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Development of the Revised WHOQOL-BREF Quality of Life Assessment: Towards a Mediation Model on Quality of Life and Posttraumatic Stress

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To my mother Chryso and my brother Stavros

Declaration

I hereby declare that the current thesis was of my own composition, except where explicitly acknowledged in the text and references, and has not been submitted in any previous application for a degree. Part of the data presented in this thesis were obtained from studies carried out in Brazil, China, Portugal, and Turkey as part of the WHOQOL-BREF-Revised project, while the secondary data were acquired from the World Health Organization. I played a major role in the project as the main coordinator, and the data analysis and interpretation are entirely my own work.

Margarita Panayiotou

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Abstract

The adverse consequences of posttraumatic stress on quality of life have been well documented. It is, however, possible that it is not the intrusive re-experiencing and hyperarousal posttraumatic stress symptoms that have an impact on quality of life per se, but the inflexible efforts to avoid internal experiences and emotions related to the traumatic event, and the way these emotions are expressed and experienced. Previous research shows that both experiential avoidance and emotion regulation have been found to be etiologically central to the development and maintenance of psychological problems in trauma survivors. The degree to which experiential avoidance and emotion regulation act together as toxic underlying mechanisms to explain the relationship between posttraumatic stress and quality of life is, however, yet to be examined. Quality of life is now regarded as an important outcome variable across a broad range of conditions and problem areas. The quality of life concept has generated a large body of research and yet its assessment has been a challenge for researchers. The WHOQOL-BREF is considered to be one of the few genuine quality of life measures but it has received much criticism, especially regarding the poor psychometric performance of its social relationships domain.

The aim of the current thesis was twofold. The first aim involved the revision of the WHOQOL-BREF through the enhancement of the social relationships domain. In Study I 986 ill and healthy individuals from five countries worldwide completed the Pilot Revised WHOQOL-BREF (WHOQOL-BREF-R) along with measures of life satisfaction, anxiety, and depression for the detailed psychometric analysis of the scale. Study I confirmed the limitations of the social relationships domain, and despite its improvement, the performance of the overall scale was found to be poor. In fact, findings from modern and robust techniques challenged the 4-factor structure of the WHOQOL-BREF. Instead, results supported the performance of a 3-factor solution, which led to the development of a psychometrically sound measure.

Study II is preceded by a systematic review of the literature investigating experiential avoidance as a mediator in trauma survivors with posttraumatic stress. Ten studies were identified and organised in two categories assessing experiential avoidance as a mediator between: 1) trauma exposure and posttraumatic stress, and 2) posttraumatic stress and maladaptive behaviours. Findings suggest that the development and maintenance of posttraumatic stress symptoms and maladaptive behaviours in the aftermath of trauma can be explained through the use of experiential avoidance. Methodological limitations and future directions for research are discussed.

The WHOQOL-BREF-R was then used in Study II, which explored an integrative mediation model whereby experiential avoidance and emotion regulation were tested as mediators in the relationship between posttraumatic stress symptomatology and quality of life in trauma exposed adults. The two mediators were also explored for their overlapping relationship. A total of 360 participants from the community completed self-report measures of posttraumatic stress, experiential avoidance, emotion regulation, and quality of life. With the use of path analysis Study II found experiential avoidance and emotion regulation to be two distinct constructs that together act as an underlying mechanism explaining the impact of posttraumatic stress on quality of life. Alternative mediating models were explored.

The current study makes an important contribution in the area of trauma and in the conceptualisation and assessment of quality of life. Findings can be considered as a first step towards an integrative mediation model of toxic mechanisms in trauma and quality of life. Additionally, the favourable psychometric properties of the WHOQOL-BREF-R make it a powerful tool for use in quality of life research.

Chapter 1

Introduction

Individuals struggling with posttraumatic stress are faced with a great deal of internal and external pressure in the aftermath of trauma (Solomon, 1989). In fact, Posttraumatic Stress Disorder (PTSD) is one of the most costly health problems that significantly impair trauma survivors' functioning and quality of life (QoL) (Doctor, Zoellner, & Feeny, 2011; Ford, 2009). The detrimental effects of posttraumatic stress on trauma survivors' QoL has received increasing attention and ignited important research efforts to identify potential mechanisms that can explain the exacerbation of PTSD symptoms and the impairment in QoL and functioning observed in the aftermath of trauma.

A considerable theoretical and empirical work has been devoted into understanding whether individual coping styles can explain the development and maintenance of trauma-related psychopathology in trauma survivors. Several theories and studies suggest that individuals struggling with symptoms of posttraumatic stress often engage in maladaptive cognitive and behavioural coping styles in an effort to alleviate their symptoms (Ehlers & Clark, 2000; Walser & Hayes, 2006). To compensate, they avoid, suppress, or try to escape painful emotions, thoughts, and aversive private events. Although such strategies have been shown to be central in the area of trauma (Boden et al., 2013; Marx & Sloan, 2005), their role in the association between PTSD and QoL remains largely understudied. The present thesis attempts, therefore, to bring together existing theories and research into an integrative mediation model where two such coping styles, emotion regulation (ER) and experiential avoidance (EA) act as underlying mechanisms in the association between posttraumatic stress and QoL. Such a model would imply that it is not just the symptoms of PTSD that impair individuals' QoL, but the constant efforts to suppress emotions, and avoid unwanted painful thoughts, bodily sensations, and

private events. Although ER and EA are neither good, nor bad themselves, their inflexible use has been found to interfere with valued living, causing impaired functioning (Wilson & Dufrene, 2008).

The usefulness of QoL in assessing the course of trauma-related psychopathology following traumatic exposure has, thus, received increasing attention. For several years great effort has been devoted to the study of QoL, but has been limited by conceptual and methodological difficulties. Given the lack of universal definition, QoL can be defined and, therefore, assessed in diverse ways. Therefore, although there are hundreds of available QoL measures, many fail to address the broad range of domains important to individuals (Connell, Brazier, O'Cathain, Lloyd-Jones, & Paisley, 2012). The literature on QoL has, therefore, invoked concerns around the validity and comparability of existing QoL measures (Katschnig, 2006).

The brief form of the World Health Organization Quality of Life (WHOQOL-BREF) assessment appears to be one of the few genuine measures of QoL. Whilst it has been shown to represent a good approximation of the concept of QoL, the WHOQOL-BREF, but especially the social relationships domain, have received several criticisms regarding their poor psychometric performance (e.g. O'Carroll, Smith, Couston, Cossar, & Hayes, 2000). These limitations, along with the improvement in the science of scale construction, have highlighted the need for its revision, and provided the basis for the aims of the current thesis. Therefore, rather than using existing QoL measures, the current thesis sought to explore the proposed mediation model using an improved version of the existing WHOQOL-BREF.

The current work, thus, explored the possibility of developing a revised version of the WHOQOL-BREF by improving its problematic domain, which would then be used as the outcome variable in the investigation of the mediation model. The two-fold aim of the current thesis was explored in two separate studies within 14 chapters. Each study is presented within a theoretical background, aims, methodology, results, and discussion. Chapters 2 to 6 are devoted to Study I, while Chapters 7 to 13 are focused on the aims of Study II.

Chapter 2 provides an overview of the concept of QoL and its assessment. The area of QoL measurement is critically analysed and the theoretical and methodological background of the WHOQOL-BREF is presented. The limitations pertaining to the scale are thoroughly discussed. Chapter 3 provides a comprehensive account of the rationale and aims concerning the revision of the WHOQOL-BREF. Chapter 4 describes the methodological approach taken to address the aims of Study I, while Chapter 5 thoroughly presents the revision of the scale within three stages. The final chapter of Study I (Chapter 6) incorporates existing theories and evidence intro the interpretation of the results presented in Chapter 5. Suggestions for future research, and the limitations and methodological strengths of Study I are reported.

The theoretical background of PTSD, ER, and EA are reviewed in Chapters 7 and 8. Particular attention is paid to their association with post-trauma psychopathology and QoL. A systematic review on the mediating role of EA in trauma survivors with PTSD is presented in Chapter 9. Chapter 10 attempts to integrate existing theory and research into a mediation model of posttraumatic stress, EA, ER, and QoL, which sets the basis for the rationale and aims of Study II. Chapter 11 reports the methodological efforts employed to address the aims reported in Chapter 10, while in Chapter 12, the results and complementary analyses of Study II are thoroughly presented. Chapter 13 finalises Study II by drawing on current theoretical views of EA and ER and their role in PTSD and QoL to provide plausible interpretations for the results of Chapter 12. The limitations of Study II and possible implications for practice are described. Finally, Chapter 14 brings together the two studies and provides a general discussion and conclusions.

Study I

“I have yet to see any problem, however complicated, which, when you looked at it the right way, did not become still more complicated”

- Poul William Anderson

Chapter 2

Quality of life and its measurement: The World Health Organization quality of life measures

2.1 Quality of life

Given the increased life expectancy resulting from improved treatments, QoL is considered to be the goal of the 21st century (Clark, 2000). QoL has, however, been a major focus for longer. The consumer movement of the 1960's and 1970's (Quilty, Van Ameringen, Mancini, Oakman, & Farvolden, 2003) highlighted the inadequacy of conventional health measures to capture the comprehensive assessment of the patient, the disease, or the outcome of a therapeutic intervention (Basu, 2004). This stressed the need for the adequate conceptualisation and measurement of QoL (Basu, 2004).

It is believed that the first reference of the term "quality of life" was made in 1920 in a book about economics and welfare (Wood-Dauphinee, 1999). Later, in 1948, the World Health Organization (WHO; 2009) in their definition of health, acknowledged the importance of physical, mental, and social dimensions in one's well-being beyond the absence of disease. Although their definition of QoL came later, their reference to well-being led to the interchangeable use of well-being and QoL. Some attempts have been made into drawing a conceptual distinction between the two (e.g. Langlois & Anderson, 2002), and although the degree of overlap is unclear, the current chapter focuses exclusively on QoL.

2.2 Conceptual framework

The complexity and subjective nature of QoL is paralleled by the challenges involved in defining it. Although a familiar idea, the term of QoL has been notoriously difficult to define and operationalize (Basu, 2004). Even when it is defined QoL seems to vary according to each person's life story and personal

characteristics (Barofsky, 2012). Unsurprisingly, previous searches for a QoL definition were shown to yield inconsistent results (Reeves & Bednar, 1994). Hornquist (1989), for example, proposed QoL to be a perceived global satisfaction within physical health, social life, cognition, and family life, with emphasis on well-being. Others suggest that it is best conceptualized within the present and past experiences, dreams, ambitions, and hopes for the future, and it describes the gap between one's actual level of functioning and his/her ideal standards, expectations, hopes, and achievements (Calman, 1984; Cella, 1994). Due to the lack of a universal definition, QoL has been perceived as an umbrella term for decades (Feinstein, 1987).

One of the reasons pertaining to the difficulties of its definition is that QoL entails both subjective and objective aspects. While some suggest that QoL assessment should only involve objective indicators, others reject the idea of objective-only assessment (Addington-Hall & Kalra, 2003; Barofsky, 2012; Bjordal, Freng, Thorvik, & Kaasa, 1995; Slevin, Plant, Lynch, Drinkwater, & Gregory, 1988). The objective assessment of QoL tends to underestimate the impact of psychological aspects (e.g. the impact of pain) while overestimating the importance of physical symptoms and toxicity (Fayers & Machin, 2007). It, therefore, seems unlikely that QoL would be determined by one's objective life condition, rather by the subjective appraisal of one's life condition (Moons, Budts, & De Geest, 2006). This is supported by the disability paradox by which disabled people who seemingly live an undesirable life experience good QoL against all odds (Albrecht & Devlieger, 1999).

Despite the on-going debates on how best to conceptualize QoL, there seems to be a degree of consensus regarding its basic features. Overall, QoL is believed to be a patient-perceived (Berlim & Fleck, 2003; Fayers & Machin, 2007; Moreiras-Plaza, Blanco-Garcia, Cossio-Aranibar, & Rodriguez-Goyanes, 2011), multidimensional construct that encompasses physical, psychological, and social functioning, and the individual's overall appraisal of his/her health, well-being, and life circumstances (Cella, 1994; Fayers & Machin, 2007; Moreiras-Plaza et al., 2011).

The absence of a consensual definition led experts from 15 countries in an effort to develop a definition that would capture the fundamental characteristics of QoL. They defined it as:

> "The individual's perception of his/her position in life in the context of the culture and value systems in which he/she lives and in relation to his/her goals, expectations, standards and concerns. It is a broad ranging concept affected in a complex way by the person's physical health, psychological state, level of independence, social relationships and their relationship to salient features of their environment" (The WHOQOL Group, 1994, p. 21).

The need for a broader and more balanced QoL definition has resulted in widespread adoption of WHO's definition (Bowling, 2003), as it seems to be one of the very few that takes into account the multidimensional nature of the concept. It includes dimensions above and beyond those described in the literature (e.g. Cella, 1994), while taking into account the individuals' subjective evaluations and satisfaction with their life (The WHOQOL Group, 1995).

2.3 Quality of life assessment

For years modern medicine focused on assessing the change in patients using clinical or biological tests (e.g. blood pressure) (Basu, 2004; Higginson & Carr, 2001). Some of these tests, however, appear to be of little interest or apparent long-term value to patients (Clark, 2000). Although they offer important information about one's health and pathological process, they are unable to separate the pathology from the patient's social context (Basu, 2004). Prolonging the life of a patient may be considered a successful outcome. However, the patient might feel that those years are not worth living (Basu, 2004; Higginson & Carr, 2001). Many cancer patients, for example, whose lives were prolonged or even saved may have to cope with pain, disfigurement, and severe side effects from chemotherapy (Fayers & Machin, 2007). Although no one can deny the importance of health improvement, it has become clear that it may be more important for the patient to restore family relationships,

have good functioning, or be able to engage in leisure activities (Michalak, Yatham, & Lam, 2005).

QoL studies started in the early 1960s with the frequency in publishing picking up during the 1980s (Naughton & Shumaker, 2010). As of today, thousands of studies have been conducted with QoL being the variable under study. The increased interest in assessing QoL has, however, highlighted the need for a more comprehensive conceptual clarification and for measures that integrate its important dimensions.

2.3.1 Properties of measurement

The choice of an instrument should always be guided by its appropriateness and good psychometric qualities, if the concept of QoL is to be accurately measured. A scale is known to be reliable when each of its items is measuring the same variable (i.e. internal consistency) and when its scores are consistent over time (test-retest reliability) (Kline, 2000a). Given however the longitudinal nature required to assess the test-retest reliability of a measure, many researchers opt for the assessment of internal consistency. In reality, however, many scales are found to have poor internal consistency (Kline, 2000b). Given that this would imply considerable error of measurement, such instruments should not be used unless there is clear evidence of validity (Raykov & Marcoulides, 2011).

Scale validity highlights an important gap between the concept an instrument is meant to represent, and what it truly measures (Barofsky, 2012). Validity, therefore, indicates whether an instrument measures what it claims to measure (Fayers & Machin, 2007; Raykov & Marcoulides, 2011). Traditionally, three types of validity are considered: The content, criterion, and construct validity. Content validity assesses the extent to which the items adequately represent all the domains of interest (Raykov & Marcoulides, 2011), while criterion validity occurs when a scale is associated with an external criterion (Raykov & Marcoulides, 2011). Construct validity can be assessed through convergent validity, which captures the degree to which a scale correlates substantially with measures that is expected to relate with (Kline, 2000b). Conversely, the absence of correlation with unrelated instruments

would indicate discriminant validity (Kline, 2000a). Due to its simplicity, convergent validity is one of the most assessed forms of validity. Of course, the lack of an agreed definition would lead to difficulties in establishing the validity of QoL measures.

QoL measures that are used routinely in patients undergoing treatment (Guyatt, Veldhuyzen Van Zanten, Feeny, & Patrick, 1989) need to be sensitive and responsive. A scale should be sensitive enough to detect, for example, changes between treatment groups, or between clinical and control groups (Fayers & Machin, 2007). On the other hand, a responsive measure should be able to detect changes within patients over time in response to treatments or improvement (Fayers & Machin, 2007; Higginson & Carr, 2001). The latter is considered to be a crucial requirement for a scale especially in situations where intervention is expected to improve patients' QoL (e.g. clinical trials; Basu, 2004; Fitzpatrick et al., 1992). This, however, highlights the tension between a measure's responsiveness and test-retest reliability. Ideally, a QoL measure should be stable under the same conditions across time but also responsive to treatment where changes are expected to occur.

2.3.2 Quality of life measures

The efforts for the development of QoL measures started in the early 1970s (Wood-Dauphinee, 1999) and since that time, numerous generic and disease-specific QoL instruments have been developed. Generic scales are applicable across various populations, health problems, and medical treatments and interventions, as they cover the complete spectrum of impairment that is relevant to QoL (Basu, 2004; Fayers & Machin, 2007; Guyatt et al., 1989; Robinson, Carr, & Higginson, 2003). This means, however, that they might be less applicable in specific diseases as they overlook domains that are important to specific groups of people (Basu, 2004; Robinson et al., 2003). Disease-specific QoL measures overcome these limitations, as they are designed to assess issues and detect changes related to specific diseases (Basu, 2004; Fletcher et al., 1992). Unlike generic measures, they are, however, unsuccessful in comparing results between different diseases (Basu, 2004; Fletcher et al., 1992). Thus, whilst disease-specific scales can offer important complementary

data (Robinson et al., 2003) some support the use of generic instruments as the main tool in clinical trials and outcomes (Berlim & Fleck, 2003). Of course, the decision should always be driven by the aims of the study. If, for example, a study's main focus is to assess change within a condition, then a disease-specific scale may be more appropriate.

2.4 Quality of life criticisms

Despite the successful application of QoL in research and clinical work, a number of methodological issues are yet to be resolved (Katschnig, 2006). One of the issues in QoL measurement deals with the interchangeable use of the concepts of QoL and health status. Unlike QoL measures, tools of health status (e.g. EQ-5D; SF-36) focus on physical symptoms, disability, and impairment, and assume that poorer health indicates poorer QoL (Carr, Gibson, & Robinson, 2001; Fayers & Machin, 2007). Thus, although they were initially designed to assess health status many researchers use them to measure what they call health-related QoL (HRQOL) (Moons et al., 2006). Although the concept of HRQOL is debatable, a substantial part of the literature is devoted to it. Despite their association, QoL and health status appear to be two distinct terms (Moons, Van Deyk, De Geest, Gewillig, & Budts, 2005; Smith, Avis, & Assmann, 1999), which is supported by studies suggesting that poor health status does not necessarily reflect poor QoL (see disability paradox; Albrecht & Devlieger, 1999). The concept of HRQOL, therefore, creates ambiguity in the literature of QoL (Moons, 2004) and may have significant implications in its measurement (Smith et al., 1999). By focusing merely on health-related status other important non-medical dimensions may be overlooked (Moons, 2004). Thus, unless the focus of the study is specifically on perceived health, health status measures may be inappropriate for assessing QoL (Smith et al., 1999). The conceptual and methodological challenges imposed by the ambiguity in the term of HRQOL needs to be, therefore, addressed, as the use of inappropriate measures may lead to incorrect conclusions.

Another issue concerns the challenge posed by the assessment of QoL. Due to the absence of a universal definition, the term itself can be defined, and therefore

measured, in diverse ways (Connell et al., 2012). Although there are a great number of available QoL measures, many fail to address the complexity of QoL measurement and the broad range of domains important to people (Connell et al., 2012). Therefore, the degree to which the results obtained from different QoL instruments are valid and comparable, remains unclear (Katschnig, 2006).

QoL remains confusing to many, as it appears to be a term describing a field of interest rather than a single variable (Katschnig, 1997), and it is, therefore, worth considering whether the broad term of QoL can be in fact conceptualized by only one definition. Pinpointing, however, an agreed definition would possibly enable the development of more valid measurements, which may advance this important area of research.

2.5 The WHOQOL

Considering the lack of a universal QoL instrument, the WHOQOL group initiated the development of a QoL measure with numerous dimensions that would be salient and applicable worldwide. Their projects resulted in what today are known to be the WHOQOL instruments (Skevington, Sartorius, Amir, & The WHOQOL Group, 2004b). Taking into account several considerations, the WHOQOL project recognized that in recent years the emphasis on health measurement has been broadened to include more than just the traditional assessments of morbidity and mortality (Saxena & Orley, 1997; The WHOQOL Group, 1994). Some of the assessments that went beyond physical health status merely examined functional status, rather than the broader concept of QoL (The WHOQOL Group, 1998b). Beyond that, several health status measures tend to be applicable in particular cultural and linguistic populations, which makes cross-cultural comparisons difficult (Saxena & Orley, 1997; The WHOQOL Group, 1994, 1995). In 1991, the WHOQOL developed a generic QoL instrument that was believed to cover important aspects of QoL and be applicable across cultures, diseases, age, and socioeconomic status (Bonomi, Patrick, Bushnell, & Martin, 2000b; The WHOQOL Group, 1998b).

2.5.1 The WHOQOL methodology

The methodology implemented for the development of the WHOQOL instruments is considered to pertain several unique features. First, health professionals, patients, healthy members, and QoL experts were all involved at each stage of the development, thereby assuring user acceptability and representation of important viewpoints (Saxena & Orley, 1997; The WHOQOL Group, 1995). Additionally, the WHOQOL methodology enabled the simultaneous development of the instruments in 15 countries across the world (Saxena & Orley, 1997; The WHOQOL Group, 1994). In fact, the WHOQOL project is considered to be one of the few to simultaneously develop a generic QoL instrument across multiple countries and languages (Bonomi, Patrick, Bushnell, & Martin, 2000a). Given the increased joint clinical trials between countries (Shimozuma, 2002), their initiative was considered important due to the great need for a multicultural QoL scale.

Another unique feature of the WHOQOL method is the translation technique. The method usually employed by other QoL measures involved the development of the instrument in one language followed by its translation into other languages (Power, Bullinger, Harper, & The WHOQOL Group, 1999). The translation method used by the WHOQOL group managed, however, to replace such commonly used methods. "Rather than simply developing an assessment in one language and translating it into other target languages, the aim was to simultaneously develop the assessment in several different cultures and languages" (The WHOQOL Group, 1998b, p. 1570).
The translation of the WHOQOL instruments in more than 20 languages enables the assessment and comparison of QoL between different cultures and languages. Of course, differences between countries are to be expected. The degree, however, to which the WHOQOL group accounted for the cultural diversity that exists within countries (see Leplège & Hunt, 1997) is unclear.

2.5.2 The pilot and field work

After achieving consensus on the definition of QoL, the pilot testing included defining the domain and facet structure of the instrument, drafting relevant questions, and developing response scales for the different language versions (The WHOQOL

Group, 1998b). With the coordination and technical support of the WHO group in Geneva, every stage of the project was carried out simultaneously in each centre[1] using common protocols (The WHOQOL Group, 1998b). Focus groups consisting of patients and healthy individuals were asked to report their views about each facet (The WHOQOL Group, 1998b). Ultimately, the choice of dimensions was consensually decided among health professionals, and healthy and ill individuals across all centres (Saxena & Orley, 1997). The suggestions of each centre led to the initial draft of 1800 questions out of which a 236-item scale was developed (The WHOQOL Group, 1994). During the field study all centres were instructed to administer the 236-item WHOQOL measure to 300 adult individuals (50% women, 50% men), 50 of which were healthy and 250 were classified as having a disease or impairment (The WHOQOL Group, 1998b). After a series of analyses the 236 items were reduced to form the final 100-item WHOQOL scale (Saxena & Orley, 1997; The WHOQOL Group, 1995).

2.6 The WHOQOL-100

The WHOQOL-100 is considered to be a generic multidimensional, multi-lingual and multicultural QoL measure designed to assess QoL within 24 facets in healthy individuals and in a wide spectrum of psychological and physical disorders (Saxena & Orley, 1997; Skevington & Wright, 2001). Respondents are asked to judge their QoL based on the past two weeks using a 5-Likert scale (e.g. “Very satisfied” - “very dissatisfied”) (Power et al., 1999). Despite the clear instructions, it would be impossible, however, to control whether participants’ judgments are indeed based on the past two weeks, as it has been suggested that individuals use their momentary affective state to make judgments about their QoL (Katschnig, 2006). For example, a manic patient would rate his/her subjective well-being and social functioning as favourable (Katschnig, 2006).

A QoL profile is constructed based on six basic domains (24 facets) and one general domain assessing overall QoL (e.g. “How important to you is your overall quality of

[1] WHO centres constitute organizations such as universities, or hospitals located in multiple countries. In some countries the study was carried out in more than one centre.

life?") and general health (e.g. "How satisfied are you with your health?") (Harper & Power, 1998). The six domain scores denote an individual's perception of QoL in regards to the following domains: Physical, psychological, level of independence, social relationships, environment, and spirituality (see Table 2.1). The domain and facet scores are scaled in a positive direction with higher scores indicating better QoL. Each of the 24 facets can be characterized as a description of a behaviour, a state of being, a capacity or potential, or a subjective perception or experience. The definitions of each facet are described in detail in the WHOQOL manual (Harper & Power, 1998).

Table 2.1 *The domains and facets of the WHOQOL-100*

Domain	Facets
I. Physical	Pain and discomfort
	Energy and fatigue
	Sleep and rest
II. Psychological	Positive feelings
	Thinking, learning, memory and concentration
	Self-esteem
	Bodily image and appearance
	Negative feelings
III. Level of independence	Mobility
	Activities of daily living
	Dependence on medicinal substances and medical aids
	Work capacity
IV. Social relationships	Personal relationships
	Sexual activity
	Social support
V. Environment	Physical safety and security
	Home environment
	Financial resources
	Health and social care: Accessibility and quality
	Opportunities for acquiring new information and skills
	Participation in and opportunities for recreation/ leisure activities
	Physical environment (pollution/noise/traffic/climate)
	Transport
VI. Spirituality/personal beliefs	

2.6.1 The WHOQOL-100 in research

The multidimensional WHOQOL-100 has been successfully applied across various conditions including inherited metabolic disease (Cazzorla et al., 2012), schizophrenia (Örsel, Akdemir, & Dağ, 2004), depression (Skevington & Wright, 2001), chronic pain (Skevington, 1998), and epilepsy (Giovagnoli, Parente, Villani, Franceschetti, & Spreafico, 2013). Using the WHOQOL-100, Angermeyer, Holzinger, Matschinger and Stengler-Wenzke (2012) found a close association between changes in the depression severity and QoL, but especially psychological QoL. Given that the psychological domain contains items related to depression symptomatology (e.g. "How important to you is it to be free of negative feelings (sadness, depression, anxiety, worry...)?"), the interpretation of such results needs, however, to take into consideration the possible overlap between the measures used. In such cases it is recommended to assess the correlations between QoL measures and psychopathological symptoms for possible spuriousness because of item overlap (Katschnig, 2006). In order to ensure that the total scores of a QoL measure reflect accurately the proposed concepts, researchers should also explore the associations of interest in each domain independently. For instance, Den Oudsten, De Vries, Van der Steeg, Roukema, and Van Heck (2009) found that in a sample of women with breast cancer, the domains and facets of the WHOQOL-100 had a different contribution to the overall QoL, across different treatment points. Such longitudinal studies can provide important information as to which domains of one's life are affected the most during the disease and its treatment.

2.6.2 Strengths and limitations

Although the WHOQOL-100 was possibly the first measure to shift the focus from the traditional health status and well-being to the multidimensional nature of QoL (Bonomi et al., 2000b), its strengths and limitations are worth noting. Existing evidence supports the valid and reliable use of WHOQOL-100 as a QoL instrument. Given, however, that the internal consistency of a scale is highly affected by the number of items, the WHQOOL-100 was expectedly found to possess very high internal consistency in many studies (e.g. Bonomi et al., 2000b; Skevington, 1998; The WHOQOL Group, 1998b). Evidence also supports the universality of the core

WHOQOL-100, as the questions designed specifically for some cultures (also known as national items) were shown to perform no better than the general questions (The WHOQOL Group, 1998b). Additionally, while existing instruments focus on unhealthy or negative conditions (Hörnquist, 1989), the WHOQOL-100 addresses both the negative and positive aspects of one's QoL.

Finally, the WHOQOL-100 was found to be responsive to change (Bonomi et al., 2000b), while the majority of its facets were found to successfully discriminate between groups of people (i.e. known-groups validity) (Bonomi et al., 2000b; Murphy & Murphy, 2006; Skevington, 1998). Nevertheless, some issues need to be taken into account when interpreting such results. The erroneous reference of the known-groups validity as discriminant validity in many studies (e.g. Bonomi et al., 2000b) might lead to wrong conclusions. While the known-groups validity of an instrument is important, the wrong interpretation of the analysis might disguise problems with the construct validity of the scale, which as a consequence may not be explored and addressed.

In the validation study by Bonomi et al. (2000b) some of the WHOQOL-100 facets (e.g. pain, spirituality) were found to correlate more highly with other domains than their own. Although such results were not anticipated, they raise the question of whether an overlap between domains should be in fact expected, and if so, how much overlap would be acceptable. In the area of scale development this poses a significant tension between psychometric validity issues and approximations of reality. While from a theoretical standpoint a QoL measurement with no overlaps would be more desirable, in reality this may be neither possible nor pragmatic.

Another limitation of the WHOQOL-100 concerns its length, which might not be appropriate in studies with large protocols, or in studies with repeated administration. Severely ill or elderly individuals may also find it daunting to respond to 100 items. Although it can offer a comprehensive image of QoL, in such instances a briefer QoL instrument would be preferable.

2.7 Development of the WHOQOL-BREF

On account of the aforementioned limitations, the WHOQOL group set to develop a shorter version of the WHOQOL-100 scale to be used in studies where a brief QoL assessment would be more useful and efficient (see The WHOQOL Group, 1998a for details on the development). The pilot and field WHOQOL-100 data plus data from additional five countries that field-tested the WHOQOL-100, were used to select the items for the so-called WHOQOL-BREF. Similar to the WHOQOL-100 field-study, the new instrument was administered to a minimum of 300 individuals across the 20 participating centres. The same sampling quota was applied as to include 50% male, 50% female, 50% below the age of 45, 50% above the age of 45, 250 individuals with disease or impairment and 50 healthy individuals.

For consistency, it was agreed that at least one question from each of the 24 WHOQOL-100 facets should be included in the new scale. The items selected from each facet were the ones that correlated most highly with the mean facet scores. Collectively, results pointed to a 26-item scale (two general and 24 specific items) grouped under four domains: Physical, psychological, social relationships (sometimes referred to as social domain), and environment. Although the WHOQOL-100 was initially developed to assess six domains of QoL, The WHOQOL Group (1998b) concluded, with the use of the eigenvalue rule, that the model would be better represented by four domains. Given however the numerous drawbacks related to the eigenvalue rule (e.g. Zwick & Velicer, 1986), their choice on how many factors to retain is questionable. The WHOQOL-BREF is completed using the same 5-point Likert scale as that of WHOQOL-100, with higher scores indicating better QoL.

2.7.1 WHOQOL-BREF in research

Given the extensive amount of references regarding WHOQOL-BREF, its applicability in various populations and cultures becomes increasingly evident. This is not surprising, as it comprises important dimensions that are often omitted from other disease specific measures (Lucas-Carrasco, Skevington, Gómez-Benito, Rejas, & March, 2011c). The successful assessment of QoL using the WHOQOL-BREF has

been documented in a number of diseases and medical conditions, including, but not limited to, traumatic brain injury (Lin et al., 2010), dementia (Lucas-Carrasco et al., 2011c), HIV/AIDS (Wig et al., 2006), and hemodialysis (Abraham & Ramachandran, 2012). In a study with Parkinson's disease patients, Hirayama, Gobbi, Gobbi, and Stella (2008) found that different aspects of patients' QoL are affected depending on the transitional periods of the disease progression. Such findings are important, as they can help to better tailor the health care assessment and treatment of patients (Hirayama et al., 2008).

It has been suggested that generic QoL tools fail to address the complexity of QoL measurement and the broad range of domains important to mental health populations (Connell et al., 2012). Although the WHOQOL-BREF is indeed a generic QoL measure, mental health patients were involved in the focus groups during its development to ensure the inclusion of their viewpoints (see The WHOQOL Group, 1998b). In a study with patients with long psychiatric history, van de Willige, Wiersma, Nienhuis, and Jenner (2005) found the WHOQOL-BREF to be more equipped for research in the area of mental health, compared to other instruments such as the EQ-5D (Brooks & EuroQol Group, 1996). Of course, generic measures are not expected to be adequate for all mental health disorders (Brazier, 2010). However, generic measures such as the EQ-5D and SF-36 (Ware, Snow, Kosinski, & Gandek, 1993) were found to be more problematic for use in populations with more severe and complex mental health disorders (Brazier, 2010; Connell et al., 2012). Conversely, a study with patients suffering from psychosis documented that the WHOQOL-BREF was completed with minimal difficulty by people having persisting psychotic disorders, even by those with significant symptoms of disability and lower educational background (Herrman, Hawthorne, & Thomas, 2002). Additionally, QoL as measured by the WHOQOL-BREF was found to be associated with eating pathology, as women at high risk for developing an eating disorder, or those with high levels of body dissatisfaction appear to experience poor QoL (Mond et al., 2013; Sanftner, 2011). It is however important to note that in cases where the WHOQOL-BREF domains are found to highly correlate with mental health symptoms (e.g. Naumann & Byrne, 2004), results should be interpreted with caution.

The usefulness of WHOQOL-BREF as a QoL tool was further supported by longitudinal studies. The detrimental aftermath of the 1998 earthquake in Zhangbei-Shangyi district, China was assessed in respect to the longitudinal change in trauma survivors' QoL (Wang et al., 2000). Results indicated that exposure to a natural disaster can significantly impair QoL at different levels throughout time. Contrarily, however, the QoL of individuals with lower limb amputation was found to remain stable across time (Coffey, Gallagher, & Desmond, 2014). As the authors suggest this is attributed to the gradual change in individuals' values and definitions of what constitutes good QoL. In a study by Cankurtaran, Ulug, Saygi, Tiryaki, and Akalan (2005) the levels of QoL of epileptic patients were assessed before and after receiving surgical treatment. The WHOQOL-BREF efficiently detected the positive effects of treatment, as patients relieved from seizures reported better QoL. Similar results from studies with rheumatoid arthritis patients (Taylor, Myers, Simpson, McPherson, & Weatherall, 2004) and women receiving substance abuse treatment (Tracy et al., 2012) can be considered as further evidence for the usefulness of WHOQOL-BREF as an outcome functioning measure before, during, and after the course of treatments.

2.7.2 Strengths and limitations

The unique and multilevel structure of the WHOQOL-BREF appears to resemble the pyramidal model of QoL proposed by Spilker and Revick (1996) presented in Figure 2.1. The top of the pyramid may be considered to represent the overall QoL, as measured by the two general items, and the total score. The four domains can be described by the middle level, while the lowest level would represent the components of each domain (e.g. physical pain). Increasing evidence supports its significant multilevel design. Whilst the WHOQOL-BREF was primarily developed on younger populations, evidence supports that older people can respond to it with minimal difficulty (Hwang, Liang, Chiu, & Lin, 2003; Naumann & Byrne, 2004). It has been shown to be valid in medical conditions (e.g. Jang, Hsieh, Wang, & Wu, 2004), however, evidence supports that it can assess the QoL of not only ill but also healthy individuals, compared to other health-status oriented measures (Huang, Wu,

& Frangakis, 2006). Additionally, it was found to be valid and stable over time (Bonomi et al., 2000b; Naumann & Byrne, 2004).

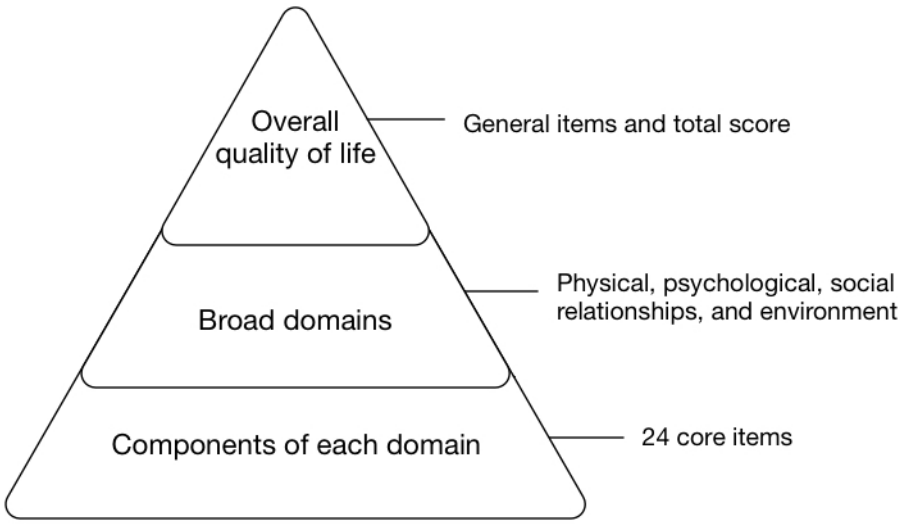

Figure 2.1 The pyramidal model of WHOQOL-BREF. Figure adopted from Spilker and Revick (1996) and modified for the present study.

However, as with the WHOQOL-100, the literature on WHOQOL-BREF invokes issues about the inaccurate use of the term "discriminant validity". Many of the studies assessing the psychometric qualities of the WHOQOL-BREF, but also of other instruments (e.g. Schatz et al., 2006), describe discriminant validity as the degree to which a scale can discriminate between groups of people. In fact, Jang et al. (2004) proposed that discriminant validity is "used to examine differences between different groups completing the same instrument" (p. 1892). However, the reference which their statement was based on (i.e. see Fayers & Machin, 2000) does not state that. On the contrary, Fayers and Machin (2000) propose that discriminant validity "recognizes that some dimensions of QoL are anticipated to be relatively unrelated, and that their correlations should be low" (p.52). It is the extent to which a measure does not correlate with instruments of other constructs from which is theoretically or empirically distinct (Goodwin, 2010; Raykov & Marcoulides, 2011; Simms & Watson, 2007). Therefore, some of the studies claiming to have measured

the discriminant validity of the WHOQOL-BREF, including the original ones (Skevington, Lotfy, & O'connell, 2004a; The WHOQOL Group, 1998a), have in fact measured its known-groups validity (e.g. Hwang et al., 2003; Jang et al., 2004; Taylor et al., 2004; Trompenaars, Masthoff, Van Heck, Hodiamont, & De Vries, 2005; Yao, Chung, Yu, & Wang, 2002), that is, the degree to which it can differentiate between groups (Raykov & Marcoulides, 2011). Notably, only few studies have accurately used the term known-groups validity (e.g. Berlim, Pavanello, Caldieraro, & Fleck, 2005; Huang et al., 2006; Ünal et al., 2001). To the authors' knowledge, studies assessing the discriminant validity of the WHOQOL-BREF are scarce (see Huang et al., 2006; Ünal et al., 2001), therefore, results from the aforementioned studies should be interpreted with caution.

In the area of scale development there has always been the ambition to gather as much information as possible from an instrument containing as few items as feasible (van de Willige et al., 2005). The transformation of long questionnaires into abbreviated ones highlights, however, the tension between efficiency on one hand and reliability/validity on the other (van de Willige et al., 2005). The appealing short form of the WHOQOL-BREF enables its use in large epidemiological studies, in situations with restricted time, and in populations having difficulty with long scales (O'Carroll et al., 2000; The WHOQOL Group, 1998a). Concerns were, however, raised as to whether the reduction of the WHOQOL-100 to the WHOQOL-BREF would diminish the new scale's responsiveness (O'Carroll et al., 2000). Although it is comprised of only 26 items, evidence substantiates the high sensitivity of the WHOQOL-BREF in small changes (Herrman et al., 2002; O'Carroll et al., 2000). In contrast, however, the responsiveness of the 3-item social relationships domain was found to be significantly lower than that of the overall WHOOQL-BREF (O'Carroll et al., 2000).

There are, in fact, several limitations regarding the social domain that require further attention. Apart from the original WHOQOL-BREF studies (Skevington et al., 2004a; The WHOQOL Group, 1998a), the social relationships domain was shown to exhibit unacceptable internal consistency in many studies (e.g. Jang et al., 2004;

Nedjat, Montazeri, Holakouie, Mohammad, & Majdzadeh, 2008; Trompenaars et al., 2005). It was also found to possess poor known-groups (Jang et al., 2004) and convergent validity (Naumann & Byrne, 2004). These weaknesses, which are more apparent in one of the domain's items about sexuality, raise the question of whether additional items should be added in the social domain. For example, while the WHOQOL-BREF can be successfully used in older populations, some participants were reluctant in responding to the question concerning sex life (i.e. "How satisfied are you with your sex life") (Naumann & Byrne, 2004). In a study by Hwang et al. (2003), older participants perceived that item to be assessing sexual intercourse only, which as found in other studies tends to have less importance for older people. For some, this is attributable to their expectations around "normal aging", the increased prevalence of barriers that result in the reprioritization of sex, and the long-term relationships that facilitate coping when sexual activities are reduced or stopped altogether (Gott & Hinchliff, 2003). Hwang et al. (2003), therefore, suggested altering this item into including intimate activities as well. The problematic nature of items concerning sexuality is paralleled by the high rates of missing data in QoL instruments besides the WHOQOL-BREF (see Fayers & Machin, 2007; Ünal et al., 2001). Therefore, one of the concerns related to the social relationships domain is the lack of thorough consideration of the sensitive and personal context that characterizes sexuality. Still, even if the reported limitations are attributable to its sensitive context, these results cast doubts as to whether it is worth including items of sexuality at the cost of high missing data values. While missing data might indicate severe problems with one's QoL, they are often underestimated (Fayers & Machin, 2007). Therefore, given the issues related to missing data, one must question whether satisfaction with social relationships can be fully conceptualized in the absence of sex life measurement.

The aforementioned limitations reflect the methodological weaknesses of the WHOQOL-BREF. This can be attributed to the fact that the social domain is composed of only three questions compared to the twelve that comprise that of WHOQOL-100. From a structural framework standpoint three is considered to be the minimum required number of items for a domain (Kline, 2011; Raubenheimer,

2004). For instance, internal consistency results should be interpreted with caution as Chronbach alpha values depend highly upon the number of items in a scale (Cortina, 1993). Given however that domains with less than three items are weak and unstable, it is often suggested to include five strong items within a domain (Costello & Osborne, 2005). It is therefore not surprising that in some studies, the fit of the WHOQOL-BREF structure was found to be poor (e.g. Hwang et al., 2003; Yao et al., 2002)[2].

2.8 The WHOQOL modules

Although the generic WHOQOL instruments can successfully assess QoL across many diseases, the WHOQOL group considered relevant to develop further add-on modules that would assess QoL in specific populations and diseases.

Given that the WHOQOL measures were developed in younger adults, it is possible that some areas important to older populations, have been overlooked (Power, Quinn, Schmidt, & the WHOQOL-OLD Group, 2005). In order to overcome this, the WHOQOL-Old group was brought together by experts in 22 countries worldwide in an effort to adapt the existing WHOQOL scales to older individuals. Based on previous WHOQOL guidelines for scale development, the WHOQOL-Old group conducted focus groups, item generation, pilot testing, item reduction, and field testing (see Power et al., 2005 for further information). Results pointed to a 24-item module grouped under six facets: Sensory abilities, autonomy, past, present and future activities, social participation, death and dying, fear pain before death. For instance, some of the questions included in the old module concerned death-related issues, which were shown to be of great importance to older adults (e.g. “How scared are you of dying?”).

