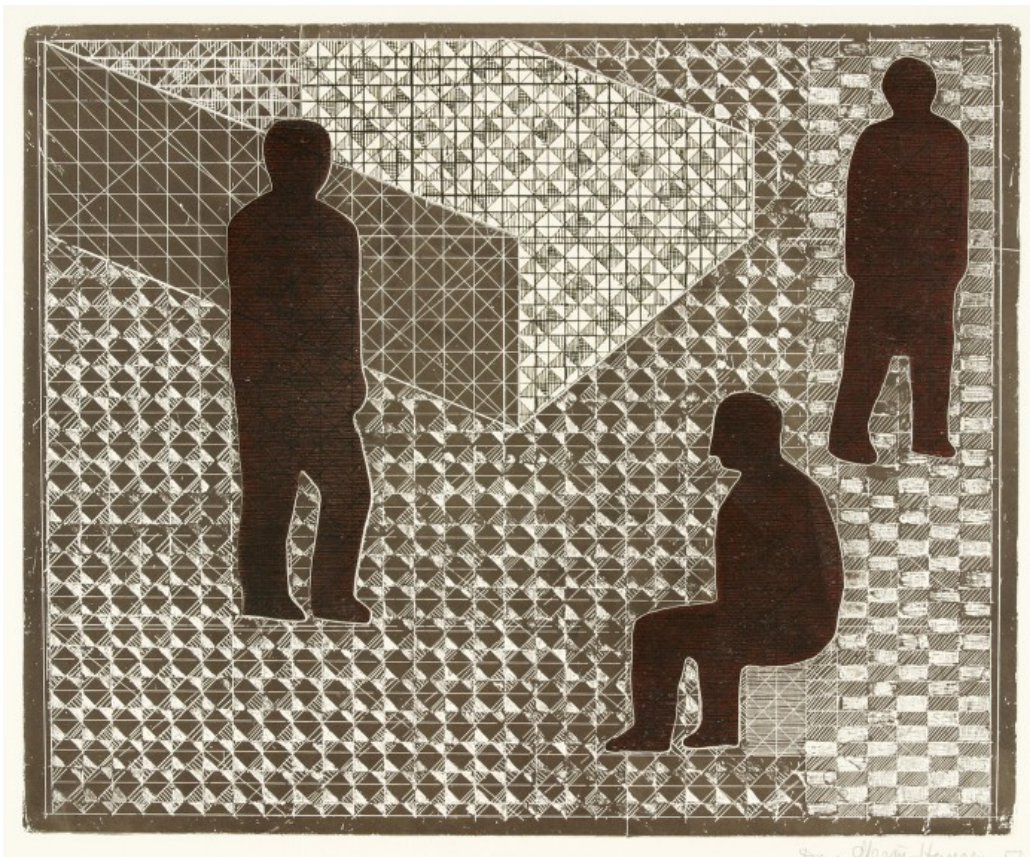# Student loneliness

An empirical investigation and construct validity study

[1]

Bachelor's Thesis

Department of Psychology, University of Copenhagen

59.968 characters equalling 25 standard pages

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[1] *"Composition with three figures"* by Dan Steerup-Hansen, 1953.

Abstract

The thesis investigates loneliness as a psychological phenomenon using both theoretical literature and empirical methods. The first part of the thesis is an investigation of two dominating theoretical approaches to loneliness. The two approaches, a cognitive and an interactionist approach, are elaborated on and further discussed with particular emphasis on the approaches' different definitions of loneliness as either a unidimensional or multidimensional phenomenon. It is argued, that these different definitions have different theoretical and methodological implications. Further, the two definitions of loneliness may both be valid, since the two approaches may arrive at these as a result of their investigation of different aspects of the same phenomenon.

The second part of the thesis is an empirical article. The focus of the article is two-part: Rasch models are used to investigate the construct validity and psychometric properties of a scale to measure loneliness, the Three-Item Loneliness scale (TILS-IF[2]). Further, the TILS-IF is used to assess the prevalence of loneliness in 940 students in their first semester and a possible loneliness-protective effect of living with someone is investigated. In addition to these overall analyses, a small review is undertaken with the purpose of investigating the validity and reliability of the TILS and to examine what research using the TILS has shown. Furthermore, a section of the article examines the transition to college (first semester), and it is argued that characteristics of this transition make students vulnerable to stressors. The method section provides an elaboration on the method used as well as a presentation of basic theory on Rasch measurement models.

Finally, the results of the article are elaborated on and discussed. Firstly, results from the item analyses show that the TILS-IF fit a Rasch measurement model without differential item functioning (DIF). Further, the TILS-IF is found to be construct valid. Secondly, in the sample, a large part of the college students (20.6 %) are found to be lonely. The high prevalence of loneliness among the students is discussed with an emphasis on the transition to college. It is argued that characteristics of the college transition can be related to specific features thought to precipitate loneliness in the interactionist approach. Thirdly, loneliness is found to be independent of living situation and this result is discussed in relation to the cognitive approach to loneliness. In conclusion, it is recommended that future research further investigate the different typologies of loneliness to provide a deeper understanding of the phenomenon.

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[2] TILS-IF refers to the "Ida Friderichsen"-version of the TILS which only deviates from the TILS in relation to the three item's response categories. This is elaborated on in part 2, section 2.2.

Contents

Part one: Conceptualizing loneliness

1. Introduction

Loneliness is an unpleasent experience associated with damaging health effects (Peplau & Perlman, 1982). Accordingly, loneliness is related to a heightened risk of stress and suicide (Cacioppo et al., 2002), depression (Russel, Cutrona, Rose, & Yurko, 1984), as well as an increased risk of all-cause mortality (Chan, Raman, Ma, & Malhotra, 2015). In light of these serious implications, it is surprising that loneliness for many years has been an overlooked research area in Denmark (Lasgaard, 2006). In recent years, however, some Danish research initiatives have been made to shed light on the prevalence and nature of the phenomenon. In 2011, the Mary Foundation included loneliness as one of their "areas of action" which has resulted in a comprehensive Danish population report (Lasgaard & Friis, 2015). This shift of focus has perhaps been encouraged by a translation into Danish of one of the most acknowledged scales for the measurement of loneliness, the UCLA Loneliness Scale (Lasgaard, 2007). To further fascilitate Danish research on the phenomenon, it may be beneficial to provide validated shorter loneliness scales in Danish, since the use of short scales in studies save both time and costs for researchers (Hughes, Waite, Hawkley, & Cacioppo, 2004). This bachelor thesis is an attempt to provide this. The thesis consists of two parts: part one is a theoretical introduction and part two is an empirical article. In part one, loneliness is defined and subsequently investigated by using two dominating psychological approaches. In relation to this, part one will look at how loneliness is commonly measured. Thus, part one will function as a theoretical basis for part two, an article with the title: "The Danish language version of the TILS-IF: an IRT-based construct validity study in a higher education context". The focus of the article will be to validate a short version of the UCLA Loneliness Scale equivalent to the Three-Item Loneliness Scale (TILS), to provide a short and valid measurement in order to further investigate loneliness in a higher education context. The scale used in this thesis will be referred to as TILS-IF, since it has items identical to the TILS but different response categories. Throughout the present thesis, the term "college" is used to conceptualize a higher undergraduate education, for example at university.

