Cross-Cultural Evaluation of Antonovsky's Orientation to Life Questionnaire: Comparison Between Australian, Finnish, and Turkish Young Adults

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Abstract

Antonovsky's concept "sense of coherence" (SOC) and the related measurement instrument "The Orientation to Life Questionnaire" (OLQ) has been widely applied in studies on health and well-being. The purpose of the present study is to investigate the cultural differences in factor structures and psychometric properties as well as mean scores of the 13-item form of Antonovsky's OLQ among Australian (n = 201), Finnish (n = 203), and Turkish (n = 152) students. Three models of factor structure were studied by using confirmatory factor analysis: single-factor model, first-order correlated-three-factor model, and the second-order three-factor model. Results obtained in all three countries suggest that the first- and second-order three-factor models fitted the data better that the single-factor model. Hence, the OLQ scoring based on comprehensibility, manageability, and meaningfulness scales was supported. Scale reliabilities and inter-correlations were in line with those reported in earlier studies. Two-way analyses of variance (gender × nationality) with age as a covariate showed no cultural differences in SOC scale scores. Women got higher scores on the meaningfulness scale than men, and age was positively related to all SOC scale scores indicating that SOC increases in early adulthood. The results support the three-factor model of OLQ which thus should be used in Australia, Finland, and Turkey instead of a single-factor model. Need for cross-cultural studies taking into account cultural correlates of SOC and its relation to health and well-being indicators as well as studies on gender differences in the OLQ are emphasized.

Keywords
Sense of coherence, Orientation to Life Questionnaire, cross-cultural, gender, confirmatory factor analysis

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Introduction

Since the publication of "Unraveling the mystery of health: How people manage stress and stay well" (A. Antonovsky, 1987), the concept of sense of coherence (SOC) has been widely applied in studies on health and well-being. Several studies have shown that SOC is an important salutogenic factor related to many aspects of health, well-being, and health-related behaviors as well as to psychological adjustment, for example, state and trait anxiety and depression.

SOC is defined as "a global orientation that expresses the extent to which one has a pervasive, enduring though dynamic feeling of confidence that (1) the stimuli deriving from one's internal and external environments in the course of living are structured, predictable, and explicable; (2) the resources are available to one to meet the demands posed by these stimuli; and (3) these demands are challenges, worthy of investment and engagement" (A. Antonovsky, 1987, p. 19). The first aspect in this definition concerns the cognitive aspects of SOC and can be named "comprehensibility" (CO). The second aspect in SOC refers to the instrumental contents and, therefore, can be labeled "manageability" (MA). According to A. Antonovsky (1987), these two aspects are strongly inter-related. CO is a requirement for a sense of MA, that is, the sense that resources are available to meet one's demands. An unpredictable and chaotic environment makes it difficult to think that one can manage well. The third aspect of SOC was named "meaningfulness (ME)." A. Antonovsky (1987) suggests that the sense of ME is the most crucial element in SOC since it is the motivational force which drives one to search for understanding and resources. Without a strong motivational basis—a strong sense of ME—feelings of CO and MA are likely to be temporary (A. Antonovsky, 1987).

Antonovsky's model about "salutogenesis" has gained wide interest in literature: a PsycINFO search with search terms "sense of coherence" and "Antonovsky" returned 2443 records (5 February 2018). While constructs resembling Antonovsky's three salutogenic factors have been used widely in literature of well-being (e.g., "Environmental mastery" and "Purpose in life" by Ryff, 1989), it seems that Antonovsky has been able to combine into his model three essential factors for well-being. One reason for the high popularity of SOC concept as defined by Antonovsky is very likely its practicality: SOC can be measured easily with few questions and, thus, the SOC measure can be embedded to various research projects without lengthening often already long