The rationale followed for the development of the disabilities module (The WHOQOL-Disabilities module) was the same as that of the WHOQOL-Old module. A number of scientists sought to answer the question of whether generic QoL measurements are appropriate for use with people with intellectual or physical

[2] The structure of the WHOQOL-BREF will be further analysed in subsequent chapters.

disabilities (Power, Green, & The WHOQOL-Dis Group, 2010). The development of the disabilities module followed the same steps as the ones described in the WHOQOL-old module. Results from the pilot and field studies pointed to a 12-item unidimensional module that captures the way others treat individuals with disabilities and the impact the disability has on individuals' daily life and emotions (e.g. "Do you feel that other people accept you?").

These add-on modules can be used in conjunction with either the WHOQOL-100 or the WHOQOL-BREF. Increasing literature on both the old module (Conrad, Matschinger, Riedel-Heller, von Gottberg, & Kilian, 2014; Dragomirecká et al., 2008; Figueira, Figueira, Mello, & Dantas, 2008; Low & Molzahn, 2007; Lucas-Carrasco, Laidlaw, & Power, 2011a) and the disabilities module (Fadyl, McPherson, & Kayes, 2011; He, Fang, Fao, & Tao, 2014; Lucas-Carrasco et al., 2011b) supports their valid, reliable, and well suited cross-cultural use with older individuals and individuals with disabilities, respectively.

2.9 Conclusions

After years of empirical research, QoL is being recognised for its importance. The inadequacy of conventional health measures to capture important aspects other than symptom severity and health status has led researchers and clinicians to considering its inclusion as an outcome measure. With increased life expectancy, governments and health organizations, acknowledge, now more than ever, the vital role of QoL measurement in the comprehensive outcome evaluation and clinical decision making for improving individuals' functioning and QoL. The study of QoL is, however, limited by conceptual and methodological difficulties. The lack of a universal definition, and its interchangeable use with the concepts of health and well-being, creates confusion and ambiguity.

Being described as an umbrella term rather than a single concept, QoL can be assessed in many ways. Thus, the literature on QoL poses concerns regarding the applicability and validity of many of the existing QoL instruments. Certainly, a continual improvement in the study of QoL is needed. Considering all the available

QoL measures, the WHOOQL-BREF appears to be one of the few good and useful approximations of QoL with a successful application in various settings and populations. However, further research and development work is needed to overcome the scale's limitations. The next chapter describes how the present study aims to fill some of the gaps mentioned in the QoL and WHOQOL literature.

Chapter 3

Study I Rationale, aims and hypotheses

3.1 Can we measure quality of life?

The great appeal in the concept of QoL is couched in the several decades of empirical research, and can be considered evidence of the importance of QoL assessment. Most researchers now acknowledge that by integrating QoL assessment into clinical trials, adverse situations may be moderated or prevented, the outcome of treatment regimen optimised (Barofsky, 2012), and areas of health care requiring a closer scrutiny identified (Asadi-Lari, Tamburini, & Gray, 2004). Although most people understand the concept of QoL, as noted in Chapter 2, the lack of a consensual definition invokes important issues with its conceptualisation and measurement. That of WHOOQL appears to be one of the few unifying and cross-cultural definitions that cover several important domains within culture, value systems, goals and standards. However, the fact that QoL can be defined and measured in numerous ways raises doubts regarding the validity of existing QoL measures. Are existing tools truly measuring QoL? More, is it possible to actually measure the complex construct of QoL? To answer such fundamental questions one must take into account the fact that the definitions and measures of complex theoretical concepts such as that of QoL rarely represent reality. Whereas in reality QoL may portray numerous domains, in practice it merely represents a latent variable constructed by researchers. In one of the questions posed by Asadi-Lari et al. (2004), Kaplan suggested that it is the researchers and clinicians that categorise the world into parcels so as to make sense of it, and QoL happens to be one of those parcels. As he claims, when patients respond to a measurement, they are merely responding to its items. Thus, each response reflects what the researcher believes that the item is measuring. Therefore, despite the need for a universal definition of QoL, it is important to remember that there could be numerous acceptable definitions and measures, as they will all be an approximation of QoL.

Although there are hundreds of available measures, there always seems to be a need for further well-constructed QoL measurements (Bonomi et al., 2000a). Some of the existing QoL measures may represent a better approximation than others, however, the clear distinctions of health status tools as opposed to genuine QoL measurements should be taken into account before choosing which tool to implement. For instance, whereas the frequency and intensity of pain can be recorded by the widely used SF-36, the degree to which a patient's life is impacted by the pain could only be assessed by a QoL measure (Hamming & De Vries, 2007). In fact, the use of health status tools as QoL measures, when health status is not the main focus of the study, can lead to erroneous conclusions about one's QoL. An individual who is found to be more socially isolated because of his/her disease may appear to have a poor social QoL on the SF-36 due to the limited social contact (Hamming & De Vries, 2007). This, however, would not necessarily imply that the individual's social life is in reality impeded by the disease. The WHOQOL instruments, on the other hand, would be able to offer a better presentation of one's social QoL, as they assess feelings of loneliness and satisfaction over relationships (Hamming & De Vries, 2007). Therefore, one's subjective perceptions and satisfaction could only be addressed by a QoL measure.

3.2 Revising the WHOQOL-BREF

Shimozuma (2002) suggests that for the assessment of QoL it is important to adopt a measurement for which the reliability and validity have been confirmed. The WHOQOL-100 and its abbreviated form WHOQOL-BREF are considered to be among the few genuine QoL instruments with favourable psychometric qualities and applicability. As reviewed in Chapter 2, the WHOQOL-BREF research has, however, raised several doubts regarding its psychometric performance, more specifically, the performance of the social relationships domain. Given that to this day the availability of genuine QoL measures is limited, there is no doubt that the existing ones should continue to be evaluated and updated. When a scale is found to be inadequate for its intended users a revision is in order (Adams, 2000; Reise, Waller, & Comrey, 2000). It is, therefore, the overall aim of Study I to further evaluate the psychometric properties of the WHOQOL-BREF and overcome the

limitations found in the literature by developing a more psychometrically sound measure. Of course, before a revision of a widely used test is initiated, one must evaluate the goals and scope of possible modifications (Butcher, 2000). Given that the WHOOQL-BREF measure was developed nearly two decades ago, the objectives of Study I took into consideration the advances in the theory and method for the assessment of the construct in question (Adams, 2000).

3.2.1 Aims

"The task of revising a test should represent an opportunity to revisit the basic assumptions that guided its original development…" (Adams, 2000, p. 284). Therefore, the first objective of Study I aimed to review the development of WHOQOL-BREF from a psychometric standpoint. Although some hypotheses were proposed, the first aim was largely exploratory. A great part of the WHOQOL-BREF literature points to the inadequate psychometric performance of the social domain, however, it was considered essential to provide extensive documentation on the psychometric qualities of the instrument overall.

Aim 1: The psychometric properties of the WHOQOL-BREF were analysed using five datasets already held by the WHO with data from various cultures and samples. It was hypothesised that the social relationships domain would present unfavourable psychometric qualities.

Given that the alterations of a measure should be based on a clear empirical justification (Butcher, 2000), the second aim was based entirely on the results of the first aim. In respect to the limitations reported in the literature, the primary goal was to improve the psychometric properties of the measure. Thus, considering that the limitations of the WHOQOL-BREF were empirically confirmed in Aim 1, the second aim was to explore the possibility of enhancing the social relationships domain by adding more items. The additional items should, at a conceptual level, be able to represent the domain.

Aim 2: a) Items from the WHOQOL-Old and WHOQOL-Disabilities modules were used to explore their association with the social relationships domain and the extent to which they would be appropriate for its improvement.

b) The best performing module[3] items would be included in the social relationships domain, thus developing the Pilot Revised WHOQOL-BREF (WHOQOL-BREF-R).

After the inclusion of additional social-related items, the third and fourth aims were exploratory and they involved the field-testing of the Pilot WHOQOL-BREF-R in five countries. Following the proposed guidelines by Butcher (2000) it was considered important to assess the psychometric properties of the new measure based on empirical data, in order to clearly differentiate it from the original measure. Aim 3 sought to identify which of the included module items were the most appropriate for enhancing the social relationships domain, while Aim 4 focused on validating the final form of the revised social domain, and thus developing the final form of the WHOQOL-BREF-R.

Aim 3: The Pilot WHOOQL-BREF-R was field-tested across five countries worldwide, and a combination of classical and modern analyses were conducted to explore whether any of the included module items were well fitted for the improvement of the social relationships domain.

Aim 4: The psychometric properties of the revised social relationships domain and the overall WHOQOL-BREF-R were examined, thereby developing the final version of the revised scale.

3.2.2 Conceptual and ethical considerations

The revision of the WHOQOL-BREF followed the ethical guidelines for test revision stating that: "…a test should be either abandoned or revised in a satisfactory way

[3] Items from the WHOQOL-Disabilities and WHOQOL-Old modules will be referred to as module items.

when it is no longer appropriate for its current purpose" (Adams, 2000, p. 284). During the revision process, several important psychometric criteria were considered, including recognizing a scale's hierarchical structure, establishing internal consistency reliability, testing of content homogeneity of the facets and ensuring that different aspects of the construct are equally represented in a scale, ensuring that the items discriminate between respondents at the appropriate level of trait intensity, and replicating the factor structure across independent samples (Smith & McCarthy, 1995). Finally, each step of the revision process took into account the interpretability criterion and aimed at maintaining the validity of the measure, that is, to assess the broad concept of QoL as defined by the WHO.

Chapter 4

Study I Methodology

4.1 Introduction

"Many psychological tests require updating if their timeliness and effectiveness are to be maintained" (Butcher, 2000, p. 270). As detailed in previous chapters, the WHOQOL-BREF measure, which was developed in the late 90s', has been one of the most successful attempts in conceptualizing the construct of QoL. However, almost two decades after, with the improvement in the science of scale development and the limitations reported about one of its domains, a clear need for its revision has arisen. Thus, Study I aimed at developing a revised version of the WHOQOL-BREF by enhancing the social relationships domain, which has been consistently reported as being problematic.

The approach of the design, measurements used, sampling methods, participant characteristics, procedure, ethical concerns, and data analysis taken to address the aims of Study I will be described in detail. The objectives of the current study were operationalized through two stages and are summarised in Figure 4.1.

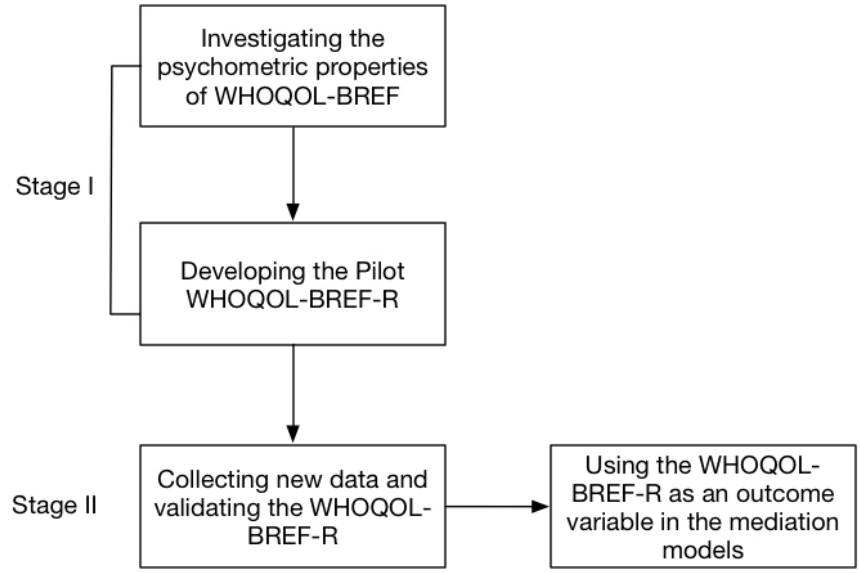

Figure 4.1 Diagram of Studies I and II.

4.2 Design

A "measure development" design was employed in both stages of Study I using Classical Test Theory (CTT) and Factor Analysis (FA) approach. Measure development research focuses on the development, evaluation, or improvement of scales and uses both descriptive and correlational designs (Barker, Pistrang, & Elliott, 2005).

4.3 Participants

4.3.1 Recruitment

In order to uphold the WHOQOL methodology for the development of a multicultural scale, nine WHOQOL centres that had previously collaborated with the WHO were asked to participate in the study. A total of five centres (55.6%) based in the UK, Turkey, China, Portugal, and Brazil responded positively. As mentioned in Chapter 2, the participating WHOQOL centres of previous WHOQOL studies (e.g. see The WHOQOL Group, 1995, 1998a, 1998b), sought to collect data from 300 adults (250 individuals with a disease or impairment and 50 "healthy" individuals), so that the psychometric properties of the scales could be properly analysed.

However, for the current study and in respect to the practical constraints of data collection, the five centres were asked to recruit a minimum of 200 adults, which is the approximate median sample size in studies using Structural Equation Modeling (SEM) (Kline, 2011). As described in Table 4.1 the recruitment took place in different settings for each centre. The details of the research teams participating in the WHOQOL-BREF-R project can be found in Appendix 1.

Table 4.1 *Recruitment place of WHOQOL-BREF-R study*

Centres	Recruitment setting
Brazil	Hospital de Clínicas de Porto Alegre (University Hospital), Porto Alegre
China	First Affiliated Hospital of Sun yat-sen University, Guangzhou
Portugal	Psychiatric Clinic of São José, Lisbon Association ReCriar Caminhos, Coimbra
Turkey	House of each participant, Barbaros Family Centre district, Manisa
United Kingdom	University of Edinburgh, Edinburgh

4.3.2 Inclusion criteria

As with previous WHOQOL studies (e.g. The WHOQOL Group, 1998b), the sampling frame was dictated by the required sample size and sample diversity required for the development of a generic multicultural QoL measurement. Hence, the participating centres were instructed to administer the pilot WHOQOL-BREF-R to 1) male and female adults (i.e. 18 years old or above) and 2) healthy and ill individuals (i.e. with a disease or impairment).

4.4 Measures

The instruments used in the first stage of Study I include the WHOQOL-BREF, the WHOQOL-Disabilities module and the WHOQOL-Old module. During the second stage, the WHOQOL-BREF, the pilot WHOQOL-BREF-R, the HADS, and the SWLS were used in order to develop and validate the final version of the WHOQOL-BREF-R. As will be described in later sections, the psychometric qualities of all scales were explored and deemed appropriate for use in the present study.

4.4.1 Demographics Questionnaire

The participating centres were advised to use the demographic questions incorporated in the existing WHOQOL-BREF, which include the participants' age, gender, marital status, health status, and education. However, the researchers of each centre had the choice to use their own questionnaires.

4.4.2 The WHOQOL-BREF

As described in more detail in Chapter 2, the WHOQOL-BREF (The WHOQOL Group, 1998a) is the abbreviated form of the WHOQOL-100 (The WHOQOL Group, 1998b) and it was designed to measure different aspects of one's QoL. It consists of 26 items, out of which two assess general QoL (e.g. "How would you rate your quality of life?") and the remaining 24 measure four discrete domains related to QoL: Psychological, physical, social relationships, and environment. The general items of both the WHOQOL-100 and WHOQOL-BREF were included in the scales to provide an overall QOL score (The WHOQOL Group, 1998b). Respondents are asked to indicate how they have felt about their QoL, health, and other aspects of their life during the past two weeks using a 5-point Likert scale (e.g. 1 = "very poor", 5 = "very good"). Higher scores on each domain indicate better QoL while lower scores suggest the opposite.

The WHOQOL-BREF is one of the most widely used instruments in the area of QoL. Its good psychometric properties were confirmed and extended by numerous validation studies. As with the original studies (Skevington et al., 2004a; The WHOQOL Group, 1998a) results from Scree Test (Trompenaars et al., 2005), correlation analysis (Jang et al., 2004) and Confirmatory Factor Analysis (CFA) (Yao et al., 2002) provided evidence for the 4-factor structure of the scale. However, results from Exploratory Factor Analysis (EFA) (Trompenaars et al., 2005; Yao et al., 2002) were contradictory, as many items were found to cross load on multiple domains. One of the few studies that examined the fit of the model through CFA confirmed the results of the original study with a Comparative Fit Index (CFI) = .89 (Yao et al., 2002). It is important to note, however, that although a CFI near .90 was

considered to be acceptable at the time the scale was developed, the new cutoff values for CFA models make such results questionable.

The WHOQOL-BREF was found to be sensitive to change in individuals receiving treatment with antidepressants (Berlim et al., 2005) while it was shown to have good convergent (Berlim et al., 2005; Trompenaars et al., 2005) and known-groups validity (Berlim et al., 2005; Jang et al., 2004; Taylor et al., 2004). Still, as mentioned in previous chapters, it is important to note that whereas most studies claim to have measured the discriminant validity of the WHOQOL-BREF, in reality, only few have done so. In short, discriminant validity is demonstrated when the overall scale or its items do not correlate highly with other measures or items from which they suppose to differ (Cambell, 1960; Zait & Bertea, 2011). Contrary to discriminant validity, most studies have assessed the known-groups validity, that is, the ability of a scale to discriminate between groups that are expected to differ (e.g. healthy vs. clinical).

The WHOQOL-BREF was found to demonstrate acceptable test-retest reliability with intraclass correlation coefficients above .72 for the four domains (e.g. Taylor, Myers, Simpson, McPherson, & Weatherall, 2004) and internal consistency with high Cronbach alpha values across all domains ($\alpha > .70$) (e.g. Yao, Chung, Yu, & Wang, 2002) except for the social relationships domain. Kline (2000a) states that low reliability in multifactorial psychological tests is to be expected. However, the practical implications of this should be carefully considered, as others have argued that values of .80 and above are considered to indicate a reliable measure (e.g. see Cramer, 2003). Therefore, ideally, the alpha coefficient should not fall below .70 (Kline, 2000b; Kline, 2011). Yet in some instances, the alpha coefficient of the social relationships domain was found to be as low as .55 (Jang et al., 2004; Nedjat et al., 2008). Other studies, including the original ones, found a marginal, yet low, alpha value ranging between .66 and .69 (Jaracz, Kalfoss, Górna, & Bączyk, 2006; Skevington et al., 2004a; The WHOQOL Group, 1998a; Trompenaars et al., 2005). Contrary to the social relationships domain, the alpha values for the other three domains were consistently found to be above the minimum .70 and sometimes

exceeding the .80 (e.g. Taylor et al., 2004). These results can be interpreted as evidence for the problematic unequal strength of the four domains.

Therefore, despite its wide use, accumulating evidence points to the poor reliability of the social relationships domain. In fact, previous studies suggest that besides its low reliability, the social domain is subject to a number of limitations. For instance, in a study with liver transplant patients, the social domain was shown to be less sensitive to changes following therapeutic interventions (O'Carroll et al., 2000). Furthermore, one of its questions concerning sex life has appeared to have a high number of missing values (Ünal et al., 2001), while all items of the social domain seem to correlate highly with other domains than with their own intended domain (Nedjat et al., 2008). These findings seem to be even more robust when the target population is older adults, as they find it difficult to relate to some of the questions of the domain (Naumann & Byrne, 2004). The psychometric assessment of the WHOQOL-BREF for the current sample was conducted as part of Study I and will be described in more detail in Chapter 5.

4.4.3 The WHOQOL Modules

The WHOQOL-Old and the WHOQOL-Disabilities (WHOQOL-Dis) module are two add-on measures that can be used in conjunction with either the WHOQOL-100 or the WHOQOL-BREF. The WHOQOL-Old (Power et al., 2005) was designed by the WHOQOL-Old Group to assess QoL in older adults. It consists of 24 items focusing on six factors that are of significant importance for older individuals: Sensory abilities, autonomy, past, present and future activities, social participation, death and dying, fear of pain before death. Each item is scored on a 5-point Likert type scale from 1 (e.g. “not at all”) to 5 (e.g. “completely”) with higher scores indicating better QoL.

The development of the WHOQOL-Old occurred simultaneously in 22 countries worldwide and a number of studies have investigated its psychometric properties (Fleck, Chachamovich, & Trentini, 2006; Liu et al., 2013; Lucas-Carrasco et al., 2011a; Peel, Bartlett, & Marshall, 2007; Power et al., 2005). Collectively, the

WHOQOL-Old demonstrated acceptable psychometric performance with good test-retest reliability values above the minimum acceptable threshold ($r > .80$; Kline, 2000a), high internal consistency (overall $\alpha = .84$ - $.87$), while all items correlated highly with their corresponding dimensions. The WHOQOL-Old was found to possess good known-groups validity and convergent validity as it correlated well with other similar scales such as the SF-12.

Likewise, the WHOQOL-Disabilities module (Power et al., 2010) was developed simultaneously in 12 countries for assessing QoL in adults with intellectual and/or physical disabilities. The WHOQOL-Dis module is an add-on module with one general item ("Does your disability have a negative (bad) effect on your day-to-day life?") and 12 specific items that target individuals with some form of disability (e.g. "Does your disability have a negative (bad) effect on your day-to-day life?"). It can be used as either a single scale or a 3-factor scale for more detailed analysis. Similar to the Old module, items are rated on a 5-point Likert type scale (e.g. 1 = "not at all"; 5 = "totally"), with higher values indicating better QoL. Contrary to general population, a study by Fang et al. (2011) indicated that a 5-point scale might not be suitable for evaluating QoL in individuals with intellectual disabilities, as perhaps it is more difficult for them to distinguish between the 5 responses (e.g. "a little" from "moderately"). A 3-point scale showed better statistical performance and was therefore considered more appropriate for individuals with intellectual disabilities.

Results from the original study support that the WHOQOL-Dis is a useful tool that can assess the impact intellectual and physical disabilities have on adults' QoL (Power et al., 2010). It was shown to have good internal consistency for both individuals with physical disabilities ($\alpha = .85$) and intellectual disabilities ($\alpha = .81$), while all items had corrected item-total correlation values above .55. Results from the Brazilian version found the WHOQOL-Dis to discriminate well between groups with different levels of depression (Bredemeier, Wagner, Agranonik, Perez, & Fleck, 2014). It has been successfully used in individuals with different physical disabilities (Jovanović, Lakićević, Stevanović, Milić-Rasić, & Slavnić, 2012) including neurodegenerative disorders (Lucas-Carrasco et al., 2011b) where it was found to

exhibit high internal consistency (α = .81) and good convergent and known-groups validity (disabled vs. non-disabled participants).

For the current study, data from both modules were used to identify any items correlating with the social relationships domain that could essentially be used for the revision of the WHOQOL-BREF. The two modules were chosen for the improvement of the scale because they entail items with social content, and as with the WHOQOL-BREF their items are rated on a 5-point Likert scale. Additionally, both modules employed the same methodology for development as with the WHOQOL-BREF, and thus were deemed appropriate for the purposes of Study I.

4.4.4 The Pilot WHOQOL-BREF-Revised

The Pilot WHOQOL-BREF-R was developed during the first stage of Study I and was used in the field study within the five WHOQOL centres. In brief, the pilot WHOQOL-BREF-R consisted of 35 items, including the initial 26 items plus nine items from the two WHOQOL modules (Appendix 2). Consistent with the existing WHOQOL-BREF, participants were asked to respond to the revised measure using the same 5-point Likert type scale. The responses used for the nine additional items were those of their respective modules (see Appendix 2 for further details). The development and psychometric properties of the pilot WHOQOL-BREF-R will be described in detail in section 5.2 of the Results chapter.

4.4.5 The Satisfaction with Life Scale

The Satisfaction With Life Scale (SWLS; Diener, Emmons, Larsen, & Griffin, 1985) is a 5-item assessment designed to measure global cognitive judgments of satisfaction with one's life (see Appendix 3). Such judgments are dependent upon a comparison of one's circumstances with what is thought to be an appropriate standard as set by the individual. Respondents are asked to evaluate their satisfaction with life using a 7-point Likert type scale with 1 = “strongly disagree” and 7 = “strongly agree”. Total scores range from 5 to 35 with higher scores suggesting that individuals perceive important areas of their lives to be going well, while lower scores would indicate the opposite (Corrigan, Kolakowsky-Hayner, Wright, Bellon,

& Carufel, 2013). More precisely, Pavot and Diener (2008) suggest that scores between 5 and 9 indicate extreme dissatisfaction with life, whereas scores between 31 and 35 indicate extreme satisfaction with life. The SWLS was employed in Study I to investigate the degree to which the WHOQOL-BREF-R is in fact related to a measurement that theoretically should be related to (i.e. convergent validity).

Since it was first developed, the SWLS has been used in a large number of studies (see Pavot & Diener, 2008 for a review), and despite the fact that it consists of only five items, it has been shown to have favourable psychometric properties (Diener et al., 1985; Pavot & Diener, 1993, 2008). The SWLS is considered to be a reliable and valid assessment of life satisfaction and subjective well-being. Results from CFA have confirmed the unidimensionality of the scale (Lewis, Shevlin, Bunting, & Joseph, 1995; Shelvin & Bunting, 1994), while a number of studies support its validity and reliability across gender, different age groups, populations, and cultures (Arrindell, Heesink, & Feij, 1999; Arrindell, Meeuwesen, & Huyse, 1991; Atienza, Balaguer, & García-Merita, 2003; Corrigan et al., 2013; Neto, 1993; Pavot & Diener, 1993, 2008; Shelvin, Brunsden, & Miles, 1998).

Results from the original validation study supported the reliability (test-retest r = .82; α = .87) and convergent validity of the scale (Diener et al., 1985). In addition, several studies have indicated that the SWLS can distinguish between marital status groups, whereas variables such as gender, age, and education do not seem to affect the scores on SWLS (Arrindell et al., 1999; Arrindell et al., 1991; Shelvin et al., 1998). However, controversial results regarding gender found in the Spanish version (see Atienza et al., 2003) indicated that that male participants may have a higher degree of global level of life satisfaction. Despite its strengths, the SWLS has been acknowledged to measure a somewhat narrow band of well-being as it is intended to assess only the cognitive components of subjective well-being (Pavot & Diener, 1993). Therefore, further instruments measuring emotional well-being should be included in research designs with a focus on the broader construct of well-being.

4.4.6 The Hospital Anxiety and Depression Scale

The Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983) is a screening instrument that was originally developed for use in general hospital outpatient department care and entails 14 items assessing anxiety and depression symptoms (see Appendix 4). The HADS is composed of two 7-item subscales measuring levels of anxiety and depression (Zigmond & Snaith, 1983). Alternatively, it can be used for assessing overall emotional distress (Johnston, Pollard, & Hennessey, 2000). One of its prominent features concerns its design, as it includes only items that are endorsed due to psychological rather than physical states (e.g. dizziness, headaches) (Johnston et al., 2000). Using a 4-point scale (0–3) respondents are asked to reflect how they have felt during the past week. The responses are then summed to give a possible total score ranging between 0 and 21 for each subscale (Snaith, 2003). A score of 7 or less on either the anxiety or depression subscale signifies normal range, a score of 8 to 10 suggests probable presence of the disorder and a score of 11 or higher indicates the likely presence of the disorder (Snaith, 2003; Zigmond & Snaith, 1983). A review study by Bjelland, Dahl, Haug, and Neckelmann (2002) further supported the cut-off points suggested by Zigmond and Snaith, while indicating that the best balance between sensitivity and specificity for the HADS can be achieved at a cut-off score of 8+. The HADS was used as part of Study I to assess the accuracy of the WHOQOL-BREF-R. More specifically, it was used to explore the degree to which the new scale could discriminate between different groups such as individuals with low vs. high emotional distress.

The psychometric qualities of the HADS have been investigated by a number of studies that support its reliability in both general and psychiatric samples and across age, diseases, and cultures (Bjelland et al., 2002; Carroll, Kathol, Noyes Jr., Wald, & Clamon, 1993; Herrero et al., 2003; Herrmann, 1997; Moorey et al., 1991; Mykletun, Stordal, & Dahl, 2001; White, Leach, Sims, Atkinson, & Cottrell, 1999; Zigmond & Snaith, 1983). The HADS has been suggested to have good internal consistency with Cronbach alpha values exceeding the minimum suggested criterion of .70 (Kline, 2000a, 2000b), while it was also found to converge with similar instruments

(Bjelland et al., 2002; Herrero et al., 2003; Johnston et al., 2000; Moorey et al., 1991; Straat, van der Ark, & Sijtsma, 2013).

The degree to which the HADS is a unidimensional or a bidimensional scale is, however, controversial. As initially proposed, the scale is designed to measure two distinct constructs, that of anxiety and depression (Zigmond & Snaith, 1983). Some evidence supports this structure (Bjelland et al., 2002; Moorey et al., 1991), although others suggest that it is best to use HADS as a single scale (Johnston et al., 2000; Norton, Cosco, Doyle, Done, & Sacker, 2013). Thus, it is not surprising that some items (e.g. item 6 "I feel cheerful") fail to load onto their own domain, as they do not appear to be unique in either anxiety or depression (Moorey et al., 1991; Mykletun et al., 2001).

4.5 Procedure

In order to verify the validity of the WHOQOL-BREF-R, all centres were instructed to collect data using the HADS and the SWLS as well as the WHOQOL-BREF-R. Translating the scales was not required as all scales used, including the module items, were already available in their respective language. The data collection for Study I occurred within a timeframe of 12 months: March 2012 – March 2013.

During that time, researchers from each WHOQOL centre aimed at collecting the required number of data with the sampling method that was deemed more appropriate for each centre. For example, participants that met inclusion criteria from China, Portugal, and Brazil were recruited personally from the researchers using a convenience sampling method. Participants from Turkey were recruited using a multistage sampling method, which entailed systematic and cluster sampling. The data collection for the Edinburgh UK centre used a snowball sampling method. More precisely, nine out of 15 randomly selected departments/schools (60%) within the University of Edinburgh agreed on circulating an e-mail to students containing information about the study and how to participate using the link to the online survey. Upon contact, participants were asked to pass the link to the online survey on to their acquaintances.

The main researcher had frequent contact with each centre in order to respond to any enquiries regarding the study, and ensure whenever possible the homogeneity in the sampling methods.

4.6 Data analysis

4.6.1 Sample characteristics

Prior to the development of the WHOQOL-BREF-R, the sample characteristics of the existing (i.e. five WHO datasets) and new (WHOQOL-BREF-R) datasets were explored. To this end, descriptive statistics were carried out for the overall sample of each dataset and for each centre individually.

4.6.2 Classical Test Theory Analysis

Most researchers now acknowledge that all instruments should satisfy basic psychometric properties if they are to be clinically useful (Fayers & Machin, 2007). Hence, for the revision and validation of the WHOQOL-BREF-R both CTT analysis and FA were employed. Whilst a detailed description of the CTT is beyond the scope of this chapter, in brief, CTT assumes that the raw score (X) obtained by the participant is made up of the participant's true score (T) and measurement error (E): $X = T + E$ (Kline, 2005). Within the theoretical framework of the CTT, it can be assumed that a test is composed of a number of items and there are several pieces of information that can be used to determine whether an item is useful and how it performs in relation to the other items (Kline, 2005). CTT is seen as the basis for effective scale construction, measurement, and psychometric evaluation (Furr, 2011).

4.6.2.1 Descriptive Statistics

Basic descriptive statistics such as missing values, minimum-maximum, means, standard deviation, skewness, and kurtosis were calculated in order to investigate the performance of the items included in the WHOQOL-BREF and pilot WHOQOL-BREF-R.

4.6.2.2 Reliability

Overall, reliability concerns the consistency of a measure. More precisely, different methods of reliability may determine the degree to which a scale performs in consistent and predictable ways (DeVellis, 2012). The reliability of the WHOQOL-BREF and pilot WHOQOL-BREF-R was assessed through internal consistency which concerns whether the items within a scale are homogeneous and interrelated - i.e. measuring the same thing (DeVellis, 2012; Fayers & Machin, 2007). Internal consistency can be measured by the Cronbach alpha coefficient with a cut-off point of .7 or above indicating the reliability of the scale (Kline, 2000b). Corrected item-total correlations indicate the correlation between an item and the collection of the remaining items (DeVellis, 2012; Furr, 2011) and a cut-off point of .3 is required (Kline, 2000a, 2000b). Corrected item-total correlations were assessed so as to investigate whether any of the existing WHOQOL-BREF items or the additional module items were inadequate ($r < .3$; Kline, 2000b), thereby considering them for elimination.

4.6.2.3 Correlation analysis

Pearson correlation analysis was used in order to identify any items correlating highly with other domains rather than with their own predicted domain. In this case, it was also used to identify which items out of the additional module items were more highly correlated with the social relationships domain. In other words, the correlations between the domains and the items from the WHOQOL-BREF and WHOQOL-BREF-R were examined so as to identify any problematic items that do not seem to measure only one thing. Any items demonstrating low correlations with their intended domain ($r < .3$ -.4) or high correlations with other domains were considered for elimination or inclusion with the alternative domain (The WHOQOL Group, 1998b).

4.6.2.4 Validity

Determining that a scale is reliable does not guarantee its validity. Therefore, more tests need to be carried out in order to establish whether a scale is measuring what it is intended to measure. There are different ways of examining the validity of an

instrument, but for the current study, two types of construct validity were assessed: The known-groups validity and convergent validity.

The known-groups validity explores whether a scale is sensitive enough to differentiate members of one group from another (DeVellis, 2012; Fayers & Machin, 2007; Raykov & Marcoulides, 2011). In the current study, T-tests were carried out in order to compare the QoL of different groups (e.g. healthy vs. ill, depressed vs. non depressed). On the other hand, convergent validity was determined by the degree to which the WHOQOL-BREF-R correlates with constructs with which it would be expected to correlate. In this case, correlation analysis was performed to explore whether the WHQOOL-BREF-R converged with the SWLS.

4.6.2.5 Accuracy

Receiving Operating Characteristic (ROC) curve analysis was used to determine the accuracy of the WHOQOL-BREF-R. In many cases ROC analysis is used to calculate a clinical test's sensitivity and specificity. However, since the WHOQOL-BREF measures a subjective construct and thus it would be difficult to indicate what constitutes a "poor" or "good" QoL, calculating a cutoff value was not deemed necessary. Thus, for the current study, ROC curve analysis was used to evaluate the new scale's accuracy, that is, the degree to which it can accurately classify patients in different groups. ROC analysis provides information about the size of the area under the curve (AUC), with a value of 1 indicating perfect accuracy and a value of 0.5 corresponding to random chance. More precisely, Mehdi, Bashardoost, and Ahmadi (2011) proposed the following cutoff points for classifying the accuracy of a test: .90-1 = excellent, .80-.90 = good, .70-.80 = fair, .60-.70 = poor, .50-.60 = fail.

4.6.2.6 Hierarchical multiple regression analysis

As with previous studies (The WHOQOL Group, 1998a), the contribution of the module items to the variance of the overall QoL was examined through hierarchical multiple regression. Given that the focus was in enhancing the social relationships domain, this analysis served in exploring the capacity of each module item to explain QoL above and beyond the contribution of the three social relationships items. In

accordance with the WHOQOL-BREF manual (Harper & Power, 1998), the overall QoL was assessed using the sum of the two general WHOQOL-BREF items, as together they represent overall QoL (The WHOQOL Group, 1998b).

4.6.3 Factor analysis

FA techniques are used to determine whether a large number of items (observed variables) can be grouped into a smaller number of factors or theoretical constructs (Worthington & Whittaker, 2006). As Nunnally (1978) states, FA is not one, simple statistical method, rather a broad collection of mathematical procedures for conceptualizing clusters of variables and determining which variables belong to which groups. FA methods can be classified as either exploratory or confirmatory (DeVellis, 2012). Although both approaches are often used in the scale development process, each of them serves different purposes and answers different questions (Bowen & Guo, 2011).

4.6.3.1 Confirmatory factor analysis

CFA is used when the researcher already has some knowledge (or theory based prediction) about the underlying structure of the construct (Pett, Lackey, & Sullivan, 2003). Thus, in CFA, researchers hypothesize what the factor structure ought to be based on previous work (Kline, 2000b). It can also be seen as the next step of EFA, as it confirms whether the factorial structure of the scale is as hypothesized or shown in previous EFAs (Wang & Wang, 2012). The validity of the factorial structure of a scale is confirmed if and when the hypothesized CFA fits the data (Wang & Wang, 2012). For the present study, CFA was used to explore the fit of the existing WHOQOL-BREF and to validate the structure of the final version of the WHOQOL-BREF-R. Factor analyses were carried out using MPlus 7.3 for Mac (Muthén & Muthén, 1998-2012), whereas for all other analyses SPSS 20 for Mac was used.

There are usually five steps that characterize most CFA models. First, during model formulation or model specification, researchers specify their model based on previous theory or empirical findings (Wang & Wang, 2012). Then, through model identification it is determined whether there is a unique numerical solution for each

of the parameters in the model (Tabachnick & Fidell, 2013; Wang & Wang, 2012). A model cannot be estimated without first being identified (Tabachnick & Fidell, 2013). After a model has been identified, model estimation occurs, in which stage population parameters are estimated with the aim of getting a small difference between the observed and estimated population covariance matrices (Tabachnick & Fidell, 2013). Maximum Likelihood (ML) is the most common estimation method (Bowen & Guo, 2011; Wang & Wang, 2012). Lastly, during model evaluation, researchers are called to evaluate the fit of their model fit which determines how well the model explains the data (Kline, 2011). If the model is found to be "unfitting" then one can decide to re-specify or modify the model and then re-evaluate it (Wang & Wang, 2012). However, there has been a considerable debate on what qualifies as a "good fitting" or "unfitting" model and which criteria are the most appropriate for reaching such a decision. These are detailed described in Appendix 5.

In the current study, SEM techniques such as CFA were employed in order to examine whether the revised structure of the scale fits the data well. After careful consideration of the literature on SEM and model fit indices it was considered more suitable to use a number of diagnostic information in the assessment of SEM models, which are summarized in Table 4.2. The approximate fit indices of the SEM models of this study will be evaluated based on the Hu & Bantler's (1999) criteria (TLI/CFI $\geq .95$ and RMSEA $\leq .06$) and based on theoretical issues or previous literature related to the study.

Table 4.2 *SEM diagnostic information used for the current study*

	Criteria	Description
1	$\chi^2(df)$, p value	Tests whether there are no discrepancies between observed and predicted covariances
2	RMSEA, 90% CI	Estimates the lack of fit in the specified model compared to a perfect model
3	CFI	Compares the specified model with the null model which assumes zero covariances among the observed variables
4	TLI	Compares the lack of the fit of the specified model to the lack of the fit of the null model
5	Factor loadings (λ)	The links between the observed variables and latent variables
6	Squared standardized factor loadings (h^2)	Indicates how much variance in the observed variable is explained by the latent variable
7	Residual correlations	Large residuals between pairs of variables indicate poor fit
8	Modification indices	Captures model misspecification

Note. RMSEA = Root Mean Square Error of Approximation; CI = Confidence Interval; CFI = Comparative Fit Index; TLI = Tucker-Lewis Index. From Tabachnick and Fidell (2013) and Wang and Wang (2012).

4.7 Ethical considerations

Following the School of Health in Social Science and College of Humanities and Social Science ethical frameworks, Stage I was deemed as a Level 1 self-audit study. Given that Stage I involved the analysis of existing (secondary) data the self-audit ethical assessment confirmed the absence of ethical risk (see Appendix 6).

During the second stage of Study I and prior to data collection, each WHOQOL centre addressed any ethical considerations related to this study based on their country's ethical codes. For the WHOQOL centres in UK, Brazil, China, and Portugal, the study was approved by the ethical committee of the respective sites where the data collection occurred (see Table 4.1 for details). The data collected by

the WHOQOL centre in Turkey were part of a bigger study, which had previously granted ethical approval by the Department of Public Health, Celal Bayar Üniversitesi. Overall, all WHOQOL centres complied with the necessary ethical rules for research conduct. Those include giving informed consent, maintaining anonymity and confidentiality issues, providing the necessary information about the study and giving the right to withdraw. Given that the data collection for the UK centre was part of a bigger study, the ethical considerations are described elsewhere (see section 11.7).

Chapter 5

Study I Results

As detailed in previous chapters, the objectives of the current study were operationalized through two stages: 1) The development of the Pilot WHOQOL-BREF-Revised and 2) its field-testing.

5.1 Stage I – Pilot WHOQOL-BREF-R

5.1.1 Psychometric properties of WHOQOL-BREF

Central to this study's objectives was to confirm the limitations mentioned in the literature. Therefore, prior to the development of the Revised WHOQOL-BREF, it was considered relevant to investigate the psychometric properties of the existing scale using various datasets containing data from a wide range of cultures, ages, and groups. To this end, descriptive statistics, reliability and correlation analyses were carried out.

5.1.1.1 Sample characteristics

Five datasets already held by the WHO that include data on the WHOQOL-BREF from previous WHOQOL studies were used to explore the psychometric properties of the scale. The datasets[4] include the Original WHOQOL-BREF study (The WHOQOL Group, 1998a), the Longitudinal Investigation of Depression Outcome (LIDO), the Russia Longitudinal Monitoring Survey, 2004-2005, and finally the two WHOQOL Modules (Power et al., 2010; Power et al., 2005). The Russia dataset included data from two-time points, however, given the objectives of the current study, only the data from the first-time point ($N = 9807$) were used.

[4] In this context, datasets are the combination of the datasets provided by each WHO centre

Most of these studies took place in multiple WHO centres[5] located in different countries (see Appendix 7 for details). In brief, 25 centres contributed a total of 11830 participants to the Original WHOQOL-BREF dataset, 2359 participants took part in the LIDO study (6 centres), while the WHOQOL-Old and WHOQOL-Dis datasets included data from 20 (N = 5566) and 14 centres (N = 3772), respectively. The data found in Appendix 8 provide a summary of the socio-demographic characteristics of the samples of each dataset in terms of age, gender, marital status, education status and health status.

On the whole, all datasets contained data from ill and healthy male and female participants, with the mean age ranging between 41.61 (SD = 14.90; LIDO dataset) and 72.52 (SD = 8.01; WHOQOL-Old dataset) within the five datasets (M = 49.50, SD = 13.02). Each centre was instructed to administer the scale to adults with "adult" being culturally defined (The WHOQOL Group, 1998b). For example, in some parts of India individuals aged 12 are considered to be adults (Skevington et al., 2004a), thus, in some instances participants were under the age of 16 at the time of the data collection.

The majority of participants were either single or married, except for the WHOQOL-Old dataset, in which older participants reported being either married or widowed. With regards to education, although there was a wide range of educational levels, a substantial number of participants reported having attended at least secondary school. Finally, the most prevalent health conditions included, but were not limited to, arthritis, hypertension, cancer, cold, diabetes, Parkinson's disease, cardiovascular problems, and mental health problems.

5.1.1.2 Descriptive statistics

Descriptive statistics were performed for the total sample of each dataset and for each centre within the five datasets so as to explore the performance of the scale. The limitations reported in the literature concern mainly the social relationships domain.

[5] WHO centres constitute organizations such as universities, or hospitals located in multiple countries that collaborated with the WHO for research purposes.

However, it was considered important to explore the psychometric properties of all items, as there is not a study, to the authors' knowledge, that has collectively examined the properties of all WHOQOL-BREF items using a variety of datasets. Hence, the missing values, mean, *SD*, and frequencies, were explored for the main 24 items included in the WHOQOL-BREF. Items 3, 4, and 26 were reversed prior to the analyses. Given that the overall results include data from a total of 66 centres, only a selection will be reported in the Appendices.