Thus, the aim of the article will be to answer the following research questions:

- What are the psychometric properties of the TILS-IF and is the scale construct valid?
- How prevalent is loneliness in a sample of higher education students, during the college

transition?

- Does living with other people provide a "loneliness-protective" effect for students, during the college transition?

2. Defining loneliness

When asked, most people intuitively know what loneliness is and what it feels like (Peplau & Perlman, 1982). This kind of implicit knowledge of loneliness is relevant when trying to define the phenomenon. Francis (1976) argues that there are two types of conceptualizations of loneliness in the literature, one primary and one secondary. The primary loneliness refers to loneliness as a general human characteristic, an existential basic condition of being human (Francis, 1976). It is often this primary loneliness that people have an implicit knowledge of, since this type of loneliness is a natural result of being an individual among other individuals and being consciously aware of that singular state (Francis, 1976). The second conceptualization refers to loneliness as an unpleasant subjective experience caused by either an unsatisfying interaction with other people or no interaction at all (Francis, 1976). The second conceptualization is found in particular in the psychological literature (Peplau & Perlman, 1982). In the general psychological literature scholars have agreed on three defining points, similar to this second conceptualization of loneliness: first, loneliness is a subjective experience and not synonymous with objective social isolation; second, the experience of loneliness is distressing and unpleasant; third, loneliness is the result of social deficits (Peplau & Perlman, 1982). The first two defining points relates to the nature of loneliness, the third point, to the etiology of loneliness. As in the general psychological literature, this thesis will conceptualize loneliness according to these three points, and thus define loneliness as; *a subjective unpleasent experience that results from social deficits.*

Because of the negative formulation, loneliness could perhaps be categorized as a pathological phenomenon. However, in the majority of the literature, including this thesis, loneliness is not conceptualized as an illness (Lasgaard, 2006). Further, "loneliness" is not included in the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association, 2013). Another important distinction to make is with regard to the concepts of *loneliness* and *aloneness*. While aloneness refers to an *objective* state that may evoke both positive (e.g. solitude and solace) and negative (e.g. longing and isolation) feelings, loneliness is a *subjective* state that can be only unpleasent (Lasgaard, 2006).

Having defined loneliness in general, two other important features should be mentioned that are still actively debated: the temporal characteristics of loneliness and the number of dimensions of loneliness (Lasgaard, 2006). A temporal distinction can be made between loneliness as a transient and a chronic state (Perlman & Peplau, 1982). While loneliness as a transient state is somewhat common and relatively uncomplicated, chronic states of loneliness may be detrimental for the individual sufferer (Perlman & Peplau, 1982). However, transient states of loneliness (e.g. related to a move or the death of a spouse) may become chronic if the individual is not able to adapt or come to terms with the new changes (Lasgaard, 2006). Thus, both transient and chronic states of loneliness are relevant for this thesis' conceptualization of the phenomenon.

The overall discussion with regard to the number of dimensions is about whether loneliness is uni- or multidimensional (Russell, 1982). In the following section, this aspect will be further investigated by elaborating on two different theoretical approaches to loneliness.

3. Two theoretical approaches to loneliness

The theoretical framework on loneliness consists of theory fragments and different interpretations and models (Lasgaard, 2006). One way to classify the different theoretical approaches to loneliness is by distinguishing between approaches that perceive loneliness as a unidimensional phenomenon and those that perceive it as a multidimensional phenomenon. Accordingly, one approach holds that loneliness is a unidimensional phenomenon reflecting a common core of experiences that represents one subjective experience (Russell et al., 1984). One of the dominating unidimensional theoretical approaches to loneliness is the cognitive approach (Peplau, Miceli, and Morasch (1982). The most recognized opposition to the unidimensional approach is represented by the interactionist approach, which holds that loneliness is a twodimensional phenomenon consisting of two qualitatively distinct dimensions (Weiss, 1973). In the following sections, the cognitive- and interactionist approach to loneliness will be elaborated on and compared to each other with regard to both conceptual and methodological implications.

3.1 The cognitive approach

A central part of the cognitive approach is the cognitive discrepancy model of loneliness which puts emphasis on specific cognitive processes as mediating factors between deficits in one's social life and the experience of loneliness (Perlman & Peplau, 1982). Some of the leading advocates of a

cognitive perspective on loneliness are Peplau, Miceli, and Morasch (1982). According to these authors, the cognitive approach to loneliness in particular emphasizes three cognitive processes; perception, evaluation, and causal attributions (Peplau, Miceli, and Morasch, 1982). In the following, these processes and their importance for the experience of loneliness will be elaborated on.

3.1.1 The cognitive discrepancy model

The cognitive discrepancy model seeks to explain loneliness from the "insider's" perspective. According to this model, loneliness emerges when individuals perceive that their social relationships fail to measure up to their inner subjective standards (Peplau, Miceli, and Morasch, 1982). Thus, loneliness stems from a perceived discrepancy between a person's actual relationships and the same person's subjective standards on how such relationships ought to be with regard to both qualitative (e.g. feel "in tune" with each other) or quantitative (e.g. number of friends) characteristics (Peplau, Miceli, and Morasch, 1982). Individuals derive such inner subjective standards for relationships in two ways; through past experience (memories) and social comparisons (Peplau, Miceli, and Morasch, 1982). Thus, both inherent functions and external factors are included in the model. According to the cognitive approach, an individual who, by objective standards, would not be categorized as lonely, may in fact experience loneliness if his social relations are quantitatively or qualitatively below his optimally subjective standards (Peplau, Miceli, and Morasch, 1982). One hypothesis stemming from the cognitive approach is that the discrepancy between a person's actual and desired relationships can be *too large* for lonely individuals: "…possibly because of a joint function of their interpersonal behavioral deficits (resulting in suboptimal *actual* relationships) and their interpersonal expectancies (resulting in unrealistically high standards for *desired* relationships" (Marangoni and Ickes, 1989, p. 101). Accordingly, lonely individuals may differ qualitatively from non-lonely individuals with regard to their interpersonal expectancies, and quantitatively with regard to their actual relationships.

3.1.2 Causal attributions

Bernard Weiner's (1974) concept of causal attributions is another important aspect of the cognitive approach. Causal attributions are hypothesized to function as a mediating and maintaining factor for loneliness (Peplau, Miceli, and Morasch, 1982). According to Weiner (1974), causal attributions

can be arranged along three primary dimensions: locus of causality (personal vs. situational), stability (constant vs. changeable), and controllability (control over situation/behavior). In the cognitive approach, the locus of causality dimension in particular is hypothesized to affect the experience of loneliness (Peplau, Miceli, and Morasch, 1982). In a study by Cutrona (1982), attributions were found to be linked to the persistence of loneliness over time. Students who remained lonely over a longer period of time (7 months) initially had more causal internal than external attributions compared to those students who subsequently recovered from loneliness (Cutrona, 1982). These results indicate that causal internal attributions, such as attributing the experienced loneliness to poor social skills instead of situational factors, increase the risk of experiencing chronic loneliness. Further, the results implicate causal internal attributions as a contributing feature to the intensity of the experience, since these may transforme a transient state into a chronic state of loneliness.

