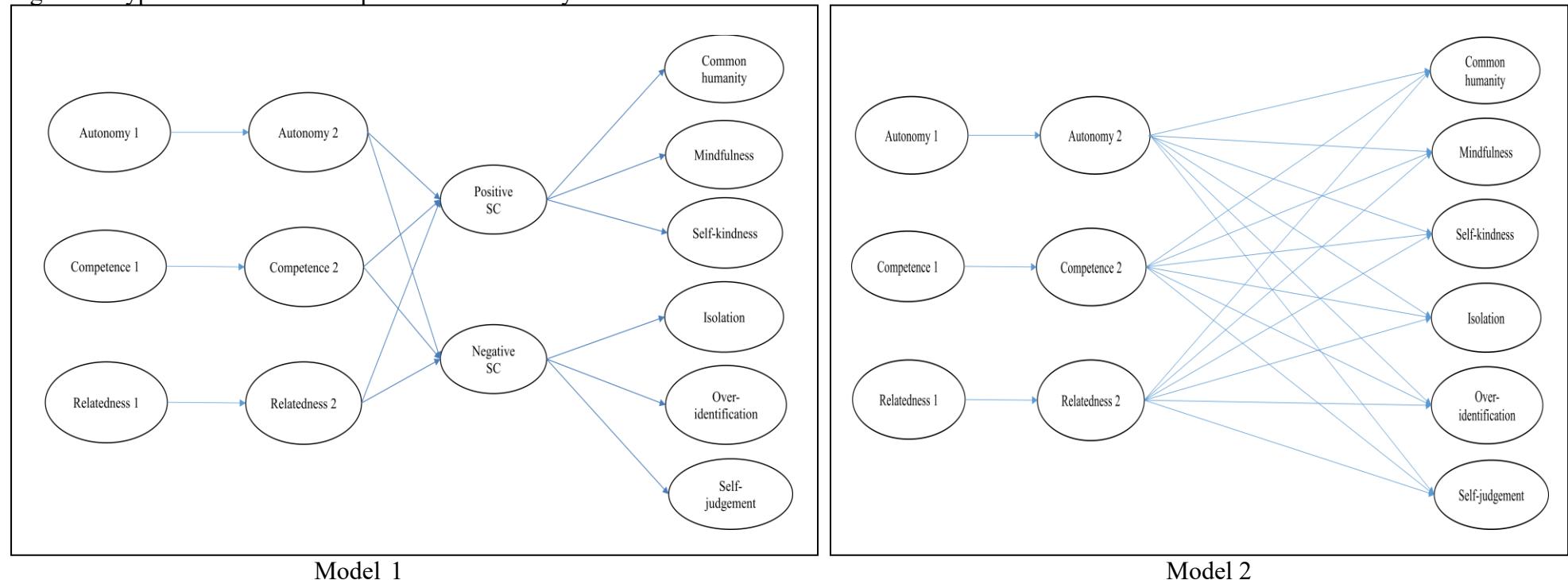
Figure 2. Relationships determined to be significant, with *p*-values shown in parentheses