Missing values

Despite the importance of issues related to missing data, there is limited consensus on the percentage of missing data that becomes problematic (Dong & Peng, 2013; Schlomer, Bauman, & Card, 2010). Schafer (1999) proposed 5% as being an acceptable number, while Bennett (2001) suggested that results may be biased when based on data with missing values greater than 10%. In the majority of the datasets less than 5% of the data were identified as missing for all items. However, that was not the case for item 21 measuring satisfaction with sex life, which was found to consistently register a great percentage of missing values. These results were consistent across datasets but were more evident in the WHOQOL-Old dataset. Notably, the elderly appeared to be reluctant to respond to many of the items included in the WHOQOL-BREF. Out of the 20 centres included in the WHOQOL-Old dataset, 18 had an excessive percentage of missing values on item 21 (sex life) with a range of 5.5% to 38.1%. These findings are in accordance with those found in Naumann and Byrne (2004) and are likely due to the fact that factors associated with being older, such as widowhood or health problems, lead older people to place a lesser importance on sex (Gott & Hinchliff, 2003).

Similar results were observed for the WHOQOL-Dis dataset. Although the percentage of missing values was higher than 5% for some of the items (e.g. capacity for work), item 21 was the only item that consistently registered the highest percentage of missing values across centres. This is consistent with previous studies in which individuals with severe physical disabilities were found to report lower

levels of knowledge, experience, self-esteem, and satisfaction over sex life (McCabe, Cummins, & Deeks, 2000; McCabe & Taleporos, 2003).

Item distributions

The patterns of item distributions in terms of floor and ceiling effects were examined for all datasets. Although the importance of such effects in QoL measures has been acknowledged (Higginson & Carr, 2001), at present there is not consensus as to what would be considered problematic. Floor and ceiling effects have been considered to reach problematic levels for items with 15% of the responses being concentrated on the lowest (floor) or highest (ceiling) possible response (McHorney & Tarlov, 1995). Others have used 20% (Holmes & Shea, 1997) or 25% (Raat, Landgraf, Bonsel, Gemke, & Essink-Bot, 2002). Considering the diversity of samples in the current study, items with a rate of 25% on the lowest or highest response were considered problematic. It was expected that responses would be distributed along the 5-Likert type scale in all datasets, although some floor or ceiling effects were expected for the Old and Disability modules.

The distribution of the 24 main items was explored for the total samples of all datasets, results of which can be found in Appendix 9. As expected from previous WHQOOL studies (e.g. Skevington et al., 2004a) responses to each of the 24 items were distributed along the full range of the 5-Likert scale in all datasets. The responses were grouped in the centre of the Likert scale for the majority of the items. Notably, items 3 (pain), 4 (medication) and 15 (mobility) appeared to exhibit ceiling effects in most datasets as a large concentration of the respondents scored on the upper limit of the scale. Ceiling effects were found for item 23 (home) in the WHOQOL-Old dataset, while floor effects were found for item 12 (finances) in the Russia dataset. Older individuals (WHOQOL-Old) and individuals with disabilities (WHOQOL-Dis) were expected to score lower (i.e. poorer QoL), thus more floor effects were anticipated for the two module datasets. However, that hypothesis was not met, as there were not any clear floor effects for any of the items.

Scale distribution

The degree to which the total WHOQOL-BREF score was normally distributed was examined for all datasets. Due to the large sample sizes in each dataset, normality tests such as the Kolmogorov-Smirnov and Shapiro-Wilk were deemed unreliable (Field, 2009; Kim, 2013). Thus, the data distribution was assessed using statistical and graphical methods. Skewness and kurtosis statistics, which concern the symmetry and the peakedness of the distribution, are among the most frequently reported methods for examining normality assumptions (Tabachnick & Fidell, 2013). For small to medium samples, the *z*-scores of skewness and kurtosis are assessed and an absolute *z* value of 3.29 ($p < .001$) corresponds to a non-normal distribution (Field, 2009; Kim, 2013). However, in large samples, even minor deviations can result in statistically significant *z*-scores. Very often though, skewed variables of large samples do not deviate enough from normality to make a substantive difference in the analysis (Tabachnick & Fidell, 2013), as the impact of non-normality diminishes when simple sizes reach 200 or more (Hair Jr., Black, Babin, & Anderson, 2010). Thus, in those cases, some suggest relying on the absolute value of the skewness and kurtosis along with the visual appearance of the distribution. There is not, however, a definite value that one can adopt to indicate problematic deviations from normality. Some suggest that for large samples an absolute skew value larger than 2 or an absolute kurtosis value larger than 7 may be used as cutoff values for determining substantial non-normality (Finch, West, & MacKinnon, 1997; Kim, 2013). A more liberal recommendation for kurtosis has been suggested by Kline (2011) where an absolute value of 10 is considered problematic. Following a more conservative approach, an absolute skew value of 1 may be considered problematic (Bowen & Guo, 2011; Hair Jr. et al., 2010).

For the current study, normality was examined based on the absolute skewness and kurtosis values and the visual representation of the data. With a possible range of 0 to 100, the mean scores ranged between 49.05 (WHOQOL-Dis) and 66.83 (WHOQOL-Old) with a mean QoL of 58.64 across datasets. As seen in Table 5.1 all skewness and kurtosis values were below the aforementioned thresholds, which together with

the histograms presented in Appendix 10, provide support for the normal distribution of the scale in all datasets.

Table 5.1 *Descriptive statistics for WHOQOL-BREF within six datasets*

Dataset	N	Min	Max	Mean	SD	Skewness	Kurtosis
WHOQOL-BREF	11828	7.81	100.00	63.43	15.25	-.30	-.00
WHOQOL-Old	5433	9.45	100.00	66.83	14.00	-.37	.07
WHOQOL-Dis	3740	.78	96.65	49.05	16.52	.07	-.26
LIDO	2352	6.32	94.68	54.86	14.00	-.21	-.08
Russia	9801	3.87	100.00	60.68	14.95	-.31	-.02

5.1.1.3 Reliability analysis

The internal consistency of the WHOQOL-BREF was analyzed for each dataset, with a particular interest in the social relationships domain. As with descriptive statistics, reliability analyses were performed for each centre individually and for the total samples within the five datasets. The majority of the centres were found to exhibit acceptable internal consistency above the minimum criterion of .70 (Kline, 2000a) for all domains, except for the social relationships domain. In many of the centres, the social domain was found to display very low alpha values (e.g. α = .40). Overall, the Cronbach alpha values for the social domain ranged between .61 (Russia dataset) and .73 (WHOQOL-Dis dataset) across the five datasets with a mean α of .65 (*SD* = .05). It is important to note that the Cronbach alpha for the social relationships domain was found to be .68 in the original validation dataset (Skevington et al., 2004a).

Regarding the reliability of the other domains, the alpha values ranged between .80 (LIDO dataset) and .88 (Russia dataset) for the physical domain (*M* = .84, *SD* = .03), between .78 (LIDO dataset) and .86 (WHOQOL-Dis) for the psychological domain (*M* = .81, *SD* = .03), and between .74 (LIDO dataset) and .85 (WHOQOL-Dis) for the environmental domain (*M* = .79, *SD* = .05). Despite the lower internal consistency exhibited by the social domain, the reliability of the overall scale was found to be excellent across all datasets ranging from .88 (LIDO dataset) to .93

(WHOQOL-Dis) with a mean alpha of .91 (*SD* = .02). Therefore, in this work and in related studies, results highlighted the poor reliability of the social relationships domain, despite the good reliability of the overall scale.

In addition, the corrected item-total correlations of the 24 items were examined, so as to detect any problematic items with low corrected-*r* values. Items with values below .30 would be considered as not measuring the same variable as the rest of the items within each domain (Kline, 2000b). A thorough examination of the results from each centre revealed most items to be performing well in all datasets. Some were found to be problematic with corrected-*r* values lower than .30, but that was observed only in some of the centres across the five datasets. Among the most prevalent ones were items regarding sleep (item 16), sexual satisfaction (item 21), physical pain (item 3), medical treatment (item 4), safety (item 8), body image (item 11) and transportation (item 25).

5.1.1.4 Correlation analysis

Consistent with previous WHOQOL studies, bivariate correlation analyses were used to identify any items correlating more highly with other than their respective domains. More specifically, the correlations between the 24 items and the mean scores of the four domains were examined. As Hays, Anderson, and Revicki (1993) suggest, item discrimination is supported if the item has the highest correlation with the domain that it is hypothesized to measure. Corrected-*r* coefficients were used for items correlating with their own domain, as these provide the correlation between the item being tested and the domain, excluding itself (DeVellis, 2012). For the rest associations the Pearson correlation coefficients were reported.

Looking at the global results from each dataset (see Appendix 11 for more detail) some of the items appear to correlate more strongly with other domains than their own. This seems to be the case for item 8 (safety), which was found to have a stronger correlation with the psychological rather than the environmental domain. Similarly, items 10 (energy), 16 (sleep), 20 (personal relationships), and 21 (sex life), which belong to either the physical or social relationships domain, were shown to correlate equally or higher with the psychological domain instead. In some cases,

item 22 (support from others) was shown to correlate more with the environment rather than the social relationships domain.

Original WHOQOL-BREF dataset (N = 11830)

Reporting the results from the centre-by-centre analyses is beyond the scope of this chapter, however, the common themes emerging from the results will be reported. Notably, there appears to be some controversy related to the current results of the Original WHOQOL-BREF dataset and the ones reported in the validation study (Skevington et al., 2004a). In their paper, the authors report that only two items occasionally correlated more strongly with other domains than their own. However, in the present study many of the items were shown to correlate more highly with other domains, at least in some of the centres. Items 4 (medication), 17 (activities), 6 (spirituality), 13 (information), and 25 (transportation) were found to correlate more highly with other domains in only 2 centres (8.33%) out of the 24 included in the WHOQOL-BREF dataset. On the other hand, item 8 ("how safe do you feel in your daily life") was found to correlate more strongly with other domains in the majority of the centres (n =19, 79.17%). In most cases, item 8 correlated more strongly with the psychological domain. Such results may suggest that individuals from different cultures perceive "safety" as a psychological rather than environmental construct. This is likely due to the broad and vague concept of the item, as it does not make a clear reference to environmental safety (e.g. "how safe is your environment?").

Items in the Original WHOQOL-BREF dataset were considered problematic if they correlated more highly with other domains than their intended domain. Those were items 10 (energy; 62.5%), 20 (social relationships; 62.5.%), 21 (sex life; 58.3%), and 22 (support; 50%). In the majority of the times, item 20 was found to correlate more with the psychological domain, item 21 with the physical and psychological domain, while item 22 correlated more strongly with the environmental domain. Such findings provide further support for the poor performance of the social domain. Items 16 (sleep) and 11 (body image) were also found to occasionally correlate more with other than their own domain (37.5%). Finally, it is worth mentioning that Skevington et al. (2004a) supported finding no items that correlated more strongly

with other domains in the overall sample. Nevertheless, results from the current study (see Appendix 11) pointed to three items (10, 20 and 8) that correlated more with the psychological rather than their respective domains. One possible explanation for this inconsistency is that in the original study Skevington et al. (2004) did not reverse items 3, 4, and 26 in all centres, thus affecting the results.

WHOQOL-Module datasets

Older individuals and individuals with disabilities were found to perceive item 14 (opportunity for leisure activities) differently, as it was found to correlate more strongly with other domains (e.g. psychological, physical). In addition, item 7 (concentration) was found to occasionally correlate more with the physical and environmental domain in both WHOQOL-Dis and WHOQOL-Old datasets. However, that was not the case for the other three datasets (i.e. WHOQOL-BREF, LIDO, Russia).

Collectively, items that appeared to be problematic in most datasets were items 16 (sleep), 20-22 (social relationship domain), and item 8 (safety). Nevertheless, it is important to note that in centres with small sample size such cross-domain correlations would be expected (Skevington et al., 2004a).

5.1.2 Constructing the Pilot WHOQOL-BREF-R

Given the above findings, it is evident that the social relationships domain consists of three items that are often problematic, resulting in poor domain reliability and discriminant validity. On account of such limitations, Study I aimed at enhancing the social relationships domain by adding more relevant items. To this end, further analyses were conducted so as to explore whether any of the items included in the WHOQOL-Old and WHOQOL-Dis module entailed social properties and thus could be used for the improvement of the domain.

5.1.2.1 Correlation analysis

Following the same rationale as the one described in section 5.1.1.4, the correlations between the social relationships domain and all items from the Disabilities and Old

modules were examined. The aim was to explore whether any of the module items would correlate highly with the social relationships domain. Thus, for the current analysis, the WHOQOL-Old and WHOQOL-Dis datasets were used.

WHOQOL-Dis dataset

Results from centre-by-centre analyses were unclear for the WHOQOL-Dis dataset, as many items were found to correlate highly with other domains besides the social relationships domain. Given that no clear themes emerged, findings from the total sample (N = 3772) (Appendix 12) were used instead. Results pointed to only 3 items (34-36) correlating more highly (r = .56 - .61) with the social relationships domain than with any other domain. Item 33 (autonomy) was found to correlate highly with both the psychological and environmental domain, however, it was retained due to its social context. The four disabilities module items chosen for the improvement of the social domain concerned whether during the past couple of weeks, participants got to make big decisions about life (item 33), were satisfied with the ability to communicate with other people (item 34), and whether they received respect (item 35) and acceptance (item 36) by others.

WHOQOL-Old dataset

Centre-by-centre results from the WHOQOL-Old dataset were also inconsistent, but overall, four items were shown to have small to high correlations with the social relationships domain: Item 21 concerning sense of companionship (range r = .26-.62, M = .44), item 22, which is related to experiencing love (range r = .20-.69, M = .43) and items 23 and 24 concerning opportunities to love (range r = .12-.60, M = .42) and be loved (range r = .21-.67, M = .44). Results were further supported by the total sample analyses (Appendix 13) in which items 22 to 24 were found to correlate more highly with the social relationships domain. Three more items concerning decisions (item 3), control of future (item 4) and respect of freedom (item 5) were found to have medium correlations with the social domain (r > .35) in some of the centres. Despite their lower correlations in the total sample results, the three additional items were retained for the improvement of the social domain due to their social context. A

description of the total 11 module items and the three social relationship items can be found in Table 5.2

Table 5.2 *WHOQOL-BREF social relationships items and proposed additional items*

Scale	Items	Questions
WHOQOL-BREF – Social Relationships	20	How satisfied are you with your personal relationships?
	21	How satisfied are you with your sex life?
	22	How satisfied are you with the support you get from your friends?
WHOQOL-Dis Module	33	Do you get to make the big decisions in your life?
	34	Are you satisfied with your ability to communicate with other people?
	35	Do you feel that other people accept you?
	36	Do you feel that other people respect you?
WHOQOL-Old Module	3	How much freedom do you have to make your own decisions?
	4	To what extend do you feel in control of your future?
	5	How much do you feel that the people around you are respectful of your freedom?
	21	To what extend do you feel a sense of companionship in your life?
	22	To what extent do you experience love in your life?
	23	To what extend do you have opportunities to love?
	24	To what extent do you have opportunities to be loved?

5.1.2.2 Hierarchical multiple regression analysis

Additional analyses were performed in order to confirm the results found in section 5.1.2.1 and further investigate the contribution of the four disabilities-module items and the seven old-module items to overall QoL. To this end, two hierarchical multiple regression models were explored so as to estimate whether the 11 module items were significant predictors of QoL above and beyond the contribution of the three social relationships items. The mean WHOQOL-BREF score was used as the dependent variable, whereas the module and social relationships items were treated as predictors and were entered in two different blocks.

WHOQOL-Dis dataset

Results from the WHOQOL-Dis dataset showed that the three social relationships items accounted for 74% of the variance in the overall QoL, F (3, 2950) = 2804.94, p < .001. When the four disabilities-module items were added in the model, there was a small but significant contribution to the overall variance of QoL, ΔR^2 = .04, F (7, 2946) = 1485.43. All four items were found to be significant predictors of QoL (see Table 5.3) beyond the social relationships items, with item 33 (autonomy) being the most powerful predictor (β = .13, p < .001). The tolerance values for all predictors were above .10 (Giles, 2002), while all Variance Inflation Factor (VIF) values were lower than 5 (Craney & Surles, 2002) suggesting absence of multicollinearity issues.

Table 5.3 *Hierarchical multiple regression with WHOQOL-Dis module items as predictors of total quality of life scores*

Predictors	*B*	*SE (B)*	β
Step 1			
Constant	15.05	.37	
20 – Relationships	4.15	.13	.40***
21 – Sex life	2.73	.10	.29***
22 – Support	3.68	.13	.37***
Step 2			
Constant	12.38	.37	
20 – Relationships	3.09	.13	.30***
21 – Sex life	2.42	.09	.26***
22 – Support	2.82	.12	.28***
33 – Autonomy	1.10	.10	.13***
34 – Communication ability	.49	.13	.05***
35 – Social Acceptance	.59	.15	.06***
36 – Respect by others	.77	.15	.08***

Note. R^2 = .74 for step 1; ΔR^2 = .04 for step 2 (ps < .001).
*** p < .001.

WHOQOL-Old dataset

With regards to the WHOQOL-Old dataset, the social relationships items were found to account for a significant amount of variance in QoL, R^2 = .62, F (3, 4447) = 2422.13, p < .001. Such findings indicate that individuals reporting more satisfaction over social relationships tend to also score more highly on the WHOQOL-BREF. As

with the disabilities module, such results are not surprising given that the three social items are part of the total score (dependent variable). Thus, the main focus of the current analysis was to investigate whether the seven old module items would be able to predict QoL over and above satisfaction with social relationships. Results provided support for the objective, as all the module items accounted for a small but significant portion of the variance in QoL after controlling for the effects of social relationships items, $\Delta R^2 = .07$, F (10, 4440) = 1005.76, $p < .001$. Overall, the model explained 69% of the variance in QoL. However, only five of the WHOQOL-Old module items were found to significantly predict overall QoL (see Table 5.4). As with the disabilities module, none of the predictors met cut-off criteria for multicollinearity.

Given the results from the hierarchical regression analyses, items 33-36 from the WHOQOL-Dis module, and items 3-5, 21, and 23 from the WHOQOL-Old module were chosen as candidates for the improvement of the social relationships domain. Items selected by these analyses were examined by the main researchers to establish whether they reflected the conceptual basis of the social relationships domain and QoL overall.

Table 5.4 *Hierarchical multiple regression with WHOQOL-Old module items as predictors of total quality of life scores*

Predictors	*B*	*SE (B)*	*β*
Step 1			
Constant	20.77	.47	
20 – Relationships	4.41	.13	.39***
21 – Sex life	2.80	.08	.34***
22 – Support	3.20	.12	.29***
Step 1			
Constant	13.76	.49	
20 – Relationships	3.43	.12	.30***
21 – Sex life	2.39	.08	.29***
22 – Support	2.55	.11	.23***
21 – Sense of companionship	.52	.10	.06***
22 – Experience love	.05	.11	.01
23 – Opportunities to love	.23	.10	.03*
24 – Opportunities to be loved	.06	.11	.01
03 – Freedom of decisions	1.31	.10	.13***
04 – Control of future	1.24	.08	.14***
05 – Respect of freedom	.60	.10	.06***

Note. R^2 = .62 for step 1; ΔR^2 = .07 for step 2 (*p*s < .001).
* *p* < .05, *** *p* < .001.

5.1.2.3 Reliability analysis

The reliability of the social relationships domain with the addition of the module items was examined for both module datasets. Given that the Cronbach alpha coefficients are highly influenced by the number of items (Kline, 2000b; Raykov & Marcoulides, 2011), the alpha value of the social domain was expected to increase with the addition of the module items. Thus, the main focus of the current analysis was on the item-total correlations (corrected-*r* values), which would give further information regarding the performance of each module item.

As expected, results showed a considerable increase in the Cronbach alpha (from .73 to .88) with the addition of the four WHOQOL-Dis module items. However, most importantly, all four items were shown to have high item-total correlations (range *r* = .67 - .75), pointing to a good starting point towards the revision of the social

relationships domain. Similar results were found for the WHOQOL-Old dataset in which the five module items improved the Cronbach alpha coefficient, which exceeded acceptability thresholds (α = .78) compared to the initial value of .63. In addition, the five module items were shown to have medium to high item-total correlations (range r = .43 - .56), which provides support for the homogeneity of the items within the domain.

5.1.2.4 The Pilot WHOQOL-BREF-R

As described in the Methodology chapter, the Pilot Revised WHOQOL-BREF scale entailed 33 core items and two general items measuring QoL. The 35-item scale included the original 26 items as described in the original paper (The WHOQOL Group, 1998a), plus the nine additional WHOQOL module items (see Appendix 2 for the final scale). Responses on the Pilot WHOQOL-BREF-R followed the same 5 Likert-type scale as with the existing measure. As for the module items, the 5-Likert scales of their respective modules were used. The 35 items assess issues regarding one's feelings about his/her QoL, health, or other important areas related to the past two weeks from the time of the data collection. For consistency, the additional nine items were placed at the end of the existing WHOQOL-BREF scale.

5.2 Stage II – Field work - Development of the WHOQOL-BREF-R

The procedure followed to field-test the 35-item Pilot WHOQOL-BREF-R has been described in detail in Chapter 4. In short, Stage II of Study I aimed at analysing the data collected from five countries around the world so as to improve the social relationships domain, thereby developing the final version of the WHOQOL-BREF-R. Therefore, from this point onwards and until section 5.2.9, only the Revised dataset will be used. The Revised dataset contains data on the Pilot WHOQOL-BREF-R, SWLS, and HADS, from five countries (N = 986).

5.2.1 Missing values and item frequencies

Preliminary data screening was performed prior to data analysis so as to investigate the percentage of missing values and the accuracy of data input in the Revised dataset. Results supported the correct entry of all data related to WHOQOL-BREF-R, HADS, and SWLS for each centre and for the total sample. Centre-by-centre analyses indicated that missing values on all variables did not exceed the 5% (Schafer, 1999), except for the WHOQOL item 21 (sex life) in China centre which was found to have a high percentage of missing values (n = 31, 15.3%). Notably, all items had less than 5% missing values in the total sample. In addition, missing values per participant did not exceed the 15%.

The item distribution in the global dataset was explored for all scales. As expected from previous analyses, responses to each of the 24 WHOQOL items were distributed along the full range of the scale. In general, responses concentrated in the middle of the Likert scales, although items 3 (pain), 4 (medication), 6 (spirituality) 15 (mobility) and 35 (opportunities to love) of the Pilot WHOQOL-BREF-R appeared to exhibit ceiling effects (>25%). It is worth mentioning that in previous analyses (section 5.1.1.2), ceiling effects for items 3, 4, and 15 were found in all existing datasets but the WHOQOL-Dis. Thus, it is possible that those items are not as applicable to general populations as to disabled individuals whose pain, mobility problems, and medication use interfere with their daily life.

Responses on the SWLS were also distributed across the full range of the 7-Likert scale with no apparent floor or ceiling effects. In contrast, the majority of the HADS-Depression subscale items were found to exhibit floor effects. That was also the case for two items of the HADS-Anxiety subscale, which is to be expected in a sample consisted mostly of healthy individuals. The item distributions of each measure for the overall dataset can be found in Appendix 14.

5.2.2 Sample characteristics

The final sample for the field study of the WHOQOL-BREF-R consisted of 986 participants within five centres: 280 (28.4%) from Brazil, 203 (20.6%) from China,

169 (17.1%) from Portugal, 219 from Turkey (22.2%), and 115 (11.7%) from the United Kingdom. The demographic characteristics of each sample were explored and are summarized in Table 5.5.

The sample characteristics of the total sample were explored in terms of age, gender, health group, marital status, and education. The age of the 986 participants ranged between 17 and 89 with a mean age of 38.67 (*SD* = 15.28). Three participants from the United Kingdom centre reported being 17 years of age at the time of the data collection. According to the Generic Professional Practice Guidelines of the British Psychological Society, those aged 16-18 are able to participate in research without a parental consent (Professional Practice Board BPS, 2008). Therefore, the data of those aged 17 were included in the analyses. A close inspection of the graphic representation revealed the 'age' variable to be positively skewed with most participants concentrating on the left side of the data, below the age of 60. All centres provided data from both genders except for Turkey whose data were part of a bigger study focusing on female adults. In the overall dataset, 63.9% (*n* = 630) of the participants were women and 36.1% (*n* = 356) were men, with a women-to-men ratio of 1.77:1. The majority of participants stated being healthy (*n* = 636, 64.5%) at the time of the data collection. The rest 350 (35.5%) reported having some form of illness, among which the most prevalent were infections, neoplasm or cancer, chronic diseases, and mental health disorders.

With regards to marital status, more than half of the participants were married (*n* = 558, 56.6%) while one-third (*n* = 326, 33.1%) reported being single. Out of the 986 participants, only 70 (7.1%) were either separated/divorced or widowed, whereas a smaller percentage (2.4%, *n* = 24) stated living as married. Five participants (.3%) form the Turkish centre indicated the option "other". Regarding education, the majority were educated to university/tertiary level (*n* = 364, 36.9%). Out of the 986 respondents, 276 (28%) received secondary school education, 23.4% (*n* = 231) attended primary school, while a smaller percentage reported having either some reading abilities (*n* = 59, 6%) or no education at all (*n* = 32, 3.2%).

Table 5.5 *Sample demographic characteristics for each centre – Revised dataset (N = 986)*

N (%)		Brazil (*n* = 280)	China (*n* = 203)	Portugal (*n* = 169)	Turkey (*n* = 219)	United Kingdom (*n* = 115)
Age	Range	18 – 89	18 – 81	18 – 78	20 – 64	17 – 47
	Mean (SD)	45.11 (16.16)	38.18 (14.23)	38.42 (16.05)	38.82 (12)	23.89 (6.43)
Gender	Male	117 (41.8)	111 (54.7)	86 (50.9)	-	42 (36.5)
	Female	163 (58.2)	92 (45.3)	83 (49.1)	219 (100)	73 (63.5)
Group	Ill	141 (50.4)	103 (50.7)	23 (13.6)	77 (35.2)	6 (5.2)
	Healthy	139 (49.6)	100 (49.3)	146 (86.4)	142 (64.8)	109 (94.8)
Marital Status	Single	80 (28.6)	58 (28.6)	83 (49.1)	15 (6.8)	90 (78.3)
	Married	166 (59.3)	139 (68.5)	64 (37.9)	181 (82.6)	8 (7)
	Living as married			8 (4.7)		16 (13.9)
	Separated/Divorced/ Widowed	30 (10.8)	5 (2.5)	14 (8.3)	20 (9.1)	1 (.9)
	Other				3 (1.4)	
Education	None		1 (.5)	2 (1.2)	29 (13.2)	
	Reading abilities				59 (26.9)	
	Primary/Elementary school	91 (32.5)	18 (8.9)	47 (27.8)	75 (34.2)	
	Secondary/High school	108 (38.6)	41 (20.2)	43 (25.4)	51 (23.3)	33 (28.7)
	Tertiary/University	257 (20.7)	142 (70)	77 (45.6)	5 (2.3)	82 (71.3)
Employment	Employed	122 (43.6)			27 (12.3)	19 (16.5)
	Unemployed	19 (6.8)			192 (87.7)	1 (.9)
	Housewife	41 (14.6)				
	Retired	56 (20)				
	Student	32 (11.4)				95 (82.6)

5.2.3 Psychometric properties of measures

The measurements used in the field study included the Pilot WHOQOL-BREF-R, the SWLS, and the HADS. The properties of HADS and SWLS in terms of descriptive statistics and reliability analysis were explored and are presented in Table 5.6. It is worth mentioning that analyses based on the HADS were performed using a smaller sample (n = 696), as Turkey did not provide any data on that scale, while China provided data only for some of the participants. Eight participants from the China centre did not complete the SWLS due to time restrictions. The psychometric properties of the WHOQOL-BREF and Pilot WHOQOL-BREF-R are described in detail in later sections.

Table 5.6 *Descriptive statistics and internal consistency for HADS and SWLS - Revised dataset (N = 986)*

	Min	Max	Mean	SD	Median	Skewness	Kurtosis	Cronbach alpha
HADS	0	38	12.09	6.73	11	.64	.18	.86
HADS-Anxiety	0	20	7.09	4.02	7	.56	-.05	.82
HADS-Depression	0	18	4.99	3.57	4	.82	.29	.75
SWLS	5	35	22.51	6.78	23	-.32	-.71	.87

Note. HADS = Hospital Anxiety and Depression Scale; SWLS = Satisfaction with Life Scale

5.2.3.1 Descriptive statistics

The data distribution was assessed for all measures. Given what has already been mentioned in previous sections (see section 5.1.1.2) regarding large sample sizes, the absolute values of skewness and kurtosis and the visual representation of the data were considered more appropriate for the inspection of normality.

As shown in Table 5.6, the absolute skewness and kurtosis values of all measures fell below 1 (Bowen & Guo, 2011; Hair Jr. et al., 2010) which suggests a normal distribution. The frequency histograms and Probability-Probability (P-P) Plots of all measures were also explored (see Appendix 15). The inspection of the histograms showed SWLS to be relatively normal, however, that was not the case for the HADS

and its two subscales, which were found to be positively skewed. The P-P Plots indicated slight deviations for the SWLS, and Anxiety subscale, whereas a larger deviation was observed for the total HADS score and the Depression subscale. Despite the fact that the impact of non-normality diminishes with large sample sizes (Tabachnick & Fidell, 2013) subsequent analyses took these results into consideration.

5.2.3.2 Reliability analysis

The internal consistency was assessed for the overall Revised dataset and for each centre separately. As seen in Table 5.6 both the HADS and SWLS had excellent Cronbach alpha values, which is consistent with previous literature (e.g. (e.g. Bjelland et al., 2002; Steger, Frazier, Oishi, & Kaler, 2006).

The alpha values for the SWLS ranged between .83 and .89 for the five centres, while all items were found to have high item-total correlations ($r > .50$). Similar results were found for the total HADS (range α = .83-.88), and the Anxiety (range α = .79 - .83) and Depression subscales (range α = .69 - .79). A lower but marginal Cronbach alpha value was found for the HADS-Anxiety scale in China centre (α = .69). Centre-by-centre results showed that all items of the two subscales were shown to have acceptable item-total correlation values and none fell below the minimum .30 threshold (Kline, 2000b).

5.2.4 Psychometric Properties of the 26-item WHOQOL-BREF

Prior to the revision of the social relationships domain, descriptive statistics and reliability analysis were undertaken so as to examine the performance of the existing WHOQOL-BREF in the current sample. In the overall sample, the total WHOQOL-BREF score (as measured by the mean of the four domains) ranged between 16.33 and 97.92 with a mean of 65.01 (SD = 13.31) and a median of 66.15. Interestingly, no values fell below 15 (i.e. very poor QoL) even though 35.5% of the sample was identified as being ill. The skewness and kurtosis values for the WHOQOL-BREF were -.44 and .33, respectively, which along the P-P Plot and Histogram (see

Appendix 15), indicate that the scale has a relatively normal distribution with only minor deviations.

With regards to reliability, the existing WHOQOL-BREF was found to exhibit excellent internal consistency in the total sample (α = .90) and in each centre (see Table 5.7). As expected, all four domains were shown to have acceptable internal consistency in the total sample and in each of the five centres, except for the social relationships domain for which alpha values did not reach the acceptability threshold of .70. The above findings provide further support for the poor reliability of the social relationships domain, which is in accordance with previous results (see section 5.1.1.3) and the original publications of the WHOQOL-BREF (Skevington et al., 2004a; The WHOQOL Group, 1998a).

All items were found to have high item-total correlations in the total sample and in each centre, except for items 3 (physical pain) and 4 (medication) from the UK centre, and item 14 (leisure activities) from the Turkey centre that were found to be problematic ($r < .30$).

Table 5.7 *Cronbach alpha for WHOQOL-BREF – Revised dataset (N = 986)*

	Brazil	China	Portugal	Turkey	United Kingdom	Overall sample
Physical	.86	.76	.78	.85	.74	.83
Psychological	.72	.74	.81	.80	.81	.77
Social Relationships	.60	.63	.61	.62	.64	.63
Environment	.76	.76	.75	.77	.77	.78
Overall scale	.89	.90	.89	.90	.88	.90
N	280	203	169	219	115	986

5.2.5 Performance of module items

The psychometric performance of the nine module items in terms of descriptive statistics, correlation analysis, and reliability analysis was explored. Responses on

the nine items were distributed along the full spectrum of the scale (range M = 3.43 - 3.82) with no evidence for floor or ceiling effects, except for item 35 (opportunities to love) for which a great percentage of responses were concentrated on the upper end (5) of the scale (31.8%).

The correlations between the nine items were explored, as it was considered relevant to explore the presence of redundant items. Results indicated a high correlation (r = .74) between items 29 (acceptance by others) and 30 (respect by others), which according to Dormann et al. (2012) might distort model estimation and subsequent prediction due to collinearity problems. Beyond that, from a conceptual multicollinearity perspective, high correlations may indicate redundant variables (Tabachnick & Fidell, 2013), which would warrant omitting one of the two variables from future analyses (Dormann et al., 2012).

Correlation and reliability analyses were carried out between the social relationship domain and items 29 and 30, whereby decisions were made as to which of the two items should be omitted from subsequent analyses. The two items were found to have medium correlations with the social relationships domain, although item 30 had a stronger relationship (r = .47, $p < .001$) than item 29 (r = .43, $p < .001$). In a similar manner, despite the high value found in both items, results from internal consistency analysis indicated item 30 to have a higher item-total correlation (r = .63) than item 29 (r = .59). Given these results, item 29 was not retained and only item 30 (respect by others) was used in subsequent analyses.

5.2.6 Correlation analysis

Bivariate correlations between the four domains and the eight module items were conducted to explore whether any of the items correlate more highly with the social relationships domain than any other domain (Table 5.8). All eight items were shown to have medium correlations with the social relationships domain but only three had a greater correlation with the social domain than the rest three domains: Item 30 (respect by others), item 34 (sense of companionship), and item 35 (opportunities to love). Thus, the three items were considered as possible candidates for the improvement of the social relationships domain.

Table 5.8 *Correlations between the 4 WHOQOL-BREF domains and 8 Module items - Revised dataset (N = 986)*

Module Items		Physical Domain	Psychological Domain	Social Relationships Domain	Environment Domain
Q27	Autonomy	.25	.39	.33	.35
Q28	Communication abilities	.24	.42	.40	.29
Q30	Respect by others	.24	.45	**.48**	.38
Q31	Making own decisions	.21	.40	.31	.33
Q32	Control of future	.27	.42	.33	.35
Q33	Respect of my freedom	.25	.44	.42	.41
Q34	Sense of companionship	.19	.40	**.43**	.28
Q35	Opportunities to love	.17	.35	**.42**	.24

Note. Items in bold indicate those that correlate more highly with the social relationships domain. All correlations were statistically significant ($p < .001$).

5.2.7 Hierarchical multiple regression analysis

Further analyses were conducted so as to examine the contribution of the three items to the overall QoL above and beyond the social relationships items. To this end, two hierarchical multiple regression models were analysed with the social relationships items and the three module items serving as predictors in two separate blocks. The total WHOQOL-BREF score and the total score of the two general items (Q1 and Q2) were treated as dependent variables in two separate models. The two general items were used in accordance to previous studies (e.g. Power et al., 1999), as together they are considered to represent global QoL. Tolerance and VIF statistics provided no support for multicollinearity issues.

Results indicated that the module items accounted for a small but significant amount of the QoL as measured by the total WHOOQL-BREF score, above and beyond the social relationship items, $\Delta R^2 = .02$, F (6, 932) = 251.19, $p < .001$, with an overall contribution of 62% in the variance of QoL. However, only items 30 ($\beta = .16$, $p <$

.001) and 34 (β = .07, p < .05) were significant predictors of the total score. Similar results were found in the model with the general items as the dependent variable. More precisely, the module items had a statistically significant contribution to the overall QoL, ΔR^2 = .02, F (6, 931) = 45.19, p <.001, but only items 30 (β = .13, p < .001) and 34 (β = .11, p < .05) were found to be significant predictors of QoL.

Thus, items 30 (social respect) and 34 (love opportunities) were considered more appropriate for the improvement of the social relationships domain, and were used in subsequent analyses.

5.2.8 Reliability of revised social relationships domain

The internal consistency of the revised 5-item social relationships domain was explored. As expected, results from global analyses showed satisfactory item total correlations for items 30 (r = .50) and 34 (r = .48). The addition of the two items contributed to a .10 increase in the alpha value (α = .73) in the overall sample (N = 986) and in each centre, although Brazil (α = .68), China (α = .68), and Portugal (α = .63) did not reach the acceptability threshold of .70. Although such cultural differences were expected to occur, the performance of the two items was further investigated using CFA.

5.2.9 Confirmatory factor analysis

EFA was not performed prior to CFA, as the structure of the model was known by previous studies (Skevington et al., 2004a; The WHOQOL Group, 1998a). Therefore, a 4-factor higher order model including the revised social domain was explored. Due to the categorical nature of the data, the model was estimated using Weighted Least Squares Means and Variance adjusted (WLSMV) estimator on the polychoric correlation matrix (i.e. correlations between two categorical indicators). WLSMV is a useful and a less time consuming method for large models involving categorical outcomes (Muthén & Muthén, 1998-2010). It compensates more effectively than the ML estimation for the bias related to the categorical aspects of the variables (Muthén, du Toit, & Spisic, 1997) and has received increasing support for its good performance (Beauducel & Herzberg, 2006; Flora & Curran, 2004; Lei,

2007; Muthén et al., 1997; Yu, 2002). As already mentioned, after careful consideration of the literature on SEM and the concerns raised in Appendix 5, a number of different diagnostic information was used in the assessment of SEM models (see Table 4.2 of section 4.6.3.1 for more details).

Results from CFA showed that the factor loadings of all items, including the two module items (λ_{30} = .70, λ_{34} = .57), were high and significant. The psychological domain appeared to have the highest factor loading (λ = .93) followed by the environmental (λ = .80), social relationships (λ = .78), and physical domain (λ = .76). However, following the cut-off points mentioned in Appendix 5, the fit of the model could be considered as unacceptable: $\chi^2(295) = 2271.76$, $p < .001$; RMSEA = .087, 90% C.I. [.083-.090], $p < .001$; CFI = .880, TLI = .868. In addition, a close inspection of the residual correlation matrix suggested misfit problems. In general, residuals should be small and central around zero (Tabachnick & Fidell, 2013). Large correlation residuals, usually greater than .10, suggest that the relation between two observed variables is not adequately estimated by the model (Kline, 2011; McIntosh, 2007; Tabachnick & Fidell, 2013). In fact, "…the more they are, the worse the explanatory power of the model for specific observed associations" (Kline, 2011, p. 171). In the present model, over 40 pairs of observed variables had a value above .10. As such results were unexpected, the original WHOQOL-BREF model was compared to the revised one, in order to explore whether the model fit would be better without the two additional module items.

In models with continuous variables and ML estimation, the comparison between competing models would be possible through the Akaike Information Criterion (AIC) index (Beauducel & Herzberg, 2006; Muthén et al., 1997; Yu, 2002). However, the AIC index is not available for WLSMV estimation. Instead, the DIFFTEST option in MPlus provides the chi-square difference between the null (H0) and a less restrictive (i.e. full) alternative model (H1) in which the H0 is nested (Kline, 2011). The H1 model for the current analysis would be the one with the 2 module items included in the social relationships domain (i.e. social domain measured by q20 q21 q22 q30 q34). In contrast, in the H0 null model the variance of

the two additional items would be set to zero (i.e. social measured by q20 q21 q22 q30@0 q34@0) supporting the null hypothesis "the model is not worse without the two items". Results led us to reject the null hypothesis (χ^2 diff (2) = 617.45, $p < .001$) indicating that the model fit would be worse without the two additional module items. However, given the unsatisfactory model fit of the revised scale, it was considered relevant to examine the fit of the original WHOQOL-BREF (without the additional two items). To this end, two datasets were used to examine the fit of the existing 4-factor WHOQOL-BREF: The Original WHOQOL-BREF dataset (N = 11830) and the Revised dataset (N = 986), results of which can be found in Table 5.9. Considering the low percentage of missing values in both datasets the Listwise deletion option was used in MPlus for dealing with missing data.

Table 5.9 *Fit indices of the existing 26-item WHOQOL-BREF*

Datasets	N	$\chi^2(df)$	RMSEA	RMSEA 90% CI (LL – UL)	CFI	TLI
Revised dataset	893	2075.46(248)***	.091***	.087 - .094	.882	.869
Original dataset	10320	21200.88(248)***	.090***	.089 - .092	.902	.891

Note. RMSEA = The Root Mean Square Error of Approximation; CI = Confidence Interval; LL = lower limit; UL = upper limit; CFI = Comparative Fit Index; TLI = Tucker-Lewis index.
*** $p < .001$

Results from both datasets pointed to a poor-fitting model. Although results from CFA were inconsistent with those of the original publication (e.g. CFI = .87; The WHOQOL Group, 1998a), it is not surprising, as contrary to the current study, the model fit in previous studies was most likely assessed using ML estimation. Beauducel and Herzberg (2006) support that the chi-square values from ML and WLSMV estimation cannot be directly compared, as their calculation differs. They also report that when ML is used, depending on the estimation and number of factors, CFI may appear to have a worse performance while RMSEA tends to indicate a better fit. That could possibly explain the discrepancy between results from the current study and previous studies that used the same data.

As was the case with previous findings, the inspection of the modification indices in both datasets revealed possible areas of misfit. For example, results suggest that item 8 (safety) should also load on the psychological domain. In addition, the residual correlation matrix indicated high values between item 8 and other environmental items, suggesting that the model does not adequately explain these relationships. The above findings are consistent with the results found in section 5.1.1.4 and can be interpreted as evidence for the problematic structure of the model.

5.3 Stage III – Re-evaluation of the 1998 WHOQOL-BREF development

The initial objectives of the current study involved the improvement of the WHOQOL-BREF social relationships domain with the use of modern psychometric methods. Although the addition of the two module items improved the internal consistency of the social relationships domain, it did not result in an overall good model fit, which can be interpreted as evidence for the problematic structure of the scale as a whole. In respect to that, new objectives were set which aimed at further investigating the structure of the existing 26-item WHOQOL-BREF. As the aims of Stage III were exploratory, no hypotheses were made. From this point onwards and until section 5.3.4 both the Original (N = 11830) and Revised (N = 986) datasets will be used.

5.3.1 Exploratory factor analysis

EFA is usually performed in the early stages of research (Tabachnick & Fidell, 2013) where the factorial structure of a measure is unknown. However, when CFA results point to a poor model, EFA can be performed in later stages of research so as to investigate the possibility of model misspecification (Muthén & Muthén, 1998-2010). Model misspecification may result by substantially low standardized factor loadings (e.g. < 20) and inadequate methods of factor extraction (Kline, 2011). It is, thus, possible that the wrong number of factors was specified for the WHOQOL-BREF. Basing their analyses on the WHOQOL-100 structure (see Skevington et al.,

2004a; The WHOQOL Group, 1998a), the WHOQOL Group explored whether a 4-factor or a 6-factor WHOQOL-BREF solution fit the data best. However, the degree to which they examined whether each of the 24 items loaded onto its corresponding factor, as expected, was unclear. Therefore, it was considered essential to carry out an EFA, which would provide a more comprehensive image of the WHOQOL-BREF structure and point to possible misspecification problems. The guidelines followed for conducting an EFA will be described in detail.