3.2 The interactionist approach

According to the interactionist approach, loneliness is the result of the combined effect of both personal and environmental factors (Perlman & Peplau, 1982). The primary spokesman for the interactionist approach Robert Weiss has proposed a typology of two distinct dimensions of loneliness: emotional isolation (emotional loneliness) and social isolation (social loneliness). In Weiss' (1973) typology of loneliness, isolation should not be taken in an objective sense (e.g. being alone). Rather, the two dimensions of loneliness result from destinct deficits in interpersonal needs.

3.2.1 Emotional loneliness

Weis (1983) argues that the nature of emotional loneliness is synonymous with attachment processes in infants, except that it occurs in the adult individual and that it does not necessarily centre on any one particular attachment figure. The concept of attachment describes an innate tendency in the infant to develop emotional bonds to one primary caregiver that may provide it with comfort and protection (Bowlby, 1982). Attachment processes are thought to be part of an organized behavioral system, whose biological function is to protect the infant, and to make it feel discomfort and elicit attachment behavior (e.g. seeking attention, crying) when it is separated from the primary attachment figure (Bowlby, 1982). If the primary attachment figure is emotionally and physically present and encouraging in the early childhood years, the infant will develop an inner

sense of security (Bowlby, 1982). According to Weiss (1983), the human attachment system undergoes changes in adolescence, releasing the attachment to the original objects (parents), so that the individual may integrate new objects (e.g. romantic partners) as attachment figures. Further, Weiss (1983) argues that (as in the case of infants) it is only when the adult feels under threat that the attachment system will become triggered and begin to dominate emotions and behavior, and thus make the adult seek the presence of a reassuring attachment figure. In these situations, adults without an attachment figure will feel emotionally isolated and experience loneliness (Weiss, 1983). Thus, the experience of loneliness is somewhat akin to separation anxiety in infants, where feelings of anxiety, restlessness, and emptiness are present (Weiss, 1973).

3.2.2 Social loneliness

Weiss' (1973) theoretical framework for loneliness focus in particular on the dimension of emotional loneliness, while the social dimension is given less theoretical attention. According to Weiss (1973), social loneliness does not stem from attachment processes, but may emerge when any severe disruption of one's social roles occur (e.g. moving to a new community, new employment). A person experiencing social loneliness will feel socially marginalized and bored (Weiss, 1973). Further, deficits in social relationships with peers are thought in particular to elicit social loneliness (Weiss, 1973). However, a divorce may also precipitate social loneliness, since a marriage can consist of both love and friendship (Weiss, 1973). Thus, social loneliness can be seen as a response to the absence of socially meaningful relationships.

3.3 Theoretical implications for conceptualizing loneliness

Perlman and Peplau (1982) suggests two issues when interpreting and comparing theoretical literature on loneliness: first, what is the nature of loneliness itself (is it a normal or abnormal condition); second, what are the causes of loneliness (do they reside within the person or within the environment). In the following section the cognitive and interactionist approaches will be compared to each other according to their conceptualization of the nature and causes of loneliness.

3.3.1 The nature and causes of loneliness

In the interactionist approach, loneliness is thought to have two underlying dimensions, emotional and social loneliness. According to Weiss (1973), the two dimensions of loneliness result from

interpersonal deficits and are expressed through different affective responses. Emotional loneliness is linked to deficits in attachment and social loneliness is linked to deficits in social relationships (Weiss, 1973). Attachment processes underlying emotional loneliness are thought to be universal biological mechanisms, and the disruption of social roles, which is the underlying cause of social loneliness, can happen to everybody (Weiss, 1973). Accordingly, deficits underlying each dimension result from "normal" contemporary processes, and thus, loneliness is viewed as a normal condition, in the interactionist approach. Further, it may be argued that the deficits that are thought to cause each dimension of loneliness are both personal and environmental in their nature. With regard to emotional loneliness, anxiety feelings related to attachment processes (e.g. resulting from general stress or the loss of an attachment figure) may function as precipitating features of loneliness (Weiss, 1983). With regard to social loneliness, any disruption of social roles (e.g. a new work environment or a move to a new city) may function as a precipitating feature of loneliness (Weiss, 1983). Thus, both personal and environmental features are thought to interact to produce the experience of either emotional or social loneliness.

In the cognitive approach, loneliness is thought to be a unidimensional phenomenon, resulting from a perceived discrepancy between one's subjective standards and the quantitative and qualitative aspects of one's relationships (Peplau, Miceli, & Morasch, 1982). Thus, loneliness is, in this approach, also thought to result from contemporary mechanisms. However, in the cognitive approach, it is not entirely clear whether loneliness is seen as a normal or an abnormal condition. One proposed hypothesis is that some lonely individuals may uphold subjective standards that are so high that no one can satisfy the criteria (Marangoni and Ickes, 1989). When loneliness is seen from this hypothesis, it is an abnormal condition. However, the processes underlying the perceived discrepancy hypothesis are thought to be normal functioning cognitive processess (Peplau, Miceli, & Morasch, 1982). Thus, in this main hypothesis of the cognitive approach, loneliness is, like in the interactionist approach, a normal condition.

Unlike the interactionist approach, the cognitive approach considers only personal features, not environmental features, to underlie the experience of loneliness. Accordingly, the cognitive approach emphasizes that only the subjective conclusion "I am lonely", stemming from the perceived discrepancy of subjective standards and actual relationships, can precipitate the experience of loneliness (Peplau, Miceli, & Morasch, 1982). Thus, in the cognitive approach, loneliness is thought to stem solely from within the person, not from within the environment.

This important difference in emphasis is reflected in the different views on loneliness-dimensions held by each approach. The interactionist approach, emphasizing an interaction between person and environment, sees loneliness as a two-dimensional phenomenon. The cognitive approach, emphasizing only causes from within the person, conceptualize loneliness as a unidimensional phenomenon. According to Russell (1982), the two views on loneliness-dimensions may indeed both be "true":

"A general or common set of experiences underlie loneliness as it is experienced by all people. Different components or dimensions of loneliness may also exist, reflecting different paths to this common experiential state (loneliness) or variations in how people respond to loneliness" (p. 101).

This argument may be used to explain why the two approaches remain relevant in the theoretical and methodological field. The cognitive unidimensional approach investigates a common set of experiences underlying loneliness as it is experienced by all people, and thus finds that loneliness is a unidimensional phenomenon. The interactionist approach, on the other hand, investigates variations in how people respond to loneliness or the different paths leading to loneliness and arrive at a different conclusion; that loneliness is a two-dimensional phenomenon. This is also in compliance with the interactionist focus on both personal and environmental causes when explaining loneliness. This complexity is needed to explain intervariability in different paths to loneliness, as well as intervariability in the overall experience. Thus, because the two approaches investigate different aspects of the same phenomenon they each arrive at a different number of dimensions. Table 1 shows the overall differences with regard to the dimensions, nature, and causes of loneliness according to the cognitive and interactionist approach respectively.

Table 1: Overall differences of the cognitive and interactionist approach to loneliness.