survey instruments. In 1987, Antonovsky published an instrument called ''The Orientation to Life Questionnaire'' (OLQ) to measure the three components of SOC (A. Antonovsky, 1987, 1993; H. Antonovsky & Sagy, 1986). The OLQ exists in a 29-item and a 13-item form. Since 1987, the OLQ has been translated to more than 49 languages and used in at least 48 countries (Eriksson & Mittelmark, 2017). The scales have generally been found to be reliable in terms of internal consistency and test–retest reliability (Eriksson & Mittelmark, 2017). In addition to reliability studies, also the construct validity of OLQ has been studied in several studies. Some studies have supported the original three-factor structures (separate but related MA, ME and CO) (Eriksson & Lindström, 2005; Feldt, Leskinen, Kinnunen, & Mauno, 2000; Feldt & Rasku, 1998; Moksnes & Haugan, 2014; Rajesh et al., 2016), some other studies have supported the one-factor structure (Aune, Dahlberg, & Haugan, 2016; Barnard & Muller, 2012; Feldt et al., 2007; Gruszczynska, 2004; Hittner, 2007; Lin et al., 2009), and some studies have supported both one- and three-factor structures (Klepp, Mastekaasa, Sørensen, Sandanger, & Kleiner, 2007). There are also studies which have resulted in a totally new factors structure, for example, two-factor structure (Sakano & Yajima, 2005) or a new three-factor structure (Sandell, Blomberg, & Lazar, 1998). These somewhat mixed results are probably due to the differences in OLQ version used (29 or 13 items), sample characteristics (culture, language, and patient group), or method (different types of confirmatory or exploratory factor analysis (CFA and EFA, respectively)).

One clear shortcoming in SOC literature is that there are virtually no comparative cross-cultural studies about SOC and each study represents a particular population. In this way, the comparability of results is very limited. It is possible that the SOC concept works well in cultures having a Judeo-Christian background where individualistic values are prevailing, but perform differently, say, in Islamic cultures where concepts of control, management, and fate may be understood in a different way. The aim of the present study is to investigate the cultural differences in factor structures and psychometric properties as well as mean scores of the 13-item form of the OLQ between Australian, Finnish, and Turkish students. The 13-item OLQ was chosen instead of 29-item version, because it is widely used in literature and has clear advantages in terms of practicality and time efficiency. OLQ is often used in clinical research among various patient groups, so the length of the research instrument is a crucial issue. Australia, Finland, and Turkey were chosen into the study since these three countries are culturally—including language (all languages belong to different language groups), religion (Islam and Christianity), and degree of individualism (Australia scoring high and Turkey low while Finland being in the middle)—and geographically (Asia, Europe, and Oceania) rather distant from each other, so they provide a good basis for comparative research. Possible similarities and

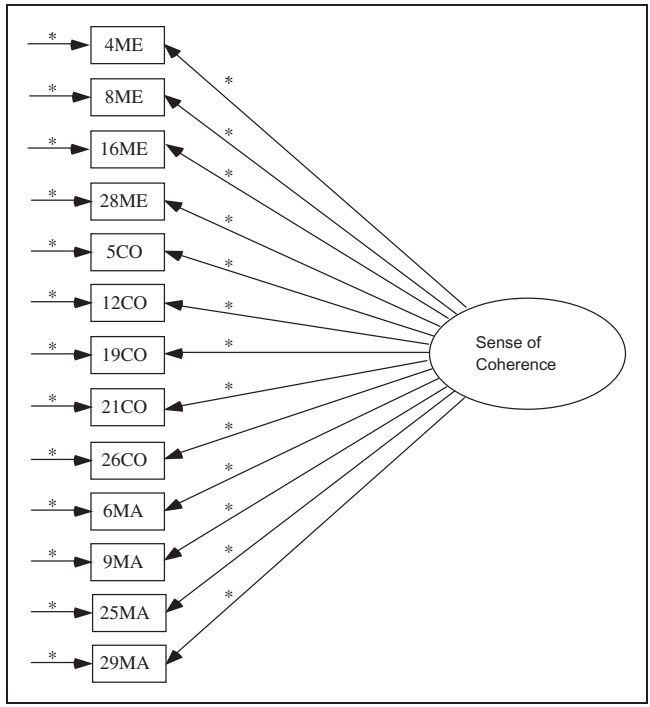

Figure 1. Hypothesized one-factor model of the OLQ factorial structure.

differences found in this study can be assumed to reflect true cultural similarities and differences.

