



## Longitudinal multigroup invariance analysis of the satisfaction with food-related life scale in university students



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### ABSTRACT

This study examined longitudinal measurement invariance in the Satisfaction with Food-related Life (SWFL) scale using follow-up data from university students. We examined this measure of the SWFL in different groups of students, separated by various characteristics. Through non-probabilistic longitudinal sampling, 114 university students (65.8% female, mean age: 22.5) completed the SWFL questionnaire three times, over intervals of approximately one year. Confirmatory factor analysis was used to examine longitudinal measurement invariance. Two types of analysis were conducted: first, a longitudinal invariance by time, and second, a multigroup longitudinal invariance by sex, age, socio-economic status and place of residence during the study period. Results showed that the 3-item version of the SWFL exhibited strong longitudinal invariance (equal factor loadings and equal indicator intercepts). Longitudinal multigroup invariance analysis also showed that the 3-item version of the SWFL displays strong invariance by socio-economic status and place of residence during the study period over time. Nevertheless, it was only possible to demonstrate equivalence of the longitudinal factor structure among students of both sexes, and among those older and younger than 22 years. Generally, these findings suggest that the SWFL scale has satisfactory psychometric properties for longitudinal measurement invariance in university students with similar characteristics as the students that participated in this research. It is also possible to suggest that satisfaction with food-related life is associated with sex and age.

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## 1. Introduction

Unhealthy diet is one of the main risk factors associated with non-transmissible chronic diseases (World Health Organization, 2015). Healthy food habits have become an imperative and difficult challenge, due to biological, socio-structural, psychological and cultural factors (Stead, McDermott, MacKintosh, & Adamson, 2011);

requiring targeted interventions in various areas to promote healthy eating behaviours. In many modern societies, eating is associated with the search for happiness and well-being (Carrillo, Prado-Gascó, Fiszman, & Varela, 2013). In this respect, there is increasing interest in research that measures food-related well-being (Ares, De Saldamando, Giménez, & Deliza, 2014, 2015, 2016; Carrillo et al., 2013; Guillemin et al., 2016; Andersen & Hyldig, 2015; Haugaard, Stancu, Brockhoff, Thorsdottir, & Lähteenmäki, 2016).

Satisfaction with food-related life is one of the most important psychological constructs linked to eating habits and well-being, and is defined as a person's overall assessment of their food and eating habits (Grunert, Dean, Raats, Nielsen, & Lumbers, 2007).

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Contemporary studies involving university students (Schnettler, Miranda, et al., 2015) and adults (Schnettler, Miranda, et al., 2013) suggest that satisfaction with food-related life has a direct impact on overall life satisfaction.

Although other tools have been developed (Ares et al., 2016; Crogan et al., 2004; Guillemain et al., 2016; King et al., 2015; Rimmington & Yüksel, 1998; Silva & Alfonso, 2011), the Satisfaction with food-related life (SWFL) scale developed and tested by Grunert et al. (2007) is currently the most broadly utilized, including studies in Europe, Asia and South America (e.g. Dean, Grunert, Raats, Nielsen, & Lumbers, 2008; Jeong & Seo, 2014; Kazbare, van Trijp, & Eskildsen, 2010; Kim, Seo, Kwon, & Cho, 2012; Omar, Gibbs, & Hart, 2011; Schnettler, Miranda et al., 2013; Schnettler, Lobos et al., 2015; Seo, Cho, Kim, & Ahn, 2013), because of its attractive features, including its applicability in a wide range of contexts, its brevity (5 items) and suitable psychometric properties (Grunert et al., 2007; Lobos, Grunert, Bustamante, & Schnettler, 2016; Schnettler, Miranda et al., 2013; Schnettler, Denegri et al., 2015; Schnettler, Miranda et al., 2015; Schnettler, Orellana et al., 2015).

It has been well established that higher levels of SWFL are associated with healthy eating habits in South Korea and Chile (Kim et al., 2012; Schnettler, Denegri, et al., 2013; Schnettler, Peña, et al., 2013; Schnettler, Miranda et al., 2015; Seo et al., 2013), happiness in Chile (Lobos, Mora, Lapo, Caligari, & Schnettler, 2015; Lobos et al., 2016; Schnettler, Orellana et al., 2015), fewer physical and mental health problems in a variety of European countries, Chile and South Korea (Dean et al., 2008; Lobos et al., 2015; Lobos et al., 2016; Schnettler, Lobos et al., 2015; Seo et al., 2013), among other positive aspects, in young people, adults and the elderly.