Model 1   Model 2
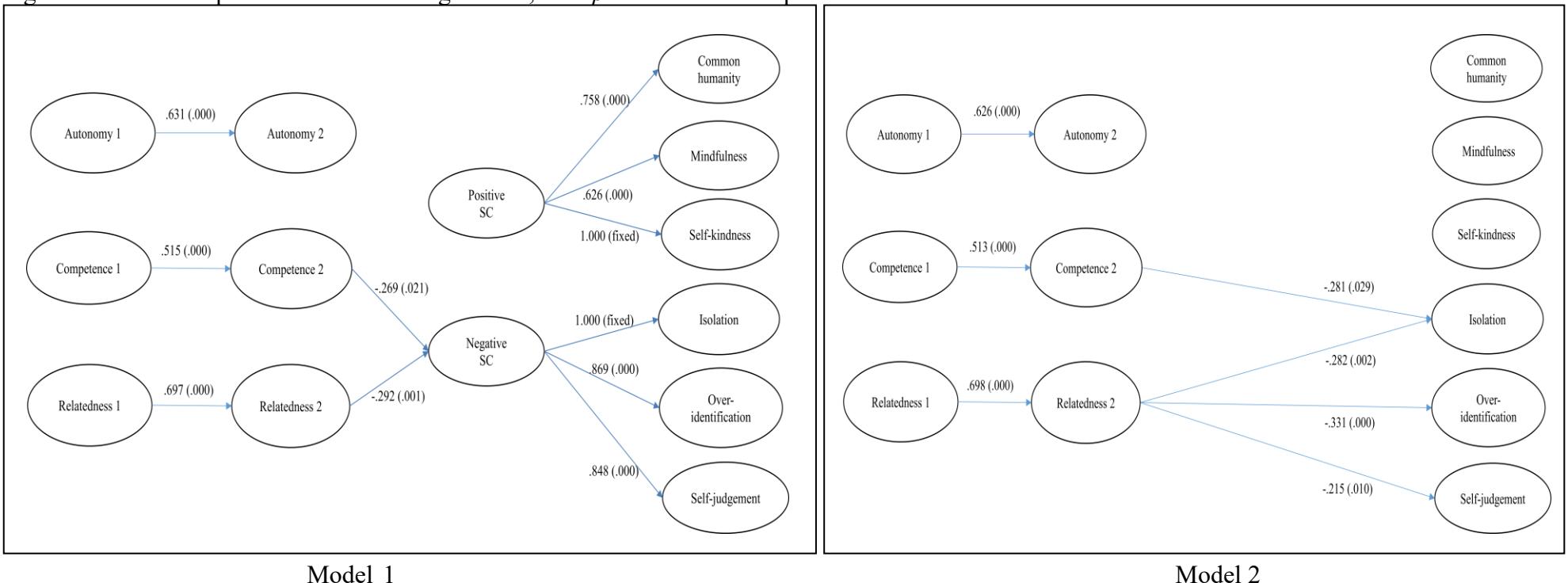
Table 1. Items in the basic psychological needs and self-compassion instruments

	Items
Basic psychological needs	
Autonomy	In my program, I feel free to make decisions.
	In my program, I can use my judgement when solving problems.
	In my program, I can take on responsibilities.
	In my program, I feel free to execute my tasks in my own way.
Competence	In my program, I have the ability to do my work well.
	In my program, I feel competent.
	In my program, I am able to solve problems.
	I succeed in my program.
Relatedness	When I am with the people from my program, I feel understood.
	When I am with the people from my program, I feel heard.
	When I am with the people from my program, I feel as though I can trust them.
	When I am with the people from my program, I feel I am a friend to them.
Self-compassion	
Common humanity	I try to see my failings as part of the human condition.
	When I feel inadequate in some way, I try to remind myself that feelings of inadequacy are shared by most people.
Self-kindness	I try to be understanding and patient toward those aspects of my personality that I do not like.
	When I am going through a very hard time, I give myself the caring and tenderness I need.
Mindfulness	When something painful happens, I try to take a balanced view of the situation.
	When something upsets me, I try to keep my emotions in balance.
Isolation	When I am feeling down, I tend to feel like most other people are probably happier than I am.
	When I fail at something that is important to me, I tend to feel alone in my failure.
Over-identification	When I fail at something important to me, I become consumed by feelings of inadequacy.
	When I am feeling down, I tend to obsess and fixate on everything that is wrong.
Self-judgement	I am disapproving and judgemental about my flaws and inadequacies.
	I am intolerant and impatient towards those aspects of my personality that I do not like.

Table 2. Means, standard deviations (SD), inter-correlations and internal consistency values for the study variables