The following three factor models are tested: a first-order one-factor model (Figure 1), a first-order correlated-three-factor model (Figure 2), and a second-order three-factor model (Figure 3). In addition to nationality, the effects of gender and age on the OLQ scores were of interest. The aim of the present study is to investigate the cultural differences in factor structures and psychometric properties as well as mean scores of the 13-item form of the OLQ between Australian, Finnish, and Turkish students. These three countries are both geographically and culturally—including language, religion, and degree of individualism—rather distant from each other, so they provide a good basis for comparative research. The following three factor models are tested: a first-order one-factor model (Figure 1), a first-order correlated-three-factor model (Figure 2), and a second-order three-factor model (Figure 3). The item numbers in Figures refer to 29-item OLQ (Appendix 1). In addition to culture, the effects of gender and age on the OLQ scores are investigated.

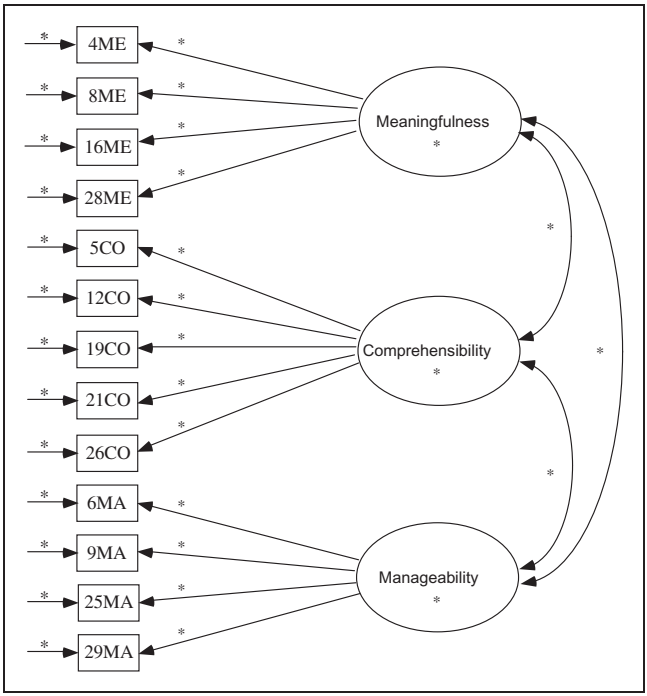

Figure 2. Hypothesized first-order correlated-three-factor model of the OLQ factorial structure.

Method

Participants

The Australian sample consisted of 201 student volunteers studying social sciences. The mean age of the sample was 30.5 years (SD = 12.0), 65.2% of the sample being female. Finnish subjects were 203 student volunteers studying social sciences. The mean age of the sample was 24.3 years (SD = 6.1), and 68.5% was female. The Turkish sample consisted of 152 student volunteers studying social sciences. The mean age of the sample was 20.0 years (SD = 2.5), 80.3% of the sample being female.

Procedure and measures

The 13-item OLQ forms were distributed to students in classrooms in each country. The participants were student volunteers who did not receive any benefit (credit or money) for participation. Basically all students attending the class

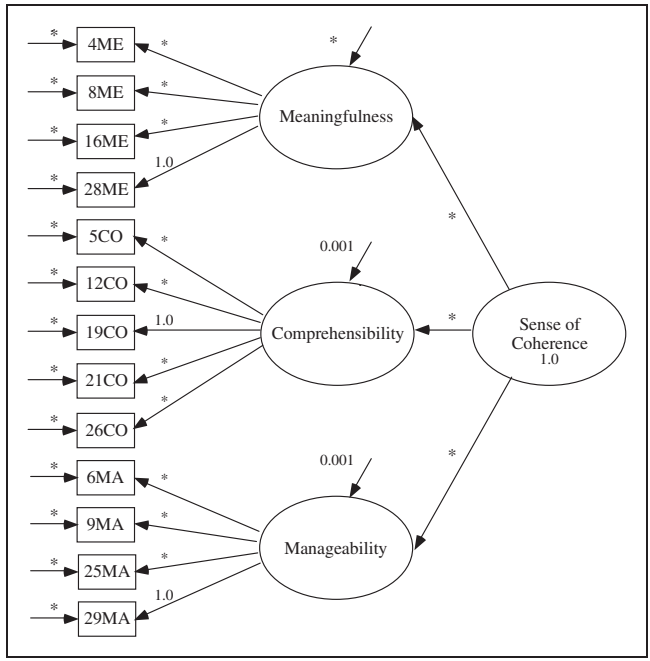

Figure 3. Hypothesized second-order three-factor model of the OLQ factorial structure.

participated in the study since the data collection took place in the end of a lecture.