Theoretical approach	Conceptualizations of loneliness		
	Dimensions	Normal/abnormal	Caused from within the person/environment
Cognitive	*One*	*Both*	*Person*
Interactionist	*Two*	*Normal*	*Both*

Theoretical conceptualizations and methodological issues are inseparable (Russell, 1982). As in the theoretical literature, the dimensions of loneliness is also an important implication for measurement (Russell, 1982). The following section will examine how loneliness is measured and what

implications the dimensions of loneliness as conceptualized by the two different approaches have had on these measurements.

3.4. Theoretical implications for measuring loneliness

Loneliness is, in this thesis, defined as in the majority of the literature, as a subjective experience (Perlman & Peplau, 1982). The subjective nature makes it difficult for researchers to manipulate or invoke the experience of loneliness in individuals, and therefore, traditional methods of experimental psychology such as observation, laboratory manipulations, and case-control studies become problematic or just irrelevant (Lasgaard, 2006). Thus, most research investigate loneliness through measures of self-report, namely loneliness scales (Lasgaard, 2006).

Both unidimensional and multidimensional loneliness scales exist. The most widely used and acknowledged unidimensional scale is the UCLA Loneliness Scale (Russell, 1996). Other scales, such as the NYU Loneliness Scale (Rubenstein & Shaver, 1982) and the Young Loneliness Inventory (Young, 1982), also conceptualize loneliness as a undimensional phenomenon. All three scales consist of statements related to a global experience of loneliness. This is characteristic of unidimensional scales investigating loneliness as an all-encompassing experience varying only with regard to intensity (Lasgaard, 2006). Further, all three scales include some statements that relate to a perceived discrepancy between subjective standards and actual relationships: *"How often do you feel that you are 'in tune' with the people around you?"* - the UCLA Loneliness Scale (Russell, 1996), *"Compared to people your own age, how lonely do you think you are?"* - the NYU Loneliness Scale (Rubenstein & Shaver, 1982), *"I cannot stop comparing the satisfaction other people get from their relationships with my own lack of satisfaction"* - the Young Loneliness Inventory (Young, 1982). The UCLA statement relates to inner subjective standards about how the person feels an ideal relationship should be (feeling "in tune" with people). The two other statements relate to the person's perception of other peoples relationships compared to his own. Thus, all three statements conceptualize some kind of a perceived discrepancy, relating the unidimensional scales to the cognitive approach to loneliness.

In contrast to the unidimensional scales, multidimensional scales investigate loneliness as a composed phenomenon with two or more dimensions. Many multidimensional scales use Weiss' (1973) typology of loneliness as a two-dimensional phenomenon, consisting of emotional and social loneliness. Because of the scales' multidimensional focus, such scales can generally be more useful in identifying variations in the experience of loneliness (Russell, 1982). One of the most used

twodimensional scales is the De Jong-Gierveld Loneliness Scale (De Jong-Gierveld & Kamphuis, 1985; De Jong-Gierveld & Van Tilburg, 2006). Another commonly used twodimensional loneliness scale is the Social and Emotional Loneliness Scale for Adults (SELSA) (DiTomasso & Spinner, 1993). Both scales emcompass statements that describe the two dimensions of loneliness according to Weiss' theory. Thus, the 11 item De Jong-Gierveld Loneliness scale has items related to social loneliness (e.g.*"There are plenty of people I can rely on when I have problems")* and items related to emotionel loneliness (e.g.*"I miss having a really close friend")* (De Jong-Gierveld & Van Tilburg, 2006). Correspondingly, The SELSA scale has items related to social loneliness (e.g. *"I'm not part of a group of friends and I wish I where"*) and emotionel loneliness (e.g. *"I have someone who fulfills my emotional needs"*). Accordingly, the two multidimensional scales can be related to the interactionist approach.

Both uni- and multidimensional loneliness scales are found to be valid and reliable (de Jong-Gierveld, 1998; Marangoni & Ickes, 1989). As mentioned, there is no overall agreement in the field as to how many dimensions of loneliness there is. The argument that unidimensional and multidimensional theories investigate different aspects of the same phenomenon, and therefore arrive at different conclusions, is also relevant when looking at loneliness scales. Accordingly, this may explain why both uni- and multidimensional scales are found to be reliable and valid.

In the next part, a short unidimensional loneliness scale will be examined, validated, and further used to investigate loneliness among a sample of higher education students.

Part two: The Danish language version of the TILS-IF: an IRT-based construct validity study in a higher education context

1. Introduction

Loneliness is a distressing and unpleasant subjective experience (Peplau & Perlman, 1982). Because of the subjective nature of loneliness, a challenge in researching loneliness lies in providing valid, objective, and comparable measurements of loneliness. Large scale survey studies

are the most common method in research investigating loneliness (Lasgaard, 2006). However, a notable limiting factor when collecting data in these studies is the length of scales included (Hughes et al., 2004). Using short scales in studies save both time and costs for researchers and may also result in more reliable responses from participants, since the burden of time spent in responding is lessened (Hughes et al., 2004). Thus, it is important to evaluate and validate short scales or concise versions of the loneliness scales in the field. The present article attempts such an evaluation and uses Rasch measurement models to validate the TILS-IF, a scale equivalent to the Danish version of the Three-Item Loneliness Scale (TILS). Accordingly, the TILS-IF has items identical to the items in the TILS but different response categories. The TILS is a short version of the University of California Los Angeles (UCLA) Loneliness Scale. The UCLA Loneliness scale is a unidimensional scale that consists of 20 indirect statements about loneliness and is one of the most widely used and recognized instruments to measure loneliness (Lasgaard & Friis, 2015; Russell, 1996).

To examine how many studies have investigated the validity and reliability of the TILS and the results of these investigations, a small systematic review in four databases (ERIC, PsycINFO, Scopus, Pubmed) was conducted. Further, the review examined what research using the TILS show with regard to loneliness. The search term "The Three Item Loneliness Scale" was used in four databases resulting in a total of 63 studies (n = 8 = ERIC, 18 = PsycINFO, 1 = Scopus, 36 = Pubmed). The 63 studies were screened and if the TILS was used, the study was included. Of the 63 studies, 13 were retained. Further, through the bibliographical references one more study was included. Thus, of the 14 included studies, 11 of the studies used the TILS to investigate loneliness and three of the studies investigated specifically the validity of the TILS. Further, eight of the 11 studies also examined the reliability of the TILS. In the two following sections, these results are elaborated on.