	AT1	CP1	RL1	AT2	CP2	RL2	CH	MI	SK	IS	OI	SJ
AT1	*.75*											
CP1	.448**	*.72*										
RL1	.337**	.367**	*.85*									
AT2	.501**	.321**	.304**	*.75*								
CP2	.202**	.461**	.238**	.463**	*.79*							
RL2	.242**	.297**	.639**	.326**	.257**	*.89*						
CH	.111	.091	.099	.123	.065	.160*	*.63*					
MI	.114	.132	.021	.200**	.115	.163*	.297**	*.60*				
SK	.153*	.204**	.153*	.209**	.203**	.201**	.482**	.443**	*.46*			
IS	.133	.246**	.149*	.245**	.262**	.292**	.457**	.277**	.558**	*.67*		
OI	.109	.181*	.142*	.094	.176*	.269**	.282**	.285**	.424**	.626**	*.69*	
SJ	.070	.133	.125	.199**	.212**	.218**	.398**	.262**	.556**	.626**	.552**	*.81*
Mean	4.37	4.63	4.67	4.37	4.61	4.66	3.37	3.81	3.27	3.17	3.38	3.06
(SD)	(0.72)	(0.57)	(0.70)	(0.71)	(0.63)	(0.87)	(0.90)	(0.66)	(0.75)	(0.96)	(0.93)	(0.99)

AT: autonomy, CP: competence, RL: relatedness, CH: common humanity, MI: mindfulness, SK: self-kindness, IS: isolation, OI: over-identification, SJ: self-judgment. Internal consistency values (Cronbach α) are shown in italics along the main diagonal.
**$p < 0.01$; *$p < 0.05$.

Oi: over-identification, mi: mindfulness, is: isolation, ch: common humanity, sj: self-judgment, sk: self-kindness, sc: self-compassion. '=~' means 'is defined by'. '~' means 'is regressed on'. '~~' means 'is correlated with'.

Latent Variables:

	Estimate	Std.Err	z-value	P(>|z|)	Std.lv	Std.all
autonomy1 =~						
auto1_1	1.000				0.765	0.720
auto1_2	0.759	0.082	9.303	0.000	0.581	0.786
auto1_3	0.712	0.087	8.155	0.000	0.545	0.655
auto1_4	0.859	0.109	7.919	0.000	0.658	0.642
competence1 =~						
compet1_1	1.000				0.470	0.573
compet1_2	1.333	0.193	6.923	0.000	0.626	0.702
compet1_3	0.926	0.143	6.474	0.000	0.435	0.639
compet1_4	0.979	0.137	7.129	0.000	0.460	0.740
relatedness1 =~						
relat1_1	1.000				0.766	0.811
relat1_2	0.885	0.071	12.396	0.000	0.677	0.847
relat1_3	0.888	0.079	11.295	0.000	0.680	0.774
relat1_4	0.549	0.069	7.994	0.000	0.420	0.575
autonomy2 =~						
auto2_1	1.000				0.736	0.693
auto2_2	0.714	0.095	7.497	0.000	0.525	0.661
auto2_3	0.776	0.099	7.812	0.000	0.571	0.684
auto2_4	0.822	0.122	6.741	0.000	0.605	0.577
competence2 =~						
compet2_1	1.000				0.420	0.583
compet2_2	1.910	0.260	7.348	0.000	0.801	0.785
compet2_3	1.004	0.127	7.893	0.000	0.421	0.650
compet2_4	1.263	0.175	7.229	0.000	0.530	0.737
relatedness2 =~						
relat2_1	1.000				0.923	0.831
relat2_2	0.932	0.066	14.064	0.000	0.860	0.881
relat2_3	0.863	0.069	12.518	0.000	0.797	0.801
relat2_4	0.717	0.061	11.762	0.000	0.662	0.762
oi =~						
sc_oi2_1_RC	1.000				0.685	0.673
sc_oi2_9_RC	1.251	0.156	8.042	0.000	0.858	0.775
mi =~						
sc_mi2_3	1.000				0.602	0.825
sc_mi2_7	0.696	0.170	4.105	0.000	0.419	0.502
is =~						
sc_is2_4_RC	1.000				0.812	0.730
sc_is2_8_RC	0.948	0.105	9.053	0.000	0.770	0.710
ch =~						
sc_ch2_5	1.000				0.643	0.626
sc_ch2_10	1.222	0.208	5.876	0.000	0.786	0.732
sj =~						
sc_sj2_11_RC	1.000				0.954	0.885
sc_sj2_12_RC	0.853	0.080	10.641	0.000	0.814	0.761
sk =~						
sc_sk2_2	1.000				0.541	0.615
sc_sk2_6	1.115	0.171	6.537	0.000	0.603	0.629
scp =~						
sk	1.000				1.000	1.000
ch	0.900	0.172	5.238	0.000	0.758	0.758
mi	0.697	0.123	5.659	0.000	0.626	0.626
scn =~						
is	1.000				1.000	1.000
oi	0.734	0.099	7.433	0.000	0.869	0.869
sj	0.996	0.105	9.488	0.000	0.848	0.848