The instructions for Finnish and Turkish participants were translations of the English instruction of the OLQ published by A. Antonovsky (1987). The OLQ was translated to Finnish by Kalimo, Vuori, and Kalimo (1990) and has been used in Finland in several studies. Similarly, OLQ has been used in other studies also in Turkey (Erim et al., 2012; Öztekin & Tezer, 2009). The scoring of the scale was based on A. Antonovsky's (1987) scoring system. A seven-point response scale was used. Item numbers presented in the present paper refer to those in the 29-item scale. The data were analyzed with SPSS and LISREL statistical packages.In addition to OLQ, the respondents' sex and age were recorded.

Results

CFAs of the proposed models in Australian, Finnish, and Turkish samples

Three proposed models (see Figures 1, 2, and 3) were tested in Australian, Finnish, and Turkish samples by using structural equation modeling (SEM)

Table 1. CFA fit indices for the one-factor model, first-order correlated-three-factor model, and second-order three-factor model for the Australian, Finnish, and Turkish data.

Model	χ^2	df	RMSEA	CFI
One-factor model				
Australians	203.76	65	0.100	0.79
Finns	161.07	65	0.086	0.95
Turks	145.80	65	0.091	0.92
First-order correlated-three-factor model				
Australians	167.29	62	0.092	0.98
Finns	134.68	62	0.076	0.96
Turks	120.91	62	0.079	0.94
Second-order three-factor model				
Australians	182.69	64	0.096	0.98
Finns	139.44	64	0.076	0.96
Turks	124.73	64	0.079	0.94

techniques. Exactly the same procedures were used in analyses of data sets from each of three countries. Since the aim of the present study was to test and compare the three hypothesized models, the approach in analysis was strictly confirmatory: any changes based on modification indices were not allowed. The generalized least squares (GLS) estimation method was used in SEM instead of the more common maximum likelihood (ML) method, because the GLS method has been found to be slightly better with small sample sizes than ML (Hu, Bentler, & Kano, 1992).

The fit of the models was assessed by using chi-square statistics, the root mean square error of approximation (RMSEA), and the comparative fit index (CFI). According to MacCallum, Browne, and Sugawara (1996), RMSEA values ranging from 0.08 to 0.10 indicate mediocre fit, and those greater than 0.10 indicate poor fit. The values for CFI range from 0 to 1, values greater than 0.90 indicating acceptable fit to data (Bentler, 1990).

One-factor model. The first model to be tested was the one-factor model of the OLQ (Figure 1). According to this model, the OLQ has only a one common factor instead of three components. In addition, errors associated with each measure were hypothesized to be uncorrelated. The results of the CFAs of Australian, Finnish, and Turkish data are shown in Table 1. The model showed mediocre, but acceptable fit to the Finnish and Turkish data (RMSEA values < 0.10 and CFI > 0.90), but non-acceptable fit to the Australian data (RMSEA $= 0.10$, CFI $= 0.79$).

First-order correlated-three-factor model. The second model evaluated was the first-order correlated-three-factor model (Figure 2). This CFA model was based on

the assumption that (1) the OLQ responses can be explained by three factors (ME, MA, and CO), (2) each sub-scale item has a non-zero target loading and a zero non-target loading, and finally, (3) errors related to each item are uncorrelated. The first factor (ME) included items 4, 8, 16, and 28, the second (CO) included items 5, 12, 19, 21, 26, and the third factor (MA) consisted of items 6, 9, 25, and 29. According to A. Antonovsky (1987), the aim of construction of the OLQ was to develop a scale to which each of three components (CO, MA, and ME) would contribute. Thus, high correlations between factors are generally expected. Therefore, in the present CFA model, the three factors were allowed to correlate (see Figure 2). The fit indices obtained in three countries for the first-order three-factor model are presented in Table 1. Both RMSEA and CFI values indicated acceptable fit to the data in Australia, Finland, and Turkey.