1.1. Studies investigating the validity and reliability of the TILS

The TILS has been validated in several studies (Hughes et al., 2004; Matthews-ewald & Zullig, 2013; Shiovitz-Ezra & Ayalon, 2011). Hughes et al. (2004) investigated the convergent and discriminant validity (both considered to be subtypes of construct validity) of the TILS by examining correlations with measures of mood and emotions from a Depression Scale, as correlations between these and loneliness have been highlighted by prior studies. Only weak correlations were found between emotions not linked to loneliness (enjoyment, energy, motivation),

supporting the discriminant validity of the english version of the TILS (Hughes et al., 2004). Further, a high correlation was found between a "self-labeling loneliness statement" from the Depression Index and the TILS, supporting the convergent validity of the English version of the TILS (Hughes et al., 2004). A study by Matthews-ewald & Zullig (2013) also found that the English version of the TILS had good convergent and discriminant validity, on the basis of showing negative and positive correlations between the TILS and various self-rated health scales (the Brief Multidimensional Students' Life Satisfaction Scale; The Centers for Disease Control's Health-Related Quality of Life Scale). Further, factor analyses provided support for the one-dimensional structure of the TILS (Matthews-ewald & Zullig, 2013). Another study using non-parametric IRT models found the Danish version of the TILS to be a one-dimensional scale with a good ability to discriminate (Loevinger's H coefficient = .73) (Lasgaard & Friis, 2015). Eight studies found the TILS to have an acceptable Chronbachs reliability ranging from α = .72-.92, with the majority of studies finding an α-coefficient over .80 (Ahmed et al., 2014; Ayalon, Shiovitz-Ezra, & Palgi, 2013; Chalise, Kai, & Saito; 2007, 2010; Chan, Raman, Ma, & Malhotra, 2015; Hughes et al., 2004; Lasgaard & Friis, 2015; Shiovitz-Ezra & Leitsch, 2010).

In this overview, the only study investigating the Danish version of the TILS was Lasgaard and Friis' 2015 study using the Mokken Scale analysis, which is a non-parametric IRT model. The present study uses a Rasch model which is a parametric IRT model. To the author's knowledge, no prior studies have attempted to validate any language versions of the TILS using parametric IRT models.

1.2 Studies using the TILS to investigate loneliness

Eleven studies used the TILS to investigate loneliness (Ahmed et al., 2014; Ayalon, Shiovitz-Ezra, & Palgi, 2013; Bolano et al., 2016; Chalise, Kai, & Saito; 2007, 2010; Chan, Raman, Ma, & Malhotra, 2015; Donovan et al., 2016; Lasgaard & Friis, 2015; Lasgaard, Friis, & Shevlin, 2016; Shiovitz-Ezra & Leitsch, 2010; Theeke et al., 2014). The TILS was used in samples from different countries including; The United States (n = 5), Denmark (2), Nepal (2), Egypt (1), and Singapore (1). In relation to this, the TILS has been translated to different languages, making it available in the following languages; English, Danish, Nepali, and Arabic. A majority of the studies (6/11) investigated loneliness in age groups over 50 years, but the samples were quite diverse and included groups such as "jail inmates", "stroke survivors", and "married people". The studies used two

different sampling methods including a face-to-face interview questionnaire design (7) or a self-administered questionnaire design (4).

In two studies investigating loneliness in age groups over 50, a high occurrence of loneliness ranging from 45-51% was found (Ahmed et al., 2014; Bolano). Bolano et al. investigated loneliness in a sample of older (aged 55+) jail inmates and also found a high occurrence of loneliness, with 45% of the sample being lonely. Ahmed et al. (2014) found, in an elderly sample (aged 60+), that 51% felt lonely often, and that loneliness was significantly associated with anxiety and depression. Ayalon, Shiovitz-Ezra, and Palgi (2013) investigated loneliness in married heterosexual couples, and found that about 25% of the variance in loneliness in married couples could be explained by their relationship. Further, the authors found that loneliness in the married couples were equivalent for men and women. The results indicate that the quality of marriage plays a significant role with regard to loneliness, and that characteristics of loneliness does not differ with regard to gender. Chan et al. (2015) found that those "sometimes lonely" and "mostly lonely" among the elderly in Singapore were respectively 39% and 44% more likely to die during an outlined period (till end December 2012) compared to those not lonely, and concluded that loneliness overall increased the risk of "all-cause mortality". Another study, Donovan et al. (2016), found that greater loneliness in cognitively normal older (aged 65+) adults was associated with elevated cortical amyloid burden, an *in vivo* research bio marker of Alzheimer Disease (AD) in the preclinical stage. These results indicate that loneliness also may be characterized as a neuropsychiatric symptom, relevant to preclinical AD (Donovan et al., 2016). Further, the results indicate that the TILS may be a relevant screening tool when screening cognitively normal adults for AD.

Two Danish population studies (Lasgaard & Friis, 2015; Lasgaard, Friis, & Shevlin, 2016) used data from the 2013 Danish National Health Survey (''How are you?''), which included 33,285 participants aged 16-102. Results from investigation of the data showed that the prevalence of loneliness in Denmark was highest in the age group 16-29 years, with just about 6.4% falling in the "lonely category" (Lasgaard & Friis, 2015; Lasgaard, Friis, & Shevlin, 2016). All of the eleven studies included used the TILS score as a sum score.

In light of the Danish results with regard to finding the highest prevalence of loneliness in the age group 16-29, it becomes relevant, in particular in a Danish context, to investigate loneliness in young adults. In the present study, loneliness was investigated in a sample of Danish higher

education students in the first semester during their transition to college. The next section will describe what research shows specifically about loneliness and the transition to college.

1.3 College transition and loneliness

A stereotypical picture of "the lonely person" is an old person sitting alone in a retirement home with only distant relatives left who never visits; however, some studies have challenged this stereotype, and find that young adults appear to be more lonely than the elderly (Cutrona, 1982; Lasgaard & Friis, 2015; Perlman, Gerson, and Spinner, 1978). For instance, an atypically high proportion of lonely people was found among a group of college students, where three-quarters of the group experienced at least some loneliness during their first term (Cutrona, 1982). Another study by Perlman, Gerson, and Spinner (1978) compared the average loneliness score for senior citizens and college students, and found that the college students scored significantly higher as a group than the senior citizens (means of 22.63 and 18.44, respectively). These studies are interesting because college students are very far from the stereotype of the lonely person, since students are surrounded on a daily basis by peers, potential friends, and thus opportunities for social activities. Several authors have argued that in particular *the transition* to college makes college students vulnerable to loneliness (Cutrona, 1982; Larose & Boivin, 1998; Drake, Sladek, & Doane, 2016). Nancy Schlossberg (2011) has proposed a psychological theory on transitions and define a transition as any event or non-event that elicit certain changes in the individuals relationships, routines, assumptions, and roles. According to Schlossberg (2011) all transitions involve some degree of stress to the individual. Thus, transitions in general are assumed to make individuals vulnerable to stressors. The transition to college is a time where many students move away from home for the first time, experience new social contexts, and experience an increased academic burden (Drake, Sladek, & Doane, 2016). Accordingly, it may be assumed that the college transition in particular make students more vulnerable to stressors. Larose and Boivin (1998) investigated specifically the transition from high school to college by assessing the students at the end of high school and during the first semester at college. The study found that students who had left home during the transition had a more profound experience of loneliness, than those who still lived at home. Many college students leave home for the first time when they begin at college, and thus, it may be this element of the college transition that make students more vulnerable to loneliness.

Some studies have investigated which consequences loneliness can have specifically for college students. One study found that loneliness was negatively associated with recognition memory

($\beta(51)$ = -.372, $p < .05$) and with grades ($\beta(63)$ = -.359, $p < .05$) for college students during their first semester (Rosenstreich & Margalit, 2015). These results indicate that higher experiences of loneliness results in poorer recognition memory (important for learning) and in a poorer overall academic performance at college (Rosenstreich and Margalit, 2015). Two other studies found that increases in the experience of loneliness were related to steeper cortisol slopes in college students (Drake, Sladek, & Doane, 2016; Sladek & Doane, 2015). Cortisol is a biomarker of Hypothalamic-pituitary-adrenal (HPA) axis activity, which is regarded as one of the biological mechanisms positively associated with psychosocial stress (Drake, Sladek, & Doane, 2016).