Regressions:

	Estimate	Std.Err	z-value	P(>|z|)	Std.lv	Std.all
scp ~						

	Estimate	Std.Err	z-value	P(>|z|)	Std.lv	Std.all
autonomy2	0.143	0.095	1.501	0.133	0.195	0.195
competence2	0.095	0.162	0.584	0.560	0.073	0.073
relatedness2	0.103	0.055	1.899	0.058	0.176	0.176
scn ~						
autonomy2	0.046	0.125	0.371	0.710	0.042	0.042
competence2	-0.521	0.226	-2.310	0.021	-0.269	-0.269
relatedness2	-0.257	0.074	-3.465	0.001	-0.292	-0.292
autonomy2 ~						
autonomy1	0.607	0.094	6.453	0.000	0.631	0.631
competence2 ~						
competence1	0.456	0.095	4.817	0.000	0.511	0.511
relatedness2 ~						
relatedness1	0.840	0.093	8.996	0.000	0.697	0.697

Covariances:

	Estimate	Std.Err	z-value	P(>|z|)	Std.lv	Std.all
.auto1_1 ~~						
.auto2_1	0.062	0.051	1.201	0.230	0.062	0.109
.auto1_2 ~~						
.auto2_2	0.007	0.026	0.282	0.778	0.007	0.027
.auto1_3 ~~						
.auto2_3	0.104	0.034	3.061	0.002	0.104	0.272
.auto1_4 ~~						
.auto2_4	0.027	0.055	0.493	0.622	0.027	0.040
.compet1_1 ~~						
.compet2_1	0.099	0.030	3.251	0.001	0.099	0.252
.compet1_2 ~~						
.compet2_2	0.095	0.041	2.339	0.019	0.095	0.236
.compet1_3 ~~						
.compet2_3	-0.017	0.020	-0.817	0.414	-0.017	-0.065
.compet1_4 ~~						
.compet2_4	0.063	0.020	3.132	0.002	0.063	0.312
.relat1_1 ~~						
.relat2_1	0.070	0.034	2.062	0.039	0.070	0.205
.relat1_2 ~~						
.relat2_2	0.042	0.023	1.801	0.072	0.042	0.212
.relat1_3 ~~						
.relat2_3	0.024	0.024	0.971	0.332	0.024	0.072
.relat1_4 ~~						
.relat2_4	0.087	0.023	3.753	0.000	0.087	0.259
.autonomy2 ~~						
.competence2	0.122	0.028	4.294	0.000	0.594	0.594
.relat1_3 ~~						
.relat1_4	0.100	0.029	3.385	0.001	0.100	0.300
.relat2_3 ~~						
.relat2_4	0.135	0.034	3.991	0.000	0.135	0.404
.compet2_1 ~~						
.compet2_3	0.075	0.026	2.916	0.004	0.075	0.260
autonomy1 ~~						
competence1	0.200	0.044	4.575	0.000	0.557	0.557
relatedness1	0.271	0.058	4.629	0.000	0.462	0.462
competence1 ~~						
relatedness1	0.169	0.039	4.305	0.000	0.468	0.468
.scp ~~						
.scn	-0.309	0.057	-5.455	0.000	-0.816	-0.816

Variances:

	Estimate	Std.Err	z-value	P(>|z|)	Std.lv	Std.all
sk	0.000				0.000	0.000
is	0.000				0.000	0.000
.auto1_1	0.543	0.072	7.580	0.000	0.543	0.481
.auto1_2	0.209	0.032	6.455	0.000	0.209	0.383
.auto1_3	0.395	0.048	8.310	0.000	0.395	0.571