Second-order three-factor model. Figure 3 displays the third model tested in this study. The model hypothesized that (1) responses to the OLQ could be explained by three first-order factors (ME, CO, and MA), and one second-order factor (SOC), (2) each item would have a non-zero loading on the first-order factor it was designed to measure and zero loading on the other two first-order factors, (3) errors terms associated with each item would be uncorrelated, and (4) co-variation among the three first-order factors would be explained fully by their regression on the second-order factor. Following constraints were applied because of reasons related to statistical identification (Byrne, 1998): (1) three parameters (one in each set of paths from the first-order factors) were fixed to 1.00 and therefore were not estimated and (2) the variance of the higher order factor (SOC) was set to 1.0. In addition, error terms associated with CO and MA were constrained to 0.001, because of a negative variance estimate, commonly known as ''Heywood case.'' According to Byrne (1998), these cases are both meaningless and inappropriate within the context of SEM statistical theory and typically represent boundary parameters, that is, parameters having values close to the boundary of admissible values. The problem of these lower boundary parameters can be solved, for example, by constraining their values to 0 (as the EQS program does by default) or a value close to 0 (Byrne, 1998). Fit indices for the second-order three-factor model for the Australian, Finnish, and Turkish data are listed in Table 1, which shows the fit of the model to be acceptable in all three countries.

Conclusions from the CFAs. Results of the CFA presented in the Table 1 show that both three-factor models fitted Australian, Finnish, and Turkish data in an acceptable degree. All three fit indices (chi-square, RMSEA, and CFI) indicated that the three-factor model fit data somewhat better than the model based on a single factor. This result is in line with both A. Antonovsky's (1987) original theoretical model and several empirical studies (Eriksson & Lindström, 2005; Feldt, Leskinen, et al., 2000; Feldt & Rasku, 1998; Moksnes & Haugan, 2014;

Rajesh et al., 2016). The first-order and the second-order three-factor models seemed to fit the data equally well. The chi-square statistics, however, indicated the first-order model to be slightly better than the second-order three-factor model. It should be noted, however, that there were no differences between models in RMSEA and CFI values, and that the differences in chi-square values were very small. Practically speaking, both three-factor models indicated equal fit to the data and, therefore, the choice between these models should be based on theoretical considerations.

Reliabilities and inter-correlations of the 13-item OLQ scales in Australian, Finnish and Turkish samples

Results from the CFAs presented above indicated that the three-factor structure of the short-form OLQ is robust among Australian, Finnish, and Turkish students. Therefore, the ME, CO, and MA sum-scales were calculated based on the scoring shown in Figure 3.

Table 2 shows Cronbach's alpha reliability coefficients for the Australian, Finnish, and Turkish samples. In general, the scales showed rather low reliability being lowest among Turks and highest among Australians. The low sub-scale

Table 2. Reliability coefficients and inter-correlations for the OLQ scales (CO, MA, ME, and SOC) in the Australian, Finnish, and Turkish sample.

Scale	Alpha	CO	MA	ME
Australians				
CO	0.78	1.00		
MA	0.74	0.77	1.00	
ME	0.76	0.50	0.55	1.00
SOC	0.88	0.89	0.88	0.78
Finns				
CO	0.66	1.00		
MA	0.56	0.60	1.00	
ME	0.69	0.43	0.51	1.00
SOC	0.81	0.85	0.84	0.77
Turks				
CO	0.57	1.00		
MA	0.54	0.66	1.00	
ME	0.62	0.43	0.39	1.00
SOC	0.78	0.88	0.83	0.72

Note: All correlation coefficients are statistically significant ($p < 0.001$). CO: comprehensibility; MA: manageability; ME: meaningfulness; SOC: sense of coherence.

reliability coefficients, however, may have been caused partly by a small number of items. The sum-scale (13 items) reliability coefficients found in the present study among Australians (0.88), Finns (0.81), and Turks (0.78) were in line with those reported in previous studies; in general, the internal consistency measured by Cronbach's alpha has ranged from 0.70 to 0.92 (in 127 studies) using SOC-13 (Eriksson & Lindström, 2005). The present study confirms the conclusion by Erikson and Mittelmark that "the sense of coherence scale shows high internal consistency" (Eriksson & Mittelmark, 2017).