In light of these results, assessing loneliness in college students becomes particularly important, since the group in general is vulnerable to loneliness, and because of the possible harmful consequences of loneliness to this particular group.

1.4 The present study

In the present study, the TILS-IF is used to assess the prevalence of loneliness in a sample of students during the transition to college (first semester at college). The students were assessed in 2013, the same year as a comprehensive Danish population report investigated loneliness using the TILS (Lasgaard & Friis, 2015). This makes comparisons between the general Danish population and the higher education students in this sample possible. The present study uses Rasch models (RM) to investigate the construct validity of the TILS-IF. When items from a scale fit a RM, measurement is construct valid according to Rosenbaum's criteria for construct validity (Kreiner, 2007). According to Rosenbaum's criteria, a scale is said to be construct valid if the criteria of unidimensionality, monotonicity, local independence, and no DIF is sustained (Kreiner, 2007). When a scale fit a RM all these criterias are fulfilled and thus, the construct validity of the TILS-IF was investigated by item analyses using the RM.

Further, measurement by Rasch items has two fundamental properties which are unique to the model: specific objectivity and sufficiency (Kreiner, 2007). Accordingly, if all items in a scale fit a RM, measurement is *specifically objective* in the sense that comparisons of items and persons are independent of each other, and the sum score is a sufficient statistic for the latent construct of loneliness (Kreiner, 2007; Kreiner, 2013). Scores from the UCLA Loneliness scale and the TILS are used as sum scores in most research making it relevant to investigate whether the sum score is a sufficient statistic. Thus, the aim of the study was to answer the following research questions:

- What are the psychometric properties of the TILS-IF and is the scale construct valid?
- How prevalent is loneliness in a sample of higher education students, during the college transition?
- Does living with other people provide a "loneliness-protective" effect for students, during the college transition?

2. Method

2.1 Participants and data collection

Table 1 presents the grouped distributions of students with regard to age and gender. All students answered the TILS-IF in an online survey in their first semester at college in 2013. The sample had an approximate response rate of 60%. Thus, the final sample consisted of 940 students (721 men, 219 women) from the Technical University of Denmark. The students were divided into three age groups: under 20 years of age (n = 105), between 20-25 years (772), and over 25 years (63).

Table 1. Gender and age distribution of participants in sample

Characteristics	Technical University Students, UCPH (N = 940)
Gender	
Male	721
Female	219
Age groups	
< 20 years	105
20-25 years	772
> 25 years	63

2.2 The Three-Item Loneliness Scale

Table 2 shows the three items of the TILS-IF which are the same items as in the original TILS. The items were translated into Danish by Lasgaard (2007).

Table 2. Items in the TILS and TILS-IF**

Item *	
2	How often do you feel that you lack companionship?
11	How often do you feel left out?
14	How often do you feel isolated from other people?

Note.*Item number refers to each item's number in the UCLA Loneliness Scale.**Items appear in Danish in the questionnaire used in the present study.

In the present study, the students originally answered the UCLA Loneliness scale with 20 items. Items in the UCLA Loneliness scale has four response categories and items in the original TILS has three response categories (table 3). Rasch analyses was initially conducted with the three TILS-IF items with four response categories (as in the UCLA), since this was as close as one could get to the original TILS with three response categories. However, for the question of prevalence, it was not possible to determine "loneliness" as done in the Danish population study by Lasgaard & Friis (2015) due to these differences in response categories, as Lasgaard and Friis (2015) used the original TILS with three response categories. To be able to compare my results with the results of the Danish population study, items in the TILS-IF were dichotomized into 0 (never, rarely) and 1 (sometimes, always), in order to obtain items where the meaning of the response categories were comparable to those in the TILS (table 3). These items could then be used to obtain a loneliness scale with a cutoff value for loneliness which was the same as the cutoff value in the population study.

Table 3. Response categories of the UCLA Loneliness scale, the TILS, and the TILS-IF

The UCLA	The TILS	The TILS-IF
1. Never	1. Rarely	0. Never / Rarely
2. Rarely		
3. Sometimes	2. Sometimes	1. Sometimes/ Always
4. Always	3. Often	

Previous studies have not classified what one must answer on the TILS to be considered lonely (Lasgaard & Friis, 2015). Lasgaard and Friis (2015) used a conservative approach to this where a total score of 7-9 (on the TILS with three response categories) would classify you as lonely. Accordingly, a person must answer "always" on one item and "sometimes" on another item, or answer "sometimes" on at least two items and "rarely" on one item to be classified as lonely

(Lasgaard & Friis, 2015). In the present study, a total score of 2-3 would classify participants as lonely, meaning that a person must answer "always/sometimes" to at least two of the items. Thus, "loneliness" is classified as having a total score of 2 or above on the dichotomized TILS-IF which is completely equivalent to the classification of "loneliness" as having a total score of 7 or above on the original TILS used in the study by Lasgaard and Friis (2015).

Both the dichotomized TILS and the TILS with four response categories were analysed using the RM and the results of the two scales where essentially the same. Thus, for simplicity, only the results of the dichotomized TILS where commented on, however, results of both scales are showed in the tables in the results section.

2.3 Item analyses by Rasch measurement models

2.3.1 The family of Rasch models

For IRT models including the family of Rasch models, four requirements for measurement must be met: Unidimensionality, Monotonicity, Local Independence (no LD), and No Differential Item Functioning (no DIF) (Kreiner, 2013). The requirement of unidimensionality means that the items of the model must measure only *one* underlying latent variable (Nielsen et al., 2017b). In the present study, this underlying latent variable is loneliness. The requirement of monotonicity means that all item responses must be positively related to the latent varible (Nielsen et al., 2017b). The requirement of no LD means that given the latent variable, item responses must be conditionally independent of each other (Nielsen et al., 2017b). Thus, in the present study, only the existence of loneliness should explain why items are correlated, and item responses should therefore depend solely on the level of loneliness, not on answers to other items (Nielsen et al., 2017b). Finally, the requirement of no DIF means that given the latent variable, items and exogenous variables must be conditionally independent of each other (Nielsen et al., 2017b). Thus, in the present study, only the existence of loneliness should explain item responses, as these should be independent of both age and gender.

In the family of Rasch models one also find the Graphical Loglinear Rasch Model (GLLRM), which is an extension of the RM that allows specific departures of uniform LD and DIF (Kreiner, 2007; 2013). Accordingly, when a fit to the pure RM is rejected specifically due to uniform LD and/or uniform DIF, it is still possible to achieve close to optimal measurement, as these departures from the RM can be integrated and adjusted for in a GLLRM (Nielsen et al., 2017b; Kreiner, 2007).