5.3.1.1 Factor rotation

As a first step, EFA was undertaken to explore the degree to which the 24 items loaded onto their corresponding domains. For consistency, the EFA was carried out in the Original dataset used for the development of the existing WHOQOL-BREF (*N* = 11830). As with previous analyses, the EFA was conducted using WLSMV estimator and the results were based on the rotated solution. Factor rotation serves to foster the interpretability of the factors derived from the initial solution (Brown, 2015; Giles, 2002), which is accomplished by rotating the factors until the most simple structure is achieved. In the search for the simplest solution two types of rotation can be used: Orthogonal or oblique. The orthogonal rotation places the factors at right angles to each other (Giles, 2002) and it is appropriate when factors are presumed to be statistically uncorrelated (DeVellis, 2012; Tabachnick & Fidell, 2013). In cases where factors are expected to be correlated, the use of oblique rotation is considered to be more appropriate, as factors can take up any position in three-dimensional space (Giles, 2002).

Notably, in the validation study of the WHOQOL-BREF, Skevington et al. (2004a) used orthogonal (Varimax) rotation, in spite of insufficient information to justify their choice. Similarly, for the development of the WHOQOL-100, The WHOQOL Group (1998b) argued: “Orthogonal rotation was employed because there was no reason to assume that facets such as physical environment and pain and discomfort would be related to one another” (p. 1582). Whilst the four WHOQOL-BREF domains are in some respects different, they were all designed to measure aspects of QoL. Using orthogonal rotation could have therefore lead to loss of valuable

information if the factors were indeed correlated (Costello & Osborne, 2005). As Raykov and Marcoulides (2011) suggest, one could set out for an oblique rotation and then examine the size of the factor intercorrelations. If they are found to be fairly small, orthogonal rotation can be considered instead (Henson & Roberts, 2006; Raykov & Marcoulides, 2011). Hence, in the current study, the EFA was conducted with the use of oblique (Geomin) rotation.

5.3.1.2 Factor loadings

The factor loadings found in an EFA structure matrix reflect important information about the relationship between factors and observed variables. They can be seen as regression coefficients, as they represent the correlation between factors and items, controlling for the impact of other factors on the item (Fayers & Machin, 2007). With EFA, researchers aim to get the clearest factor structure possible (Costello & Osborne, 2005) and the size of the factor loadings can be a good indicator towards that. In general, the higher the loading, the more the item characterizes its corresponding factor (Giles, 2002). There is not, however, an agreement as to how strong the loadings should be. Some suggest that factor loadings greater than .30 (Brown, 2015; Costello & Osborne, 2005; Giles, 2002; Kline, 2000b) or .32 (Tabachnick & Fidell, 2013) are considered to be significant and capable of defining a factor. Some suggest that strong items with loadings above .45 (Tabachnick & Fidell, 2013) or .50 (Costello & Osborne, 2005) are desirable in setting a good start for the development of a solid latent factor. Complex items loading highly on more than one factor (i.e. cross loading) (Giles, 2002) can reduce the clarity of the factor structure. Thus, ideally, a solution should not contain any cross loadings. Some suggest that items with loadings above .32 on more than one factor could be considered for elimination (Costello & Osborne, 2005). Matsunaga (2010) and Worthington and Whittaker (2006) suggest focusing on the discrepancy between the primary and secondary factor loading and retain only those with a clear discrepancy (.15 - .40). In general, cross loadings found in EFA can provide useful information as to whether an item appears to be measuring more than what it is intended to measure.

Overall, researchers should aim at retaining at least three (Raubenheimer, 2004; Velicer & Fava, 1998) but preferably five strong items per factor, as factors with fewer than three items can be weak and unstable (Costello & Osborne, 2005). Many have suggested that more indicators per factor could possibly lead to more reliable factors, better construct representations, greater interpretability, and more stability across populations (Brown, 2015; DeVellis, 2012; Little, Lindenberger, & Nesselroade, 1999; Marsh, Hau, Balla, & Grayson, 1998).

5.3.1.3 4-Factor EFA of WHOQOL-BREF

Following the structure proposed by Skevington et al. (2004a) a 4-factor EFA with oblique rotation was performed in order to examine the accuracy of the suggested 4-factor model. Results are presented in Table 5.10. It is worth noting that all factor intercorrelations were statistically significant ranging from .05 to .71. However, it is important to note that the significant correlation between Factor 2 and 3 (r = .05) could have occurred due to the large sample size. Factor 4 appears to represent the environmental domain and was found to have low to medium correlations (r = .27 - .50) with the rest of the three domains, which contradicts the previous argument by the WHOQOL Group (The WHOQOL Group, 1998b).

Interestingly, results from the 4-factor EFA pointed to an unclear factor structure as the 24 items failed to construct four distinct factors. This was not unexpected for some of the items (e.g. items 8, 20-22), which were found to load more highly onto other domains than their own. Several factors can account for these findings including, but not limited to, the ambiguity in the wording, the poor discriminant and convergent validity, and the cultural differences.

Table 5.10 *4-Factor EFA of the existing WHOQOL-BREF – Original dataset (N = 11830)*

	Factors			
Items	1	2	3	4
Item 3	**0.589**	0.012	**-0.539**	0.064
Item 4	**0.574**	0.090	**-0.464**	-0.051
Item 10	**0.476**	**0.373**	-0.042	0.014
Item 15	**0.324**	0.243	-0.122	0.248
Item 16	0.161	**0.415**	-0.015	0.103
Item 17	0.010	**0.865**	-0.055	0.041
Item 18	-0.005	**0.906**	-0.038	-0.070
Item 5	**0.676**	0.034	0.211	0.039
Item 6	**0.699**	-0.003	0.336	-0.040
Item 7	**0.472**	0.217	0.110	-0.016
Item 11	0.244	**0.295**	0.168	0.136
Item 19	0.077	**0.681**	0.303	0.001
Item 26	**0.399**	0.251	0.038	-0.024
Item 20	0.009	**0.469**	**0.465**	0.163
Item 21	-0.006	**0.502**	0.290	0.011
Item 22	0.074	0.227	**0.303**	0.281
Item 8	**0.530**	0.066	0.063	0.158
Item 9	**0.384**	-0.096	0.019	**0.367**
Item 12	**0.339**	-0.127	0.017	**0.500**
Item 13	**0.372**	-0.028	-0.014	**0.413**
Item 14	**0.329**	0.056	-0.083	**0.337**
Item 23	0.013	0.062	0.140	**0.609**
Item 24	-0.167	0.118	0.035	**0.692**
Item 25	0.014	0.030	-0.052	**0.660**

Note. In bold are the items loading highly on each domain. Estimation = WLSMV; Rotation = Geomin.

5.3.2 Factor extraction

Factor extraction, whereby a large pool of items is reduced into meaningful factors, is of great significance in the development of psychometric tools. Selecting the correct number of factors to retain is one of the most crucial steps (Turner, 1998), as evidence supports that retaining too few or too many factors can affect the measure (Hayton, Allen, & Scarpello, 2004; McCoach, Gable, & Madura, 2013). Given the

above findings, it was therefore considered relevant to reconsider and reinvestigate the factor extraction of the existing WHOQOL-BREF, as it could possibly shed more light on the previous findings.

The factorial structure of its parent scale WHOQOL-100 was decided upon the "eigenvalue > 1" rule and the visual representation of the Scree test (The WHOQOL Group, 1998b). Given that the structure of the WHOQOL-BREF was based on that of WHOQOL-100, a factor extraction was probably not deemed necessary during the development of the scale. Thus, in the original study, The WHOQOL Group (1998a) merely conducted a CFA on the 4-factor structure, whereas in the subsequent validation study, Skevington et al. (2004a) confirmed the 4-factor structure of the WHOQOL-BREF with the use of the eigenvalue > 1 rule. However, despite being the most frequently used method, the accuracy of the eigenvalue is questionable (Patil, Singh, Mishra, & Todd Donavan, 2008; Zwick & Velicer, 1986). A detailed discussion on the different methods for factor extraction and the strategy applied in the current study is presented in Appendix 16, and is summarized below.

Given the extensive methods available for retaining a factor and the limitations mentioned in Appendix 16, the use of the eigenvalue rule was not considered a suitable approach. Instead, the use of a more accurate and modern method than that used in the development of the WHOQOL-BREF was deemed to be more suitable for the aims of the current study. Considering the limitations and strengths of each method, the decision on how many factors to extract was based upon the interpretation criterion and a number of methods including the Scree test (Cattell, 1966), the Minimum Average Partial Test (MAP; Velicer, 1976) and Parallel Analysis (PA; Horn, 1965).

5.3.2.1 WHOQOL-BREF factor extraction

For consistency, the current analysis was first conducted using the Original dataset (N = 11830), however, the dataset was split in two randomly selected sub-samples (n = 5915). PA was performed using the first half sub-sample, results of which were validated using the Revised dataset. The scree plots for the half sub-sample and

Revised datasets are presented in Figure 5.1. As expected, results from the sub-sample were unclear and open to interpretation. From a first look, the point of inflexion appears to be located on the third component, although some could argue that there is a second drop on the fifth component. Contrarily, the scree plot of the Revised dataset (N = 986) indicated a 3-factor solution with a clear drop on the third component

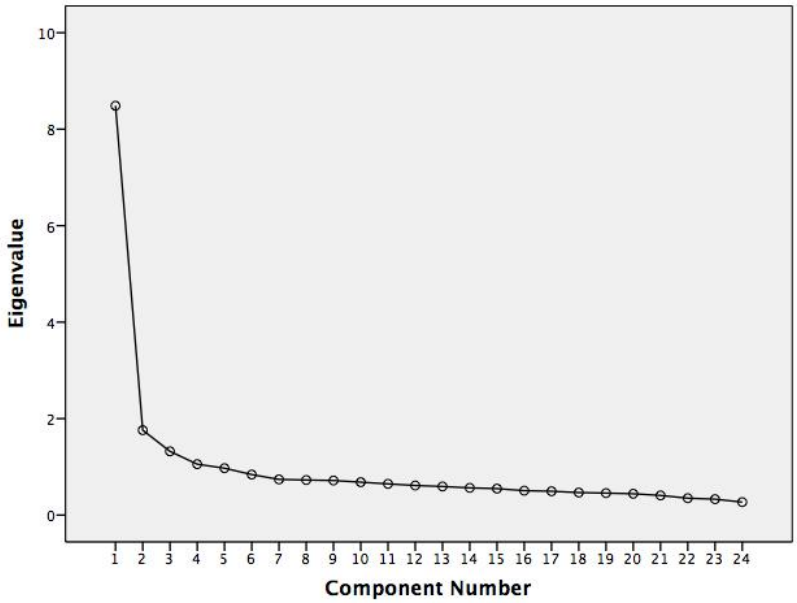

Figure 5.1a. Original sub-sample (n = 5915)

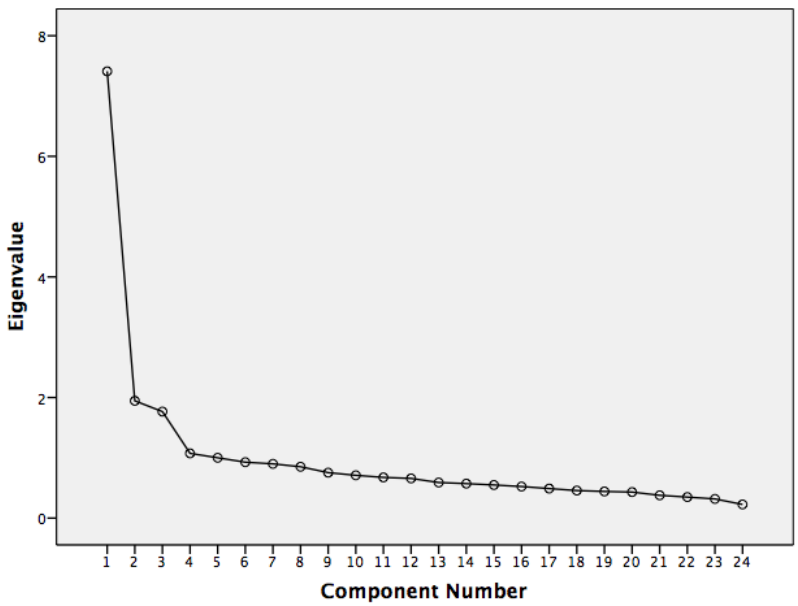

Figure 5.1b. Revised dataset (N = 986)

Figure 5.1 Scree plots for WHOQOL-BREF items.

Using the syntax provided by O'Connor (2000), a MAP test was then undertaken in both datasets so as to further investigate the factorial structure of the scale (see Table 5.11). Results from the Original sub-sample dataset pointed to a 2-factor solution, as the smallest values from the squared (.0111) and fourth power test (.0003) were found on the second component. On the other hand, results from the Revised dataset pointed to a 3-factor solution. More precisely, the correlation value for the squared test was found on the third component (.0126) while for the fourth power test, it was located on both the third and fourth component (.0005).

Table 5.11 *Velicer's MAP test for WHOQOL-BREF*

		Average partial correlations	
Dataset	No. of components	Squared	Fourth power
Original sub-sample	.00	.1106	.0169
(n = 5915)	1.00	.0118	.0005
	2.00	.0111	.0003
	3.00	.0116	.0004
	4.00	.0130	.0005
Revised dataset	.00	.0848	.0118
(N = 986)	1.00	.0164	.0010
	2.00	.0137	.0006
	3.00	.0126	.0005
	4.00	.0140	.0005

Given that results from MAP test were inconclusive for the two datasets, PA was also conducted. As with MAP test, PA analysis was carried out using the syntax proposed by O'Connor (2000). PA was undertaken for both datasets using Principal Component Analysis which was found to be superior to the Principal Axis Factoring method (Timmerman & Lorenzo-Seva, 2011), which has the tendency to overfactor (Buja & Eyuboglu, 1992; Timmerman & Lorenzo-Seva, 2011). Results from MAP test were confirmed and extended by the results found in PA. As seen in Table 5.12, both datasets provided support for a 3-factor solution, as only the eigenvalues of the first three factors were larger than those derived from random datasets. Notably,

more than three factors had eigenvalues above 1 in the Original dataset, which when based on the eigenvalue rule supports the decision of Skevington et al. (2004a) to retain four factors. However, according to PA, the eigenvalue of the fourth factor would account for less variance that one would expect by chance alone.

Table 5.12 *Parallel analysis for WHOQOL-BREF*

			Random EV	
Datasets	Factors	EV	Median EV	95th EV
Original sub-sample	1	8.49	1.12	1.14
(*n* = 5915)	2	1.77	1.11	1.12
	3	1.32	1.09	1.10
	4	1.06	1.08	1.09
Revised dataset	1	7.41	1.31	1.35
(*N* = 986)	2	1.95	1.26	1.29
	3	1.77	1.22	1.25
	4	1.07	1.19	1.22

Note. Based on 10000 random datasets. EV = eigenvalues; 95th = 95th percentile

Results from Scree test, MAP test, and PA were in agreement for the Revised dataset, which provide evidence for the existence of a 3-factor solution. However, results were debatable in the Original sub-sample dataset. This was not surprising, as very often, results from MAP and PA differ. In such cases some suggest using the interpretability criterion, increasing the number of random data sets in PA, and inspecting carefully the two smallest average correlations from the MAP test for a close call (O'Connor, 2000; Wuensch, 2012). Increasing the random data sets from 1000 to 10000 in the current study provided the same 3-factor solution. However, the inspection of the MAP test revealed that the second smallest correlations are located on the third factor, pointing to the possibility of a 3-factor solution (see Table 5.11).

In addition, given that the WHOQOL-BREF entails items from discrete aspects of QoL such as that of psychological, physical, social, and environmental QoL, it would not be theoretically plausible to retain only two factors. Forcing items into too few factors could result in loss of information, the neglect of potentially important

factors, the fusing of factors, distortions in the factor solution, and/or increase in the factor loadings errors (O'Connor, 2000). Therefore, all results considered, the 3-factor structure appeared to provide the most accurate solution, and thus was applied in subsequent analyses. The above findings are profoundly important, as they challenge what was initially thought to be a 4-factor WHOQOL-BREF.

5.3.3 Exploring the 3-factor WHOQOL-BREF

Given the above findings and the complexity of defining the concept of QoL, Part III of the current study aimed at identifying problems of misfit and improving the scale as a whole. Hence, further analyses were carried out in order to explore the performance of the 3-factor WHOQOL-BREF.

5.3.3.1 Exploratory factor analysis – Original dataset half sub-sample (*n* = 5915)

An EFA with oblique (Geomin) rotation was undertaken so as to further inspect and interpret the three factors. The current analysis was performed using the first half sub-sample used in section 5.3.2.1, results of which were validated by performing CFA on the other half sub-sample.

The primary aim of the EFA was to inspect which items load highly onto which factors. Worthington and Whittaker (2006) suggest setting the "minimum values for factor loadings as high as possible and the absolute magnitude for cross loadings as low as possible (without compromising scale length or factor structure), which will result in fewer cross loadings of lower magnitudes and better approximations of simple structure" (p. 823). Given the guidelines detailed in section 5.3.1.2, items were retained based on the following rules: Ideally, only items with strong factor loadings were considered for inclusion (> .40-45), items with factor loadings lower than .30 and items with cross loadings above .32 on more than one factor were considered for elimination, unless the difference between the two loadings was large (≥.15). Finally, EFA aimed at retaining factors with at least three, but preferably five strong items. Overall, the objective of the current analysis was to retain meaningful factors without compromising the reliability and validity of the WHOQOL-BREF.

EFA – First sub-sample (n = 5915)

Results from oblique rotation are based on two matrices, one representing the factor loadings (rotated factor loadings) and one representing the correlations between factors and items (Tabachnick & Fidell, 2013). Thus, results from the current study were interpreted based upon both matrices. It is important to note that only items 3 to 26 were included in the analyses as items 1 and 2 represent general QoL and are not part of the overall WHOQOL-BREF score.

Results from the 3-factor EFA indicated small to large statistically significant correlations between the three factors (r = .18 -.58, p < .05), which provide support for the use of oblique, and not orthogonal rotation. The smallest correlation was observed between Factors 2 and 3, which was not surprising, as Factor 2 did not appear to form a meaningful factor. The rotated 3-factor matrix presented in Table 5.13 revealed a number of problematic items. After the removal of each item, the EFA was conducted again. Items 3 (pain) and 4 (medication) were removed first as they appeared to substantially cross load onto more than one factor. The poor performance of these items was not surprising, as at times, they were found to exhibit very low item-total correlations, possess ceiling effects, and correlate more with other domains than their own.

Table 5.13 *Step 1: 3-Factor EFA of WHOQOL-BREF – Sub-sample (n = 5915)*

	Factors		
Items	1	2	3
3 – Pain	**0.555**	**-0.564**	0.094
4 – Medication	**0.612**	**-0.522**	-0.031
5 – Positive Feelings	0.482	0.143	0.286
6 – Spirituality	0.466	0.220	0.241
7 – Concentration	0.526	0.043	0.129
8 – Safety	0.454	0.008	0.296
9 – Environment	0.163	0.002	0.469
10 – Energy	0.726	-0.096	0.097
11 – Bodily appearance	0.481	0.130	0.162
12 – Finances	0.103	-0.001	0.585
13 – Information	0.232	-0.021	0.495
14 – Leisure	0.306	-0.072	0.380
15 – Mobility	0.515	-0.117	0.251
16 – Sleep	0.559	-0.005	0.041
17 – Activities	0.944	0.002	-0.152
18 – Work	0.976	0.001	-0.257
19 – Self-esteem	0.723	0.295	-0.031
20 – Relationships	0.403	0.455	0.199
21 – Sex life	0.460	0.282	0.000
22 – Support	0.210	0.310	0.333
23 – Home	0.012	0.181	0.618
24 – Health services	-0.039	0.125	0.611
25 – Transport	0.007	0.008	0.630
26 – Negative feelings	0.555	-0.030	0.057

Note. Problematic items are in bold. Rotation = Geomin. χ^2 (207) = 6810.79, $p < .001$; RMSEA = .079, 90% C.I. [.077 - .080], $p < .001$; CFI = .937; TLI = .916.

After their removal, the 3-factor structure assumed a clearer form with factor 1 measuring psychosocial QoL, factor 2 assessing physical QoL, and factor 3 assessing environmental QoL. As seen in Step 2 (Table 5.14), despite being designed to measure environmental QoL, item 8 clearly loaded on the psychosocial domain. That was not surprising though, as similar results were found in CFA and correlation analysis of previous sections. “Sometimes a statement does not provide enough information for a respondent to make a decision” (Giles, 2002, p. 110). This seems to be the case for item 8, as the ambiguity in its statement does not make it a clear item.

Although there was a number of items that appeared to be problematic, item 8 was removed first, as it was expected to be influencing more items from the psychosocial domain (e.g. items 7, 11, 19) due to their possible shared variance.

Table 5.14 *Step 2: 3-Factor EFA of WHOQOL-BREF – Sub-sample (n = 5915)*

	Factors		
Items	1	2	3
5 – Positive Feelings	0.678	0.062	0.090
6 – Spirituality	0.850	-0.012	-0.028
7 – Concentration	0.379	0.327	-0.001
8 – Safety	**0.342**	0.229	0.193
9 – Environment	0.155	0.009	0.445
10 – Energy	0.271	0.558	0.005
11 – Bodily appearance	0.254	0.330	0.137
12 – Finances	0.059	-0.009	0.600
13 – Information	0.065	0.142	0.493
14 – Leisure	0.018	0.244	0.390
15 – Mobility	0.070	0.409	0.258
16 – Sleep	0.072	0.497	0.065
17 – Activities	-0.074	0.945	0.001
18 – Work	-0.012	0.934	-0.120
19 – Self-esteem	0.340	0.527	0.003
20 – Relationships	0.439	0.128	0.234
21 – Sex life	0.317	0.263	0.031
22 – Support	0.323	-0.047	0.379
23 – Home	-0.014	-0.094	0.759
24 – Health services	-0.272	0.001	0.837
25 – Transport	-0.225	0.011	0.799
26 – Negative feelings	0.342	0.340	-0.045

Note. Problematic items are in bold. Rotation = Geomin. χ^2 (168) = 7177.78, $p < .001$; RMSEA = .076, 90% C.I. [.074 - .078], $p < .001$; CFI = .949; TLI = .930.

Expectedly, after its removal, the structure became clearer and most of the aforementioned items loaded onto their own domains (Table 5.15). However, in Step 3, items 7 (concentration), 19 (self-esteem), 22 (social support), and 26 (negative feelings) were found to cross load onto two factors. As with previous results (see section 5.1.1.4) items 7, 22 and 19 were found to have high correlations with more than one domain. It is possible that some of these items have a different meaning to

different people. For example, depending on the current state of each respondent, the question "how satisfied are you with your self" (item 19) could be related more to physical (e.g. ability to work, function, get around, perform well in daily life) than psychological aspects. Only item 19 along with items 7, and 22 were chosen for elimination, as they were previously found to be problematic.

Table 5.15 *Step 3: 3-Factor EFA of WHOQOL-BREF – Sub-sample (n = 5915)*

	Factors		
Items	1	2	3
5 – Positive Feelings	0.672	0.044	0.108
6 – Spirituality	0.828	-0.027	-0.002
7 – Concentration	**0.319**	**0.336**	0.031
9 – Environment	0.101	0.031	0.459
10 – Energy	0.220	0.566	0.043
11 – Bodily appearance	0.253	0.319	0.146
12 – Finances	0.021	0.011	0.617
13 – Information	0.007	0.168	0.521
14 – Leisure	-0.035	0.271	0.416
15 – Mobility	0.035	0.422	0.282
16 – Sleep	0.055	0.497	0.078
17 – Activities	-0.075	0.945	0.005
18 – Work	0.003	0.923	-0.120
19 – Self-esteem	**0.395**	**0.489**	-0.015
20 – Relationships	0.543	0.057	0.200
21 – Sex life	0.399	0.211	0.002
22 – Support	**0.400**	-0.101	**0.355**
23 – Home	0.029	-0.115	0.743
24 – Health services	-0.235	-0.008	0.814
25 – Transport	-0.225	0.017	0.794
26 – Negative feelings	**0.324**	**0.333**	-0.030

Note. Problematic items are in bold. Rotation = Geomin. χ^2 (150) = 4491.96, $p < .001$; RMSEA = .075, 90% C.I. [.073 - .076], $p < .001$; CFI = .954; TLI = .935.

In the fourth step, and consistent with previous findings (section 5.1.1.3) items 11 (bodily appearance) and 21 (sex life) were found to be problematic with factor loadings below .30. Item 21 was found to be particularly problematic in this work (e.g. missing values, item-total correlations, correlation analysis) and in previous studies, possibly due to its sensitive content.

Table 5.16 *Step 4: 3-Factor EFA for WHOQOL-BREF – Sub-sample (n = 5915)*

	Factors		
Items	1	2	3
5 – Positive Feelings	0.721	0.032	0.086
6 – Spirituality	0.855	-0.038	-0.009
9 – Environment	0.149	0.006	0.444
10 – Energy	0.317	0.529	0.003
12 – Finances	**0.268**	**0.276**	0.171
13 – Information	0.130	-0.056	0.592
14 – Leisure	0.118	0.104	0.485
15 – Mobility	0.094	0.215	0.364
16 – Sleep	0.132	0.390	0.237
17 – Activities	0.087	0.485	0.067
18 – Work	-0.055	0.944	0.000
20 – Relationships	-0.005	0.906	-0.096
21 – Sex life	0.364	0.162	0.245
23 – Home	**0.285**	**0.278**	0.046
24 – Health services	-0.012	-0.072	0.736
25 – Transport	-0.272	0.004	0.835
26 – Negative feelings	-0.199	0.003	0.787

Note. Problematic items are in bold. Rotation = Geomin. χ^2 (102) = 2976.08 $p < .001$; RMSEA = .071, 90% C.I. [.069 - .073], $p < .001$; CFI = .965; TLI = .947.

The inspection of the rotated structure matrix in Step 5 (Table 5.17) revealed item 20 (relationships) to have low factor loadings on the psychosocial (λ = .297) and environmental domain (λ = .295), while it was found to correlate equally with the two domains in the structure matrix. It is possible that the removal of item 21, with which item 20 had shared variance, has reduced its factor loading. Given that previous findings indicated item 20 to correlate more with the psychological domain, it was considered relevant, at this point of the analyses, to force item 20 to load onto the psychosocial domain. This decision was also based on the fact that with the removal of item 20, the social relationships domain of the WHOQOL-100 and the existing WHOQOL-BREF would not be represented. Hence, subsequent analyses were undertaken so as to investigate the performance of item 20 in the psychosocial domain. In addition, the possibility of enhancing the psychosocial domain by adding more social items was considered, as their addition would better represent the domain.

Table 5.17 *Step 5: 3-Factor EFA of WHOQOL-BREF – Sub-sample (n = 5915)*

	Factors		
Items	1	2	3
5 – Positive Feelings	0.754	0.037	0.068
6 – Spirituality	0.835	-0.013	-0.004
9 – Environment	0.168	-0.006	0.447
10 – Energy	0.322	0.530	0.002
12 – Finances	0.144	-0.060	0.584
13 – Information	0.133	0.091	0.489
14 – Leisure	0.108	0.227	0.349
15 – Mobility	0.153	0.410	0.205
16 – Sleep	0.108	0.475	0.061
17 – Activities	-0.042	0.938	0.006
18 – Work	-0.002	0.897	-0.084
20 – Relationships	0.297	0.154	0.295
23 – Home	-0.010	-0.069	0.737
24 – Health services	-0.264	0.002	0.834
25 – Transport	-0.175	0.012	0.764
26 – Negative feelings	0.340	0.307	-0.007

Note. Underlined are the items loading highly on each domain. Rotation = Geomin. χ^2 (75) = 1962.48, $p < .001$; RMSEA = .067, 90% C.I. [.065 - .070], $p < .001$; CFI = .974; TLI = .958.

It is worth noting that the final structure (Table 5.17) exhibited the best model fit, χ^2 (75) = 1962.48, p < .001; RMSEA = .067, 90% C.I. [.065 - .070], p < .001; CFI = .974; TLI = .958. In addition, the correlations between the new three factors were high (but not too high) and significant (r = .59 - .65, p = .001) which provides evidence for the good discriminant validity of the factors (Brown, 2015). The descriptions of the 16 items of the revised WHOQOL-BREF are summarized in Table 5.18.

Overall, results from EFA were not unexpected, as many of the items chosen for elimination were criticized for their poor performance in previous studies (e.g. Skevington et al., 2004a), results that were confirmed and extended by the current study. The final solution provided a minimum of four items per factor with satisfactory factor loadings above .35 for the majority of the items. Certainly, some suggest retaining items with very strong factor loadings (Costello & Osborne, 2005; Matsunaga, 2010; Tabachnick & Fidell, 2013) but the removal of more items would

compromise the length, factor structure, reliability, and validity of the scale (Worthington & Whittaker, 2006). It is worth noting that the 16-item WHOQOL-BREF and the existing WHOQOL-BREF correlated equally well with the WHOQOL-100 ($r = .88, p < .001, N = 4768$), which suggests that the removal of the eight items did not compromise the validity of the measure.

Table 5.18 *Item descriptions of the 3-factor 16-item WHOQOL-BREF*

Physical domain	
10	Do you have enough energy for everyday life?
15	How well are you able to get around?
16	How satisfied are you with your sleep?
17	How satisfied are you with your ability to perform your daily living?
18	How satisfied are you with your capacity for work?
Psychosocial domain	
5	How much do you enjoy life?
6	To what extent do you feel your life to be meaningful?
26	How often do you have negative feelings such as blue mood, despair, anxiety, depression?
20	How satisfied are you with your personal relationships?
Environmental domain	
9	How healthy is your physical environment?
12	Have you enough money to meet your needs?
13	How available to you is the information that you need in your day-to-day life?
14	To what extent do you have the opportunity for leisure activities?
23	How satisfied are you with the conditions of your living place?
24	How satisfied are you with your access to health services?
25	How satisfied are you with your transport?

5.3.3.2 Confirmatory factor analysis of 16-item WHOQOL-BREF

Second Sub-sample (n = 5915)

In scale development, CFA is considered the logical sequence to EFA (Brown, 2015). Therefore, to validate the EFA results found in the first sub-sample, CFA was performed on the 16-item WHOQOL-BREF using the second sub-sample. Results were later validated in the Revised dataset. The criteria used for the assessment of the model fit were the ones mentioned in Chapter 4 and Appendix 5.

A 3-factor second order CFA where the 3 factors load onto a higher order factor representing overall QoL was examined for the half sample dataset (N = 5915), results of which pointed to a mediocre fit: $\chi^2(101) = 4610.67$, $p < .001$; RMSEA = .090, 90% C.I. [.087 - .092], $p < .001$; CFI = .940; TLI = .928. The RMSEA value could be considered as suggesting a fair fit (Wang & Wang, 2012), however the CFI was only marginal (< .95). The factor loadings were high and statistically significant ranging between .56 (item 24) and .87 (item 17), and with significant communalities (h^2 = .32 - .76). The inspection of the correlation residual matrix revealed only five pairs with a correlation above .10.

Compared to the results from the 4-factor CFA model mentioned in the current study (Section 5.2.9), the 3-factor model appears to present a better fit, as the CFI and TLI were found to be higher, while the RMSEA was shown to be smaller. Notably, the 3-factor model exhibited more favourable fit indices compared to the 4-factor model of previous publications (Skevington et al., 2004a; The WHOQOL Group, 1998a). Although not all fit indices were reported in the original paper, a CFI of .87 was found for the 4-factor model, which was improved (CFI = .90) after several modifications.

Whilst the 3-factor model could be considered to present an acceptable model fit approximation, further improvements were required. Attempts at model modification based on the correlation residual matrix, and the modification indices led to the improvement of the correlation residual matrix and to a better fit: $\chi^2(96) = 2301.55$, $p < .001$; RMSEA = .064, 90% C.I. [.062 - .067], $p < .001$; CFI = .971; TLI = .963.

Factor loadings ranged between .54 (item 24) and .81 (item 10), while communalities ranged between .29 (item 24) and .66 (item 10). Modification was accomplished after four sets of error terms were allowed to covary. More precisely the error covariances of items 17 (activities) and 18 (work), 24 (services) and 25 (transportation), 5 (positive feelings) and 6 (spirituality), 20 (relationships) and 23 (home), and finally 13 (information) and 14 (leisure) were added in the model. Overall, the modified model appears to have a better fit than the original modified WHOQOL-BREF with a CFI of .90 (The WHOQOL Group, 1998a). However, these results need to be interpreted with caution and they should not be directly compared to those of the original study, as the WHOQOL Group may have used a different method for the estimation of the CFA models.

CFA in Revised dataset ($N = 986$)

For validation purposes, a 3-factor CFA model (with the same error covariances) was conducted in the Revised dataset. Results were similar, further supporting the fit of the 3-factor model, $\chi^2(96) = 493.19$, $p < .001$; RMSEA = .066, 90% C.I. [.060 - .072], $p < .001$; CFI = .964; TLI = .955. Factor loadings ranged between.48 (item 24) and .83 (item 17) and the item communalities ranged between.23 (item 26) to .69 (item 17) for the Revised dataset.

However, given that the psychosocial domain was comprised of three psychological items and only one social-related item, it was believed that by adding more social items would provide a more representative psychosocial domain. To this end, the module items used for the revision of the social relationships domain were considered to be appropriate for the improvement of the psychosocial domain and were therefore used in subsequent analyses. Prior to enhancing the psychosocial domain, the internal consistency of the 3-factor model was examined in both datasets, so as to further examine the psychometric properties of the revised scale.

5.3.3.3 Internal consistency of 16-item WHOQOL-BREF-R

The item-total correlations and alpha values for the three domains and the overall scale are summarized in Table 5.19. In general, the reliability of the overall 16-item

scale was found to be excellent with Cronbach alpha values of .89 for the Original half dataset and .86 for the Revised dataset. The alpha values of the three domains ranged between .76 and .83 for the Original-half dataset, and from .70 to .81 for the Revised dataset. In addition, item-total correlations were found to be high (> .40) in both datasets. It is important to note that despite its short form, the psychosocial domain reached the acceptability threshold of .70. In addition, item 20 (relationships), which is the only social-related item within the psychosocial domain, was shown to have strong item-total correlations in both datasets. Thus, results from reliability analysis further supported the 3-factor structure, but most importantly the existence of a psychosocial domain.

Table 5.19 *Internal consistency of WHOQOL-16 for both datasets*

Items	Item-total correlations	
	Original-half dataset (n = 5915)	Revised dataset (N = 986)
Physical	**.83**	**.81**
10 Energy	.65	.62
15 Mobility	.54	.54
16 Sleep	.50	.41
17 Activities	.75	.77
18 Work	.69	.68
Psychosocial	**.76**	**.70**
5 Positive Feelings	.63	.54
6 Spirituality	.60	.56
20 Social Relationships	.52	.41
26 Negative Feelings	.47	.41
Environment	**.78**	**.76**
9 Environment	.47	.41
12 Finances	.55	.50
13 Information	.53	.51
14 Leisure	.45	.42
23 Home	.53	.51
24 Services	.48	.50
25 Transport	.51	.53
Overall scale	**.89**	**86**

Note. Numbers in bold represent the Cronbach alpha coefficient of each domain

5.3.4 Improvement of psychosocial domain – Revised dataset (N = 986)

The alpha values of the psychosocial domain were found to be lower than the other two domains, thus, the possibility of enhancing the domain was explored. Given that items 21 (sex life) and 22 (social support) of the social relationships domain were removed during the EFAs, the eight module items previously used for the

improvement of the social domain were used in the current analyses. The Revised WHOQOL-BREF-R dataset (N = 986) was used for carrying out all the analyses related to the improvement of the psychosocial domain, as it is the only one that contains data on both the WHOQOL-BREF and the module items.

To this end, a number of analyses were undertaken, as there is not, to the authors' knowledge, an objective method whereby items are selected for the enhancement of a domain or a scale. Following previous WHOQOL guidelines (The WHOQOL Group, 1998a) the correlations between the eight module items and the mean total score of the psychosocial domain were examined. Results indicated moderate correlations for all items with a range of .38 and .45. Items 30 ("Do you feel that other people respect you?") and 33 ("How much do you feel that the people around you are respectful of your freedom?") were shown to have the strongest association (r = .45), followed by item 34 ("to what extend do you feel a sense of companionship in your life?").

In addition to bivariate correlations, internal consistency analysis was conducted with the eight module items included in the psychosocial domain, in order to examine the items with the highest item-total correlations. Results confirmed those found in correlation analysis, as all items were found to have moderate to high item-total correlations ranging between .48 and .62. The highest corrected-r value was observed for item 30 (r = .62), followed by items 33 (r = .60) and 31 (r = .58; "How much freedom do you have to make your own decisions?"). However, from a face validity point of view, items 30, 31 and 33 appear to contain similar wording (respect by other about self and freedom and having the freedom to make decisions). Thus, the possibility of redundancy could arise, which would be undesirable (see Table 5.20 for a description of those items).

A 1-factor forced EFA was then performed with the eight module items and the four psychosocial items in order to explore the factor loadings of each module item. The inspection of the 1-factor EFA matrix revealed four items with strong factor loadings: Items 30 (λ = 73), 31 (λ = 72), 34 (λ = 72), and 33 (λ = 71). Overall, results were consistent across analyses, which pointed to four strong candidates that

could be used for the improvement of the psychosocial domain. However, in order to avoid redundancy, item 33 which appeared to have a less favorable performance than the rest was not retained. Hence, only items 30, 31, and 34 were considered for the enhancement of the psychosocial domain

Table 5.20 *Description of module items 30, 31, 33, and 34*

Items	Description
30	Do you feel that other people respect you?
31	How much freedom do you have to make your own decisions?
33	How much do you feel that the people around you are respectful of your freedom?
34	To what extend do you feel a sense of companionship in your life?

The degree to which the psychosocial domain could be improved with the addition of the three module items was examined through internal consistency analysis. All three items were found to have medium to high item-total correlations (r_{30} = 53, r_{31} = 45, r_{34} = 47) while the Cronbach alpha coefficient of the domain increased from .70 to .77.

EFA was then carried out with the 16 WHOQOL items plus items 30, 31 and 34, in order to confirm the structure of the scale. Results from both PA and MAP test pointed to a 3-factor solution (see Appendix 17), hence, a 3-factor EFA with WLSMV estimation and Geomin rotation was carried out. Medium to large intercorrelations were observed for the three factors ranging between .32 and .52 ($p <$ .001). The rotated 3-factor structure matrix is summarized in Table 5.21, which provided further support for the 3-factor structure of the 19-item WHOQOL-BREF. All items were found to substantially load onto their corresponding factor with loadings equal to or higher than .32 (Tabachnick & Fidell, 2013). Overall, factor loadings ranged between .32 (item 14) and .97 (item 17), while the three additional module items were found to substantially load on the psychosocial domain (λ = .55 - .61).

On the whole, results highlight the favourable factorial structure of the revised WHOQOL-BREF while they also support the addition of the three module items in the psychosocial domain.

Table 5.21 *3-Factor EFA of the 19-item WHOQOL-BREF-R (N* = 986)

	Factors		
Items	1	2	3
10 – Energy	**0.669**	0.039	0.080
15 – Mobility	**0.543**	0.033	0.220
16 – Sleep	**0.428**	0.156	-0.021
17 – Activities	**0.966**	-0.080	0.033
18 – Work	**0.907**	-0.092	-0.026
5 – Positive Feelings	0.243	**0.568**	-0.004
6 – Spirituality	0.026	**0.838**	-0.191
20 – Relationships	0.051	**0.517**	0.143
26 – Negative feelings	0.107	**0.456**	-0.078
30 – Respect from others	-0.030	**0.606**	0.143
31 – Freedom of choices	-0.052	**0.548**	0.165
34 – Companionship	-0.047	**0.583**	0.032
9 – Environment	0.054	0.283	**0.328**
12 – Finances	0.213	0.136	**0.403**
13 – Information	0.187	0.215	**0.395**
14 – Leisure	0.297	0.008	**0.318**
23 – Home	-0.023	0.375	**0.468**
24 – Health services	0.000	-0.017	**0.746**
25 – Transport	0.100	-0.057	**0.752**

Note. Items loading highly on each domain are in bold. Rotation = Geomin. χ^2 (117) = 676.72 $p <$ .001; RMSEA = .071, 90% C.I. [.066 - .077], $p <$ .001; CFI = .954; TLI = .933.

5.3.5 Psychometric properties of the final WHQOOL-BREF-R – Revised dataset

The improvement of the psychosocial domain led to the final version of the WHOQOL-BREF-R, which comprised 19 main items within three domains assessing satisfaction of one's life related to physical, psychosocial, and environmental

aspects. Using the Revised dataset several analyses were then undertaken in order to explore the psychometric properties of the final 19-item WHOQOL-BREF-R.

5.3.5.1 Confirmatory factor analysis

A 3-factor higher order CFA model with the four error covariances plus the three social items loading onto the psychosocial domain was conducted. Results pointed to a fair fit, $\chi^2(145) = 746.75$, $p < .001$; RMSEA = .067, 90% C.I. [.062 - .072], $p < .001$; CFI = .950; TLI = .942, which was further improved when the error terms between items 30 (respect by others) and 5 (positive feelings), and 16 (sleep) and 26 (negative feelings), were allowed to covary: $\chi^2(143) = 664.14$, $p < .001$; RMSEA = .062, 90% C.I. [.058 - .067], $p < .001$; CFI = .957; TLI = .949. More paths could be added to the model, which would further improve the model fit, however, only those that make theoretical sense should be added. The 19-item WHOQOL-BREF was shown to have high factor loadings ranging between .47 (item 26) and .83 (item 17) with moderate to large communalities ranging from .22 (item 26) to .69 (item 17). Only a few pairs of variables had residual correlations above .10, which further supports the fit of the model. The correlations between the three domains were found to be strong ranging between .62 and .67, but were not too high to imply poor discriminant validity between the factors (Brown, 2015).

The full 19-item model (H1) was then compared against a more constrained model (H0) in which the variance of items 30, 31 and 34 were set to zero. Results led to the rejection of the H0 model (χ^2diff (3) = 831.51, $p < .001$), suggesting that the model fit is better when items 30, 31 and 34 are part of the psychosocial domain. The final WHOQOL-BREF-R is presented in Figure 5.2.