.auto1_4	0.619	0.074	8.400	0.000	0.619	0.588
.compet1_1	0.451	0.052	8.638	0.000	0.451	0.672
.compet1_2	0.403	0.055	7.382	0.000	0.403	0.507
.compet1_3	0.274	0.034	8.064	0.000	0.274	0.592
.compet1_4	0.174	0.026	6.802	0.000	0.174	0.452
.relat1_1	0.305	0.044	6.893	0.000	0.305	0.342
.relat1_2	0.181	0.030	5.975	0.000	0.181	0.282
.relat1_3	0.309	0.041	7.554	0.000	0.309	0.401
.relat1_4	0.357	0.039	9.076	0.000	0.357	0.669
.auto2_1	0.586	0.079	7.453	0.000	0.586	0.519
.auto2_2	0.357	0.046	7.799	0.000	0.357	0.564
.auto2_3	0.371	0.049	7.610	0.000	0.371	0.532
.auto2_4	0.735	0.086	8.571	0.000	0.735	0.667
.compet2_1	0.342	0.040	8.564	0.000	0.342	0.660
.compet2_2	0.401	0.067	6.017	0.000	0.401	0.385
.compet2_3	0.242	0.030	7.962	0.000	0.242	0.577
.compet2_4	0.237	0.034	6.995	0.000	0.237	0.457
.relat2_1	0.382	0.054	7.024	0.000	0.382	0.310
.relat2_2	0.214	0.039	5.513	0.000	0.214	0.224
.relat2_3	0.354	0.047	7.471	0.000	0.354	0.358
.relat2_4	0.317	0.039	8.076	0.000	0.317	0.420
.sc_oi2_1_RC	0.567	0.074	7.638	0.000	0.567	0.547
.sc_oi2_9_RC	0.487	0.088	5.509	0.000	0.487	0.399
.sc_mi2_3	0.170	0.082	2.077	0.038	0.170	0.319
.sc_mi2_7	0.521	0.066	7.942	0.000	0.521	0.748
.sc_is2_4_RC	0.579	0.073	7.881	0.000	0.579	0.468
.sc_is2_8_RC	0.584	0.072	8.100	0.000	0.584	0.496
.sc_ch2_5	0.641	0.091	7.060	0.000	0.641	0.608
.sc_ch2_10	0.536	0.109	4.908	0.000	0.536	0.464
.sc_sj2_11_RC	0.251	0.067	3.723	0.000	0.251	0.216
.sc_sj2_12_RC	0.481	0.067	7.212	0.000	0.481	0.421
.sc_sk2_2	0.481	0.059	8.101	0.000	0.481	0.621
.sc_sk2_6	0.556	0.070	7.963	0.000	0.556	0.604
autonomy1	0.586	0.110	5.317	0.000	1.000	1.000
competence1	0.221	0.055	3.982	0.000	1.000	1.000
relatedness1	0.586	0.090	6.492	0.000	1.000	1.000
.autonomy2	0.326	0.074	4.412	0.000	0.602	0.602
.competence2	0.130	0.033	3.933	0.000	0.739	0.739
.relatedness2	0.438	0.071	6.129	0.000	0.514	0.514
oi	0.115	0.048	2.398	0.016	0.245	0.245
mi	0.221	0.083	2.651	0.008	0.608	0.608
ch	0.176	0.063	2.807	0.005	0.426	0.426
sj	0.256	0.073	3.495	0.000	0.281	0.281
.scp	0.261	0.064	4.088	0.000	0.891	0.891
.scn	0.549	0.103	5.351	0.000	0.832	0.832