In the GLLRM, uniform LD is interpreted as rational response behaviour and response dependence created by the contents of items (Kreiner, 2007). For LD to be uniform, the correlation between the two items must be the same for all values of the latent variable (Kreiner, 2007). For DIF to be uniform, item responses must not only depend on the latent variable, but also on the exogenous variables (Nielsen et al., 2017a). Further, item responses must depend on the exogenous variables in the *same* (uniform) manner for all levels of the latent variable (Nielsen et al., 2017a). If the departures in the GLLRM only include LD (and not DIF) the statistical sufficiency of the sum score is retained, but it may result in a reduced reliability (Nielsen, 2017a).

2.3.2 Strategy of Rasch analyses

Andersen's (1973) conditional likelihood ratio (CLR) test was used to test the overall fit of both the pure RM (homogeneity in score groups) and the GLLRM, and to check the global DIF (Nielsen et al., 2017a). Comparisons of the observed and expected item-restscore correlations were applied to test the individual fit of items under the RM (Nielsen et al., 2017a). If fit to the pure RM was rejected, further testing was conducted to see if items could fit a GLLRM which take account of unidimensional LD and/or unidimensional DIF (Nielsen et al., 2017a; Kreiner & Nielsen, 2013). Reliability was estimated using Chronbach's alpha coefficient (Kreiner & Nielsen, 2013). The statistical software package DIGRAM (version 3.58; Kreiner & Nielsen, 2013) was used to conduct all item analyses. This software provides analyses of DIF and LD, and tests for unidimensionality and the sufficiency of the score (Nielsen et al. 2017a; Kreiner & Nielsen, 2013). The critical level for rejection of $p < .05$ was used to imply statistical significance of all tests (Nielsen et al., 2017a). The partial Goodman-Kruskal gamma coefficients was used to test the correlation between item pairs (LD) or between items and exogenous variables (DIF) given the rest-scores (Kreiner & Christensen, 2004). DIF was tested specifically relative to the two exogenous variables age group and gender. In the analyses, two exogenous variables were included: Age (< 20, 20-25, > 25 years) and Gender (female, male). For further technical details, the reader is referred to Kreiner & Nielsen (2013). For further theoretical details, cf. Kreiner (2013).

3. Results

3.1 Rasch analyses of the TILS-IF

Analyses were run for the TILS-IF with four response categories and the TILS-IF with two response categories. Whether the scale had two or four response categories did not matter, since the same overall results were found for the two scales (Tables 4-7). In the following, only results with regard to the dichotomized TILS-IF are commented on for simplicity.

The initial descriptive item analyses of the raw score of the TILS-IF showed no problems with monotonicity or homogeneity of the three loneliness items, as no errors were found in either cases. An excellent consistency of the three loneliness items was found, with all item correlations being significant and positive, ranging from .631 to .855. No evidence of DIF was found (Table 4). However, the TILS did not fit the pure RM, as evidence against global homogeneity was found (CLR(2) = 12.86, p = .00) (Table 4). In order to make tests exhaustive, further analyses were conducted to test for LD and missing DIF. The tests showed no evidence for missing DIF relative to age or gender. However, evidence for LD was found for item 11 and 14 (Gamma = .64, p = .01). This LD was adjusted for in the GLLRM. After adjusting the model, new tests for LD did not provide any evidence of further LD of items. The GLLRM was then tested and the TILS-IF was found to fit this model since the global homogeneity test was insignifiant, and no evidence for global DIF was found (Table 5). Tests showed no problems with item fits for the individual TILS-IF items to the GLLRM, as all where insignificant (Table 6). The TILS-IF was found to have a less than satisfactory reliability (α = .60)(Table 7).

Table 4. Global test of fit: Homogeneity in score groups and Global test of DIF in the RM for the TILS-IF with 2 and 4 response categories

		RM		
Scales	Tests of fit	CLR	df	p
TILS (2 response categories)	Global homogeneity	12.86	2	.00
	Global DIF relative to			
	Age	2.0	4	.74
	Gender	1.5	2	.47
TILS (4 response categories)	Global homogeneity	27.19	8	.00
	Global DIF relative to			
	Age	22.5	16	.13
	Gender	5.0	8	.76

Notes. CLR = Conditional likelihood ratio test. P-values were evaluated for false detection rate due to multiple testing using the Benjamini-Hochberg procedure.

Table 5. Global test of fit: Homogeneity in score groups and Global test of DIF in the GLLRM* for the TILS-IF with 2 and 4 response categories

		GLLRM		
Scales	Tests of fit	CLR	df	p
TILS (2 response categories)	Global homogeneity	2.28	3	.52
	Global DIF relative to			
	Age	5.7	6	.46
	Gender	2.7	3	.44
TILS (4 response categories)	Global homogeneity	22.42	15	.10
	Global DIF relative to			
	Age	27.4	30	.60
	Gender	10.6	15	.78

Notes. CLR = Conditional likelihood ratio test. P-values were evaluated for false detection rate due to multiple testing using the Benjamini-Hochberg procedure. Rejected p-values are marked >.05. *Model adjusted for local dependence between item 11 and 14.

Table 6. Item fit statistics in the GLLRM for the TILS-IF with 2 and 4 response categories in Table 5

	Item-restcore gamma coefficient (γ)								
	TILS (2 response categories)					TILS (4 response categories)			
Item	γ Obs	γ Exp	S.D.	p	Item	γ Obs	γ Exp	S.D.	p
2	.66	.66	.05	1.00	2	.48	.47	.04	.88
11	.73	.76	.04	.41	11	.62	.62	.03	.93
14	.83	.79	.04	.36	14	.61	.60	.03	.68

Note. Item fit was also tested using conventional infit and outfit estimation, both with the same result as the comparison of the observed item-restscore correlations to the expected under the model shown in this table.

Table 7. Reliability of the TILS-IF with 2 and 4 response categories in GLLRM in table 4

Scales	Reliability
TILS (2 response categories)	.60
TILS (4 response categories)	.64

3.2 Criteria-related construct validity of the TILS-IF

The results of the item analyses showed that the TILS fit a GLLRM. Thus, according to Rosenbaum's criteria for construct validity the TILS is construct valid.

3.3 Loneliness among college students

Descriptive analyses showed that 20.6% of the students in the sample could be categorized as lonely (TILS-IF score > 2). Further, the effect of the student's living situation was tested. Results of the test showed that there where no significant differences in loneliness between students living alone and students living with others (X^2 (1) = 1.91, p = .17) (Table 8).

Table 8. Living situation and loneliness (n= 940)*

Live Alone	Students Not lonely	Students Lonely
No	80.9 %	19.1 %
Yes	77.1 %	22.9 %

4. Discussion

4.1 Discussion of results

The purpose of the present study was to investigate the construct validity of the TILS-IF and further, to investigate the prevalence of loneliness in a sample of recently transferred college students and the effect of their living situation on loneliness.

Results of the Rasch analyses show that the TILS-IF fit a GLLRM, one of the Rasch models, and that the TILS-IF is construct valid. Further, the TILS-IF has no problems with monotonicity, homogeneity, and consistency. The TILS-IF is a unidimensional scale, a fact that the fit to GLLRM supports. The fit to the GLLRM also indicates that the sum score of the TILS-IF can be used as a sufficient statistic. Although the TILS has presented good reliability in previous studies, the TILS-IF was found to have a somewhat poorer reliability score in our sample. This may be partly explained by the fact that the scale only consists of three items. However it does not explain why prior studies have found that the TILS have a high reliability. According to Nielsen et al. (2017a),

departures from the GLLRM including unidimensional LD, may result in a reduced reliability. Thus, the incorporated unidimensional LD of the GLLRM may explain the somewhat poorer reliability score found in the present study.