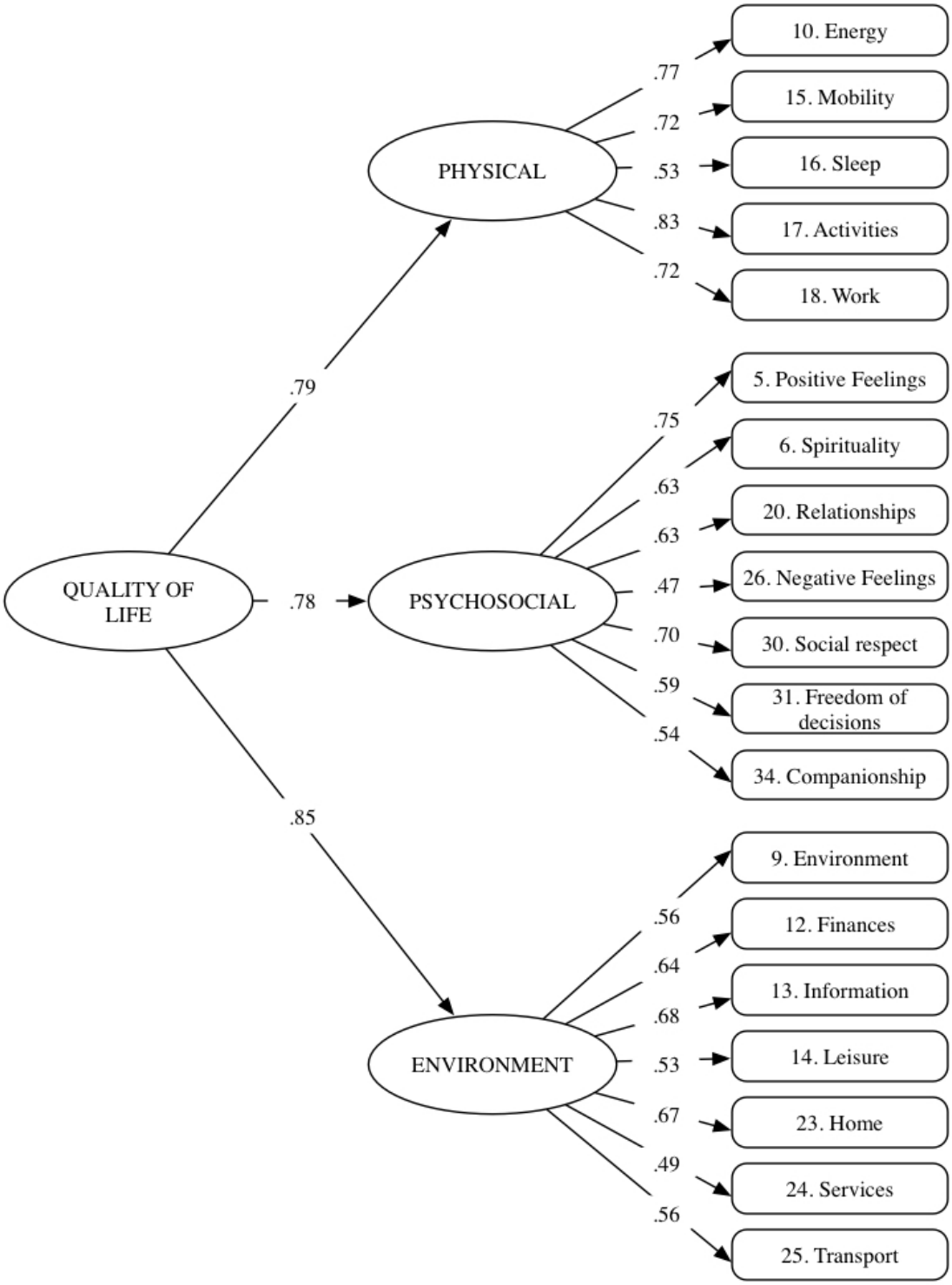

Figure 5.2 The final 19-item WHOQOL-BREF-R.

5.3.5.2 Reliability

The reliability of the WHOQOL-BREF-R was examined for each of the five centres and for the total sample (N = 986), results of which can be found in Table 5.22. Items were found to perform well for the overall sample with satisfactory item-total correlations above .40. In addition, the reliability of the scale was found to be excellent with high alpha values for the overall scale (α = .87) and for the three domains (α = .76 - .81).

With regards to centre-by-centre results, the alpha coefficients for each of the five centres were high and above the minimum .70 for the physical (range α = .75 - .84), psychosocial (range α = .71 -.79), and environmental (range α = .72 -.76) domains. In addition, the alpha values for the overall scale were shown to be excellent in all centres (range α = .86 -.87). Centre-by-centre analyses indicated medium to high item-total correlations (> .30) for all items, but two. Items 9 (physical environement) and 34 (companionship) were found to have lower item-total correlations (rs = .27) in the China centre. Whilst the alpha value of their respective domains would increase by .02 in China centre, their removal would compromise the reliability of the scale in the rest of the centres and in the total sample. Although their removal would not have detrimental implications for the current study, it is important to always consider how the removal of certain items would compromise the scale's reliability and validity in future samples. Thus, despite the low item-total correlations the two items were not removed from the scale.

WHOQOL-BREF vs. WHOQOL-BREF-R measure

The reliability of both the WHOQOL-BREF (α = .90) and WHOQOL-BREF-R (α = .87) was found to be high in the total sample (N = 986). Thus, it is worth noting that although the WHOQOL-BREF-R consists of five items less, the reliability of the revised scale was not severely compromised. Interestingly, the WHOQOL-BREF psychological domain and the WHOQOL-BREF-R psychosocial domain were found to be equally reliable (α = .77). Such results present a strong case for the good performance of the new domain and the scale overall.

Table 5.22 *WHOQOL-BREF-R internal consistency of each domain and overall scale*

	Item-total correlations					
Items	Brazil *n* = 280	China *n* = 203	Portugal *n* = 169	Turkey *n* = 219	United Kingdom *n* = 115	Overall sample *N* = 986
Physical	**.84**	**.75**	**.75**	**.83**	**.78**	**.81**
10 Energy	.62	.49	.61	.63	.66	.62
15 Mobility	.56	.49	.39	.64	.36	.54
16 Sleep	.46	.40	.33	.38	.47	.41
17 Activities	.82	.70	.71	.77	.68	.77
18 Work	.75	.55	.59	.76	.63	.68
Psychosocial	**.74**	**.71**	**.74**	**.79**	**.77**	**.77**
5 Positive Feelings	.50	.53	.58	.58	.66	.52
6 Spirituality	.48	.51	.63	.56	.55	.59
20 Social relationships	.51	.42	.49	.61	.48	.50
26 Negative feelings	.41	.39	.39	.40	.41	.42
30 Respect by others	.45	.51	.36	.62	.45	.53
31 Freedom of choices	36	.42	.43	.35	.41	.45
34 Companionship	.48	.26	.40	.56	.46	.47
Environment	**.73**	**.76**	**.72**	**.74**	**.76**	**.76**
9 Environment	.33	.26	.41	.50	.40	.41
12 Finances	.51	.50	.44	.34	.39	.50
13 Information	.42	.52	.41	.45	.57	.51
14 Leisure	45	49	.39	.21	.45	.42
23 Home	.48	.60	.52	.53	.47	.51
24 Services	.41	.55	.44	.59	.60	.50
25 Transport	.52	.50	.41	.57	.49	.53
Overall scale	**.86**	**.87**	**.86**	**.87**	**.86**	**.87**

Note. Numbers in bold indicate the Cronbach alpha coefficients for each domain and the overall scale.

5.3.5.3 Convergent validity

In order to establish the convergent validity of the revised scale, bivariate correlations were computed with relevant measures. It was hypothesized that the overall scale as well as the three domains would have a high negative correlation with the HADS and positive correlations with the SWLS and the overall health and QoL as assessed by the two general items. The associations between the variables of interest were all explored using Pearson *r*, except for the HADS variable. Given the violations of normality observed in the HADS data, correlations invlolving that measure were carried out using Spearman's coefficient r_s, which is a non-parametric test accounting for non-normal data.

Results (Table 5.23) provided support for these hypotheses, as the three WHOQOL-BREF-R domains and the mean total score were found to have strong negative correlations with the HADS. Additionally, medium to high positive associations were observed between the WHOQOL-BREF-R and the SWLS, and overall QoL. It is not surprising that the SWLS was found to corralate more highly with the psychosocial domain than any other domain, as they both entail items concerning satisfaction and enjoyment with life. The correlations were high enough to confirm the new scale's convergent validity, however they were not too high to imply problems with multicollinearity and discriminant validity. Similar results were observed in the centre-by-centre analyses.

Table 5.23 *Correlations between the WHOQOL-BREF-R and other measures*

Measures	Physical	Psychosocial	Environmental	Total mean
SWLS	.43	.69	.49	.65
HADS	-.52	-.62	-.43	-.64
Overall Health and QoL	.56	.52	.50	.65

Note. Spearman correlation was used for HADS; *N* (SWLS, Overall Health) = 986; *N* (HADS) = 696; All correlations were significant, $p < .001$.

WHOQOL-BREF and WHOQOL-BREF-R measures

Furthermore, it was considered relevant to investigate the association between the WHOQOL-BREF-R and the existing WHOQOL-BREF, as this would determine the degree to which the two measures assess the same thing. As a first step, the associations between the domains of the two scales were explored and as anticipated, correlation analysis provided support for the hypothesized relationships. More precisely, the two environmental domains were found to have nearly a perfect correlation (r = .99, p < .001), while the two physical domains were shown to correlate very highly (r = .94, p < .001). Lastly, the psychosocial domain was also found to correlate highly with the existing psychological domain (r = .83, p < .001). The above findings could be considered as suggesting that the scale revision has not interfered with the content validity of the revised domains, as they appear to measure the same thing as the existing ones. The psychosocial domain was not expected to correlate as highly with the social relationships domain, as it entails only one item from the original domain. Despite not measuring the same thing, results indicated a high correlation between the two (r = .69, p < .001), suggesting that the psychosocial domain measures similar aspects of that measured by the original social relationships domain.

As expected, the correlation between the total WHOQOL-BREF and WHOQOL-BREF-R scores was found to be high in the total sample (r = .95, p < .001) and in the five centres ranging between .94 (UK) and .96 (Turkey). The above findings can be considered as suggesting that despite the shorter form and the addition of the three module items, the revised scale measures the same thing as the existing scale.

5.3.5.4 Known-groups validity

The known-groups validity of the revised scale was assessed between healthy (n = 636, 64.5%) and ill (n = 350, 35.5%) individuals. It was expected that the total mean score of the WHOQOL-BREF-R would be able to discriminate between the two groups. Results form the Independent Sample T-test provided support for the hypothesis, as a significant difference was found between the two groups, t (983) = 8.97, p < .001, with participants in the "ill" group reporting lower scores on the

WHOQOL-BREF-R (M = 59.62, SD = 13.58) than the healthy group (M = 67.34, SD = 12.55). Similar results were observed for each of the three domains. Such results provide support for the known-groups validity of the revised scale, as the WHOQOL-BREF-R appears to be able to detect differences between groups that are in fact expected to differ.

5.3.5.5 Accuracy

The accuracy of the revised measure was examined through ROC analysis, which is a non-parametric test. Thus, for the current study two dichotomous outcome variables were constructed based on the HADS subscales. Specifically, participants meeting HADS cutoff criteria (≥ 8; Snaith, 2003) on the Anxiety subscale were grouped together as the clinical group (n = 276), while the rest were classified as being healthy (n = 420). Similarly, a dichotomous variable based on the Depression subscale contained data from clinical (n = 160) and healthy (n = 527) participants. The WHOQOL-BREF-R was found to accurately classify individuals in different groups for both the anxiety (AUC = .75, 95% CI [.72 - .79], p < .001), and the depression variables (AUC = .83, 95% CI [.80 - .87], p < .001). Similar results were observed for each of the three domains, although notably, the psychosocial and physical domains were found to be more accurate than the environmental domain. This can perhaps be attributed to the similar physical and psychological items between the HADS and the two domains. Thus, despite the subjective nature of the WHOQOL-BREF-R, the above findings reflect its ability to classify participants in different diagnostic groups such as depression and anxiety.

5.3.5.6 Individual differences

As a last step, the impact of socio-demographic characteristics in terms of gender and age on the mean total WHOQOL-BREF-R score was examined through Regression analysis, Independent sample T-test and ANOVA analysis. As with previous WHOQOL studies (Skevington et al., 2004a) multiple regression analysis was performed in order to investigate the impact of gender and age on individuals' total scores. In the current sample, age was found to be the only impactful significant predictor of the total WHOQOL-BREF scores (β = .15, p < .001).

Based on the age frequencies of the current study, three age groups were constructed: 1) 17-30 (n = 369, 37.4%), 2) 31-50 (n = 387, 39.2%) and 3) 51+ (n = 230, 23.3%), which were then used in One-way ANOVA so as to examine the different scores between the three groups. Results showed a significant effect of WHOQOL-BREF-R scores on groups of age, F (2, 982) = 12.08, p =.000. Post hoc analyses using the Bonferroni post hoc criterion indicated that the mean total score was significantly higher in the age group "17-30" (M = 67.10, SD = 12.77) than in the second "31-50" (M = 63.83, SD = 12.77) and third "51+" (M = 61.86, SD = 13.63) groups. Interestingly, the difference between individuals aged 31-50 and those aged above 51 (M difference = 1.98) was not statistically significant.

With regards to gender, an Independent sample T-test was conducted to assess the difference in the total scores between male (n = 356, 36.1%) and female (n = 630, 63.9%) participants. Results were not statistically significant between the two groups t (983) = 1.26, p = .21, as female participants (M = 64.20, SD = 13.59) were found to have similar scores to male participants (M = 65.31, SD = 13.15). Given the above findings, it can thus be concluded that scores on the WHOQOL-BREF-R differ only with regards to age.

5.4 Conclusions

The current series of analyses set out to address previous limitations found in the literature by developing an improved version of the existing WHOQOL-BREF-R. Clearly, the assumption of a perfect scale is not realistic. Thus, the present work never sought to develop a scale that would resemble perfect reflections of reality, but merely a useful approximation of it (Goffin, 2007). Given the theoretical challenges of defining a subjective construct such as that of QoL, it is believed that the Revised WHOQOL-BREF represents a useful approximation of one's QoL, and a psychometric improvement on the existing WHOQOL-BREF.

The final version of the 21-item WHOQOL-BREF-R consists of 19 main items assessing one's QoL across three specific domains: Physical (e.g." How satisfied are you with your sleep?"), psychosocial (e.g. "To what extend do you feel a sense of

companionship in your life?"), and environment (e.g. "How healthy is your physical environment?"). It also includes two general items of overall QoL and satisfaction with health ("How would you rate your quality of life?" and "How satisfied are you with your health?"), which together are considered to represent global QoL. The items are scored using a 5-item Likert type scale, with higher total scores suggesting greater satisfaction with QoL, whereas lower scores would indicate the opposite. The final questionnaire of the WHOQOL-BREF-R can be found in Appendix 18.

Chapter 6

Study I Discussion

As detailed in Chapter 2, there appears to be enough theoretical and empirical evidence to support the successful application of QoL in various contexts and populations. To date, hundreds of efforts have been made towards the assessment of QoL, however it is likely, given its complexity, that the full picture of QoL cannot be perfectly evaluated. A substantial research effort should, therefore, be devoted to the continuing definition, measurement, exploration, and explanation of QoL and its challenges (Glatzer, 2004). Although QoL researchers are better equipped, both theoretically and practically, than in the past (Møller & Huschka, 2009), more research is needed before the issues around QoL measurement are resolved. Study I of the current thesis aimed at describing the comprehensive picture of QoL and empirically addressing some of the questions and limitations raised in the literature.

The overall aim of Study I was to revise the widely used WHOQOL-BREF QoL measure by enhancing the social relationships domain. Results indicated that not only the social relationships domain was found to be problematic, but also the structure of the overall measure. With the use of more robust techniques than the ones used in the original studies, findings indicated that the WHOQOL-BREF items can be better conceptualised within three and not, as initially thought, four domains. With the merge of the psychological and social relationships domains, Study I of the current thesis explored the possibility of a 3-factor model and developed an improved and clearer structure of a valid and reliable revised WHOQOL-BREF.

6.1 WHOQOL-BREF

The WHOOQL-BREF is considered to be one of the few tools that have successfully assessed the theoretical basis of QoL. Findings from the current study have, however, showed that from a psychometric standpoint the measure suffers from several limitations. As a first step, Study I set out to explore the psychometric properties of the WHOQOL-BREF, as it is the first study, to the authors' knowledge, that has investigated the performance of the measure using five different datasets from different countries, ages, and groups.

An important issue emerging from the findings is that items on sexuality (item 21) appear to register a great rate of missing values. Results were more notable in older individuals and in individuals with disabilities. This, however, was not surprising, as some studies have shown that these groups of people are less likely to be satisfied with their sex life (e.g. Gott & Hinchliff, 2003; McCabe & Taleporos, 2003). It is important to note, however, that whereas the percentage of missing values could indeed suggest that (i.e. dissatisfaction with sex life), definite inferences cannot be drawn. In fact, some might be satisfied with their sex life but prefer to withhold that information. Although often underestimated, missing data may have a great impact on the interpretations of findings (McKnight, McKnight, Sidani, & Figueredo, 2007). In the area of scale development, missing data is considered to be one of the factors that might affect the psychometric properties of a measure (McKnight et al., 2007). Therefore, it is possible that the high missing data values of item 21 influence the overall performance of the social relationships domain.

Some interesting yet anticipated findings emerged from the reliability analysis. All domains, but the social relationships domain, were found to possess good to excellent internal consistency. In contrast, the social relationships domain was consistently found to exhibit very poor to marginal reliability. Although these findings were unsurprising, they confirm the domain's poor psychometric performance. These results may be attributable to the great rate of missing values in item 21 or the low number of items (i.e. 3) included in the domain. In some instances though, as evident by its occasional low corrected item-total correlations, item 21

may not be assessing the same thing as the other two items do, that is, social relationships.

An important matter emerging from the findings of the current study is the strain between psychometric validity and approximations of reality. Findings from correlation analysis indicated that some of the items were correlating more highly with other than their intended domains. Although in centres with small sample sizes such results may be expected (Skevington et al., 2004a), doubts are raised as to whether such cross loadings are acceptable. In reality, cross loadings between different QoL aspects would be expected. From a psychometric standpoint though, these findings can be considered as evidence for the problematic performance of the WHOQOL-BREF structure. These results are particularly important because in practice, unclear and unreliable structures may lead to wrong conclusions about one's QoL. Collectively, findings from all five datasets are consistent with those reported in the literature and suggest the inferior psychometric qualities of the social relationships domain compared to the rest three domains.

6.2 WHOQOL-BREF-R

Although not initially designed to assess social QoL in general populations, findings from Study I indicated the promising performance of the module items within the social relationships domain. Interestingly though, the challenges around the assessment of QoL in multiple cultures were reflected in some of the findings. Despite the successful attempts to enhance the social relationships domain, the inclusion of the module items did not improve the domain in all five countries. Items that tap a dimension of QoL may be equivalent in meaning, but are possibly valued or conceptualised differently across different cultures (Hays et al., 1993). The fact that cultural diversity exists not solely between, but also within countries (Leplège & Hunt, 1997) may explain the cultural differences observed in the current and previous WHOQOL studies (e.g. Skevington et al., 2004a). It appears, therefore, to be increasingly challenging to develop items that have the same meaning to so many cultures. Furthermore, the growing complexity of lifestyles in the new millennium that is observed in many cultures makes it even more difficult to compile

comprehensive measures that tap the full range of QoL (Møller & Huschka, 2009). Therefore, these findings should be interpreted within the challenges imposed by the cultural differences.

Before embarking on further analyses to explore which module items perform well in all five centres, CFA findings, while preliminary, indicated that the WHOQOL-BREF presents a poor approximation of QoL. Considering the older standards for acceptable model fit, the model could have been considered as a good fit to the data at the time of its development. The improvements in the science and technology of test construction need, however, to be taken into account when revising a measure (Butcher, 2000). Contrary to expectations, the unacceptable CFA results (based on new guidelines) in both the Original and Revised datasets raised doubts regarding the structure of the scale as a whole. Similar concerns were raised in previous studies in which the WHOQOL-BREF items presented an unclear structure (Taylor et al., 2004; Trompenaars et al., 2005; Yao et al., 2002). Often a researcher might demonstrate that the structure of an existing measure is not "as advertised" by the original authors (Reise et al., 2000). Indeed, further findings from EFA indicated that the 24 items failed to construct four distinct domains. Such poor EFA models may frequently result from the overreliance on the default options found in many statistical packages (Reise et al., 2000). This was the case with the validation study of the WHOQOL-BREF (Skevington et al., 2004a), in which the authors used the problematic eigenvalue > 1 rule for retaining factors.

Findings from the current thesis raise important issues regarding the use of the default options despite the advancements in psychometrics (Butcher, 2000). Instead of using modern robust methods, researchers continue to rely on traditional statistical analyses that are often out-dated and unfitting, which may compromise the results. In turn, this may lead to erroneous interpretations. For instance, The WHOQOL Group (1998b) relied on the default options (principal components analysis with varimax rotation, eigenvalue rule) for the development of the WHOQOL-100. Some limitations need however to be noted. First, the EFA was conducted on the facet level and not on the item level, as it would be understandably difficult, if not

impossible, to conduct an EFA on 100 items. However, as mentioned in Chapter 4, the use of orthogonal rotation was not justifiable. Facets such as physical environment and pain and discomfort would be expectedly less correlated than, for instance, sleep and rest, and pain and discomfort. Given, however, that all facets were developed to assess QoL and were expected to form a total score (see Power et al., 1999), contrary to The WHOQOL Group (1998b) suggestions, one would expect all facets to be related. Second, the limitations of the eigenvalue rule for factor extraction were noted long before the development of the WHOQOL-100 and WHOQOL-BREF (see Zwick & Velicer, 1986). However, at the time, researchers did not have the opportunity to use other suggested methods such as the MAP and PA, as such methods were not available within familiar software environments like they are today (e.g. O'Connor, 2000). The methodological limitations in the development of the WHOQOL-100 extend, however, to the WHOQOL-BREF. Whereas the EFA of the WHOQOL-100 was carried out on the facet level, the EFA for the WHOQOL-BREF was conducted on the item level. Thus, it could not be certain that the 4-factor structure of the WHOQOL-100 would fit that of the WHOQOL-BREF. Although the structure of the WHOQOL-BREF should have received a detailed analysis, it can only be speculated that Skevington et al. (2004a) did not consider necessary to explore whether each item was highly tapping onto its corresponding domain. The different structure supported by the results of the current and previous studies (e.g. see Yao et al., 2002) stress, however, the necessity for this analysis. When the fit of a scale is found to be poor, researchers should consider conducting exploratory analyses so as to find the areas of misfit.

As briefly discussed in previous chapters, these findings raise an important question in the area of scale development. How separable are the items within a measurement? Given that all WHOQOL-BREF items were designed to assess QoL, one would expect at least some cross loadings. For instance, item 19 (self-esteem) was found to be cross loading onto the physical domain. It would make sense that when people feel good about themselves they will also experience high physical QoL (e.g. having enough energy for everyday life, or vice versa). It is possible that, as with many instruments in social sciences, the items of the WHOQOL-BREF are not

separable. However, vague wording and cultural differences may also account for the cross loadings found in a scale. From a psychometric standpoint, domains should be able to discriminate from one another, but in reality that rarely ever happens. This poses a significant dilemma in the area of psychometrics and a balanced approach between psychometric validity and real life approximations should, therefore, be taken in mind when developing a measure. Given that the current study aimed at developing a measure that would assess overall but also separate and distinct aspects of QoL, it was considered essential to remove unclear items. Although this would artificially separate the domains, having distinct but yet related factors may enable future studies to assess only certain aspects of QoL that may be of interest.

Findings from a series of 3-factor EFAs on the Original dataset revealed the most optimal model structure and despite the 20-year discrepancy between the Original and Revised dataset, the structure of the revised model was successfully replicated in the new sample. This may suggest that the majority of the WHOQOL-BREF items are not out-dated. The replication in a new sample was very important, as without evidence of replication the items would possibly intercorrelate less highly in the new sample or the revisions made would not have the same effect on the measure in a new sample (Smith & McCarthy, 1995). A closer inspection of the structure in more countries is, however, essential.

Despite the good fitting model, Study I considered important to enhance the content validity of the psychosocial domain by adding more social related items. As anticipated, some of the module items were found to be a powerful addition, thereby creating a more representative psychosocial domain. In terms of the initial four domains, the WHOQOL-BREF-R contains five physical items, three psychological items, four social items, and seven environmental items. Notably, the spirituality facet of the WHOQOL-100 is still represented in the revised measure (i.e. item 6: “to what extend do you feel your life to be meaningful?”). This is of great significance, as professionals are highly suggested to assess patients’ spirituality (Koenig, 2004).

Thus, although eight items form the original scale were removed, while three new items were added, some interesting findings emerged. The WHOQOL-BREF-R and its three domains were found to correlate very highly with the existing WHOQOL-BREF, suggesting that the two measures assess the same thing. Therefore, despite the improvements made, the validity of the revised measure has not been compromised.

Consistent with the WHOQOL definition of QoL and other definitions found in the literature (e.g. Hörnquist, 1989), the WHOQOL-BREF appears to assess QoL within the context of the culture and in respect to one's level of independence and freedom of choice, personal and social relationships, feelings, life satisfaction, physical energy, mobility and ability to perform in daily life, physical environment and home conditions, financial considerations, transport and access to health services, and leisure activities. It is of course reasonable that some of the facets included in the WHOQOL-100 will not be represented in the revised form. This, however, did not appear to affect the validity of the revised measure as findings from correlation analysis showed that both the existing WHOQOL-BREF and the shorter WHOQOL-BREF-R seem to be assessing what the 100-item measure does.

Although shorter by five items, the overall WHOQOL-BREF-R and its three domains were found to be accurate, valid and evidently more reliable and with a more favourable structure than the existing measure. Finally, consistent with previous studies (Skevington et al., 2004a), the WHOQOL-BREF-R was found to be stable across gender, but not across age. Younger individuals (aged 17-30) appear to experience better QoL than older groups. Results, however, are inconsistent with other studies that found younger individuals to be less satisfied with their lives than older individuals (Mercier, Peladeau, & Tempier, 1998; Moser et al., 2013). Further research is, therefore, needed to explore under which conditions QoL is affected by age.

6.3 Limitations and future research

The findings of Study I should be interpreted within several limitations. A major limitation concerns the limits of generalizability due to the population sampling. The WHOQOL-BREF measure was initially revised using the Original dataset. However, the choice of the additional social items was based upon the Revised dataset, which incorporates data from mostly younger individuals and from a limited number of countries. Future research should, therefore, focus on exploring the psychometric performance of the revised measure in other cultures than the ones included in the study, as well as in specific populations and older adults. Second, due to several restrictions in data collection (e.g. time, financial), each participating centre collected data using a different sampling technique. Given that the majority of the centres provided data from a convenience sample, the degree to which the samples are representative of each culture, is unclear. Additionally, although the revision process occurred mainly on the overall sample of the Revised dataset, most centres did not provide equal numbers of male and female, or ill and healthy individuals. This may limit the conclusions of the study to the sample of the current study.

New social items were not drafted for the revision of the domains, which may be considered as a limitation. The module items were, however, found to perform well within the psychosocial domain and the overall measure and, thus, were considered to be adequate for the aims of Study I. The fact that the three additional module items are part of the WHOQOL-Disabilities and WHOQOL-Old modules might raise concerns for potential overlap when the modules are used in conjunction with the WHOQOL-BREF-R. Taking into account, however, the fact that the scores of each module and the WHOQOL-BREF are not summed to give a total score, the possibility of spurious results due to overlap is low.

Another limitation concerns the absence of a cut-off value. Hamming and De Vries (2007) note that there are generally no “standard” or “normal” values of QoL, which may affect the interpretation of results. This, of course, is directly connected to the conceptual considerations discussed in Chapter 2. QoL instruments are limited by the subjective and complex nature of the concept, which they represent. A score of 0 on

the WHOOQL-BREF-R would be representative of the poorest QoL, while a score of 100 would suggest the optimal QoL. Given, however, that each individual evaluates QoL differently, QoL scores cannot be computed to represent a threshold. For that, the calculation of a threshold for the WHOOQL-BREF-R was not considered feasible. In practice, for example, the impact of disease and the benefits of treatment on QoL can be assessed by comparing the QoL of patients with their baseline values. This, therefore, poses an issue within the greater literature of QoL and future research should consider whether a threshold value is indeed feasible or even necessary.

Due to restrictions from the cross-sectional nature of the data, the psychometric properties of the WHOQOL-BREF-R were not explored in respect to temporal reliability and responsiveness. Although it was found to detect differences between groups and be internally consistent, longitudinal research is needed to explore the stability of the measure across time, and whether it can detect clinical differences. Another limitation concerns the lack of evidence for other forms of validity. The discriminant validity of the scale was confirmed for its four domains, but not for the overall scale (e.g. using unrelated measures). Given that in reality, as mentioned in Chapter 2, only a limited number of studies assessed the discriminant validity of the WHOQOL-BREF, future research is needed to assess the construct validity of the revised measure in respect to discriminant validity. Time and space restrictions also prevented further in depth analysis of the data, therefore, future analyses including Item Response Theory and measurement invariance may be conducted.

Finally, although alternative structures were explored, where applicable, throughout the revision process, it is possible that there are other equally well fitting models. For instance, there are not universally accepted guidelines regarding which items to retain during a revision process. Different guidelines could, therefore, lead to different models. As discussed in previous chapters, this raises the philosophical question of whether correct models really exist (Kline, 2011). Psychological measurements are considered to be an estimation of theoretical constructs (Thambirajah, 2005) and such models simply cannot fully capture the complexity of

the phenomena that they claim to represent (MacCallum, 2003). At best, they can enhance our understanding of such phenomena by providing a representation of a complex pattern between variables (MacCallum, 2003). In fact, all statistical models are possibly wrong to some extend (Kline, 2011) and should, therefore, be guided by an understanding that they are imperfect and cannot be made to be exactly correct (MacCallum, 2003). This, of course, is interconnected with the debate discussed in Chapter 4 and Appendix 5 on whether a standard gold should be used in the assessment of such models (e.g. Goffin, 2007). Tomarken and Waller (2003) suggest following a more cautious interpretation, such as that the WHOQOL-BREF-R is a well-fitting model, but only one possible representation of the underlying structure from a larger pool of possible models.

6.4 Strengths and implications

Despite the aforementioned limitations, the current study had some worth mentioning methodological strengths and implications. First, the psychometric properties of the WHOQOL-BREF were explored in a large number of datasets, while the revision of the measure occurred using a large and culturally diverse sample of ill and healthy individuals. Secondly, the use of robust and well-fitting analyses and methods ensured the development of a psychometrically sound measure of QoL.

One important implication concerns the good psychometric properties of the three domains included in the WHOQOL-BREF-R. In studies where only certain domains of QoL are of interest, the domains of the revised measure can be included, if needed, as stand-alone measures. Additionally, the psychometrically sound module items are already available in most of the world's major languages, which enables the easy application of the WHOQOL-BREF-R in other languages.

Although it is shorter than the existing scale, it encompasses good depth of domains that are fundamental in the conceptualisation and measurement of QoL. The fact that it takes around 2-5 minutes to complete provides a rapid method of assessing one's QoL, especially in time-restricted situations such as clinical trials, large-scale

studies, and studies with repeated measurement. Of course, as with the existing WHOQOL-BREF, a balance between length and detail will be important to consider when selecting between the WHOQOL-BREF-R and the WHOQOL-100 (The WHOQOL Group, 1998a).

Given the complexity of the concept studied, the revised measure appears to reflect several important issues that were considered important in the assessment of QoL. Most QoL researchers generally agree that the views of citizens on QoL should be preferred over those of experts (Møller & Huschka, 2009). The WHOQOL-BREF-R contains items that were developed from focus groups of healthy and ill individuals, thereby ensuring the representation of their views. Another strength concerns the fact that, compared to other instruments that focus on illness and disability, the WHOQOL-BREF-R assesses both happiness and negative aspects, as they were both suggested to be valuable indicators of QoL that should not be overlooked (Glatzer, 2015; Tay, Kuykendall, & Diener, 2015).

The WHOQOL-BREF-R can be used for research in medicine and health care with presumably more accurate interpretations than those derived from WHOQOL-BREF. Given that it is one of the few genuine QoL measures, its use may contribute to our understanding of how, and to what extend, diseases and their course of treatment, and health care services may impact patients' QoL. It might also be of value in monitoring policy change to capture the possible impact of change on individuals' QoL.

Finally, many of the findings of this study add to our understanding of QoL and the challenges imposed by its measurement. It highlights important issues regarding the use of robust methods, and the balance between empirical evidence and the interpretability criterion. It is noteworthy that Study I took into account theoretical, philosophical, and measurement issues, thus, the analyses and the interpretation of findings were not driven solely by empirical evidence. This may guide future research related to the development of new QoL measures towards a balanced consideration and application of all the issues raised in the current study.

6.5 Conclusions

Findings from Study I make a noteworthy contribution in the conceptualisation and measurement of QoL. The detailed theoretical, philosophical, and psychometric approach taken has offered a comprehensive and thorough analysis of the concept of QoL and has highlighted several issues around its assessment. Given the limitations found in the WHOQOL-BREF, and the new psychometric procedures available, Study I implemented robust and modern analyses, which enabled the development of a more psychometrically sound, revised QoL measure.

The WHOQOL-BREF-R is considered to represent the broad aspect of QoL as agreed by many cultures. On the whole, results highlight its favourable factorial structure, as they support the existence of a psychosocial domain within a three, and not a four-factor structure. Given that there is no statistical test or fit that may prove that a model is correct (Tomarken & Waller, 2003), the current measure was considered to provide an adequate revision. Although there are possibly other equally well fitting models, the WHOQOL-BREF-R can be considered as a significant step towards the accurate and comprehensive conceptualisation and measurement of QoL. It can, therefore, be recommended for future use in the research of QoL.

Study II

“Sometimes surrender means giving up trying to understand and become comfortable with not knowing”

-Eckhart Tolle

Chapter 7

Study II

Living in the aftermath of trauma: The impact of posttraumatic stress on quality of life

7.1 Introduction

With the use of the WHOQOL-BREF-R QoL measure developed in Study I, Study II sought to explore an integrative mediation model of posttraumatic stress and QoL. Given the favourable psychometric properties of the WHOQOL-BREF-R, the revised measure was, therefore, implemented in the analysis of the proposed model for the accurate and comprehensive assessment of QoL.

As will be discussed in later sections, increasing evidence suggests that trauma-related psychopathology such as PTSD appears to have a great impact on trauma survivors' psychosocial functioning and QoL (Warshaw et al., 1993). Trauma survivors who experience recurrent distressing dreams may report poor physical QoL (e.g. dissatisfied with sleep), while those experiencing feelings of detachment from others will likely report a poor psychosocial QoL. It is possible, however, that the impact PTSD has on one's QoL is operationalized through several underlying mechanisms, such as one's appraisals of the traumatic event and posttraumatic stress symptoms. The following sections are devoted to the review of QoL and coping styles in the aftermath of trauma and the exploration of such a mediation model.

7.2 Psychological trauma

The literature on psychological trauma has evolved dramatically in the last decades permitting a better understanding of the concept and its theory. Trauma and its detrimental effects have long interested researchers and clinicians. In fact, many early psychiatrists considered trauma to be etiologically central in many psychiatric

disorders (van der Kolk, 1987). Psychological trauma is considered to involve the experience of catastrophic, uncontrollable and unpredictable events that include both physical and psychological elements (Reyes, Elhai, & Ford, 2012). These uncontrollable features of threat leave trauma survivors feeling helpless, and often violate their basic beliefs about their physical and social worlds (Bower & Sivers, 1998). Indeed, many trauma survivors feel that their experience has altered their course of life (Ford, 2009).

7.2.1 Definition and prevalence

The definition of trauma, despite of its literal meaning of wound or injury deriving from the Greek word "τραύμα" (Ford, 2009), has been the source of much debate and controversy. When it was first included in the Diagnostic and Statistical Manual of Mental Disorders (DSM) III (American Psychiatric Association, 1980) trauma was perceived as a set of abnormal extreme stressors that were outside the range of regular human experience. Epidemiological studies, however, challenged this view based on the high prevalence of traumatic exposure observed in the general population (e.g. Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995). In DSM-IV-TR traumatic events were, therefore, redefined to involve actual or threatened death or serious injury, or a threat to the physical integrity of oneself or others, followed by intense fear, helplessness, or horror (American Psychiatric Association, 2000). This revised definition of trauma was, however, criticized given its implication that trauma survivors consistently experience certain emotions (Brewin, Andrews, & Rose, 2000b). Indeed, evidence suggests that other feelings such as sadness, anger, guilt, shame, grief, and disgust appear to be involved in the experience of traumatic events (Brewin et al., 2000b; Regel & Joseph, 2010; Rosen, Frueh, Elhai, Grubaugh, & Ford, 2012). For instance, children enduring abuse might experience helplessness or shame, but not fear per se (Resick & Miller, 2009). In other cases, trauma survivors have reported being numb or in a daze during the event (Brewin et al., 2000b). Taking this into consideration, and the need for a broader definition of trauma, traumatic events have been recently defined as the exposure to actual or threatened death, serious injury, or sexual violence through direct exposure, witnessing in person, indirect exposure, or repeated exposure to the aversive details

of the event (American Psychiatric Association, 2013). Although the debate on the definition of trauma has led to an increasingly well-articulated understanding of the concept (Weathers & Keane, 2007), as a next step, researchers should develop new and/or revise existing tools for the assessment of traumatic exposure as described in DSM-5 (Kilpatrick, 2013; Kilpatrick et al., 2013).

Trauma is not a new phenomenon. War, violence, and natural disasters have always existed in the history of humankind. Remarkably however, some of the problems following traumatic exposure could not have occurred in the distant past (O'Brien, 1998). For instance, advances in technology enabled the images of the 9/11 terrorist attacks to reach millions of viewers. As a result, a substantial number of people who were not directly exposed at the events still met criteria for probable PTSD (Galea et al., 2003). It has been estimated that the majority of people will most likely experience at least one traumatic event in their lifetime, while others will experience several (Frans, Rimmö, Åberg, & Fredrikson, 2005; Kessler et al., 1995). Research looking at the prevalence rates of trauma, found that approximately 50% to 90% of the population has been exposed to at least one traumatic event (Bernat, Ronfeldt, Calhoun, & Arias, 1998; Breslau et al., 1998; Creamer, Burgess, & McFarlane, 2001; Frans et al., 2005; Kessler et al., 1995). In this area of trauma studies, the most commonly reported events were traffic road accidents, witnessing someone being badly injured or killed, natural disasters, and sudden unexpected death of a loved one. Given, however, the continuous change in the definition of trauma, these findings should be interpreted with caution, as each study defined and measured trauma differently.

7.2.2 Reactions in the aftermath of trauma

Since its inclusion in the DSM-III there has been a better understanding of the reactions following traumatic exposure. It has been largely acknowledged that acute stress reactions are expected to occur in most trauma survivors. Some of the most common reactions and emotions reported throughout the trauma literature include fear, anxiety, guilt, shame, sadness, anger, dissociation, and avoidance (Regel & Joseph, 2010; Rosen et al., 2012). At times, acute stress reactions can be seen as

instinctive self-protective attempts to survive in the face of life-threatening or psychologically overwhelming harm (Ford, 2009). For instance, trauma survivors may try to compensate for the painful reminders by engaging in avoidant behaviours. In the weeks following the event, physical symptoms including sleep disturbances, hyper-vigilance, insomnia, fatigue, tension, headaches, and cognitive impairment are also expected to occur (Ford, 2009; McFarlane, Atchison, Rafalowicz, & Papay, 1994; Regel & Joseph, 2010). These symptoms usually commence during the first hours or days following the traumatic event and are short-lived (Regel & Joseph, 2010). The majority of people are, in fact, expected to naturally adapt within months (Bryant, 2004; Regel & Joseph, 2010). However, for some, the impact of the traumatic event persists to the point of significant impairment, consistent with several psychiatric disorders (see Norris et al., 2002 for a review).

7.3 Posttraumatic stress disorder

7.3.1 Historical overview

Art and literature have always been interested in the tragedies of life (Ford, 2009). However, it was not until the First World War that psychiatrists turned their attention to the detrimental consequences of battle (O'Brien, 1998). Due to the existing limited knowledge, the immediate treatment of soldiers focused on rest and the removal of danger (Ford, 2009). Later, with the civil, feminist and human rights movements of 1960s and 1970s, the focus shifted from combat to the harmful and traumatic consequences of sexual and domestic violence (Ford, 2009; Rosen et al., 2012). It was not until 1980, however, that the condition resulting from traumatic exposure, today known as PTSD was formally recognized as a psychiatric disorder (Bodkin, Pope, Detke, & Hudson, 2007).

7.3.2 PTSD diagnosis and prevalence

Since its recognition as a psychiatric disorder, PTSD has captured the attention of mental health professionals, their patients, and the public at large (Rosen et al., 2012). However, as with the concept of trauma, PTSD has been a subject of debate and controversy. In fact, the PTSD diagnostic criteria have changed a number of times within the past three decades (see Appendix 19), during which time doubts

were raised regarding its validity and high comorbidity with other mental health disorders (Rosen et al., 2012; Spitzer, First, & Wakefield, 2007). Based on these limitations, the latest DSM-5 focused on capturing a more comprehensive profile of the disorder and to mitigate potential overlaps with other psychiatric disorders (O'Donnell et al., 2014). Changes included the elimination of criterion A2 (i.e., feelings of fear, helplessness, or horror), the addition of new symptoms, and the reorganization of the existing symptoms into four clusters (Friedman, Resick, Bryant, & Brewin, 2011). Thus, the revised PTSD criteria require exposure to actual or threatened death, serious injury, or sexual violence (see section 7.1 for Criterion A) followed by the development of four clusters of symptoms including intrusion, avoidance, negative alterations in cognitions and mood, and alterations in arousal and reactivity (American Psychiatric Association, 2013). These symptoms need to be present for more than one month, causing clinically significant distress or impairment in social, occupational, or other important areas of functioning, and should not be attributable to the physiological effects of a substance or other medical conditions (see Appendix 19 for more details). Thus far, research in this area supports the removal of the A2 criterion (O'Donnell et al., 2014), the improvement in reduced comorbidity (Elhai et al., 2012) and the new four-cluster PTSD structure (Elhai et al., 2012; Miller et al., 2013). Given, however, that some of the studies (Demirchyan, Goenjian, & Khachadourian, 2014; Elhai et al., 2012) adapted existing DSM-IV PTSD measurement tools in the assessment of DSM-5 PTSD, the validity of the results is unclear.

Although PTSD is considered to be one of the most prevalent psychiatric disorders following trauma, the continuous change in its criteria led to inconsistent PTSD lifetime prevalence rates (e.g. 7.8% - 9.5%; Breslau et al., 1998; Kessler et al., 1995). It is estimated that approximately 1 adult in 12 has experienced PTSD in their life (Breslau et al., 1998). Compared to previous criteria, the latest DSM-5 diagnosis was found to yield higher lifetime prevalence estimates (e.g. Miller et al., 2013), although there is some inconsistency to the results (Kilpatrick et al., 2013; O'Donnell et al., 2014). Further epidemiological studies are, therefore, needed to explore the PTSD prevalence rates using psychometrically sound measures consistent with the DSM-5

diagnosis.

7.3.3 Partial PTSD vs. full PTSD

The fact that most epidemiological studies focused solely on individuals meeting full PTSD criteria highlights one of the issues concerning the diagnosis of PTSD that is yet to be resolved. Although the majority of trauma survivors do not develop PTSD (Keane, Marx, & Sloan, 2009) those that experience a range of symptoms but do not meet the full diagnostic criteria are recognized by some as suffering from partial or subthreshold PTSD (e.g. McLaughlin et al., 2015). Even though there have been some concerns that labels are often being applied to what may appear to be a brief and normal human reaction (Frueh, Elhai, & Kaloupek, 2004), there has been a growing awareness that partial PTSD not only exists, but also entails significant negative psychological outcomes (Zlotnick, Franklin, & Zimmerman, 2002). In the area of partial PTSD, some studies demonstrate comparable impairment levels between partial and full PTSD (Carlier & Gersons, 1995; Stein, Walker, Hazen, & Forde, 1997), although these results have been questioned (Breslau, Lucia, & Davis, 2004).