The study of satisfaction with food-related life is especially relevant at the university years. This stage is marked by many changes and challenges for students, who must often move away from the family home and take responsibility for their diet for the first time (Blichfeldt & Gram, 2013). This stage may implicate unhealthy eating habits (Cooke & Papadaki, 2014; Matthews, Doerr, & Dworatzek, 2016) with negative outcomes such as poor nutrition (Li et al., 2012), psychological distress (Fincham, Roomaney, & Kagee, 2015), the development of diet-related chronic diseases (Roy, Kelly, Rangan, & Allman-Farinelli, 2015) and eating disorders (Quick & Byrd-Bredbenner, 2013), among other health problems. Therefore, this is a critical stage where eating habits that will affect future health are developed (Deliens, Clarys, De Bourdeaudhuij, & Deforche, 2014).

Since 2010, SWFL has been measured in samples of university students in Chile, which has shown SWFL to be closely linked to certain subjective well-being variables. In fact, higher levels of SWFL in university students have been linked to healthy eating habits, family support and eating at home more frequently, fewer mental health problems, lower obesity prevalence, fewer dietary restriction problems, higher levels of happiness and more importance assigned to food for well-being (Schnettler, Denegri, et al., 2013; Schnettler et al., 2014; Schnettler, Miranda, et al., 2015; Schnettler, Denegri, et al., 2015; Schnettler, Orellana, et al., 2015; Schnettler et al., 2016). In addition, levels of SWFL have been related to various socio-demographic characteristics. Lower levels of satisfaction with food related life have been found in students belonging to families from low socioeconomic statuses (Schnettler, Miranda, Sepúlveda, & Denegri, 2011; Schnettler, Denegri et al., 2015; Schnettler, Orellana, et al., 2015). Higher levels of food-related life in university students have been positively associated with the possibility of living with parents while attending university (Schnettler, Denegri, et al., 2013; Schnettler, Denegri, et al., 2015; Schnettler, Miranda, et al., 2015). In addition, higher levels of satisfaction with food-related life have been reported in female

students who enjoy family meal times (Schnettler et al., 2016).

Given that cross-sectional and longitudinal studies suggest that life satisfaction is age-sensitive (Bai, Wu, Zheng, & Ren, 2011; Clench-Aas, Nes, Dalgard, & Aarø, 2011; Hultell & Gustavsson, 2008; Pons, Atienza, Balaguer, & Garcia-Merita, 2000; Wu, Chen, & Tsai, 2009), it could also be expected that SWFL will change over the years. Wu et al. (2009) examined longitudinal measurement invariance in the Satisfaction with Life Scale (SWLS). The authors concluded that the SWLS has satisfactory psychometric properties for longitudinal measurement invariance, but they suggested using different items of the SWLS in longitudinal usage for undergraduate and adolescent samples. The SWFL has exhibited good psychometric properties and shows a one-dimensional structure. However, in recent studies (Schnettler, Miranda, et al., 2013; Schnettler, Miranda, et al., 2015) where SWFL was used to predict satisfaction with life, there were two items that did not work well (item 1. "Food and meals are positive elements"; item 2. "I am generally pleased with my food"), and it has been hypothesized that this is due to cultural and age specific issues. The initial evaluation of the structure of SWFL in an adult sample showed a need to omit the first item in order to obtain an acceptable fit (Schnettler, Miranda, et al., 2013), and in a subsequent study with university students, a better fit was obtained by eliminating the second item (Schnettler, Miranda et al., 2015). In the first case it was hypothesized that the content of the item was not accurate for the cultural features of the sample, and in the second case, the item was not suitable for the age of respondents.

Despite the increasing use of the SWFL scale, its longitudinal measurement invariance has not been assessed. Longitudinal measurement invariance analysis examines the equality of factor structure for a measure across time. Given that satisfaction with food-related life is likely to change with changes in the environment or the person (Grunert et al., 2007), it could also be expected that SWFL will change over time. Therefore, testing the longitudinal measurement invariance of the SWFL scale is important in order to evaluate changes in food-related life satisfaction throughout life. This is of specific importance during stages of life marked by changes in eating habits, such as is the case during university years. Longitudinal measurement invariance is desirable because it ensures that the same construct can be assessed across time and provides a solid basis for mean comparison (Wu et al., 2009).

Considering the preceding factors and the impact that SWFL has on life satisfaction, this study aims to evaluate the longitudinal measurement invariance of the SWFL using follow-up data from university students. The follow-up data was used to examine the longitudinal measurement invariance of the SWFL in different groups of students, according to sex, age, socioeconomic status (SES) and place of residence during the study period. Based on this analysis, this study aims to provide evidence on the psychometric properties of the SWFL scale for use in longitudinal studies.

## 2. Methods

### 2.1. Participants

The present study uses data from 114 university students from five state universities located in different geographical zones of Chile. These 114 students completed three waves of measurement in three consecutive years. Data collection began in June to August 2013 (T1), with 369 people (53.7% women), with inclusion criterion being a first-year or third-year student. Approximately one year later, from March to May 2014 (T2), 119 subjects completed a second measurement (66.4% women), and 186 new students entered the study, making a total of 305 subjects (60.0% women) for the second wave. The last measurements were taken from March to

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