The correlations between the OLQ sub-scales ranged from 0.39 to 0.77, the strongest correlation being between CO and MA (range: 0.60–0.77) in every sample (Table 2). This finding is in accordance with A. Antonovsky's (1987) theoretical notion that high MA is strongly contingent on high CO. ME correlated with MA and CO, but to a lesser degree (range: 0.39–0.55).

Effects of age, gender, and culture on the SOC scores

Means and standard deviations for the OLQ scales for the Australian, Finnish, and Turkish sample are presented in Table 3. Effects of age, gender, and nationality on the OLQ scale scores were studied by using two-way analysis of variance (ANOVA) (gender × nationality) with age as a covariate. Age was entered to the model as a covariate first, because SOC is considered to be age dependent to some extent (A. Antonovsky, 1987), and because there were age differences between

Table 3. Means and standard deviations of the OLQ scales (CO, MA, ME, and SOC) for Australians, Finns, and Turks.

	Australians		Finns		Turks	
	Men	Women	Men	Women	Men	Women
Comprehensibility (5 items)						
Mean	4.33	4.41	4.43	4.05	4.05	4.32
SD	1.17	1.14	0.86	0.81	1.13	1.02
Manageability (4 items)						
Mean	4.55	4.56	4.57	4.43	4.70	4.68
SD	1.02	1.14	0.92	0.83	1.03	1.00
Meaninglfulness (4 items)						
Mean	4.88	5.21	4.55	4.93	4.51	5.04
SD	1.06	1.05	0.98	0.78	1.02	0.96
Sense of coherence (13 items)						
Mean	4.57	4.70	4.51	4.44	4.39	4.65
SD	0.95	0.94	0.76	0.67	0.85	0.82

Australian, Finnish, and Turkish samples ($F_{2,551} = 74.49$, $p = 0.000$, $\eta^2 = 0.21$). Two-way ANOVAs with age as covariate showed that age had positive effect on all SOC scale scores including the SOC sum score ($F_{1,545} = 18.54$, $p = 0.000$, $\eta^2 = 0.03$), ME ($F_{1,545} = 11.04$, $p = 0.001$, $\eta^2 = 0.02$), MA ($F_{1,545} = 9.89$, $p = 0.002$, $\eta^2 = 0.02$) and CO ($F_{1,545} = 17.25$, $p = 0.000$, $\eta^2 = 0.03$). ANOVA results showed also that gender had a statistically significant effect only on ME scores ($F_{1,545} = 18.62$, $p = 0.000$, $\eta^2 = 0.04$) women scoring higher than men. No main effect of gender on SOC sum score ($F_{1,545} = 2.13$, $p = 0.145$, $\eta^2 = 0.00$), MA ($F_{1,545} = 0.26$, $p = 0.608$, $\eta^2 = 0.00$) or CO ($F_{1,545} = 0.00$, $p = 0.973$, $\eta^2 = 0.00$).

Culture had no statistically significant effect in $< 5\%$ significance level on any of the SOC scales. The only "marginal" effect (in 6% significance level) was found on MA ($F_{2,545} = 2.80$, $p = 0.062$, $\eta^2 = 0.01$). No effects of culture were found on the SOC sum score ($F_{2,545} = 0.71$, $p = 0.491$, $\eta^2 = 0.00$), ME scores ($F_{2,545} = 1.80$, $p = 0.167$, $\eta^2 = 0.01$), or CO ($F_{2,545} = 0.44$, $p = 0.973$, $\eta^2 = 0.00$).