Some authors claim that loosening the PTSD diagnostic criteria threatens to dissolve the line between normal posttraumatic reactions and the disorder (Breslau et al., 2004; Friedman et al., 2011; Wakefield & Spitzer, 2002), while others posit that the proposed cutoff values of some PTSD measures are too stringent for trauma survivors that do not meet full diagnostic criteria (e.g. Dickstein et al., 2015). Given that both groups appear to have diagnosable symptoms and disruptions of adjustment, it may be critical to include partial PTSD in the psychiatric epidemiology and research. At present, however, there is not enough empirical evidence to warrant its inclusion as a distinct diagnosis (Friedman et al., 2011). Until this issue is resolved, researchers should consider adjusting the cutoff values to meet the needs of particular populations in particular contexts (Dickstein et al., 2015).

7.3.4 Risk Factors

The fact that more than 75% of trauma survivors come through the traumatic event without significant psychological sequelae (Breslau, Davis, Andreski, & Peterson, 1991; Breslau et al., 1998; Frans et al., 2005) has ignited several attempts to identify factors pertaining to the aetiology of PTSD. Efforts of this nature have shown that demographic characteristics, pre-trauma, peri-traumatic, and post-trauma factors (Keane et al., 2009; Regel & Joseph, 2010) may predispose individuals to develop posttrauma disorders. Although men are more likely to experience a traumatic event, women seem to be more susceptible to developing PTSD, with a ratio of approximately 2:1 (Breslau et al., 1998; Keane et al., 2009; Kessler et al., 1995; Rosen et al., 2012). Additional demographics such as prior trauma experience, psychiatric history, and age (i.e. very young and very old) also appear to increase the risk of PTSD development (Keane et al., 2009; Perkonigg, Kessler, Storz, & Wittchen, 2000).

Research looking at peritraumatic factors indicated that the probability for PTSD development varies as a function of trauma type. More precisely, rape, physical assault, and combat were found to be among the strongest predictors of PTSD (Breslau et al., 1998; Frans et al., 2005; Perkonigg et al., 2000). Additional evidence supports that other factors including peritraumatic dissociation, and emotional and physiological reactions (e.g. shortness of breath, pain) may predict subsequent PTSD diagnosis (Breh & Seidler, 2007; Lawyer et al., 2006; Norman, Stein, Dimsdale, & Hoyt, 2008; Vásquez et al., 2012). Although peri-traumatic risk factors appear to have the greatest predictive power, post-trauma factors such as lack of social support and negative social reactions (e.g. being stigmatised) also carry significant weight (e.g. Iversen et al., 2008; Schnurr, Lunney, & Sengupta, 2004; Ullman & Filipas, 2001).

7.3.5 Theoretical models of PTSD

As researchers and clinicians began to study and treat PTSD, a number of theories have evolved to get a better understanding of its symptoms, thereby implementing more efficient treatments in their work with trauma survivors (Monson, Resick, &

Rizvi, 2014). Their efforts sought to explain why posttraumatic reactions continue to exist despite the fact that the traumatic event lies in the past (Regel & Joseph, 2010). Learning theorists (e.g. Kilpatrick, Veronen, & Best, 1985), for instance, posit that fear and anxiety associated with the traumatic event are acquired through classical and operant conditioning. A wide variety of stimuli that were either present during the event (e.g. noises, odours) or became conditioned through generalization (e.g. similar noises) acquire fear-inducing capacities that may elicit symptoms of fear and anxiety. When such symptoms are developed, trauma survivors engage in avoidant behaviours, which are negatively reinforced (i.e. due to symptom reduction), therefore preventing extinction of the link between the trauma and conditioned cues (Falsetti, Monnier, & Resnick, 2005; Monson et al., 2014).

Information-processing theories (e.g. Foa, Steketee, & Rothbaum, 1989), on the other hand, propose that PTSD emerges through the development of a fear structure in memory that includes the representations and meanings of the feared stimuli and fear responses. A fear structure is activated when external information matches that represented in the structure, thereby producing cognitive, behavioural, and physiological anxiety reactions (Cahill & Foa, 2007). When a fear structure accurately represents threat, it enables effective action (e.g. avoiding a car crash). However, the same fear structure can become maladaptive when 1) the associations between the stimulus elements do not accurately represent the world, 2) the responses are evoked by harmless stimuli, 3) both the responses and the stimuli are erroneously associated with threat and 4) the individual's responses (e.g. avoidance) interfere with adaptive behaviour and traumatic memory processing (Cahill & Foa, 2007). Given that a large number of stimuli can activate the fear structure, trauma survivors often perceive the world as a dangerous place (Cahill & Foa, 2007).

One of the most influential models of PTSD is that of Ehlers and Clark (2000). Their model focuses on perceived threat and memory, and suggests that pathological symptoms of trauma and PTSD arise when trauma survivors process the traumatic event and/or its consequences in a way that produces a sense of serious and current internal or external threat (even though the event is itself historical). This threat

motivates a series of behavioural and cognitive responses (e.g. avoidance) that appear to be effective in the short-term (due to distraction, arousal reduction, cue exposure control) but tend to hinder cognitive change in the longer term, thus maintaining the disorder.

The way an event is appraised is a crucial component of this model. As the authors claim, some trauma survivors are characterized by idiosyncratic negative appraisals of the trauma and thus are unable to see it as a time-limited event. For instance, through overgeneralization, individuals may perceive normal activities as being more dangerous than they really are (e.g. "Nowhere is safe"). Some might exaggerate the probability of future traumatic events (e.g. "The next disaster will strike soon") or negatively perceive the fact that the traumatic event happened to them as opposed to other people (e.g. "Bad things always happen to me"). Negative beliefs regarding the sequelae of the traumatic event can lead to a persistent sense of current threat, thereby contributing to the maintenance of PTSD symptomatology. In the aftermath of trauma, reactions such as numbing, re-experiencing and so forth are perceived as normal, but individuals with negative appraisals may consider them as threats to their mental health (e.g. "I'm going mad"). The theory is paralleled in some of the studies examining the importance of appraisals in trauma. Pre-trauma catastrophic thinking about self (Bryant & Guthrie, 2005) and negative appraisals about one's symptoms (Ehlers, Mayou, & Bryant, 1998) were found to predict subsequent posttraumatic stress. Individuals with distorted beliefs and appraisals are guided by persistent fear and thus engage in dysfunctional coping mechanisms (e.g. thought suppression, avoidance), which paradoxically maintain the disorder. Ehlers and Clark's influential model has received considerable attention in the trauma literature, and it is deemed one of the most comprehensive models of PTSD, with its components matching those of other theories (e.g. conditioning, dysfunctional beliefs, schemas etc.) (Taylor, 2006).

7.4 Post-trauma functioning and quality of life

The substantial impairment in functioning caused by PTSD places the disorder alongside the most costly disorders and health problems (Doctor et al., 2011; Ford,

2009). Trauma survivors are required to cope with a great deal of internal and external pressure on a regular basis (Solomon, 1989) which impacts their social/interpersonal life and overall functioning. Indeed, increasing evidence suggests that PTSD is associated with poorer functioning when compared to other types of anxiety disorders[6] (Warshaw et al., 1993). In fact, individuals with a PTSD diagnosis are likely to earn less money, get a divorce, change jobs frequently, become involved in the legal system, have suicidal thoughts, and have trouble raising their children (Keane & Barlow, 2002; Maia et al., 2007). Research in both community and veteran samples shows that individuals with PTSD are likely to experience high levels of depression, social withdrawal and isolation (Hofmann & Asmundson, 2008), lower objective living conditions and satisfaction (Schnurr, Lunney, Bovin, & Marx, 2009), diminished QoL, and problems with interpersonal violence (Zatzick et al., 1997). Chronic pain also contributes to impaired functioning and general negative affect in the emotional, personal, and work life of trauma survivors physically injured during the traumatic event (e.g. Asmundson, Norton, Allerdings, Norton, & Larsen, 1998; Hours et al., 2013). Another study with individuals being involved in a motor vehicle accident showed that physical impairment is associated with poor social interaction, emotional behaviour, and communication (Palyo & Beck, 2005).

In line with Study I, recent systematic reviews on QoL supported that, as with many other psychiatric disorders, PTSD appears to play a significant role in trauma survivors' QoL (Hansson, 2002; Olatunji, Cisler, & Tolin, 2007). Approximately 59% of the individuals with PTSD were found to have severe impairment in QoL across all domains (Rapaport, Clary, Fayyad, & Endicott, 2005). Notably, however, the adverse symptoms of PTSD not only affect the QoL of individuals with PTSD but also the QoL of their families (e.g. Peraica, Vidović, Petrović, & Kozarić-Kovačić, 2014). Clearly, the usefulness of QoL assessment in monitoring the course of PTSD in the aftermath of trauma has been widely acknowledged. Longitudinal data from adolescents (e.g. Goenjian et al., 2011), and adult non-veteran (Johansen,

[6] PTSD has been recently reclassified as a Trauma and Stressor-Related Disorder. Given, however, that it was considered an Anxiety Disorder for decades, results pertaining QoL and functioning in anxiety disorders will be reported.

Wahl, Eilertsen, Weisaeth, & Hanestad, 2007) and veteran samples (Schnurr, Hayes, Lunney, McFall, & Uddo, 2006) generated valuable empirical research with important application in clinical practice. Such research efforts showed that changes in PTSD severity are associated with improved QoL (Giacco, Matanov, & Priebe, 2013; Schneider, Palmer, Romero, & O'Regan, 2015; Schnurr et al., 2006).

Pursuing this line of research, investigators sought to explore the influence of specific PTSD clusters of symptoms on QoL. The numbing/avoidance cluster, for instance, was found to be uniquely associated with psychosocial functioning (Kuhn, Blanchard, & Hickling, 2003), while numbing symptoms appeared to be associated with parenting satisfaction (Samper, Taft, King, & King, 2004) and overall QoL (Lunney & Schnurr, 2007; Schnurr, 2008). In a recent study, poor QoL was found to be particularly associated with hyperarousal symptoms (Giacco et al., 2013). Exploring the associations between specific PTSD symptoms and domains of QoL might provide important insights into the mechanisms by which PTSD influences QoL. This can, in turn, guide therapy, as some of the PTSD symptoms may require more specific treatment efforts. Lunney and Schnurr (2007) support that depending on the targeted PTSD symptoms, different life aspects can be improved. Change in avoidance and hyperarousal, for instance, were found to uniquely predict change in achievement, while reexperiencing and numbing predicted change in self-expression and relationships, respectively.

It is important to note, however, that elevated QoL impairment within PTSD might be present due to factors other than those deriving from the actual disorder. Poor QoL can be explained by an overlap with the functional impairment mentioned in the DSM-IV and DSM-5 PTSD diagnosis (Olatunji et al., 2007). The severity of comorbid depression symptomatology can be another important factor in the determination of QoL in patients with PTSD (Araujo et al., 2014). Indeed, in Rapaport et al. (2005) 37% of the individuals with PTSD reported a current or lifetime history of depressive disorder. Such issues should, therefore, be taken into account when interpreting the results. Additionally, as mentioned in Study I, findings from QoL research in trauma survivors should always be considered in the context of

the different instruments used (Olatunji et al., 2007), as QoL has been defined and measured in diverse ways. It is worth noting that several of these studies have employed health status measures such as the SF-36 (e.g. Pagotto et al., 2015; Pittman, Goldsmith, Lemmer, Kilmer, & Baker, 2012; Pupo, Serafim, & de Mello, 2015; Wang, Cao, Wang, Zhang, & Li, 2012) and EQ-5D (e.g. Haagsma et al., 2012; Khachadourian, Armenian, Demirchyan, & Goenjian, 2015). While the EQ-5D provides an important health index assessing mobility, self-care, usual activities, pain and discomfort, and depression and anxiety (Brooks & EuroQol Group, 1996), doubts have been raised regarding its focus on physical health (Brazier, 2010; Connell et al., 2012). Whereas these aspects are important for the conceptualisation of QoL, the degree to which they fully assess the comprehensive concept of QoL is unclear.

7.5 Conclusions

Drawing from current theories and research on posttraumatic stress, researchers have gained important knowledge and a better appreciation of the aversive consequences of trauma on functioning and QoL. These models suggest that to compensate individuals struggling with PTSD symptoms engage in dysfunctional cognitive and behavioural coping mechanisms such as avoidance. Avoidance, in turn, exacerbates or maintains impaired functioning and the symptoms associated with the traumatic event. Given that coping styles may significantly impact QoL, further research is needed to identify and understand the mechanisms through which PTSD impacts trauma survivors. The next Chapter aims to do this by reviewing two individual strategies often used by trauma survivors in the aftermath of trauma, and how these paradoxically exacerbate or maintain PTSD and poor functioning.

Chapter 8

Emotion regulation and experiential avoidance as mediating mechanisms of posttraumatic stress

8.1 Introduction

It is a fact that humans struggle (Hayes & Lillis, 2012). Many will have to cope with the adversities of a traumatic event at some point in their life. It is, therefore, normal and common for individuals struggling with negative events and negative affect to employ several coping mechanisms so as to alleviate their emotional pain. Despite the high prevalence rates of trauma exposure, as reviewed in Chapter 7, only a small portion of trauma survivors meet criteria for a PTSD diagnosis. This highlights the need to better understand risk factors that may account for the development and maintenance of post-trauma psychopathology. The current Chapter, therefore, seeks to review two constructs, ER and EA, as core mechanisms pertaining to the aetiology and maintenance of PTSD symptoms and poor functioning in individuals exposed to traumatic events.

8.2 Emotion Regulation

8.2.1 Emotions

Emotions are part of human functioning with usually adaptive functions that are crucial for the achievement of goals (Nyklíček, Vingerhoets, & Zeelenberg, 2011). The definition of emotion has, however, been characterized by rich debates over the years (Thompson 2011). Emotions were initially portrayed to be uncontrollable forces opposite to the powers of reason (Power & Dalgleish, 2008), that exerted an influence on behaviour (Koole, 2009). In recent years, although emotion theorists differ in their emphasis on the functional, conceptual, or biological constituents of

emotion (Thompson, 2011), there seems to be a consensus that emotions are the individuals' responses to the internal or external stimuli relevant to their needs, goals, or concerns (Scherer, Schorr, & Johnstone, 2001). Emotions often arise when something important to us is at stake (Gross, 2002).

One of the core features of emotion is the moment of its emergence (Gross, 2014). Appraisal theory suggests that emotions arise when an individual evaluates (appraises) events and situations as being relevant to active goals (Roseman & Smith, 2001). The quality and intensity of the elicited emotion is, therefore, believed to depend upon the person's subjective evaluation of the situation (Schmidt, Tinti, Levine, & Testa, 2010). This is paralleled in studies supporting that appraisals are important predictors of the intensity of individual emotions (Siemer, Mauss, & Gross, 2007). Whatever the goal (e.g. staying alive, maintaining social relationships) and whichever meaning is attributed to a situation, it is its perceived meaning that elicits emotions (Gross, 2014). Upon their emergence, a second relevant feature of emotion is the coordinated set of behavioural, experiential, and physiological response tendencies, that together facilitate overt action (Gross, 2002; Nyklíček et al., 2011). The fight-flight reaction, for instance, involves increased heart rate and blood pressure, dilation of the bronchi and increased blood flow to the muscles, preparing the body for action (Nyklíček et al., 2011).

Three features of emotion that are emphasized in many theories include what gives rise to an emotion, what are its components, and its flexible capacity (Gross, 2008). These features constitute the "modal model" of emotion developed by Gross and Thompson (2007) in which the process of emotion is analysed according to its unfolding. As seen in Figure 8.1 the emotional sequence begins with a situation, internal or external. This situation is then attended to and appraised by the individual in terms of what the situation means and in light of relevant goals (Gross, 2014), resulting in emotion response tendencies (Gross, 2008). For instance, when the attention of an individual is captured by the presence of a snake, the individual appraises that situation in respect to certain goals, for example, wanting to distance him/herself from the snake. If the snake is appraised as being life-threatening, then

the individual might choose to run. This is consistent with Ehlers and Clark's (2000) cognitive model of PTSD, in which cognitive and behavioural reactions to emotions arise upon one's inaccurate and maladaptive appraisals. For instance, a trauma survivor who experiences flashbacks and nightmares may negatively appraise this situation (e.g. "I am going mad", or "I will never get over this"), which may elicit unhelpful responses such as withdrawing.

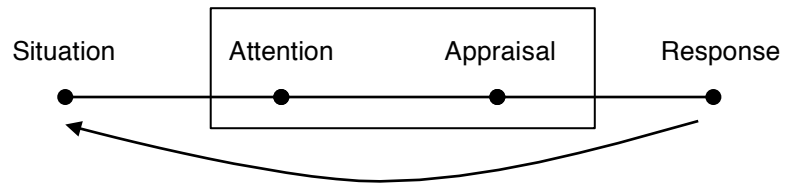

Figure 8.1 The modal model of emotion. Adapted by Gross (2014) for the current study.

8.2.2 Conceptual and theoretical basis of emotion regulation

Whilst emotions can be adaptive, they can also be ill-matched to a situation and must be regulated (Gross, 1999b). Under such circumstances individuals try to regulate their emotional responses so that they better serve their goals (Gross, 2002). Therefore, the degree to which emotional arousal promotes or impedes constructive functioning depends on whether emotions are monitored, evaluated, and controlled by the individual (Thompson, 1991). While emotions are regulated by others in early life (e.g. by parents), they later become self-regulated due to neurophysiological development, growth of cognitive and linguistic skills, and a better understanding of emotion and the self (Thompson, 1991). The regulation of emotions started receiving an increased attention in the early 1980s and since then researchers from a variety of disciplines have sought to examine how and under which circumstances this regulation occurs.

Some suggest that ER is operationalized as a two-way process. As the term implies ER involves the generation of emotions followed by their internal or external

management or mismanagement (Campos, Frankel, & Camras, 2004; Thompson, 1991, 1994). A review of ER suggests that in its broader sense the concept involves attempts to manage all states that are emotionally charged, including moods, stress, and positive or negative affect (Koole, 2009). One of the most consensual definitions describes ER "as the processes by which individuals influence which emotions they have, when they have them, and how they experience and express these emotions" (Gross, 1998b, p. 275). ER is neither inherently good nor bad and can occur consciously (changing an upsetting topic) or unconsciously (lighting a cigarette under anxious situations) (Gross, 1999b; Gross, 2002). Given the multicomponent nature of emotions, ER involves changes in the latency, rise time, magnitude, duration, and offset of behavioural and psychophysiological responses (Gross, 2002).

One of the most prominent and influential models of ER is that of Gross (1998a) which focuses on the timing of regulation. In his model, emotions are believed to be regulated by either manipulating the input or the output of the emotional response system. As described in Figure 8.2 ER strategies differ in respect to when their impact has an effect on the emotion generative process (Gross, 2002). At the broadest level, ER strategies[7] can be categorized as antecedent-focused and response-focused. Antecedent-focused strategies, as the term implies, are usually evoked at the front end of the emotion generative process before the emotion response tendencies have become fully activated (Gross, 2002; Richards & Gross, 2000). These strategies can take many forms, for instance, placing oneself in a situation where certain emotions are more likely to occur (e.g. visit friends), altering one's mental state so as to prevent certain feelings from occurring, and modifying the way emotion-relevant stimuli are appraised (Gross & Muñoz, 1995).

[7] The term strategy should be used with caution as it might be taken to imply that these ER processes are executed consciously whereas in reality many forms of ER may be evoked unconsciously (Gross, 2002).

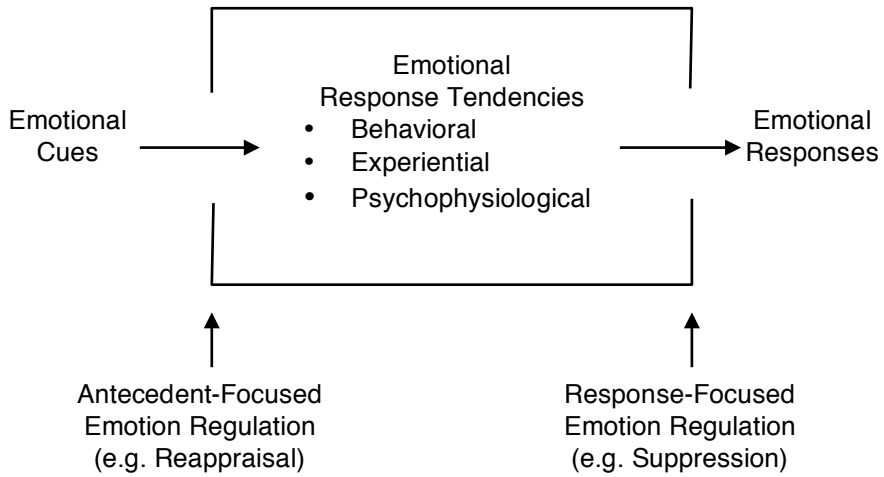

Figure 8.2 A process of emotion regulation. Adapted by Gross (1998a) and modified for the current study.

On the other end of the spectrum, response-focused strategies occur once an emotion is already under way, and after the response tendencies have been generated (Gross, 2002). Such strategies aim at intensifying, diminishing, prolonging, or decreasing ongoing emotional experiences, expressions, or physiological responses (Gross, 1998a). Examples include hiding one's excitement when holding a strong hand in a game of cards (Gross & Muñoz, 1995) or masking feelings of anxiety as one leaves a child at the kindergarten for the first time (Gross, 2002).

Within the two types of ER strategies there are five specific forms that can be allocated along the timeline of the emotion process. The ER process model presented in Figure 8.3 builds on the modal model of emotion (Figure 8.1) and treats each step as a potential target for regulation (Gross, 2014). Under the ER process, a situation is selected, modified, attended to, appraised, and a particular set of emotional responses is evoked (Gross, 2014). The first four of these processes are antecedent-focused, whereas only the fifth is response-focused (Gross & John, 2003). Situation selection is located on the front end of the emotion generative process and it is used to approach or avoid people or situations on the basis of their potential emotional impact (Gross, 1998a). For instance, one may decide to meet with a cheerful friend

the night before a big exam rather than going to the last-minute study session with other nervous students (Gross, 2002). Once a situation is selected, situation modification acts on it so as to modify its emotional impact (Gross, Richards, & John, 2006). For instance, if the friend asks about the exam then the individual can make it clear that he or she would rather talk about something else (Gross, 2002). Given that situations have many different aspects, attentional deployment can be used to pick which specific aspects to focus on (Gross et al., 2006). Individuals employing this strategy may chose to turn their attention toward or away from an aspect so as to influence the emotional impact (Gross, 1998a). However, even after a situation has been selected, modified, and selectively attended to, it is still possible to alter its emotional impact through cognitive change (Gross, 1998b). Cognitive change is related to the meaning of the situation and its specific aspects. In line with the appraisal theories of emotion, individuals appraise the situation they are in so as to alter its emotional significance (Gross & Thompson, 2007). During the day of the big exam, the person might remind him or herself that "it's only a test" rather than seeing the exam as a measure of self value (Gross, 2002). It can also be used to magnify the emotional response, or change the emotion itself (e.g. transforming anger at a bully into pity; Gross, 2002). One commonly used cognitive change strategy is that of downward social comparison, through which individuals compare oneself with less fortunate others so as to reduce negative feelings (Taylor & Lobel, 1989). The meaning assigned to the situation during cognitive change is crucial, as it may impact which response tendencies will be generated in that particular situation (Gross, 2002). Finally, the last process occurs after the response tendencies have been generated. During response modulation individuals regulate the physiological and experiential aspects of a situation or an emotion (Gross & Thompson, 2007). For example a person in grief might use alcohol to regulate his or her emotional pain.

Of course, ER does not end in response modulation. As signalled by the feedback arrow in Figure 8.3 emotion generation is an ongoing process that extends beyond a single episode (Gross, 2014). Often, emotional responses elicit further emotions that require regulation, or emotional responses modify the social situation that the person

finds themselves in, for example tears tend to elicit care and compassion from significant others.

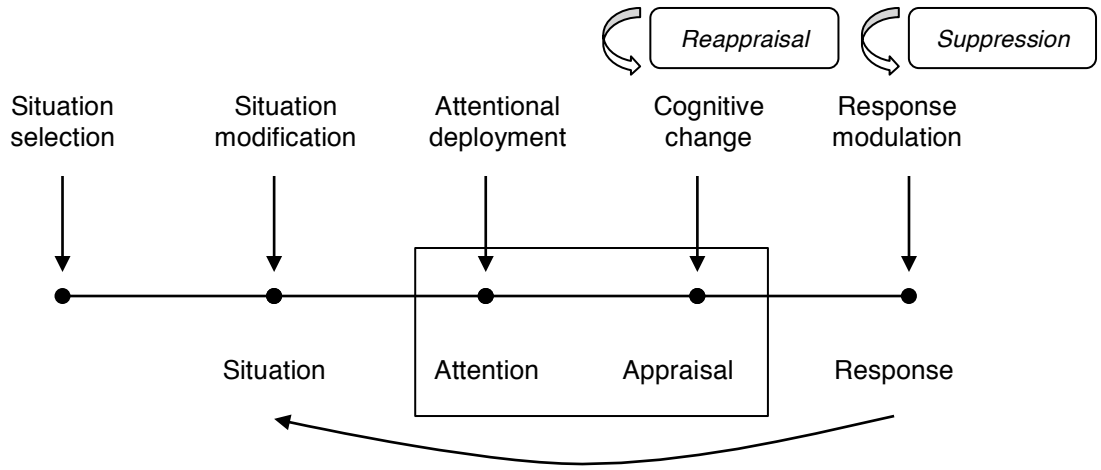

Figure 8.3 The five processes of emotion regulation. Adapted by Gross and Thompson (2007) and modified for the present study.

Gross (1998a), however, acknowledges that this model of ER does not adequately represent the multifaceted evaluation and modulation processes, nor does it represent differences among emotions or individuals.

8.2.2.1 Emotion regulation vs. coping

Gross (2014) considers ER and other coping mechanisms as part of the broader construct of affective regulation. However, the degree to which they are best conceptualized as separate or overlapping processes is unclear. Lazarus and Folkman (1984) defined coping as the "constantly changing cognitive and behavioral efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the resources of the person" (p.141). Later, Lazarus (1993) distinguished between two major functions of coping: Problem-focused and emotion-focused. Whereas problem-focused coping focuses on acting upon the environment or oneself, emotion-focused coping aims at changing the meaning of stressful events so as to reduce subsequent emotional distress. Some consider coping to fall under the broad

definition of ER (Aldao, Nolen-Hoeksema, & Schweizer, 2010; Garnefski, Kraaij, & Spinhoven, 2001), however, despite their shared similarities coping styles focus solely on stressful situations and experiences (Gross & John, 2003; Watson & Sinha, 2008). ER, on the other hand, includes processes that are not necessarily considered in the coping literature, such as sustaining or increasing positive emotions (Gross, 1998b). Additionally, whereas coping includes non-emotional controlled volitional processes, ER includes both controlled and automatic processes concerned mostly with emotions (Compas et al., 2013; Richards & Gross, 2000). Coping can also be distinguished from ER by its emphasis on longer periods of time (e.g. coping with bereavement; Gross, 2014). Although some evidence demonstrates the distinct relationship between emotion-focused coping and ER (Watson & Sinha, 2008), to date, there has not been enough research that can shed light on this debate. In fact, studies including both terms are scarce (Compas et al., 2013), therefore, future studies should more closely examine the possible connection between coping and ER.

8.2.3 Reappraisal and suppression

Given that emotions develop over time, their regulation at different points in the emotion-generative process would lead to different outcomes (Gross, 2014). Although there are numerous strategies of ER, the current chapter focuses on two of the most well researched forms of ER: Cognitive reappraisal[8], an antecedent-focused ER strategy, and expressive suppression, a form of response-focused ER. Both processes are usually employed to down-regulate (i.e. reduce) emotions, however, they are operationalized in different ways.

It is widely accepted that it is not the situation per se that generates emotions, rather the individual's appraisals of that situation (Gross, 1999a). Therefore, reappraisal is employed for assessing a situation in a way that alters an emotional response or diminishes its emotional relevance (Gross, 2014; Richards & Gross, 2000). Being part of cognitive change (see Figure 8.3), reappraisal is used to interpret a potentially

[8] Cognitive reappraisal and expressive suppression will be referred to as reappraisal and suppression throughout the text.

emotion-eliciting stimuli in non emotional terms (Gross, 2002). Given that it can change both the appraisals of the situation and the appraisals related to one's emotional responses to that situation (Werner & Gross, 2010), individuals can modify their behavioural expression but also what they feel (Gross & John, 2003). If effective, reappraisal prevents the experience of full-blown emotional responses and eliminates the need for continual self-regulatory effort during an emotional event (Richards & Gross, 2000). This also means that reappraisal can efficiently alter the subsequent unfolding of emotion trajectory (Gross & John, 2003).

Contrarily, suppression, which is part of response modulation, is behaviourally oriented and aims at inhibiting or decreasing ongoing emotional expression and experience while the individual is emotionally aroused (Gross, 2002, 2014). For instance, suppression might enable one to keep a straight face while telling a lie (Koole, 2009). Unlike reappraisal, suppression strategies influence how emotion response tendencies are modulated once they have been triggered (John & Gross, 2004). However, given that suppression occurs late in the emotion-generative process, individuals are required to continuously manage emotion response tendencies (Gross et al., 2006). Inevitably, the continuous efforts of self-monitoring and modulation of emotion expression consume cognitive resources that would otherwise be useful for optimal functioning (Gross et al., 2006). This was supported by experimental studies that found suppression, but not reappraisal, to impair memory (Richards & Gross, 2000) and social interactions (Gross & John, 2003; Richards, Butler, & Gross, 2003). Efforts to suppress emotions may turn the attention inward, thereby heightening the salience of emotion-related memories (Richards et al., 2003). Additionally, the chronic use of suppression often leads to a condition called expressive dissonance, that is, facially displaying the opposite of what one feels (Robinson & Demaree, 2007). Indeed, suppressors were found to easily mislead others about their true self and often experience themselves as “fake” or inauthentic (Gross & John, 2003). Individuals living in expressive dissonance were found to be less successful at mood repair, experience less positive emotion and more negative emotions, avoid close relationships, have less positive relations with others, and

report lower self-esteem, life satisfaction, and more depressive symptoms (Gross & John, 2003).

Reappraisal on the other hand, is often seen as an adaptive and protective form of ER. Individuals who reappraise were found to have closer relationships with friends, fewer depressive symptoms, and greater self-esteem and life satisfaction (Gross & John, 2003). Given that reappraisal occurs early in the ER process it lacks the cognitive costs that accompany suppression. Indeed, individuals using reappraisal were found to report better functioning and psychological health (Hopp, Troy, & Mauss, 2011). Under certain circumstances, even expressive suppression can be beneficial, for example, for maintaining relationships by concealing negative emotions (Gross, 2002). Still, the inappropriate or ineffective regulation of emotions appears to be a crucial factor in psychopathology. Whereas in theory suppression is used to decrease emotional experience, in practice, it paradoxically increases negative emotions. Expressive suppression was found to increase subjective anxiety in patients with panic disorder during a carbon dioxide challenge (Levitt, Brown, Orsillo, & Barlow, 2004), while thought suppression was found to increase self-reported anxiety and the frequency of anxious thoughts (Koster, Rassin, Crombez, & Näring, 2003). It is, therefore, possible that it is the habitual and inflexible use of suppression that contributes to psychopathology (Moore, Zoellner, & Mollenholt, 2008), especially given that other, less cognitively taxing forms of ER (e.g. reappraisal, acceptance) are available for reducing negative emotion experience and expression (Gross, 2002).

8.2.4 Emotion regulation in PTSD

Among the symptoms that characterise PTSD is the inability to effectively manage emotions to suit the demands of different situations (Kashdan, Breen, & Julian, 2010). Pursuing valued goals following trauma exposure requires managing a wide range of emotional states, some of which can be painful or uncomfortable (Campbell-Sills, Barlow, Brown, & Hofmann, 2006). Therefore, to compensate, trauma survivors often engage in harmful efforts of ER (e.g. suppression) which can impede them from pursuing their goals and maintaining desired life circumstances

(Campbell-Sills et al., 2006; Koole, 2009). Therefore, the impact of maladaptive ER is particularly relevant to individuals with anxiety disorders who struggle on a regular basis with excessive and persistent negative emotions (Campbell-Sills et al., 2006). In fact, current conceptualisations suggest that individuals with PTSD over-use ineffective forms of ER (e.g. suppression), while under-using effective ones (e.g. reappraisal) (Boden et al., 2013; Ehlers & Clark, 2000).

Evidence suggests that the way people interpret and regulate their peritraumatic and posttraumatic emotions may be influential in the development of PTSD (Benoit, Bouthillier, Moss, Rousseau, & Brunet, 2010). Attempts for ER might be particularly problematic for individuals struggling with PTSD symptomatology due to the conflict between striving to manage everyday emotions and the ongoing emotional disturbances characteristic of the disorder (Kashdan et al., 2010). Indeed, existing studies found a unique association between difficulties in ER and PTSD symptom severity above and beyond anxious reactivity to traumatic event cues (Badour & Feldner, 2013). Given the cognitive load required by ER strategies, particularly response focused strategies, individuals with PTSD are often left with few resources available for other meaningful cognitive tasks (Kashdan et al., 2010). Veterans with PTSD were found to be focused on regulating and controlling emotional experiences more frequently and intensely compared to those without PTSD (Kashdan et al., 2010; Roemer, Litz, Orsillo, & Wagner, 2001). Given, however, that suppression has the unintended side effect of also reducing the expression of positive emotions (Gross & John, 2003), individuals with PTSD may be in greater risk for the maintenance of their symptoms. Indeed, in the area of trauma studies, veterans with PTSD were found to suppress both positive and negative emotions (Roemer et al., 2001). Paradoxically the suppression of emotional experience increases the same unpleasant emotional experience among individuals with PTSD, which in turn maintains the symptoms of PTSD. Several studies have confirmed that difficulties in ER presents a risk factor for the development and maintenance of PTSD and impaired functioning in trauma survivors (Cloitre, Han, Miranda, & Strovall-McClough, 2005; Ehring & Quack, 2010; Moore & Zoellner, 2012; Tull, Barrett, McMillan, & Roemer, 2007a). Trauma survivors whose lives are organised by

frequent ER strivings are more likely to report lower well-being and self-esteem, and derived less purpose meaning and joy (Kashdan et al., 2010).

Although fewer studies have investigated the role of expressive suppression and cognitive reappraisal within trauma, some evidence suggests that the more frequent use of suppression and less frequent use of reappraisal are associated with PTSD symptomatology (Eftekhari, Zoellner, & Vigil, 2009). The use of similar expressive suppression strategies was also found to be associated with increased frequency of trauma-related intrusive thoughts, and symptoms of anxiety, distress, and depression in a sample of trauma survivors with PTSD (Shipherd & Beck, 1999). More recently, ER strategies were found to play a significant role in the treatment of PTSD. In a sample of military veterans entering trauma-focused CBT therapy, PTSD symptom severity was positively associated with suppression, and inversely associated with reappraisal. Notably, changes in suppression and reappraisal during treatment predicted PTSD symptom severity at discharge (Boden et al., 2013)

Many theories and treatments acknowledge that individuals with PTSD struggle with the regulation of emotional and behavioural responses (see Batten, Orsillo, & Walser, 2005). It is possible that suppression prevents the emotional processing of the traumatic event, resulting in the maintenance of PTSD symptomatology (Foa et al., 1989). It is well established, for example, that the emotional disruption in the aftermath of trauma (i.e. numbing; American Psychiatric Association, 2013) is an important risk and maintenance factor of PTSD (e.g. Roemer et al., 2001). Although reappraisal has been generally viewed as adaptive, cognitive models of PTSD posit that the inaccurate negative appraisals of a traumatic event (e.g. “I attract disaster”) produce a sense of current threat which may result in the maintenance of posttraumatic stress symptomatology (Ehlers & Clark, 2000). Research on this area found support for the association between PTSD and the way people appraise their trauma. In a study with political prisoners, individuals with PTSD were found to report mental defeat and a feeling of alienation from others (Ehlers, Maercker, & Boos, 2000). Similarly, third wave cognitive behavioural therapies suggest that it is not the negative emotions nor the failed ER that lead to behavioural harm per se, but

rather the attempts to avoid such emotions (Blackledge & Hayes, 2001).

8.2.4.1 Emotion regulation as a mediator in trauma survivors with posttraumatic stress

Often there is more to an observed relationship such as the presence of possible underlying effects (Little, Card, Bovaird, Preacher, & Crandall, 2007). In an effort to better understand differences in coping styles following a traumatic event, researchers have, therefore, turned their attention to the mediating role of ER. The assessment of mediation models has become popular in psychological studies because they allow the testing of possible causal mechanisms (Shrout & Bolger, 2002). Briefly, mediation occurs when the effect of a predictor on the outcome variable is explained by a third variable (i.e. a mediator). Such research is important in providing a better picture of etiological pathways in trauma survivors struggling with PTSD.

A search for the mediating role of ER in trauma situation revealed numerous studies, most of which were published during the past decade. As emphasized in Figure 8.4 ER has been explored for its mediating effects between A) traumatic exposure and posttraumatic stress and other negative psychological outcomes and B) posttraumatic stress and negative psychological outcomes. The recursive feedback arrows in process B indicate the maintenance of PTSD symptoms through the maladaptive use of ER.

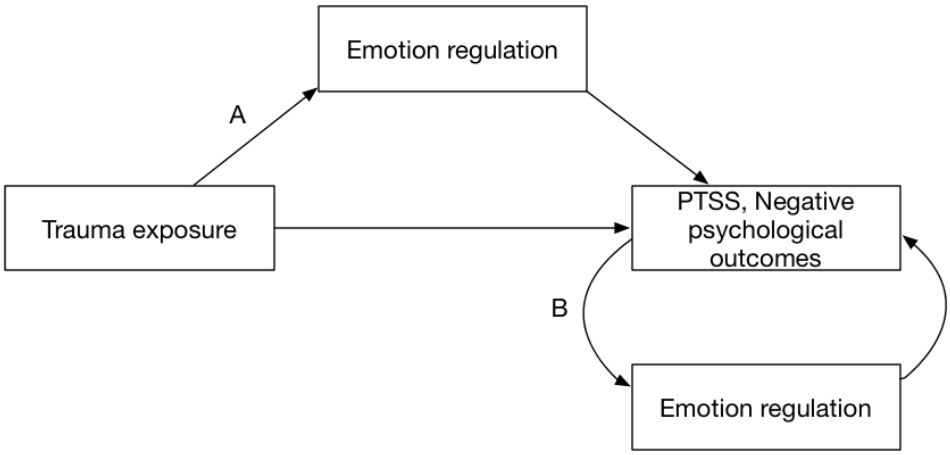

Figure 8.4 Emotion regulation as a mediator in trauma; PTSS = Posttraumatic stress symptoms.

Consistent with process A in Figure 8.4, several studies sought to investigate the impact childhood maltreatment and abuse has on adult psychopathology through ER. Notably, most studies used the Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004) in which difficulties in ER are defined as the ability to monitor, evaluate, and modulate emotional experiences consistent with the demands of a specific context or set of goals. The DERS assesses specific ER processes including the awareness and understanding of emotions, their acceptance (or non-acceptance), the ability to control impulsive behaviours and act towards desired goals, and the ability to flexibly use ER strategies to modulate emotional responses toward meeting valued goals and situational demands (Gratz & Roemer, 2004). Difficulties in the above aspects of ER were found to mediate the relationship between childhood abuse/maltreatment and symptoms of PTSD (Burns, Jackson, & Harding, 2010; Lilly, London, & Bridgett, 2014; Stevens et al., 2013; Weiss, Tull, Lavender, & Gratz, 2013) and depression (Ullman, Peter-Hagene, & Relyea, 2014). These findings seem to collectively suggest that individuals who were either abused or maltreated as children have not learned how to effectively regulate emotions, thus being more vulnerable to symptoms of posttraumatic stress (Stevens et al., 2013). The capacity of abused children to effectively regulate emotions is possibly

overwhelmed by the constant efforts of managing recurrent negative emotions (Burns et al., 2010). Given, therefore, that individuals with PTSD are required to constantly manage intense emotions, the absence of effective regulation perpetuates their symptoms and leads to functional impairment (Stevens et al., 2013).

Similarly, high betrayal trauma (i.e. trauma perpetrated by someone to whom the victim is close) was found to indirectly affect symptoms of posttraumatic stress, anxiety, and depression through ER difficulties in a sample of undergraduate students (Goldsmith, Chesney, Heath, & Barlow, 2013). The opposite was also observed. In a sample of Tibetan refugees, Hussain and Bhushan (2011) found that protective ER strategies, such as acceptance and putting into perspective (i.e. thoughts of playing down the seriousness of the event when compared with other events) mediated the impact of traumatic exposure on symptoms of PTSD. The latter also mediated the relationship between trauma and posttraumatic growth. This is consistent with studies showing that adaptive ER strategies are associated with more positive affect, fewer symptoms of psychopathology, and better functioning (Garnefski et al., 2001; Ruiz, 2010).

As reviewed in Chapter 7, the struggle associated with PTSD extends beyond the obvious symptoms of the disorder. It has been well documented that trauma survivors with PTSD are more likely to experience impaired functioning and diminished QoL than those without PTSD (Buckley, Mozley, Bedard, Dewulf, & Greif, 2004; Zatzick et al., 1997). They are also more likely to develop other anxiety, mood, and substance disorders (Kessler, 2000). Recent research, however, suggests that it is not the pervasive PTSD symptoms that lead to poor psychological outcomes and impaired functioning, rather the way trauma survivors influence which emotions they have, when they have them, and how they experience and express them. Consistent with the process B of Figure 8.4, difficulties in ER were found to act as an underlying mechanism in the relationship between PTSD and marijuana-use coping motives (Bonn-Miller, Vujanovic, Boden, & Gross, 2011), impulsive behaviours and aggression (Miles, Menefee, Wanner, Teten Tharp, & Kent, 2015; Weiss, Tull, Viana, Anestis, & Gratz, 2012), symptom complexity (Choi, Choi, Gim, Park, &

Park, 2014), depression, difficulties with social adjustment, and trauma-related depersonalization (Klemanski, Mennin, Borelli, Morrissey, & Aikins, 2012).

Given that trauma survivors struggle with excessive and painful reminders of trauma on a regular basis, some may continuously appraise trauma-related events and people as threatening (Cahill & Foa, 2007). These feelings of imminent threat may encourage individuals into overrelying on internally directed strategies that are designed to avoid potential reminders of the trauma (e.g. suppression; Desrosiers, Vine, Klemanski, & Nolen-Hoeksema, 2013). Although such responses may reduce perceived threat and alleviate painful psychological symptoms in the short-term, they tend to hinder cognitive change or intervene with the movement toward goals in the longer term (Ehlers & Clark, 2000; Kashdan, Barrios, Forsyth, & Steger, 2006). Engaging, for instance, in impulsive behaviours (e.g. Weiss et al., 2012) or avoiding the expression of emotions as a way to distract oneself from emotional states is associated with high cognitive load, which leaves few resources available for other meaningful cognitive tasks (Kashdan et al., 2010). This may prevent trauma survivors from living a meaningful life, resulting in impaired functioning and negative psychological outcomes.