With regard to the prevalence of loneliness, results showed that 20.6% of the students in the sample could be categorized as lonely. Like this study, the Danish population report by Lasgaard and Friis (2015) also sampled data in 2013. Lasgaard and Friis (2015) found that the highest prevalence of loneliness was in the overall age group 16-29, where 6.4% of the people could be categorized as being lonely (TILS score > 6). In the subgroup aged 25-29, 6.7% of the people could be categorized as being lonely. This was the highest prevalence of loneliness found in the population report. However, the prevalence of 6.7% is very far from the prevalence of 20.6% found in this study. The students in this study's sample answered the TILS-IF during their first semester and thus, the experience of loneliness may be caused by the transition to college. The transition to college is defined as the time when students are transferred to college and during their first semester. Thus, the experience of loneliness during the transition to college is perhaps only transient and may not last through the time at college. However, a transient experience of loneliness can become chronic if the individual is not able to adapt to the new situation (Lasgaard, 2006). Therefore, the experience of loneliness in relation to transitions become important to investigate. Cutrona (1982) investigated students who where lonely during their transition to college and whether they remained lonely after seven months. In this study, students who remained lonely initially had more causal internal than external attributions than those students who subsequently recovered from loneliness (Cutrona, 1982). Accordingly, if the college students attribute feelings of loneliness to features within themselves they might struggle more to adapt to their new situation and their experience of loneliness during the college transition may become chronic.

Features of the college transition may also contribute to a heightened risk of experienced loneliness in students. Several authors have investigated loneliness and the college transition specifically in relation to attachment theory (Larose & Boivin, 1998; Wei, Russell, and Zakalik, 2005; Wiseman, Mayseless, and Sharabany, 2005). Weiss (1973) was one of the first to connect attachment theory and loneliness in his theory of loneliness as a twodimensional concept consisting of emotional and social loneliness. Emotional loneliness will emerge, when a vulnerable adult is without a reassuring attachment figure and social loneliness will emerge when an individual's social roles are disrupted (Weiss, 1983). Transitions in general result in some degree of stress and thus, one can argue that the

college transition places students in a vulnerable situation. Further, during the college transition, many college students move away for the first time and find themselves in a new social context. This means that many college students don't have any available attachment figures nearby, and further, a new social context of college can be regarded as a major disruption of the students' prior social roles. Thus, these features of the college transition may precipitate both emotional and social loneliness. Accordingly, this may explain the high prevalence of loneliness found in the group of college students during their transition to college.

With regard to students' living situation, the present study found no significant differences in loneliness dependent on living situation. Thus, whether the students lived alone or with someone did not influence their experience of loneliness. This is interesting in light of the cognitive disrepancy model for loneliness, where loneliness is thought to emerge *only* when individuals perceive that their social relationships fail to measure up to their inner subjective standards (Peplau, Miceli, and Morasch, 1982). Accordingly, no quantitative aspects alone (such as number of friends) are thought to effect the experience of loneliness, which is in compliance with the results indicating that it has no influence whether the individual lives alone or comes home to an apartment filled with people. One issue in relation to this finding concerns the method of asking. Students answered the question "Do you live alone?", and could reply yes or no. It is possible that some students living in dorms may have answered yes to the question, perhaps because they have their own room and therefore think of themselves as living alone. However, living in a dorm should count as living with someone else, since there are often common rooms in dorm facilities. The insignificant results could be attributed to this. Nevertheless, it is also possible that the experience of loneliness is independent of living situation and future studies should take this issue into account.

4.2 Limitations and further recommendations

One possible limitation of the TILS is that the scale is very short. This makes it an efficient tool to measure loneliness, however, also potentially more imprecise than longer scales such as the UCLA Loneliness scale. Another potential limiting factor of the TILS is that the scale cannot be used to distinguish between a transient and chronic experience of loneliness (Lasgaard, Friis, & Shevlin, 2016). It is difficult to know whether the experience of loneliness during the college transition may actually lead to a chronic state of loneliness. Future studies may benefit from assessing loneliness in college students before college start, during the college transition (first semester), and in each

semester (or at least in the final semester), to monitor levels of loneliness and investigate the risk of loneliness experienced in the first semester at college.

Given the known associations of loneliness and stress, depression, and a higher risk of all-cause mortality, it is recommended that those in college student affairs pay greater attention to this phenomenon. It may be considered to screen students when they enter college, and to monitor students' levels of loneliness with measures such as the TILS (Matthews-ewald & Zullig, 2013). Other studies have suggested possible interventions to ease the college transition for students. Mattanah et al. (2010) investigated a cost-effective peer-led social support intervention program aimed to positively affect students' social adjustment to college. The intervention program consisted of nine peer-led group sessions where college transition-related subjects, such as "creating new social ties" and "balancing work, academics, and social life", were discussed among the students (Mattanah et al., 2010). The study found no difference in overall adjustment between students from the intervention group and students who had not participated in any intervention (Mattanah et al., 2010). However, students from the intervention group were found to be significantly less lonely ($t(58.6) = -3.13$, $p < .01$, $d = -.53$) than the no-intervention group (Mattanah et al., 2010). Thus, a peer-led social support group may protect college students from experiencing loneliness during the college transition. Further, meeting fellow students in a peer-led support group may help college students who attribute their experience of loneliness to features within themselves. Accordingly, when students meet peers struggling with problems similar to themselves and discuss those problems collectively, the result may be an alternative understanding of their personal problems. Another study, Rosenstreich and Margalit (2015), found that loneliness among college students correlated negatively with recognition memory (important for learning new things) and grades, and further investigated whether a *mindfulness-intervention* could protect against these negative effects of loneliness. In the study, lonely students who participated in the mindfulness group were found to have significantly higher average grades than lonely students in the control group ($\beta = .570$, $p < .001$) (Rosenstreich and Margalit, 2015). Accordingly, a mindfulness group may protect students against the negative effects of loneliness on academic achievement at college.

Theories on loneliness each conceptualizes loneliness as an either uni- or multidimensional phenomenon. Russell (1982) has argued that different theoretical approaches may arrive at different dimensions because they investigate different aspects of the same phenomenon. In the present study, a unidimensional scale was used to assess loneliness as a global experience, and both unidimensional and multidimensional theories was used to attempt to explain the different paths to

this experience. Thus, uni- and multidimensional theories can be used to investigate different aspects of loneliness, and both approaches are therefore useful when investigating the phenomenon. Future studies should seek to further investigate the relationship between uni- and multidimensional approaches to loneliness to shed light on the differences and similarities of these approaches, and thus, provide a deeper understanding of the phenomenon.

5. Bibliography

The literature used in this thesis includes a total of 1654.9 standard pages of literature. This total includes 1013.2 standard pages of primary literature and 641.7 standard pages of secondary literature. In the following bibliography, the standard pages of each article is listed in the end of each reference in boldface.

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