Discussion

The aim of the present study was firstly to examine the structure of the Antonovsky's OLQ (A. Antonovsky, 1987) in Australian, Finnish, and Turkish student samples by CFA, and secondly to investigate possible cross-cultural differences in SOC. The first model tested was a single-factor model (Figure 1) which was based on results from previous studies applying EFAs. The second (first-order correlated-three-factor model in Figure 2) and the third model (second-order three-factor model in Figure 3) were based on A. Antonovsky's (1987, 1993) theory and scoring suggestion for the OLQ. These three models were tested by using CFA in the strictest sense of the word, that is, no modifications like releasing error covariances were allowed to the original model.

Results of the factorial studies of the OLQ have been rather mixed (Eriksson & Lindström, 2006; Eriksson & Mittelmark, 2017). While some studies have supported only the one common factor structure (Aune et al., 2016; Barnard & Muller, 2012; Feldt et al., 2007; Gruszczynska, 2004; Hittner, 2007; Lin et al., 2009) and some studies rejected the existing one and three-factor structures (Sakano & Yajima, 2005; Sandell et al., 1998), most of the studies seem to support the original three-factor structure (Eriksson & Lindström, 2006; Feldt, Kinnunen, & Mauno, 2000; Feldt & Rasku, 1998; Moksnes & Haugan, 2014; Rajesh et al., 2016). The results of the current study were in line with both one-factor and three-factor models, because the fit of both one-factor and three-factor models were all good. It should be noted, however, that three-factor models (both first- and second-order three-factor models) fitted better to data than the one-factor model. In fact, the one and three-factor models do not need to exclude each other: the present study shows that the second-order three-factor model fitted the data well. This means that scores based on one common SOC

factor or three factors (ME, MA, CO) can be used depending on the needs of the user. The support to the original theoretical structure by A. Antonovsky (1993) can be considered especially strong since the same structure was obtained in three culturally different countries, that is, Australia, Finland, and Turkey.

In the present study, the scale score correlations between CO and MA were very strong in all three samples. This finding is in accordance with both early empirical findings (A. Antonovsky, 1987, 1993; Bishop, 1996; Feldt & Rasku, 1998; Flannery & Flannery, 1990; Pasikowski, Sek, & Scigala, 1994) and A. Antonovsky's theory (1987). According to A. Antonovsky (1987), high CO is a precondition for MA and, therefore, the correlation coefficient between these two scales can be expected to be high but not perfect suggesting that CO and MA are closely inter-related separate constructs. In addition, ME—the motivational component of the SOC—had only moderate correlations to CO and MA in Australia, Finland, and Turkey. It can be concluded that the correlations between three components of SOC supported Antonovsky's theoretical assumptions.

ANOVA (gender × country with gender as covariate) results showed that there was no significant main effect of culture on any of the SOC scores (except on MA at 6% significance level). Together with the good fit of the Antonovsky's three-factor model in the Australian, Finnish, and Turkish data, the lack of statistically significant cultural differences in SOC indicates that the SOC is a truly individual difference variable, which is not influenced by culture at least when Australians, Finns, and Turks are compared. This finding is especially important when taking into account how different these three countries are. For example, Australia can be labeled as "individualistic" scoring in Hofstede's Individualism as high as 90, while Turkey is clearly more collectivistic (score 37) and Finland (score 63) is located in individualism between Australia and Turkey (Hofstede, Hofstede, & Minkov, 2010). Obviously, the SOC concept is defined equally and the OLQ as measure of SOC works similarly in these three countries. Differences between individuals in SOC might be influences by many factors but obviously culture is not clearly among them. While the present study did not find cultural differences in OLQ scores, it does not mean that OLQ is a "culture-free" instrument without cultural bias in responses. More studies with much more than three countries are needed for conclusions about the effects of culture on SOC.