Notably, in this area of work, the majority of mediation studies employed DERS to examine the mediation models. In fact, only one study to the authors' knowledge has examined the mediating effects of (emotional) suppression (Kaplow, Gipson, Horwitz, Burch, & King, 2014) which mediated the effects of adverse life events on suicidal thoughts/attempts in adolescents. Although most studies focused on the difficulties in ER overall, one of the studies using DERS examined the individual mediating effects of five different strategies (clarity, non-acceptance, goals, impulsivity, and lack of access to strategies) (Nickerson et al., 2015). Interestingly, limitations in the capacity to engage in goal-directed behaviour were found to explain the relationship between trauma exposure and living difficulties and PTSD symptomatology in a sample of traumatized treatment-seeking refugees. Experiencing difficulties in completing important tasks as a result of intense emotional distress may facilitate avoidant-oriented behaviours, thereby exacerbating

PTSD reactions (Nickerson et al., 2015). The importance of values and goals has been highlighted in Acceptance and Mindfulness-based treatments of PTSD which focus on guiding trauma survivors into acting in accordance with their values and goals in the presence of painful memories and emotions (e.g. Batten et al., 2005).

Although there appears to be enough evidence to support that trauma related outcomes are developed and maintained through ER, results should be interpreted in light of several issues. It is important to note that although most studies have used the DERS to assess the concept of ER, different samples and mediation techniques were used to assess the mediation models. Additionally, while overall difficulties in ER are clearly implicated in trauma, the role of specific ER strategies remains unclear. Future research should, therefore, focus on conducting mediation analyses with multiple mediators so as to examine the individual effects and power of different forms of ER (e.g. reappraisal and suppression). Finally, given the cross-sectional nature of the studies, the direction or temporal order of the relationships under study cannot be determined. Unlike longitudinal data, cross-sectional data precludes inferences about causality. Therefore, alternative pathways are also plausible.

8.2.5 Emotion regulation conclusions

Many trauma survivors will end up suffering from aversive posttraumatic stress symptoms (PTSS) and some will actively attempt to control or modify painful emotions related to the traumatic events. Findings from mediation models add to our understanding around ER as a toxic underlying mechanism in the aftermath of trauma. Such findings may have important implications for clinical practice, as they encourage targeting ER through the promotion of adaptive and flexible ER strategies. Promising results demonstrated the improvement of ER and reduction of PTSD symptoms in a CBT therapy inducing skills training in affect and interpersonal regulation/prolonged exposure (Cloitre, Koenen, Cohen, & Han, 2002; Cloitre et al., 2010), dialectical behaviour therapy (Steil, Dyer, Priebe, Kleindienst, & Bohus, 2011) and Mindful-based therapy in which changes in ER mediated changes in PTSD symptomatology (Price & Herting, 2013). More research is, however,

necessary to explore whether improvements in ER would mediate the reduction of PTSD symptoms within therapies targeting ER.

8.3 Experiential avoidance

Individuals dealing with aversive events tend to avoid, suppress, dissociate so that they will not feel, think or remember whatever it is that pains them (Hayes & Lillis, 2012). Negative affect is an aversive state and people understandably try to terminate it as quickly as possible (Baumeister, 1990). From a survival standpoint, by avoiding danger one also avoids possible harmful consequences, just like a rat would avoid returning to a chamber where it previously received an electric shock (Chawla & Ostafin, 2007). Despite being a common reaction, increasing evidence suggests that the chronic avoidance of unwanted internal experiences, feelings and thoughts may have negative long-term effects. This process has been labelled as "experiential avoidance" and it is the "phenomenon that occurs when a person is unwilling to remain in contact with private experiences (e.g., bodily sensations, emotions, thoughts, memories, behavioural predispositions) and takes steps to alter the form or frequency of these events and the contexts that occasion them" (Hayes, Wilson, Gifford, Follette, & Strosahl, 1996, p. 1155). EA is recognised by several distinct theoretical backgrounds including existential, Gestalt, client-centred, and behavioural conceptualisations of psychopathology (Hayes, Stroshal, & Wilson, 1999). In fact, some of the PTSD theories (Cahill & Foa, 2007; Ehlers & Clark, 2000) mentioned in Chapter 7 suggest that behaviours of avoidance are evoked by perceived threat and fear.

8.3.1 Experiential avoidance vs. avoidance and coping

Similar to ER, the conceptual definition of EA has been the subject of controversy partly due to the conceptual overlap with other forms of avoidant coping. The unique concept of EA is believed to involve all emotional, cognitive, and behavioural avoidance processes (Boeschen, Koss, Figueredo, & Coan, 2001; Varra & Follette,

2004). However, terms such as emotional avoidance or cognitive avoidance are often used in detriment of the more generic concept, especially when these are the forms individuals seek to escape, avoid, or modify (Hayes, Strosahl, & Wilson, 2012; Hayes et al., 1996). This unclear conceptualisation, however, raises the question of how the generic concept of EA is related to more specific forms of avoidance. The degree to which EA is a distinct or overlapping concept, or a form of coping in itself is unclear. Whilst there are some differences between EA and other forms of avoidance (e.g. emotional suppression) there appears to be a certain degree of overlap between them (Hayes, Levin, Plumb-Vilardaga, Villatte, & Pistorello, 2013).

Several attempts have been made to draw clear distinctions between the way EA and other forms of avoidance can be operationalized. For example, despite the conceptual overlap between EA and PTSD avoidance, it has been suggested that they are two distinct concepts. Avoidance symptoms have been part of the PTSD diagnostic criteria since its inclusion in DSM-III and as with EA, it includes emotional, behavioural, and cognitive aspects. PTSD avoidance is, however, associated solely with the traumatic event, memories, and other contextual features of the event, and it is often induced on exposure to trauma-related cues (Kashdan & Kane, 2011; Tull, Gratz, Salters, & Roemer, 2004). EA, on the other hand, involves the general avoidance of any internal experiences and feelings experienced as aversive, that are not necessarily related to the traumatic event (Tull et al., 2004). Trauma survivors engaging in EA may avoid unwanted experiences that have nothing to do with their trauma (Kashdan & Kane, 2011).

Along the same lines, EA can be differentiated from avoidant coping. Whilst the focus of coping has been mostly on external stressors, EA involves the experience of thoughts, feelings, and bodily sensations (Kashdan & Kane, 2011). One very important distinction involves the contextual framework EA is rooted in. Whereas coping styles are focused on the frequency and content of behaviour, EA pertains to the function and context of behaviour (Kashdan et al., 2006). That is, EA is contextualised in one's inability to move toward valued goals. EA is, in fact, less of a concern for theorists when it is outside the context of valued aims or pursuit of goals

(Kashdan & Kane, 2011). Indeed, as described in subsequent sections, an individual's degree of commitment and action towards valued goals poses an important aspect of therapies such as Acceptance and Commitment Therapy (ACT) that target EA (Walser & Hayes, 2006). Results from limited empirical research, however, do not appear to support the theory. Karekla and Panayiotou (2011) found significant empirical overlap between avoidant coping and EA, although the latter was shown to contribute a unique variance in psychological stress and QoL. Additional evidence supports the overlap between EA and thought suppression and rumination (Lee, Witte, Weathers, & Davis, 2015; Tull et al., 2004). Interestingly, acceptance, which is considered to be the antithesis of EA, was found to be distinct from overlapping constructs such as cognitive reappraisal and perceived emotional control (Kollman, Brown, & Barlow, 2009). While there appears to be a degree of overlap, the inconsistent results prevail from drawing definite inferences.

8.3.2 Experiential avoidance assessment

Research looking at the association between EA and avoidant coping has been a challenge for researchers due to the inconsistencies in the assessment methods used. Most measures tap into different elements of EA (Boeschen et al., 2001) and despite the unclear association between EA and avoidant coping, Walser and Hayes (2006) propose that existing measures of coping can be used in an ACT-consistent fashion. This, however, contradicts their view that "one of the most important aspects of assessment in the ACT approach investigates individuals' degree of commitment and action" (Walser & Hayes, 2006, p. 155). Taking this into consideration, EA unlike coping, should be assessed within the context of values and goals. Therefore, according to this view, it seems unlikely that the existing coping measures (e.g. the White Bear Thought Suppression Inventory) could be used in an ACT-related fashion, as not all are designed to assess individuals' commitment and action toward valued goals. This view concurs with some of the questions included in EA measures such as the Multidimensional Experiential Avoidance Questionnaire (MEAQ; "I continue working towards my goals, even if I have doubts") and the Acceptance and Action Questionnaire (AAQ; "Worries get in the way of my success"). The latter has been, in fact, considered to assess EA within the context of valued behaviours,

choices, and activities (Kashdan et al., 2006).

Although during the last decade the AAQ has significantly shaped the field of ACT and EA, it has recently received some doubts regarding its validity. In their first version of the AAQ, Hayes et al. (2004a) supported the development of "a short general measure of experiential avoidance" (p. 553), with a focus on experiential control, psychological acceptance, and taking action despite experience of aversive private events (Walser & Hayes, 2006). Later, Hayes, Luoma, Bond, Masuda, and Lillis (2006) stated that "…the AAQ, although it is often referred to generically as a measure of EA, is actually a more general measure of several ACT processes that bear on psychological flexibility" (p.10). Although some consider the latest version of AAQ (AAQ-II) as a measure of psychological flexibility (e.g. Gloster, Klotsche, Chaker, Hummel, & Hoyer, 2011), the degree to which it fully captures this concept is unclear (see Figure 8.5 for psychological flexibility). The use of AAQ-II as a measure of EA and psychological inflexibility (Bond et al., 2011) has, therefore, been questioned. Some evidence suggests that the AAQ-II appears to be a measure of general psychological distress, rather a pure index of EA (Gámez, Chmielewski, Kotov, Ruggero, & Watson, 2011; Wolgast, 2014). This is reflected in studies that found very high correlations between the AAQ-II and measures of psychopathology (e.g. Gloster et al., 2011). Another study showing that the AAQ-II does not make a significant contribution to the prediction of obsessive compulsive symptoms above measures of general distress and obsessive beliefs, adds to that concern (Abramowitz, Lackey, & Wheaton, 2009). These results were, however, challenged by a recent study that examined the contribution of the AAQ-II compared to other measures of psychopathology. Results indicated that the AAQ-II explains unique variance in psychopathology above and beyond established measures of depression and anxiety (Gloster et al., 2011). Although further research is needed to address the doubts raised in the literature of EA, studies using the AAQ measures have made a significant contribution to the body of knowledge about EA and psychological inflexibility (see Chawla & Ostafin, 2007 for a review). Given the complexity of EA, researchers should perhaps consider assessing this concept with the use of various assessment tools (e.g. see Orcutt, Pickett, & Pope, 2005).

8.3.3 The use of experiential avoidance

EA is believed to be readily available to conscious awareness for several reasons. From a survival standpoint, EA can be a useful and effective strategy to avoid the dangers of daily life, but it goes beyond that, as it is socially cultivated (Hayes & Wilson, 1994). For instance, children are often encouraged to suppress the expression of their emotions (e.g. "stop crying or I will give you something to cry about"; Hayes et al., 1996). Additionally, the concept of “feeling good” is highly promoted by our culture and by therapists targeting the reduction or alteration of emotional and cognitive events (Hayes, Strosahl, Bunting, Twohig, & Wilson, 2004b; Hayes & Wilson, 1994). Given that society accepts thoughts and feelings as valid and sensible causes of overt behaviour (Hayes & Wilson, 1994), thoughts and feelings that cause unwanted behaviours should, therefore, be avoided (Hayes et al., 1996). For instance, a trauma survivor suffering from PTSD may use feelings of anxiety as a socially valid reason to avoid discussing about the traumatic event, which would be culturally understood and supported.

8.3.4 The paradox and its consequences

EA emerges rather naturally in human cognition, but consistent with the theories of PTSD mentioned in Chapter 7, it may persist through negative reinforcement. The avoidance of trauma-related cues, for instance, would be negatively reinforced by short-term feelings of relief, thus increasing the likelihood of similar behaviours occurring in future similar contexts (Chapman, Gratz, & Brown, 2006; Kashdan & Breen, 2007). Individuals thus get caught in an amplifying loop of EA and although it is not an abnormal process per se, a large body of empirical evidence has been developed to support that it is one of the most toxic processes in the coping literature (Hayes & Lillis, 2012).

Similar to ER, in some contexts (e.g. when trying not to show feelings of anxiety during a job interview) EA is considered to be a benign self-protective strategy that can prevent seemingly disastrous consequences (Kashdan et al., 2006). Controlling unwanted feelings, thoughts, and bodily sensations can work as long as it does not interfere with individuals’ personal values and goals (Kashdan et al., 2006). The

immediate effects of EA are mostly positive, and it is, therefore, believed by those using it to be working (Hayes et al., 1996). EA behaviours can be placed under the antecedent-consequential stimulus control. For instance, difficult psychological experiences are likely to generate strong antecedent aversive control (Wilson & Dufrene, 2008). Cues associated with the traumatic event (e.g. images, odours etc.) may increase the likelihood that individuals will want to avoid these cues and the private experiences associated with them. The avoidance of trauma-related experiences provides relief. Therefore, on the surface, EA behaviours constitute attempts at being free from aversive and stressful events (Walser & Hayes, 2006). However, once the trauma cues have been avoided, EA behaviours generate consequential control, that is, the consequences (e.g. relief, stress reduction) that are followed by the avoidance of trauma-related cues is reinforcing, as it influences the likelihood of the avoidant behaviours happening again (Wilson & Dufrene, 2008). Paradoxically, EA is counterproductive in the long run and often leads to an increase of the frequency, severity, and accessibility of the very thing one seeks to avoid (Gold & Wegner, 1995; Hayes et al., 2006; Reddy, Pickett, & Orcutt, 2006). Research looking at the consequences of thought suppression found that individuals instructed to avoid thoughts related to a story reported more story-related thoughts than those who were actively thinking about the story (Clark, Ball, & Pape, 1991). Often, attempts to avoid unwanted private events tend to increase their functional importance (Hayes et al., 2006).

Increasing evidence suggests that many forms of psychopathology can be viewed as unhealthy methods of EA (Hayes et al., 1996). Findings from reviews (Chawla & Ostafin, 2007; Hayes et al., 1996) and an emerging body of work suggest that EA behaviours may play a significant role in depression (Tull et al., 2004), trichotillomania (Begotka, Woods, & Wetterneck, 2004), self-harm (Chapman et al., 2006), eating disorders (Lillis, Hayes, & Levin, 2011; Rawal, Park, & Williams, 2010), alcohol (Levin et al., 2012) and substance abuse (Buckner, Zvolensky, Farris, & Hogan, 2014), psychosis symptomatology (Goldstone, Farhall, & Ong, 2011) and anxiety disorders (Berman, Wheaton, McGrath, & Abramowitz, 2010). The function of EA as a risk factor for anxiety-related pathology has received support by several

experimental studies. In response to carbon dioxide-enriched air inhalation, healthy participants higher in EA demonstrated greater cognitive-affective distress (Feldner, Zvolensky, Eifert, & Spira, 2003), more panic symptoms, more severe cognitive symptoms, and more fear, panic, and uncontrollability than the group low in EA (Karekla, Forsyth, & Kelly, 2004; Spira, Zvolensky, Eifert, & Feldner, 2004). Results from these studies have provided a better picture of the toxic effects of EA in healthy individuals, as it appears to exacerbate symptoms of anxiety in individuals with no history of anxiety-related disorders (Kashdan et al., 2006).

Why is EA so costly though? In an effort to avoid pain, the range of behaviours and experiences that do not involve feared or unwanted private events becomes limited (Hayes et al., 2006). Similar to maladaptive forms of ER, directing one's self-control toward the avoidance of stressful feelings, diminishes the available resources for self-control in other goals (e.g. coping with stress and living a mindful life) (Muraven & Baumeister, 2000). Additionally, in the process of avoiding negative memories and experiences, one avoids the positive ones as well (Hayes & Lillis, 2012). Many peoples' lives are put on hold until unwanted experiences are managed, resulting in less personal growth opportunities and diminished well-being (Kashdan & Kane, 2011). Veterans with PTSD reported less meaning and joy, and diminished well-being and self-esteem when focused on avoiding emotions (Kashdan et al., 2010). In a recent study, chronic use of EA was found to relate to reduced well-being, autonomy, self-acceptance, purpose in life, personal growth, and positive relationship with others (Fledderus, Bohlmeijer, & Pieterse, 2010). The chronic use of EA thus becomes a toxic and disordered strategy when it prevents people from living a meaningful life. Indeed, the constant struggle to avoid or control unwanted thoughts diminishes contact with present experiences (Kashdan et al., 2006). This leads to the delay of an approach-based lifestyle, which hinders long-term desired values and goals due to the focus on more immediate culturally encouraged goals (Hayes et al., 2006; Kashdan & Breen, 2007). It is not surprising that EA was found to be associated with decreased tendency to delay gratification, that is, the tendency to give up immediate pleasure in pursuit of long-term rewards (Gerhart, Heath, Fitzgerald, & Hoerger, 2013). Given that EA behaviours are situated within

antecedent-consequential stimulus control, the short-lived and immediate rewards followed by the avoidance of aversive antecedent stimuli interferes with the pursuit of valued outcomes (e.g. educational achievement, social relationships, healthy eating etc.). It has, however, been widely observed that this may lead to reduced well-being, autonomy, self-acceptance, purpose in life, personal growth and positive relationships with others (Fledderus et al., 2010).

8.3.5 Philosophical and theoretical background

As previously mentioned, EA is rooted in ACT, which is the most well developed and empirically researched of the third wave of behavioural therapies. ACT builds upon the previous waves of behavioural therapy and is based on the philosophical concept of functional contextualism (Hayes, Barnes-Holmes, & Roche, 2001). Functional contextualism and, subsequently, ACT, view psychological events as an interaction between the individual and historically and situationally defined contexts (Hayes et al., 2004b). In the concept of contextualism, actions need to be categorised by history and purpose (Hayes & Lillis, 2012). Therefore, in functional contextualising, analysis of a behaviour is meaningless without a context (Bach & Moran, 2008). For instance, EA is neither good, nor bad in itself, unless it interferes with valued living (Wilson & Dufrene, 2008). Therefore, within contextualism, ACT is exquisitely sensitive to the role of context, which is why it attempts to alter the context rather than the form or content of clinically relevant behaviour toward the accomplishment of goals (Hayes et al., 1999).

The major focus of ACT is to promote psychological flexibility, that is "contacting the present moment fully as a conscious human being and persisting or changing behavior in the service of chosen values" through six core processes (see Figure 8.5) (Hayes & Lillis, 2012, p. 41). Unlike ACT, most treatments focus on the impact thoughts and feelings have on clients' behaviours, with the aim of changing, controlling or even eliminating any undesirable thoughts or emotions (Hayes & Wilson, 1994). ACT, on the other hand, encourages people to begin living a meaningful life consistent with their personal values (Hayes & Lillis, 2012). Within the concept of ACT, EA is tackled through acceptance (Figure 8.5) which involves

opening up and making room for painful feelings, sensations, and thoughts (Harris, 2009). Acceptance is not about forcing oneself through, or tolerating painful feelings (Hayes & Lillis, 2012), rather allowing them to be as they are (Harris, 2009). Patients are encouraged to be active and fully aware of unwanted private events without attempting to change their frequency or form especially when doing so would be harmful (e.g. leading to reduced goal pursuit) (Hayes et al., 2006). For example, PTSD patients can be taught to feel anxiety simply as a feeling, without defence (Hayes et al., 2006). With PTSD patients, acceptance often works as an exposure treatment, but even during exposure patients are encouraged to notice elicited unwanted feelings and practice moving towards accepting, than avoiding them (Varra & Follette, 2004). Given the essential role of values and goals within ACT, a successful PTSD treatment would occur with changes in EA and changes in patterns of valued behaviours (Hayes et al., 2004b; Varra & Follette, 2004).

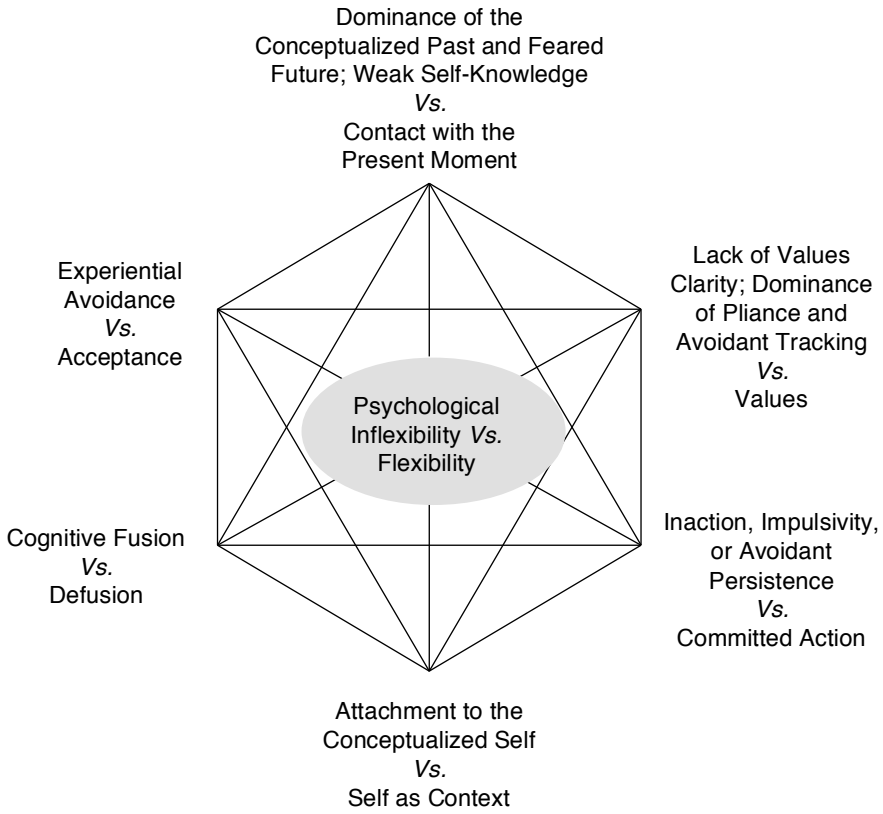

Figure 8.5 The 6 core processes of psychopathology and intervention that underlies ACT. Figure adopted from Hayes at al. (2006) for the current study.

8.3.5.1 ACT application and criticisms

Despite its promising applications, ACT has been subject to several criticisms. Some have posited that ACT and CBT are two similar rather than distinct forms of therapy (Arch & Craske, 2008). These doubts have been amplified by studies showing no substantial difference between ACT and other types of treatment (Bach, Hayes, & Gallop, 2012; Öst, 2008). For some this may suggest that the target of psychological inflexibility may be the same as targeting other underlying therapeutic processes that are implemented in other forms of CBT (e.g. altering attentional bias, reducing avoidance, decreasing anxiety sensitivity; Gloster et al., 2011).

In a recent meta-analysis, Öst (2014) found that there was no significant

improvement in methodological quality and deterioration in effect size compared to a previous meta-analysis (Öst, 2008). A-Tjak et al., 2015, however, support that the methodological quality of the ACT studies has improved over the years. Öst (2014) supports that ACT is not yet a well-established treatment for any disorder, but it is probably efficacious for chronic pain and tinnitus, and possibly efficacious for depression, psychotic symptoms, OCD, mixed anxiety, drug abuse, and stress at work. Together, therefore, the two recent meta-analyses suggest that the methodological quality of ACT RCTs might not be as flawed as stated by Öst (Hertenstein & Nissen, 2015).

In fact, presently, ACT is recognized by the Division 12 of the American Psychology Association Clinical Psychology Society as an effective treatment for chronic pain with strong empirical support, and for depression, mixed anxiety, obsessive-compulsive disorders, and psychosis with modest empirical support (Society of Clinical Psychology APA, 2013).

Despite a clear margin for improvement and along with the consensus that many of the early ACT studies were small and preliminary (Hayes & Lillis, 2012), the criticisms regarding the efficacy of ACT have been challenged (Levin & Hayes, 2009). At a clinical level, growing evidence supports the effectiveness of the concepts introduced by ACT (e.g. mindfulness, acceptance, values) (Hayes, Villatte, Levin, & Hildebrandt, 2011), which have been incorporated in many of the new evidence-based treatments (Hayes & Lillis, 2012). In their recent meta-analysis A-Tjak et al. (2015) found ACT to be more effective than treatment as usual or placebo and can be as effective in treating anxiety disorders, depression, addiction, and somatic health problems. However, the discrepancies between the two recent meta-analyses (A-Tjak et al., 2015; Öst, 2014) highlight the need for comprehensive and collective guidelines for the efficacy of ACT within different somatic and psychiatric disorders (Hertenstein & Nissen, 2015).

It is important to note, however, that apart from the efficacy regarding symptom reduction, ACT has a potential advantage over other treatments. ACT therapists help

clients to make room for life's difficulties and their effects and to move in the direction of their chosen values (Hayes et al., 1999). Therefore, ACT might be associated with broader substantial changes regarding psychological functioning and lead to less disappointment if patients do not perceive a significant symptom reduction (A-Tjak et al., 2015).

8.4. Conclusions

Trauma survivors struggle with reminders of the traumatic event on a regular basis. To compensate, many resort to inflexible and harmful attempts at ER and EA for immediate relief from their symptoms. While these strategies appear to be adaptive in the short-term, it has been widely observed that they disrupt or impede achievement of valued goals, preventing trauma survivors from living a meaningful life.

Evidence from the wider literature suggest that maladaptive forms of ER are etiologically central in the development of PTSS and impaired functioning in trauma survivors. It is, therefore, possible to explain the development and maintenance of PTSD symptoms and maladaptive behaviours through the use of such techniques. These findings permit a better understanding of the etiological pathways pertaining to trauma-related psychopathology and provide guidance for improved future research. Given, however, the severe impairment in functioning and QoL of individuals with chronic PTSD, further research is required to elucidate the underlying mechanisms by which PTSD impacts trauma survivors in the aftermath of trauma exposure. The next chapter, thus, includes a systematic review of the literature investigating EA as a mediator in trauma survivors with posttraumatic stress.

Chapter 9

Systematic review

Experiential avoidance as a mediator in trauma survivors with posttraumatic stress: a systematic review

9.1 Introduction

The majority of people will most likely experience a traumatic event in their lifetime, but regardless of the type of trauma most will adjust well to their experiences through natural processes (Regel & Joseph, 2010). Yet approximately 1 trauma survivor in 12 (8.3%) will meet diagnostic criteria for PTSD (Breslau et al., 1998). Posttraumatic stress, even for those without a diagnosis, is often disabling, affecting the well being of trauma survivors and their families.

The fact that only a minority of individuals who have experienced significant trauma meet criteria for a PTSD diagnosis has long interested researchers and clinicians. Since the inclusion of PTSD in the DSM-III, numerous attempts have been made to identify connections between underlying factors that may contribute to the development and maintenance of such symptoms. A large body of research has collectively shown that several factors may predispose individuals to developing PTSD, including demographic characteristics (e.g. gender, age at trauma, race and education, family psychiatric history), pre-trauma (e.g. previous traumatic experiences and psychological problems prior to exposure), peri-traumatic (e.g. peri-traumatic dissociation and emotional responses), and post-trauma factors (e.g. diagnosis for Acute Stress Disorder, social support, and substance misuse) (Brewin, Andrews, & Valentine, 2000a; Regel & Joseph, 2010). Of course, such elements are helpful in predicting the likelihood of PTSD development, but as Varra and Follette (2004) suggest, personal characteristics such as individual coping styles appear to be

most salient to treating PTSD, as they are prone to influence and change. EA is one such coping style.

Despite being relatively a recent concept, EA has received increasing attention in the trauma literature. Obviously, the absence of pain and unwanted private experiences is to be desired (Hayes & Strosahl, 2004). Although EA can be seen as a protective strategy, it paradoxically leads to an increase of the frequency, severity, and accessibility of the painful things trauma survivors seek to avoid (Hayes et al., 2006). The content and form of these events are part of daily life and they are not necessarily problematic or dysfunctional (Kashdan et al., 2006). It is the rigid and inflexible attempts at avoiding such events that may lead to impairment. The enormous effort and time devoted to the use of EA may interfere with the present moment, and with movement toward valued goals (Kashdan et al., 2006). In fact, accumulating evidence supports that the chronic use of EA is associated to less positive events, diminished well-being, and maladaptive behaviours, including trauma related disorders (see Chawla & Ostafin, 2007 for a review).

The detrimental effects of maladaptive avoidant behaviours on individuals with PTSS have been also acknowledged in one of the most influential models of PTSD (Ehlers & Clark, 2000). The model suggests that trauma survivors engage in maladaptive behavioural strategies, such as suppressing one's thoughts or avoiding reminders or situations related to the traumatic event, which hinder change in negative appraisals about the trauma, thus maintaining the PTSS. Although cognitive and behavioural avoidance are both considered to be parts of EA (Boeschen et al., 2001), they can be differentiated from the broader concept of EA that is believed to be contextualised in one's commitment and ability to move toward valued goals (Kashdan & Kane, 2011). Still, their association remains unclear.

With trauma survivors, EA generally centers on maladaptive behaviours used to avoid trauma-related thoughts, emotions, memories, and bodily sensations (Hayes & Strosahl, 2004). Individuals suffering from posttraumatic stress struggle with aversive traumatic memories, unwanted thoughts and painful feelings, thus it makes

sense that they would engage in avoidant behaviours (Walser & Hayes, 2006). For example, a trauma survivor of sexual abuse may avoid intimacy (Walser & Westrup, 2007) as such an experience might elicit unwanted feelings and thoughts. However, striving to control such unwanted events gets in the way of positive experiences and personal growth. By avoiding intimacy, that trauma survivor might lose the opportunity to form important relationships (Walser & Westrup, 2007). As Kashdan et al. (2010) suggest, trauma survivors seem to put their life on hold until their anxiety is managed. Indeed, veterans with PTSD were found to report a greater number of desires focused on regulating and controlling emotional experiences compared to veterans without PTSD. Those who engaged in more avoidant behaviours were found to also report lower well-being and lower self-esteem, and the opposite was also observed. In a sample of college students, Kashdan and Kane (2011) found that those reporting higher distress and low reliance on EA also reported the greatest growth and meaning in life, suggesting distressing thoughts do not always lead to impaired functioning. Their results indicate that a willingness to be in contact with distressing personal events might serve as a catalyst for finding benefit after trauma (Kashdan & Kane, 2011).

EA has been found to significantly predict PTSD symptom severity over time (Marx & Sloan, 2005), and it was shown to persist in civilian war survivors reporting current PTSD symptoms compared to those who have recovered or never experienced any symptoms (Morina, Stangier, & Risch, 2008). As expected, this was found to lead to impaired psychological functioning and lower subjective QoL (Morina, 2007; Plumb, Orsillo, & Luterek, 2004). Beyond that, EA was shown to have a detrimental effect on physical functioning, as evident by a study with trauma survivors suffering from chronic pain (Ruiz-Párraga & López-Martínez, 2015). Interestingly, Boeschen et al. (2001) found only a small effect of EA on psychological outcomes, which consistent with the cognitive model of Ehlers and Clark (2000), suggests that social cognitions (e.g. disrupted beliefs) have a stronger relationship with psychological outcomes in trauma survivors. However, these results may be due to the fact that only the cognitive aspect of EA was measured. In contrast, Batten, Follette, and Aban (2001) found EA to be connected to childhood

sexual abuse which was predictive of psychological distress. In one of the few prospective studies, chronic dysfunction shooting survivors endorsed higher rates of EA (Orcutt, Bonanno, Hannan, & Miron, 2014). According to the authors, students who made attempts in avoiding negative internal experiences prior to the shooting were more likely to continue utilizing this avoidant strategy post-shooting, which in turn may have further contributed to unremitting distress. In another study with veterans and undergraduate students, Plumb et al. (2004), found EA to be a stronger predictor of psychological distress than pre-trauma (i.e. previous distress symptomatology) and peri-traumatic (i.e. the severity of the traumatic event) factors.

From a therapeutic standpoint, the above findings are of great importance because as previously noted, EA may be more prone to influence and change compared to other predictors of posttraumatic stress. Given the involvement of EA in trauma, it is possible that mindful and accepting behaviours may improve psychological adjustment and reduce the risk of PTSD symptoms severity in the aftermath of trauma (Thompson, Arnkoff, & Glass, 2011).

Beyond the ample empirical support for the connection between EA and poor mental health, there has been an increased interest in the role of EA as a mediator. The mediating role of EA in maladaptive behaviour and psychopathology was explored to some extend in a review by Chawla and Ostafin (2007). However, more recently, EA was found to mediate the impact of shame experiences with caregivers (Carvalho, Dinis, Pinto-Gouveia, & Estanqueiro, 2015), anxiety sensitivity (Tull & Gratz, 2008) and passive coping (Fledderus et al., 2010) on depression. In a study with clinical and healthy populations EA was found to act as a mediator in the relationship between life hassles and distressing delusional experiences (Goldstone et al., 2011). Evidence also supports its effects as a partial mediator in the relationship between body image dissatisfaction and disordered eating (Timko, Juarascio, Martin, Faherty, & Kalodner, 2014). Both EA and acceptance, which are often seen as the two ends of the same spectrum, were found to play a mediating role in individuals with chronic pain (Costa & Pinto-Gouveia, 2011; Gillanders, Ferreira, Bose, & Esrich, 2013; Vowles, McCracken, & Eccleston, 2008). Although individuals

understandably spend time and effort in getting rid of the pain, in doing so, pain becomes more central, dominant and disruptive (Costa & Pinto-Gouveia, 2011).

In respect to trauma, increasing evidence supports the impact of EA as a mediator. For example, Fiorillo, Papa, and Follette (2013) found that EA mediated the relationship between childhood sexual abuse and revictimization. Other studies found that EA mediated the relationship between child maltreatment and PTSD symptoms in adolescents (Shenk, Putnam, & Noll, 2012), emotional abuse and depression (Barnhofer, Brennan, Crane, Duggan, & Williams, 2014) and adult sexual assault and physical health (Palm & Follette, 2008). Such findings provide a better picture of the etiological pathways involved in trauma. It is possible that it is not traumatic events per se that have an impact on posttraumatic stress, rather the inflexible efforts to avoid internal experiences related to the traumatic events. Although a great part of the literature has used non-clinical samples, and while different measures and mediation strategies have been employed to assess the mediation models, there is enough evidence to suggest that EA is etiologically central to the development and maintenance of psychological problems.

9.2 Review question

Although a review by Thompson et al. (2011) touched upon the literature of acceptance in trauma and while Chawla and Ostafin (2007) have conceptualized EA as a core mechanism to psychopathology in general, thus far, the literature on EA as a mediator in posttraumatic stress is yet to be systematically reviewed. Thus, the aim of the current study was to extend previous work and comprehensively assess the literature on the mediating role of EA in adult trauma survivors.

As shown in Figure 9.1, the current systematic review will attempt to answer whether EA mediates the relationship between 1) traumatic events, trauma-related maladaptive behaviours, and/or psychopathology and symptoms of post-traumatic stress in adults, and 2) symptoms of post-traumatic stress and subsequent impairments in physical and psychosocial functioning. Answering these questions will clarify the underlying processes linking trauma to subsequent suffering, which

may guide the development of more effective psychological treatment approaches (Kazdin, 2007).

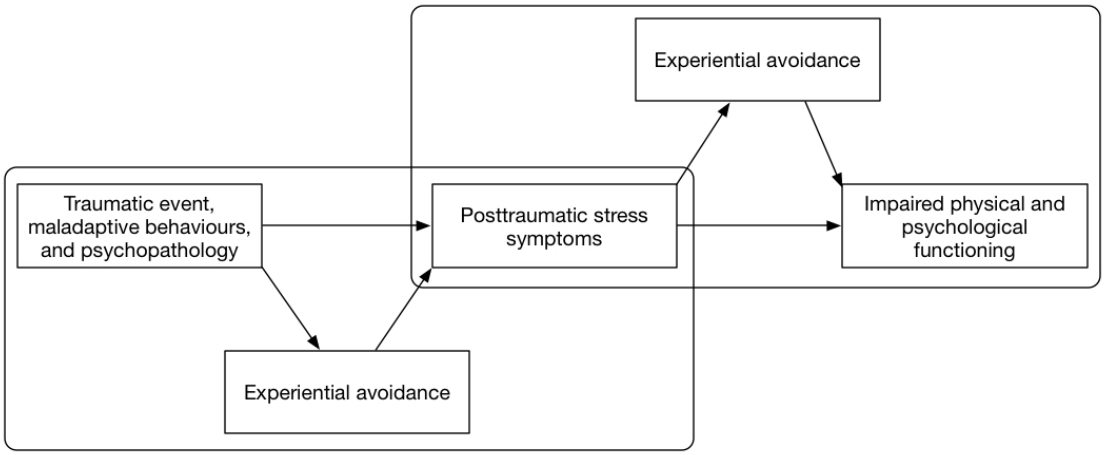

Figure 9.1 Experiential avoidance as a mediating mechanism in trauma.

9.3 Methodology

9.3.1 Selection criteria

Studies were eligible for inclusion if their population consisted of adults (i.e. above the age of 18) who had experienced at least one traumatic event in their lifetime. Traumatic events are defined as exposure to actual or threatened death, serious injury, or sexual violence by direct exposure, witnessing in person, indirect exposure (i.e. learning that it occurred to a close family member of friend), or repeated exposure to aversive details of the traumatic event (American Psychiatric Association, 2013). However, given that the definition has evolved throughout the years, eligible studies were those with populations exposed to traumatic events defined as such by the main authors of each study.

Only published studies with valid quantitative measurements assessing EA as a mediating mechanism were eligible for inclusion. Unpublished manuscripts were excluded. Studies assessing other forms of avoidance, such as general avoidant coping, PTSD avoidance, ER, or thought suppression, were also excluded on the basis that they do not resemble the full concept of EA. Finally, eligible studies had to

include posttraumatic stress as either the independent (predictor) or the outcome variable in the mediation model.

9.3.2 Literature search

Online electronic databases were searched up to February 2015. Embase (1980-), Medline (1946-) and PsycINFO (1806-) were searched for studies assessing the effects of EA as a mediator in adult trauma survivors with PTSS. Three different groups of terms were used in the search strategy, covering EA (avoid*, experiential avoid*, EA, AAQ, ACT, mindful*, accept*, psychological flexibility, psychological inflexibility, willing*), posttraumatic stress (PTSD, post-trauma*, posttrauma*, trauma*, trauma* events, posttraumatic stress*, post-traumatic stress*, trauma* disorder*), and mediation (mediat*, indirect, mediat* effect, indirect effect). The references of relevant reviews and studies were also searched for papers not already identified by the electronic databases. The first author conducted the literature searches. All titles resulted from the searches were scanned and the abstracts of relevant articles were read. If, based on the abstract, a study seemed relevant to the purposes of the current review, the full-text was retained so as to identify whether it met inclusion/exclusion criteria.

9.3.3 Study selection

The literature searches resulted in a total of 2431 papers, two of which were identified by the references of other studies. After screening the titles and abstracts, and after removing duplicate studies, a total of 55 full-text papers were assessed for eligibility. Ten of these studies met full inclusion criteria (see Figure 9.2). Searches were conducted again in May 2015 (Embase Week 21, Ovid Medline and PsycINFO May week 3), but none of the 49 new records met inclusion criteria.

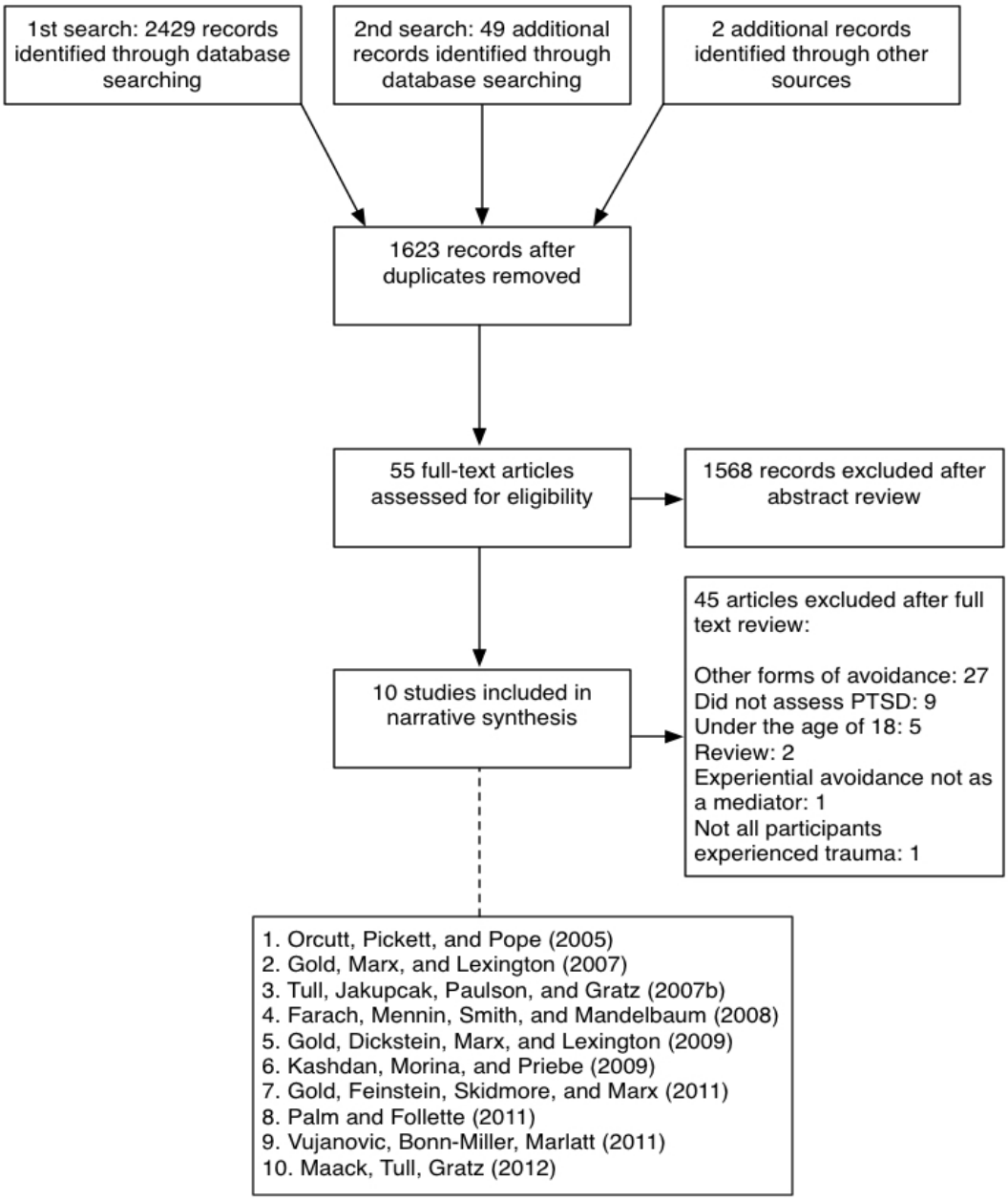

Figure 9.2 Flowchart of database searching.

9.3.4 Review registration

The review protocol was registered with PROSPERO international prospective register of systematic reviews (CRD42015021943), prior to the data extraction and quality assessment (Panayiotou, Gillanders, & Hutton).

9.3.5 Data extraction and analytic approach

A data extraction sheet was used to extract data of the included studies with regards to study characteristics (authors, study design, participants, predictor and outcome variables and the EA measures) and sample characteristics (mean age, gender, most prevalent traumatic event, and ethnic background). Two groups of studies were analysed, one assessing PTSD severity as the predictor, and one assessing it as the outcome. Authors of included studies were contacted by the main author where additional data were needed.