Oi: over-identification, mi: mindfulness, is: isolation, ch: common humanity, sj: self-judgment, sk: self-kindness, sc: self-compassion. '=~' means 'is defined by'. '~' means 'is regressed on'. '~~' means 'is correlated with'.

```
Latent Variables:
                    Estimate   Std.Err   z-value   P(>|z|)    Std.lv    Std.all
  autonomy1 =~
    auto1_1           1.000                                    0.762     0.718
    auto1_2           0.764     0.082     9.281     0.000      0.582     0.787
    auto1_3           0.718     0.088     8.159     0.000      0.547     0.658
    auto1_4           0.859     0.109     7.867     0.000      0.655     0.639
  competence1 =~
    compet1_1         1.000                                    0.470     0.572
    compet1_2         1.338     0.193     6.928     0.000      0.628     0.704
    compet1_3         0.926     0.143     6.471     0.000      0.435     0.639
    compet1_4         0.979     0.137     7.126     0.000      0.460     0.740
  relatedness1 =~
    relat1_1          1.000                                    0.765     0.811
    relat1_2          0.886     0.071    12.392     0.000      0.678     0.848
    relat1_3          0.889     0.079    11.284     0.000      0.680     0.774
    relat1_4          0.550     0.069     8.001     0.000      0.421     0.576
  autonomy2 =~
    auto2_1           1.000                                    0.738     0.695
    auto2_2           0.714     0.094     7.568     0.000      0.527     0.663
    auto2_3           0.787     0.099     7.964     0.000      0.581     0.696
    auto2_4           0.805     0.121     6.672     0.000      0.594     0.566
  competence2 =~
    compet2_1         1.000                                    0.423     0.587
    compet2_2         1.903     0.257     7.399     0.000      0.804     0.787
    compet2_3         1.002     0.126     7.936     0.000      0.423     0.653
    compet2_4         1.241     0.171     7.241     0.000      0.524     0.729
  relatedness2 =~
    relat2_1          1.000                                    0.922     0.830
    relat2_2          0.932     0.066    14.050     0.000      0.860     0.881
    relat2_3          0.865     0.069    12.519     0.000      0.797     0.802
    relat2_4          0.719     0.061    11.767     0.000      0.662     0.763
  oi =~
    sc_oi2_1_RC       1.000                                    0.663     0.650
    sc_oi2_9_RC       1.340     0.159     8.418     0.000      0.889     0.802
  mi =~
    sc_mi2_3          1.000                                    0.561     0.770
    sc_mi2_7          0.782     0.178     4.393     0.000      0.438     0.525
  is =~
    sc_is2_4_RC       1.000                                    0.777     0.699
    sc_is2_8_RC       1.002     0.108     9.256     0.000      0.778     0.718
  ch =~
    sc_ch2_5          1.000                                    0.596     0.580
    sc_ch2_10         1.424     0.237     6.019     0.000      0.849     0.790
  sj =~
    sc_sj2_11_RC      1.000                                    0.957     0.888
    sc_sj2_12_RC      0.849     0.079    10.796     0.000      0.812     0.759
  sk =~
    sc_sk2_2          1.000                                    0.470     0.535
    sc_sk2_6          1.247     0.193     6.470     0.000      0.586     0.605

Regressions:
                    Estimate   Std.Err   z-value   P(>|z|)    Std.lv    Std.all
  oi ~
    autonomy2         0.157     0.113     1.397     0.163      0.175     0.175
    competence2      -0.359     0.197    -1.824     0.068     -0.229    -0.229
    relatedness2     -0.238     0.068    -3.523     0.000     -0.331    -0.331
  mi ~
    autonomy2         0.167     0.102     1.637     0.102      0.220     0.220
    competence2       0.034     0.173     0.196     0.845      0.026     0.026
    relatedness2      0.038     0.058     0.652     0.515      0.062     0.062
  is ~
```

	Estimate	Std.Err	z-value	P(>|z|)	Std.lv	Std.all
autonomy2	-0.016	0.133	-0.118	0.906	-0.015	-0.015
competence2	-0.516	0.236	-2.185	0.029	-0.281	-0.281
relatedness2	-0.238	0.078	-3.043	0.002	-0.282	-0.282
ch ~						
autonomy2	0.152	0.107	1.421	0.155	0.188	0.188
competence2	-0.019	0.179	-0.109	0.914	-0.014	-0.014
relatedness2	0.110	0.062	1.785	0.074	0.170	0.170
sj ~						
autonomy2	0.001	0.149	0.007	0.994	0.001	0.001
competence2	-0.468	0.261	-1.792	0.073	-0.207	-0.207
relatedness2	-0.223	0.086	-2.584	0.010	-0.215	-0.215
sk ~						
autonomy2	0.130	0.096	1.353	0.176	0.204	0.204
competence2	0.135	0.164	0.825	0.409	0.121	0.121
relatedness2	0.105	0.055	1.892	0.058	0.206	0.206
autonomy2 ~						
autonomy1	0.606	0.094	6.436	0.000	0.626	0.626
competence2 ~						
competence1	0.462	0.095	4.845	0.000	0.513	0.513
relatedness2 ~						
relatedness1	0.841	0.093	9.009	0.000	0.698	0.698