According to A. Antonovsky (1987), SOC is psycho-social trait which is formed in childhood or adolescence and thereafter remains relatively unchanged. The research findings about age and SOC are, however, somewhat mixed. In some studies, a general decline in SOC has been reported (B. Nilsson, Westman, Holmgren, & Stegmayr, 2003; Silverstein & Heap, 2015), while in some other studies age has had a positive relationship to SOC (K. W. Nilsson, Leppert, Simonsson, & Starrin, 2010; Richardson, Ratner, & Zumbo, 2007; Volanen, Suominen, Lahelma, Koskenvuo, & Silventoinen, 2007). In a

review by Rivera, Garcia-Moya, Moreno, and Ramos (2012), the influence of age on SOC was found in six of the 16 studies reviewed but the direction of this influence was not clear and the effect sizes were low (Rivera et al., 2013). In the present study, the sample consisted of young adults studying at university, which might partly explain the positive correlation between age and SOC. Early adulthood is characterized by increase in autonomy and self-efficacy when the individual moves away from his or her parental home for studying or work and start to manage his/her own life in larger degree that during adolescence. It can be assumed that this drastic increase in autonomy reflects in higher SOC. On the other hand, most of the young adults have not yet faced traumatic life events of decline in health which may decrease the SOC (Lundberg & Toivanen, 2011; Silverstein & Heap, 2015).

If the effect of age on SOC is not clear and depends on the sample, the studies about sex differences in SOC are inconclusive as well (Rivera et al., 2013). While about one-third of studies about SOC in adolescence have not found any differences between sexes, about two-thirds of the studies have reported higher level of SOC among boys (Rivera et al., 2013). In the present study, women scored higher in ME but no gender difference was found in the other components of SOC. It should be noted that the sample of the present study consisted of young adults (over 18 year olds). The sex differences (boys scoring higher than girls) have been found mostly among 15 to 18 year olds (Rivera et al., 2013) while the findings among older samples have been mixed. Future research and especially longer follow-up studies are needed to clarify the relationship between age, gender, and the components of SOC. It is possible that some components of the SOC like MA are stronger among boys/men, while girls/women may score higher in some other components like ME. Similarly, the degree of MA might decrease as function of (old) age when the physical performance declines while other components like comprehensiveness and ME might get stronger.

Some limitations of the study should be taken into account. The samples were collected in three distinct countries. It is questionable, however, how much university students represent their general culture. The ''student culture'' in these three countries can be assessed to be fairly similar and thus limit the cultural variation in OLQ scores. Unlike nationally representative samples, student samples on the other hand form a robust basis for collaboration since the effects of education; age and socio-economic are more or less under control. This is especially important in countries like Turkey where general education level and even literacy rate is clearly lower than, say, in Finland. In future, the applicability of OLQ should also be studied among other groups than educated university students. The effect of such variables as religion and socio-economic factors on OLQ scores might be stronger among less educated respondents. In the present study, neither cultural factors (e.g. individualism-collectivism, religiousness) nor socio-economic factors were recorded. Since SOC measures a person's general view to life, it is very likely that such factors as religion and culture influence the SOC.

While SOC is mostly used as an explaining factor in health-related studies, it would be also important to study which factors are related to formation of SOC.

In conclusion, CFAs of responses to the 13-item OLQ collected in Australia, Finland, and Turkey indicated that the three-factor models, both first- and second-order models, fitted these three data sets better than the single-factor model. Hence, the original scoring system based on three components and a SOC sum scale was supported. In addition, differences between scale correlation coefficients and reliabilities as well as scale sum scores emphasized the need for future cross-cultural studies on SOC. Furthermore, gender differences in SOC components need to be addressed. Antonovsky's claim that SOC is a universal concept that has the same structure among men and women in various cultures can be tested only with profound and methodologically sound cross-cultural studies.

Appendix 1

	Item	Scale
4.	Not caring about what goes on around you.	ME
5.	Having been surprised by people whom one thought one knew well.	CO
6.	Having been disappointed with people whom one counted on.	MA
8.	Life having had very clear goals and purpose.	ME
9.	Having been treated unfairly.	MA
12.	Having been in an unfamiliar situation without knowing what to do.	CO
16.	Finding daily things a source of deep pleasure and satisfaction.	ME
19.	Having very mixed-up feelings and ideas.	CO
21.	Having inside feelings one would rather not feel.	CO
25.	Feeling like sad sacks (losers).	MA
26.	Seeing things in the right proportion.	CO
28.	Feeling that there is little meaning in the things in daily life.	ME
29.	Not being sure you can keep your life under control.	MA

Note: item numbers refer to the 29-item OLQ.

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