Covariances:

	Estimate	Std.Err	z-value	P(>|z|)	Std.lv	Std.all
.auto1_1 ~~						
.auto2_1	0.067	0.051	1.307	0.191	0.067	0.118
.auto1_2 ~~						
.auto2_2	0.007	0.026	0.254	0.799	0.007	0.024
.auto1_3 ~~						
.auto2_3	0.100	0.034	2.967	0.003	0.100	0.265
.auto1_4 ~~						
.auto2_4	0.034	0.055	0.615	0.538	0.034	0.050
.compet1_1 ~~						
.compet2_1	0.100	0.030	3.267	0.001	0.100	0.254
.compet1_2 ~~						
.compet2_2	0.091	0.040	2.248	0.025	0.091	0.228
.compet1_3 ~~						
.compet2_3	-0.017	0.020	-0.823	0.411	-0.017	-0.065
.compet1_4 ~~						
.compet2_4	0.063	0.020	3.122	0.002	0.063	0.309
.relat1_1 ~~						
.relat2_1	0.072	0.034	2.109	0.035	0.072	0.209
.relat1_2 ~~						
.relat2_2	0.040	0.023	1.750	0.080	0.040	0.206
.relat1_3 ~~						
.relat2_3	0.024	0.024	0.984	0.325	0.024	0.073
.relat1_4 ~~						
.relat2_4	0.087	0.023	3.736	0.000	0.087	0.258
.sc_oi2_1_RC ~~						
.sc_sk2_6	0.161	0.051	3.148	0.002	0.161	0.268
.sc_mi2_3 ~~						
.sc_sk2_2	0.077	0.041	1.855	0.064	0.077	0.222
.autonomy2 ~~						
.competence2	0.123	0.029	4.303	0.000	0.590	0.590
.relat1_3 ~~						
.relat1_4	0.100	0.029	3.380	0.001	0.100	0.300
.relat2_3 ~~						
.relat2_4	0.135	0.034	3.973	0.000	0.135	0.403
.compet2_1 ~~						
.compet2_3	0.073	0.026	2.842	0.004	0.073	0.255
autonomy1 ~~						
competence1	0.199	0.044	4.568	0.000	0.556	0.556
relatedness1	0.269	0.058	4.618	0.000	0.461	0.461
competence1 ~~						
relatedness1	0.168	0.039	4.299	0.000	0.468	0.468
.oi ~~						
.mi	-0.147	0.041	-3.601	0.000	-0.442	-0.442

```
        .is             0.392    0.069     5.673    0.000     0.917     0.917
        .ch            -0.100    0.042    -2.410    0.016    -0.285    -0.285
        .sj             0.400    0.071     5.620    0.000     0.721     0.721
        .sk            -0.213    0.047    -4.554    0.000    -0.804    -0.804
    .mi ~~
        .is            -0.146    0.047    -3.136    0.002    -0.386    -0.386
        .ch             0.134    0.040     3.319    0.001     0.430     0.430
        .sj            -0.169    0.052    -3.263    0.001    -0.344    -0.344
        .sk             0.170    0.043     3.926    0.000     0.726     0.726
    .is ~~
        .ch            -0.270    0.062    -4.343    0.000    -0.674    -0.674
        .sj             0.519    0.082     6.326    0.000     0.820     0.820
        .sk            -0.294    0.056    -5.211    0.000    -0.974    -0.974
    .ch ~~
        .sj            -0.268    0.065    -4.144    0.000    -0.516    -0.516
        .sk             0.201    0.048     4.215    0.000     0.809     0.809
    .sj ~~
        .sk            -0.328    0.061    -5.393    0.000    -0.839    -0.839

Variances:
                       Estimate  Std.Err   z-value  P(>|z|)   Std.lv    Std.all
        .auto1_1        0.547    0.072     7.616    0.000     0.547     0.485
        .auto1_2        0.208    0.032     6.414    0.000     0.208     0.380
        .auto1_3        0.392    0.047     8.283    0.000     0.392     0.567
        .auto1_4        0.622    0.074     8.423    0.000     0.622     0.592
        .compet1_1      0.452    0.052     8.646    0.000     0.452     0.672
        .compet1_2      0.401    0.055     7.360    0.000     0.401     0.504
        .compet1_3      0.274    0.034     8.072    0.000     0.274     0.592
        .compet1_4      0.174    0.026     6.810    0.000     0.174     0.452
        .relat1_1       0.306    0.044     6.909    0.000     0.306     0.343
        .relat1_2       0.180    0.030     5.959    0.000     0.180     0.281
        .relat1_3       0.310    0.041     7.560    0.000     0.310     0.401
        .relat1_4       0.357    0.039     9.074    0.000     0.357     0.668
        .auto2_1        0.584    0.078     7.488    0.000     0.584     0.517
        .auto2_2        0.355    0.045     7.819    0.000     0.355     0.561
        .auto2_3        0.360    0.048     7.504    0.000     0.360     0.516
        .auto2_4        0.749    0.086     8.667    0.000     0.749     0.679
        .compet2_1      0.339    0.040     8.532    0.000     0.339     0.655
        .compet2_2      0.396    0.067     5.955    0.000     0.396     0.380
        .compet2_3      0.241    0.030     7.927    0.000     0.241     0.573
        .compet2_4      0.242    0.034     7.129    0.000     0.242     0.468
        .relat2_1       0.385    0.055     7.058    0.000     0.385     0.312
        .relat2_2       0.214    0.039     5.524    0.000     0.214     0.224
        .relat2_3       0.353    0.047     7.464    0.000     0.353     0.357
        .relat2_4       0.316    0.039     8.068    0.000     0.316     0.418
        .sc_oi2_1_RC    0.603    0.073     8.250    0.000     0.603     0.578
        .sc_oi2_9_RC    0.439    0.083     5.274    0.000     0.439     0.357
        .sc_mi2_3       0.215    0.069     3.139    0.002     0.215     0.406
        .sc_mi2_7       0.505    0.066     7.694    0.000     0.505     0.724
        .sc_is2_4_RC    0.633    0.081     7.853    0.000     0.633     0.512
        .sc_is2_8_RC    0.569    0.076     7.519    0.000     0.569     0.484
        .sc_ch2_5       0.700    0.087     8.016    0.000     0.700     0.664
        .sc_ch2_10      0.433    0.112     3.867    0.000     0.433     0.375
        .sc_sj2_11_RC   0.246    0.066     3.740    0.000     0.246     0.212
        .sc_sj2_12_RC   0.484    0.066     7.349    0.000     0.484     0.423
        .sc_sk2_2       0.551    0.065     8.494    0.000     0.551     0.714
        .sc_sk2_6       0.595    0.081     7.393    0.000     0.595     0.634
         autonomy1      0.581    0.110     5.291    0.000     1.000     1.000
         competence1    0.220    0.055     3.978    0.000     1.000     1.000
         relatedness1   0.585    0.090     6.486    0.000     1.000     1.000
        .autonomy2      0.331    0.074     4.465    0.000     0.608     0.608
        .competence2    0.131    0.033     3.962    0.000     0.737     0.737
        .relatedness2   0.436    0.071     6.119    0.000     0.513     0.513
        .oi             0.375    0.084     4.474    0.000     0.852     0.852
        .mi             0.294    0.079     3.740    0.000     0.935     0.935
        .is             0.488    0.103     4.728    0.000     0.808     0.808
        .ch             0.329    0.089     3.715    0.000     0.926     0.926
```

| .sj | 0.821 | 0.121 | 6.768 | 0.000 | 0.896 | 0.896 |
| .sk | 0.187 | 0.058 | 3.213 | 0.001 | 0.847 | 0.847 |