9.3.6 Quality assessment

The quality of the studies was assessed in respect to selection bias, attrition bias, confounding, and selective outcome reporting. The relevance of the research question, and the quality of measurement and the overall study, the magnitude of indirect effects, and the statistical power were also assessed. Three readily available checklists were adapted and modified to meet the requirements of the current review and fit the designs of the included studies. The development of the 15-item checklist was based upon the following tools: 1) National Institute of Health (NIH) Quality Assessment tool for observational cohort and cross-sectional studies (U.S. Department of Health and Human Services National Institute of Health, 2014), 2) the Agency for Healthcare Research and Quality (AHRQ) item bank for assessing risk of bias and confounding for observational studies of interventions or exposures (Viswanathan, Berkman, Dryden, & Hartling, 2013), and 3) the Scottish Intercollegiate Guidelines Network (SIGN) checklist for cohort studies (Scottish Intercollegiate Guidelines Network, 2012). Seven additional questions that captured key quality criteria of the included studies were developed (see Appendix 20 for the full checklist). Given that one of the included studies employed a longitudinal

design, the addition of two questions (i.e. q16-17) was considered important for assessing the attrition bias related to the follow-up loss.

The main reviewer and an external investigator assessed 50% of randomly chosen studies in duplicate, so as to calculate the inter-rated agreement. The external investigator was blinded (i.e. unaware of the authors and journal of each report), as this would provide a more accurate inter-rated agreement and limit the risk of introducing bias. The ratings of each researcher were entered in SPSS 20 for Mac and an inter-rated agreement analysis was performed. More specifically, the Cohen's kappa was computed for each of the five studies (see Table 9.1). Kappa values ranged between .61 and .86 (M = .75, SD = .09) indicating substantial agreement between the two investigators (Landis & Koch, 1977). High kappa values are indicative of a minimal amount of measurement error as introduced by the raters (Hallgren, 2012). Any discrepancies found between the principal investigators were resolved by discussion. In some isolated cases, the second reviewer was consulted.

Table 9.1 *Inter-rated agreement for the risk of bias assessment*

Studies	Cohen's *k*	*p* value
Gold et al. (2007)	.77	< .001
Kashdan et al. (2007)	.61	< .001
Farach et al. (2008)	.78	< .001
Palm and Follette (2010)	.86	< .001
Maack et al. (2012)	.75	< .001

A summary of the final risk of bias assessment can be found in Table 9.2. Studies were categorised as low, medium, and high risk of bias. Those at high risk of bias were not excluded from the qualitative synthesis, but their limitations were noted.

9.3.6.1 Statistical quality

The statistical quality of the studies was assessed in respect to the method used for mediation testing. Most researchers are familiar with the Baron and Kenny's steps of mediation (1986) along with Sobel's test (1982) and it is well accepted that it is among the most widely used methods for assessing mediation. However, advancement in statistics has highlighted potential limitations with this approach

(e.g. see Fritz & MacKinnon, 2007; Krause et al., 2010) and a burgeoning literature gave rise to more robust techniques such as that of bootstrapping (Preacher & Hayes, 2004; Preacher & Hayes, 2008) and SEM (e.g. path analysis, Multi-level mediation analysis; Hayes, 2009, 2013; Yuan & MacKinnon, 2009). In fact, SEM is now preferred over the Baron and Kenny method as it has been found to be superior to regression models while they also offer the possibility of testing multiple mediation models (Iacobucci, Saldanha, & Deng, 2007). Thus, studies using Baron and Kenny's steps along with Sobel's test were considered to possess lower statistical quality. The highest rating was given to studies employing more robust techniques such as bootstrapping and SEM.

Table 9.2 *Risk of bias assessment summary*

		Orcutt et al. (2005)	Gold et al. (2007)	Tull et al. (2007)	Farach et al. (2008)	Gold et al. (2009)	Kashdan et al. (2009)	Gold et al. (2011)	Palm& Follette (2011)	Vujanovic et al. (2011)	Maack et al. (2012)
	Relevant research question	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**
Selection bias	Appropriate inclusion/exclusion criteria	**Low**	**Low**	**Low**	**Low**	**Low**	**Med**	**Low**	**Low**	**Low**	**Low**
	Inclusion/exclusion criteria applied uniformly to all participants	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**
	Clearly defined and relevant study population	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**
	Bias due to sampling and recruitment strategy	**Med**	**Med**	**Med**	**Med**	**Med**	**Med**	**Med**	**?**	**Med**	**High**
	Sampling and recruitment strategy applied uniformly to all participants	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**
Attrition bias	High percentage of missing data	**?**	**?**	**?**	**?**	**?**	**Low**	**?**	**?**	**?**	**?**
	Appropriate methods used to handle missing data	**Low**	**?**	**?**	**?**	**?**	**Low**	**?**	**Low**	**?**	**?**
Measures and variables	The variables of interest were clearly defined	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**
	Valid and reliable measurements were used	**Low**	**Low**	**Low**	**Med**	**Low**	**Low/?**	**Low**	**Low/?**	**Low**	**Low**
	Measures were implemented consistently across all participants	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**
Confounding	Inclusion of confounding variables	**Med**	**Med**	**Low**	**Med**	**Med**	**Low**	**Med**	**?**	**Med**	**Low**
Outcome reporting	Outcomes missing from the results	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**
	Adequate methods were used to assess mediation	**Low**	**Med**	**Med**	**Low**	**Low**	**Med**	**Low**	**Med**	**Med**	**Med**
Attrition bias (loss of follow-up)	Concerning rates of follow-up loss	**N/A**	**N/A**	**N/A**	**Low**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
	Comparison between full participants and those lost in follow-up	**N/A**	**N/A**	**N/A**	**Low**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
	Results are believable	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**

Note. N/A = Not applicable; Med = Medium risk of bias; ? = Unclear risk of bias (i.e. not reported, cannot determine)

9.4 Results

9.4.1 Study and sample characteristics

A total of 10 studies assessing EA as a mediator were included in the qualitative synthesis. The majority of studies (n = 9) employed a cross-sectional design and only one collected longitudinal data (Farach, Mennin, Smith, & Mandelbaum, 2008). Only three studies assessed posttraumatic stress symptom severity as the predicting variable (Kashdan, Morina, & Priebe, 2009; Tull, Jakupcak, Paulson, & Gratz, 2007b; Vujanovic, Bonn-Miller, & Marlatt, 2011). The rest treated PTSD symptoms as the outcome variable (see Table 9.3 for a summary of study and sample characteristics).

The included studies provided data from a total of 1479 adult trauma survivors from the community, four of which included a college sample (Farach et al., 2008; Maack, Tull, & Gratz, 2012; Orcutt et al., 2005; Palm & Follette, 2011). Nine of the studies were conducted in the U.S.A, and one was conducted in Kosovo (Kashdan et al., 2009). Most participants were female (n = 1092, 73.8%), and the mean age of participants was 28.35 (Mdn = 26.41, SD = 7.17) (based on the data provided by nine studies). With regards to participants' ethnic background, only eight studies provided enough information. Of the 1113 participants included in these studies, the majority of them (n = 742, 67%) were Caucasian (see Table 9.3 for more details).

9.4.1.1 Experiential avoidance measures

The concept of EA was outlined only recently, therefore very few measures have been developed to measure it. Indeed, until recently, the only available scale was the AAQ developed by Hayes et al. (2004a) to measure EA. The AAQ was later revised by Bond et al. (2011) to assess EA and psychological inflexibility. The majority of studies (n = 9), therefore, used the AAQ instrument for assessing the mediation analysis. Despite the theoretical challenges of measuring EA, the AAQ was found to possess adequate psychometric qualities. In the original study, Hayes et al. (2004a) reported moderate internal consistency (α = .70) and test-retest reliability (r = .65), and adequate convergent validity. Of the included studies using the AAQ, only one (Gold, Marx, & Lexington, 2007) did not report the internal consistency of the scale

in their sample. However, for the remaining eight studies the Cronbach alpha coefficient ranged between .50 (Tull et al., 2007b) and .76 (Kashdan et al., 2009) with a mean alpha below acceptability thresholds (M = .65, SD = .09). In fact, only three studies reached or exceeded the minimum value of .70 (Gold, Dickstein, Marx, & Lexington, 2009; Gold, Feinstein, Skidmore, & Marx, 2011; Kashdan et al., 2009). Thus, while it was originally found to exhibit marginal but adequate internal consistency, the Cronbach alpha values were found to be low in the majority of the studies. The only study that did not use the AAQ, was that of Vujanovic et al. (2011). Although not an EA measure per se, lower scores on the Non-Judgmental Acceptance subscale of The Kentucky Inventory of Mindfulness Skills (Baer, Smith, & Allen, 2004) may indicate increased EA.

Orcutt et al. (2005) carried out a SEM path analysis wherein they had the opportunity to measure EA as a latent construct through three different measures. Apart from the AAQ, the authors used the Toronto Alexithymia Scale (Bagby, Parker, & Taylor, 1994), which measures the inability to identify and describe emotions. Additionally, they used a thought suppression measurement, the White Bear Thought Suppression Inventory (Wegner & Zanakos, 1994). The internal consistency of the combined scales was found to be excellent (α = .92).

Table 9.3 *Study and sample characteristics*

Studies	Design	Participants (N)	Gender (Female%)	Mean age (SD)	Most prevalent TE	Ethnic background	EA scale	Predictor	Outcome variable
Orcutt et al. (2005)	Cross-sectional	Undergraduate students (229)	71%	< 24 - 96%	Interpersonal events	White – 60% Black – 22% Latino/a – 5% Asian American – 8% Other – 4% No response – 1%	AAQ-9 TAS-20 WBSI	Traumatic interpersonal events	PTSD symptoms
Gold et al. (2007)	Cross-sectional	Gay men (74)	0%	34.71 (12.53)	Childhood and adult sexual abuse	Caucasian – 67.7% African-American – 10% Hispanic – 11.4% Asian – 5.4% Native American – 1.4% Other – 5.4%	AAQ-9	Internalized homophobia	Depression, PTSD
Tull et al. (2007)	Cross-sectional	Male students, faculty, and stuff (113)	0%	26.41 (5.00)	Interpersonal violence	White – 59% Black – 12% Latino – 5% Asian – 11% Native American – 2% Multi-racial – 3% Other – 8%	AAQ-9	PTSD	Aggressive behavior
Farach et al. (2008)	Longitudinal	University students (44)	86%	18.9 (0.8)	9/11 Attack	Caucasian – 63% Asian – 21% Latino – 7% African-American – 2% Mixed or other – 7%	AAQ-9	Pre-trauma Generalised Anxiety Disorder	Psychological functioning, PTSD

Gold et al. (2009)	Cross-sectional	Gay women (72)	100%	33.47 (11.78)	Childhood and adult sexual abuse	Caucasian – 67.1% African-American – 7.1% Hispanic – 4.3% Asian – 1.4% Native-American – 1.4% Mixed – 4.3% Other – 7.1%	AAQ-9	Internalized homophobia	PTSD
Kashdan et al. (2009)	Cross-sectional	Civilian war survivors (174)	70.11%	39.52 (11.17)	War related	Albanian - Not reported	AAQ-9	PTSD, MDD, SAD	Global distress, quality of life
Gold et al. (2011)	Cross-sectional	Gay women (122) and gay men (115)	51.48%	33.56 (12.47)	Childhood sexual abuse	Caucasian – 71% African-American – 9% Hispanic – 8% Asian – 3% Native-American – 1% Mixed – 2% Other – 6%	AAQ-9	Childhood physical abuse	PTSD, Depression
Palm & Follette (2011)	Cross-sectional	Undergraduate students (92)	100%	24.5 (7.99)	Interpersonal victimization	Not reported	AAQ-9	Cognitive flexibility	PTSD
Vujanovic et al. (2011)	Cross-sectional	Community-recruited sample (153)	51.63%	23.69 (9.68)	Experiencing or witnessing a serious accident, fire, or explosion	White/Non-Hispanic – 90.8% Hispanic – 1.3% Asian – 1.3% African American – 0.7% Other – 2.6% No response – 3.3%	KIMS Non-judgmental acceptance	PTSD	Alcohol use coping motives
Maack et al. (2012)	Cross-sectional	Undergraduate students (291)	75.3%	20.38 (2.66)	Motor vehicle accident	White – 60.5% African American –11.7% Asian – 8.9% Biracial – 6.9% Latino/a – 5.5% Asian Indian – 3.1% Native American – 0.3% Other – 3.1%	AAQ-9	Behavioural inhibition	PTSD

Note: EA = Experiential avoidance; AAQ-9 = 9-item Acceptance and Action Questionnaire; TAS-20 = Toronto Alexithymia Scale; WBSI = White Bear Thought Suppression Inventory; KIMS = Kentucky Inventory for Mindfulness Skills; PTSD = Posttraumatic Stress Disorder; MDD = Major Depressive Disorder; SAD = Social Anxiety Disorder

9.4.2 Study Quality

All studies were considered to be relevant to the key question of the review in respect to the study question and the population used. Appropriate inclusion/exclusion criteria were applied uniformly to all participants, across all studies. However, a common pattern arose in respect to missing data. Despite the significance of missing values in social science, the majority of the studies did not report the amount of missing data (n = 9) and whether appropriate methods were used to handle them (n = 7).

All studies were considered to have introduced, to some extend, bias due to the recruitment and sampling methods. Although the sampling method of each study was applied uniformly to all participants, the non-random data collection method employed by the majority of the studies resulted in low external validity, as results cannot be generalized to populations other than the ones included in each study.

In respect to mediation analysis, only four studies used either SEM or bootstrapping techniques (i.e. low bias). Although the study by Kashdan et al. (2009) used a bootstrapping technique, it received only a medium score, as the bootstrapping was not used for both mediation models under study.

With regards to the measurements used, even though they were all implemented consistently across participants, only five studies reported the internal consistency of all measures in their sample (Gold et al., 2011; Maack et al., 2012; Orcutt et al., 2005; Palm & Follette, 2011; Tull et al., 2007b). The remaining studies did not provide enough information. The majority of measures used in Kashdan et al. (2009) were found to be reliable, however, the reliability of the Albanian version of MINI was unclear.

Finally, the majority of studies (n = 9) included at least some confounding variables in their analyses. In the study by Gold et al. (2009) different trauma exposure groups reported different levels of internalized homophobia and PTSD symptom severity. However, the traumatic groups were not included as a confounder in the mediation

analyses. Bias due to confounding was unclear for one of the studies (Palm & Follette, 2011).

9.4.2.1 Statistical Quality

Although the majority of the studies were published after research had emerged on mediation analysis using SEM, only one study employed SEM to assess the mediation model (Orcutt et al., 2005). Four studies used a bootstrapping technique (Farach et al., 2008; Gold et al., 2009; Gold et al., 2011; Kashdan et al., 2009), two of which followed the Baron and Kenny's steps (Gold et al., 2009; Kashdan et al., 2009). The remaining studies employed Baron and Kenny's mediation steps along with different versions of Sobel's test (e.g. Goodman equation, Aroian test), which were considered of lower statistical quality with medium risk of bias.

9.4.2.2 Indirect effects and statistical power

Although all studies assessed the significance of the indirect relationship, notably, only one of them reported the size of the indirect effect (*ab*; Figure 9.3). More precisely, Farach et al. (2008) reported the magnitude of all indirect relationships in both standardized and unstandardized forms, along with their bootstrapping confidence interval values. According to Cohen's f^2, pretrauma Generalized Anxiety Disorder (GAD) was found to have a medium to large indirect effect on PTSD through EA (ab = .32). Five studies reported the direct effects between the relationships under study (*a*, *b*, and *c*), however, the remaining four did not provide enough information (Kashdan et al., 2009; Maack et al., 2012; Palm & Follette, 2011; Tull et al., 2007b). Kashdan et al. (2009) and Gold et al. (2011) reported the confidence intervals (CI) of the indirect effect but not its actual size. These results parallel other studies suggesting that mediation studies pay little attention on reporting the size of the indirect effect, despite the recommendation of Baron and Kenny (1986) to "examine not only the significance of the coefficients but also their absolute size" (p. 1177) (Preacher & Kelley, 2011).

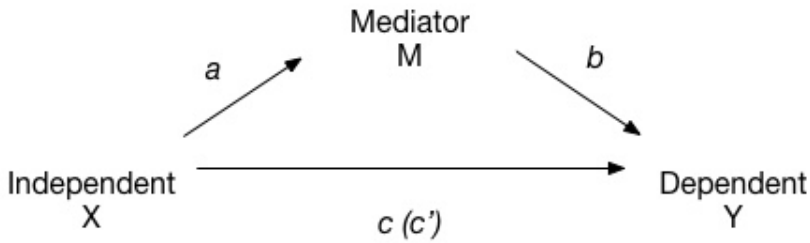

Figure 9.3 Simple mediation model; *c'* = the slope of Y regressed on X, controlling for M.

With regards to statistical power, none of the studies reported having conducted a power analysis prior to data collection. This merits consideration as small sample sizes may lead to more sampling error in estimates in path coefficients (Warner, 2013). Small sample sizes may also reduce power to detect real mediation effects (Little, 2013). It has been widely acknowledged that the causal steps, for instance, cannot be recommended except in large sample sizes (Preacher & Hayes, 2008). Notably, for Baron and Kenny (1986) mediation test, a sample size of 20,886 would be necessary to achieve .8 power in full mediation (Fritz & MacKinnon, 2007). Four of the included studies had fairly small sample sizes (Farach et al., 2008; Gold et al., 2009; Gold et al., 2007; Palm & Follette, 2011) ranging between 44 and 92. However, only two of those employed bootstrapping techniques (Farach et al., 2008; Gold et al., 2009) which can be applied to small sample sizes (Preacher & Hayes, 2004; Shrout & Bolger, 2002).

9.4.3 Traumatic exposure

Of the included studies, only three assessed the degree to which the traumatic event was consistent with both DSM-IV Criteria A1 and A2 for PTSD (i.e. the event involved actual or threatened death or serious injury, or a threat to the physical integrity of self or others that caused intense fear, helplessness, or horror) (Maack et al., 2012; Orcutt et al., 2005; Vujanovic et al., 2011). However, all 1479 participants reported exposure to at least one traumatic event.

Six studies included individuals having experienced traumatic interpersonal events. The most frequently reported events were sexual victimization and rape (Palm & Follette, 2011), being stalked (Orcutt et al., 2005), physical assault (Tull et al., 2007b), and childhood and adult physical and sexual abuse (Gold et al., 2009; Gold et al., 2011; Gold et al., 2007). One study assessed war-related traumatic events (Kashdan et al., 2009), while the study by Farach et al. (2008) collected data from individuals exposed to the terrorist attacks of 9/11. Finally, of the studies measuring general traumatic events, the most prevalent were motor vehicle accidents (Maack et al., 2012) and experiencing or witnessing a serious accident, fire, or explosion (Vujanovic et al., 2011).

9.4.4 PTSD severity

One study employed trained masters-level psychology students to assess PTSD severity in an interview format using the MINI international Neuropsychiatric Interview (Kashdan et al., 2009). The remaining nine studies used self-report questionnaires including the Distressing Events Questionnaire (DEQ) (Orcutt et al., 2005), the Posttraumatic Stress Diagnostic Scale (PDS) (Farach et al., 2008; Gold et al., 2009; Gold et al., 2011; Gold et al., 2007; Vujanovic et al., 2011), and the PTSD Checklist (PCL) (Maack et al., 2012; Palm & Follette, 2011; Tull et al., 2007b).

All studies but one (Farach et al., 2008) reported the PTSD symptom severity either by providing the mean PTSD value or the percentage of individuals meeting criteria for a probable diagnosis. Of the three studies using the PCL, two exceeded the threshold for community samples (> 35; Palm & Follette, 2011; Tull et al., 2007b), whereas in the study of Maack et al. (2012) 12.4% met criteria for probable PTSD diagnosis (using a cutoff value of 44). Based on the PDS mean scores, PTSD severity ranged from mild (Vujanovic et al., 2011) to moderate (Gold et al., 2009; Gold et al., 2011; Gold et al., 2007) in samples from the community. However, it is important to note that the three studies by Gold and his colleagues were part of the same study. On the basis of the DEQ scale, 39% of the female undergraduates and 20% of the male undergraduates met criteria for a PTSD diagnosis (Orcutt et al., 2005). Finally,

in a study with community war survivors 26.4% met diagnostic criteria for PTSD (Kashdan et al., 2009).

Only five studies instructed participants to complete the PTSD scales with respect to the event they identified as most traumatic (Farach et al., 2008; Maack et al., 2012; Orcutt et al., 2005; Palm & Follette, 2011; Vujanovic et al., 2011). For the remaining five studies, the degree to which the PTSD symptom severity was the result of the traumatic exposure is unclear.

9.4.5 Experiential avoidance as a predictor of psychopathology

Prior to assessing the mediating effect of EA, the included studies examined the degree to which EA was a significant predictor of PTSD symptomatology and other psychopathology. Consistent with existing literature, seven studies found EA to be a significant predictor of PTSD symptomatology, in such a way that individuals higher in EA also reported more PTSD symptoms (Farach et al., 2008; Gold et al., 2009; Gold et al., 2011; Gold et al., 2007; Maack et al., 2012; Palm & Follette, 2011). In the path analysis by Orcutt et al. (2005), the direct path from EA to PTSD was also found to be significant (β = .47). Of the seven aforementioned studies, four found EA to also predict depression symptomatology (Gold et al., 2009; Gold et al., 2011; Gold et al., 2007; Palm & Follette, 2011), while the study by Farach et al. (2008) indicated that EA can also predict social and work disability, loss of psychological resources (e.g. loss of hope and optimism), mood and anxiety symptoms, and worry, in the aftermath of the 9/11. In the remaining three studies, EA was found to significantly predict the expression of aggressive behaviours (Tull et al., 2007b), alcohol use coping motives (Vujanovic et al., 2011) and poor global distress and QoL (Kashdan et al., 2009).

9.4.6 Experiential avoidance as a mediator

Three studies treated PTSD data as the predicting variable (Kashdan et al., 2009; Tull et al., 2007b; Vujanovic et al., 2011). The outcomes assessed in those studies include aggressive behaviour, alcohol use coping motives, and global distress and QoL.

The second group of studies included those that treated PTSD symptomatology as the outcome (Farach et al., 2008; Gold et al., 2009; Gold et al., 2011; Gold et al., 2007; Maack et al., 2012; Orcutt et al., 2005; Palm & Follette, 2011). In these seven studies, internalized homophobia (n = 2), interpersonal traumatic events (n = 2), GAD (n = 1), cognitive flexibility (n = 1), and behavioural inhibition (n = 1) were used as the predictor.

9.4.6.1 PTSD symptoms as the predictor

In a sample of male participants reporting exposure to interpersonal violence such as physical assault and sexual assault, EA was found to mediate the impact PTSD symptomatology has on aggressive behaviour, beyond trait levels of anger (Tull et al., 2007b). However, results should be interpreted with caution due to the low internal consistency of the AAQ found in their sample (α = .50).

The study by Kashdan et al. (2009) included Albanian civilian war survivors seven years after the 1999 war in Kosovo with an average exposure of 12 war-related traumatic events. Following Baron and Kenny's steps, the authors found EA to partially mediate the relationship between PTSD symptomatology and QoL, which was further supported by the bootstrapping CI. However, that was not the case for global distress, as the effect of PTSD symptoms on global distress remained significant, even after the inclusion of EA. Although this is consistent with absence of mediation, it is important to note that it has been argued that a significant direct path does not necessarily imply absence of mediation (Krause et al., 2010). Also, given that the psychometric properties of the MINI Albanian version are unclear, results should be interpreted with caution.

Only one study examined the mediating effects of acceptance, which is often seen as opposite to EA. In a trauma-exposed community sample with moderate alcohol problems, non-judgmental acceptance was found to partially mediate PTSS and the use of alcohol as a coping mechanism (Vujanovic et al., 2011).

9.4.6.2 PTSD symptoms as the outcome

Although limited by the mediation technique (i.e. Sobel's test) and the marginal but lower internal consistency of the AAQ (α = .67), Palm and Follette (2011) found EA to be a significant mediator. In a sample of undergraduate women who endorsed some form of interpersonal event (e.g. rape, sexual molestation, physical assault), EA was found to fully mediate the relationship between cognitive flexibility, that is, being aware and willing to consider alternative thoughts and behaviours, and PTSD severity. In another study of undergraduate students, EA was found to partially mediate the effects of interpersonal events on PTSD symptoms, as evident by the satisfactory SEM model (Orcutt et al., 2005). Even though the authors constructed EA using three different measures with high factor loadings (λ = .79 for the AAQ), the internal consistency of the AAQ was found to be low (α = .56), which, as acknowledged by the authors, could have reduced the strength of findings. EA was also found to partially mediate childhood physical sexual abuse and PTSD symptoms among gay women with a history of childhood physical abuse, which was further supported by the bootstrapping CI (Gold et al., 2011). However, only 32 (13.5%) participants endorsed childhood physical abuse, perhaps leading in less power.

EA was found to partially and fully mediate the relation between internalized homophobia and PTSD symptom severity in sexually-assaulted gay men (Gold et al., 2007) and women (Gold et al., 2009), respectively. It was also found to mediate the relationship between behavioural inhibition system (BIS) sensitivity and probable PTSD status. It is suggested that trauma survivors with heightened BIS sensitivity may evaluate trauma-related stimuli as threatening, thereby engaging in EA behaviours, ultimately increasing the risk for the development and maintenance of PTSD symptomatology (Maack et al., 2012).

Finally, in the only longitudinal study, EA four months after the events of 9/11 was found to mediate the relationship between pre-trauma GAD and PTSS severity 12 months after the traumatic events, in a sample of undergraduate students who were exposed to the terrorist attacks. However, the lower internal consistency of the AAQ

(α = .67) in that sample should be taken into consideration when evaluating the results.

9.5 Discussion

Existing research assessing EA as a mediator in trauma survivors with PTSD symptomatology was described in a narrative synthesis. An examination of mostly cross-sectional studies with predominantly Caucasian community samples provide enough evidence to support the hypothesis that not only is EA a significant predictor of trauma-related psychopathology, it also appears to serve as a toxic underlying mechanism in trauma survivors experiencing PTSS. The samples of the included studies were found to exhibit mild to moderate PTSD severity with higher PTSD rates than existing epidemiological studies (e.g. Breslau et al., 1998). Thus, although the studies did not employ clinical samples the participants of each study were certainly not distress-free.

Evidence supports the partial or full mediating role of EA between PTSD symptoms and aggressive behavior (Tull et al., 2007b), QoL (Kashdan et al., 2009) and alcohol use coping motives (i.e. drinking as a way of coping) (Vujanovic et al., 2011), and between traumatic interpersonal events (Orcutt et al., 2005), childhood physical abuse (Gold et al., 2011), internalized homophobia (Gold et al., 2009; Gold et al., 2007), GAD (Farach et al., 2008), BIS (Maack et al., 2012), cognitive flexibility (Palm & Follette, 2011) and PTSD symptomatology.

Despite the variability among studies, it is suggested that the unwillingness to experience certain private events, and the attempts to alter their form or frequency, is related to greater PTSD severity. The way trauma survivors respond to traumatic events may be a potential pathway to the development and maintenance of PTSS. Thus, it is possible that it is not the exposure to traumatic events per se that leads to the development of PTSD, but the time and effort devoted to avoiding unpleasant experiences. In turn, EA may be a mechanism by which PTSD severity leads to the development of other maladaptive behaviours and poor QoL in the aftermath of trauma. Therefore, as previously proposed, the current synthesis suggests that some

trauma survivors try to eliminate painful experiences and events associated to their traumatic experience by engaging in experiential avoidant behaviours. These deliberate attempts to avoid or alter such events get in the way of movement toward valued goals, personal growth, and other positive experiences (Kashdan et al., 2006). Long-term use of EA may prevent trauma survivors from coping with natural everyday negative emotions, thereby interfering with their recovery (Kashdan et al., 2009).

9.6 Clinical implications

In practice, such findings may be particularly useful, as the dysfunctional and painful symptoms following trauma could be alleviated by targeting the responsible underlying mechanism. Therapies targeting EA and psychological inflexibility, such as ACT (e.g. Orsillo & Batten, 2005; Walser & Westrup, 2007) and Mindfulness-Based Cognitive Therapy (MBCT) may be promising for trauma survivors struggling with PTSS. Although a major focus of ACT is to increase patients' ability to make and keep commitments to behaviour change (e.g. acting towards valued goals) (Orsillo & Batten, 2005), recent findings also support its successful application in PTSD symptom reduction (e.g. Codd, Twohig, Crosby, & Enno, 2011). A trauma survivor that was treatment nonresponsive to a form of cognitive behaviour therapy, reported clinically significant decreases in PTSD severity, depression, and anxiety, after receiving a 21-week trial of ACT (Twohig, 2009). Similarly, a 2-hour ACT workshop with OIF/OEF veterans resulted in significant declines in symptoms of depression, anxiety, and PTSD, and increases in relationship satisfaction (Blevins, Roca, & Spencer, 2011). Similar results were observed in patients receiving MBCT treatment for chronic PTSD (e.g. King et al., 2013).

Mindfulness-based therapies and ACT entail openness to experience and the practice of observing thoughts and feelings as an ongoing flow of events that do not need to be judged or acted upon (Walser & Westrup, 2007), whereas other therapies focus on the modification of harmful private experiences. Thus, such therapies may be useful in treating trauma survivors that may refuse other forms of therapy (Orsillo & Batten, 2005). In addition, given the emphasis in the present moment contact with trauma-

related emotions, memories, and associated physiological reactivity, ACT and Mindfulness-based therapies may be helpful to trauma survivors experiencing psychological symptoms in the initial weeks following the traumatic event (Thompson et al., 2011). Although further research is needed for assessing the long-term efficacy of ACT and MBCT in trauma, preliminary evidence supports their successful application in individuals struggling with psychological problems related to their traumatic experience. Hence, given the suggested importance of EA in the development and maintenance of PTSS and other maladaptive behaviours, reducing EA while promoting acceptance and willingness should possibly be considered a major goal in treating trauma survivors.

9.7 Limitations

9.7.1 Design and sampling

Despite the promising preliminary findings of this synthesis, results should be interpreted in light of several limitations. Perhaps, one of the most important methodological limitations of the included studies concerns the sampling method. The majority of the studies (n = 9) collected data from convenience samples in a non-random manner, resulting in low external validity. Non-random sampling methods prevent the results from being generalized, which means that the extent to which EA is a significant mediator to other populations remains unclear. Therefore, results should be interpreted with caution and in respect to the sample of each study. The only study that employed a random technique was that of Kashdan et al. (2009), however, the results could not be extended to populations other than Albanian civilian war survivors.

A second limitation concerns the cross-sectional nature of most studies (n = 9). Mediation is often seen as a causal sequence of effects (i.e. predictor causes mediator, mediator causes outcome). However, given the use of cross-sectional data, it would not be possible to determine the direction of any causal relationships that may exist in the examined model, especially given the potential conceptual overlap between PTSD avoidance symptoms and EA. In fact, it is possible that in studies where PTSD severity acted as the outcome, EA followed rather than preceded the

PTSD symptoms. Although conceptually different from EA, a study by Naifeh, Tull, and Gratz (2012) found support for this hypothesis, as both PTSD severity and emotional avoidance were found to be significant mediators. In light of such ambiguity, only two studies examined a reversed meditation model in which non-judgmental acceptance (Vujanovic et al., 2011) and EA (Maack et al., 2012) acted as the outcome variable. Based on the guidelines proposed by Baron and Kenny (1986) and Kenny, Kashy, and Bolger (1998), results did not support the reversed mediation model, providing further evidence for the mediating role of EA and non-judgmental acceptance.

Therefore, given that cross-sectional designs prohibit the determination of the nature and directionality of relationships examined in each study, results should be translated into possible links between relationships and not causal effects. In fact, the authors of the only longitudinal study suggest interpreting their findings as hypothesis generators rather than as confirmation of the theoretical model, as each construct was assessed at a unique time (Farach et al., 2008).

9.7.2 Measurement

Interestingly, the majority of the studies using the AAQ-9 measure found a low internal consistency (Farach et al., 2008; Maack et al., 2012; Orcutt et al., 2005; Palm & Follette, 2011; Tull et al., 2007b). Therefore, the results of these studies should be interpreted with caution. With the development of the AAQ-II, Bond et al. (2011) addressed the limitations related to the low internal consistency, however recent evidence has raised doubts regarding its validity. In fact, preliminary evidence supports that the AAQ-II may be a general distress measure rather than a measure of EA/psychological inflexibility (see Gámez et al., 2011; Wolgast, 2014). Thus, clearly, further research is needed to address such limitations and encourage the development of psychometrically sound measurements of EA. Until that time, other EA and mindfulness measures such as the Multidimensional Experiential Avoidance Questionnaire (Gámez et al., 2011), the Mindful Awareness and Acceptance Scale (Brown & Ryan, 2003), the Kentucky Inventory of Mindfulness Skills (Baer et al., 2004), and the Five Facet Mindfulness Questionnaire (Baer, Smith, Hopkins,

Krietemeyer, & Toney, 2006), could be used, as they have been applied in the area of trauma and PTSD with promising results (e.g. see Call, Pitcock, & Pyne, 2015; Dvorak, Arens, Kuvaas, Williams, & Kilwein, 2013; Owens, Walter, Chard, & Davis, 2012; Thompson & Waltz, 2010).

9.7.3 Mediation testing

As previously mentioned, the majority of the studies (n = 7) followed the fours steps for establishing mediation. Of those seven, four used the initial guidelines proposed by Baron and Kenny (1986) (Kashdan et al., 2009; Maack et al., 2012; Palm & Follette, 2011; Tull et al., 2007b). One study (Vujanovic et al., 2011) followed the updated paper by Kenny et al. (1998), while the remaining two studies employed both papers (Gold et al., 2009; Gold et al., 2007). Although the major focus in both papers is on the four steps for mediation testing, it is important to highlight their dissimilarities, as the results of the included studies were interpreted in different ways. In short, Baron and Kenny (1986) reported that during the last step "…a previously significant relation between the independent and dependent variables is no longer significant, with the strongest demonstration of mediation occurring when Path c is zero…When Path c is reduced to zero, we have strong evidence for a single, dominant mediator. If the residual Path c is not zero, this indicates the operation of multiple mediating factors" (p. 1176). In all four studies using these guidelines, the effect of the predictor on the dependent variable was reduced to non-significant after controlling for EA. Hence, based on the above rationale, such results provide support for EA as a mediator. However, none of those four studies found a zero coefficient for Path c, which would of course imply partial mediation. Only Kashdan et al. (2009) correctly identified the mediating effect as being partial, as two of the studies claimed that it fully mediated the effect (Maack et al., 2012; Palm & Follette, 2011). However, in reality, EA was found to only partially mediate the relation between the predictor and the outcome.

On the other hand, the updated paper by Kenny et al. (1998) supports that the effect of the predictor on the outcome controlling for the mediator should be zero for complete mediation. If not, then partial mediation is indicated. Contrary to the paper

by Baron and Kenny (1986), the authors did not make any reference on significance levels, which means that the mediation is stated in terms of zero or non-zero coefficients, and not significant/non-significant effects. Of the studies using the guidelines by Kenny et al. (1998), only that of Vujanovic et al. (2011) followed the aforementioned guidelines. Regardless of the significance level, the authors concluded of a partial mediation, as the direct effect was diminished but was still different from zero (β = .11). In the contrary, the studies using the guidelines of both papers, considered a non-significant direct effect to indicate full mediation (Gold et al., 2009) despite the coefficient being different from zero (β = .10) and a significant direct effect to be consistent with partial mediation (Gold et al., 2007). Therefore, in the current review, the degree to which EA acted as a partial or full mediator was dependent upon the guidelines used and the interpretation made by the authors.

9.7.4 Indirect effects and statistical power

The conclusions of each study are limited by the lack of the indirect effect sizes, which limits the interpretation of the results and their significance to theory and practice. On the other hand, none of the studies detailed any information as to whether a power analysis was conducted. Therefore, the degree to which the sample size was appropriate to detect the expected mediating effects is unclear. Lower power in some of the studies might have influenced the results while also increasing the possibility for a Type II error. Therefore, results should be interpreted in light of these limitations.

9.7.5 Review limitations

Finally, a number of limitations related to the current review need to be borne in mind when evaluating the findings. First, the age restriction (above 18) prevents from generalizing the findings to children or adolescents. The inclusion of articles was limited to published manuscripts and despite the thorough searches in multiple electronic databases, it is still possible that some studies were overlooked. Also, due to the variability of the included studies, the current review precluded a quantitative analysis (meta-analysis). Finally, given the unclear conceptual overlap between EA

and other forms of avoidant coping, the current review excluded studies assessing any other forms of avoidance.

9.8 Directions for future research

The development of the third wave cognitive behavioural therapies has enabled researchers and clinicians to examine the impact concepts such as mindfulness, psychological (in)flexibility, and EA/acceptance have on health and psychopathology. The aim of this review and other related research is to inform researchers whether EA can be conceptualized as an underlying factor of trauma-related psychological problems, thereby advancing this area of research. Drawing from the current review, for such an aim to be achieved, there are several recommendations to be made, which will hopefully provide guidance for improved future research:

1. The degree to which EA overlaps with the avoidance cluster of PTSD symptoms or other forms of avoidance (e.g. Ehlers & Clark, 2000) remains unclear. Thus, future researchers should consider addressing this by employing longitudinal designs. Longitudinal studies are critical in determining the direction of the relationships and the causality effects that may exist among the variables of interest. Future research should also consider experimentally manipulating EA to examine its effects on posttraumatic stress. Of course, such designs are worth pursuing if there is enough statistical evidence for mediation (Shrout & Bolger, 2002). The combination of experimental designs with mediation analysis may posit a promising methodology as it combines the interpretability of randomised manipulations with estimation of mediation (MacKinnon, Fairchild, & Fritz, 2007).

2. The review indicates that the majority of studies have followed the guidelines for mediation proposed by Baron and Kenny (1986) and Kenny et al. (1998). However, given their limitations, future research would benefit from the use of more robust methods for mediation testing, including SEM. For example, Kashdan et al. (2009) found no support for mediation between PTSD severity and global distress, due to the statistical significant effect of PTSD on global distress, after the inclusion of the

mediator (Baron & Kenny, 1986). Considering however that the mediation should be measured by the size of the indirect effect and not by the lack of the direct effect (Krause et al., 2010; Zhao, Lynch Jr, & Chen, 2010), EA could in fact be considered as a partial mediator in that relationship. Employing SEM would also permit the testing of more complex models with multiple mediators. For example, future researchers should consider examining the interaction between EA and other forms of avoidant coping, the degree to which these overlap, and how together they can explain important relationships in the trauma literature.

3. The importance of the effect size has been widely acknowledged (Preacher & Kelley, 2011; Thompson, 2007). Researchers are urged to consider not only whether their study's effects were significant, but also how large they were and whether they were relevant to theory and practice (Preacher & Kelley, 2011). Future mediation studies should, therefore, consider reporting all direct and indirect effect sizes (e.g. in a figure; see Figure 9.3) in multiple forms (e.g. standardized, unstandardized), as this would provide a more comprehensive image of the relationships under study.

4. Given the importance of statistical power in mediation models, future studies should consider pre-specifying a sample size that would satisfy statistical power. For most mediation studies minimum sample sizes of 150-200 would be advisable (Warner, 2013). Fritz and MacKinnon (2007) have recommended the necessary sample sizes required for .8 power for six of the most common mediation tests. However, researchers should use the recommended sample sizes as a lower limit of the number needed for .8 power, not as a guarantee of .8 power (Fritz & MacKinnon, 2007).

5. Given the possible clinical implications of the current review, future studies should assess the clinical change in individuals struggling with PTSS and poor functioning after following a trial targeting EA (e.g. ACT programme). For example, in a study with veterans suffering from PTSD, Bormann, Oman, Walter, and Johnson (2014) found that mindful attention mediated treatment effects on reduced PTSD and depression symptoms while improving psychological well-being. Similarly, future

researchers should consider assessing the mediating role of EA/acceptance within therapy.

6. Although not included in the current review, evidence supports the mediating effect of EA in other age groups such as adolescents (e.g. Shenk, Putnam, Rausch, Peugh, & Noll, 2014). Thus, the possible mediating role of EA should be extended in other populations including clinical samples and older adults.

7. Future studies should not solely use the AAQ measurement, but extend the findings of the current review by using other measurements of EA/acceptance. As with the study by Orcutt et al. (2005), mediation testing through SEM path models would enable the measurement of EA using multiple measures.

8. Finally, future studies should present all the necessary information in respect to effect sizes, power analysis, missing values, study design, participant characteristics, and reliability of measurements used, which will enable the replication of results and their accurate interpretation.

9.9 Conclusion

Despite the variability in the included studies and the need for further research to elucidate the role of underlying mechanisms in trauma, there is enough evidence to suggest the probable mediating role of EA in community trauma-exposed young adults struggling with PTSD symptoms. The current review suggests that the development and maintenance of PTSD symptoms and maladaptive behaviours can be explained through the use of EA. Such findings can be considered as a first step in understanding the toxic diathesis and underlying effects of EA in the aftermath of trauma. They also encourage the conduct of further research and the application of treatments designed to promote flexible behaviours and acceptance.

Chapter 10

Study II Rationale, aims and hypotheses

The detrimental effects of PTSD symptomatology on QoL and functioning have been well documented. As detailed in Chapter 7, individuals with PTSD were found to struggle with substantial QoL impairment across several domains of QoL (Olatunji et al., 2007; Rapaport et al., 2005). This concurs with the latest PTSD diagnostic criteria, which connote that the disorder is generally characterised by severe impairment in functioning (Criterion G; American Psychiatric Association, 2013). Although successful efforts have been made into identifying risk factors that may account for the development and exacerbation or maintenance of PTSS, little is understood about the mechanisms by which PTSD severity impacts trauma survivors' QoL.

As reviewed in previous chapters, recent evidence supports the possibility that PTSD symptoms lead to diminished QoL indirectly, through chronic efforts to avoid and suppress emotions, thoughts, behaviours, and bodily sensations associated with the traumatic event. Indeed, in an effort to escape and avoid painful emotions, thoughts, and experiences trauma survivors engage in maladaptive EA and ER strategies, which intervene with the movement toward goals and impact individuals' overall functioning and QoL. Although ER strategies vary, some are more maladaptive than others. For instance, suppression of emotional expression is widely considered a dysfunctional strategy that facilitates attempts to suppress or dampen emotional experience and expression. Although both EA and suppression foster the avoidance and escape of unwanted experiences, the degree to which they are overlapping or two distinct concepts has been somewhat controversial.

Overall, Study II sought to explore the association between ER and EA, and the degree to which they mediate the relationship between posttraumatic stress and QoL in adult trauma survivors. The aims of the current study were carried out through three stages (see Figure 10.1). Stage I explored a measurement model, which investigates the degree to which ER and EA are distinct or overlapping concepts. The subsequent stages investigated the mediating effects of ER and EA and their intercorrelations in the relationship between PTSS and QoL. More precisely, Stage II sought to explore a parallel mediation model in which both ER and EA act as underlying mediating mechanisms to explain the impact PTSS have on QoL. Stage III attempted to extend the model of Stage II by exploring the relationship between ER and EA and more precisely the degree to which one is a variant of the other in the association between PTSS and QoL. This was achieved by employing serial mediation models.

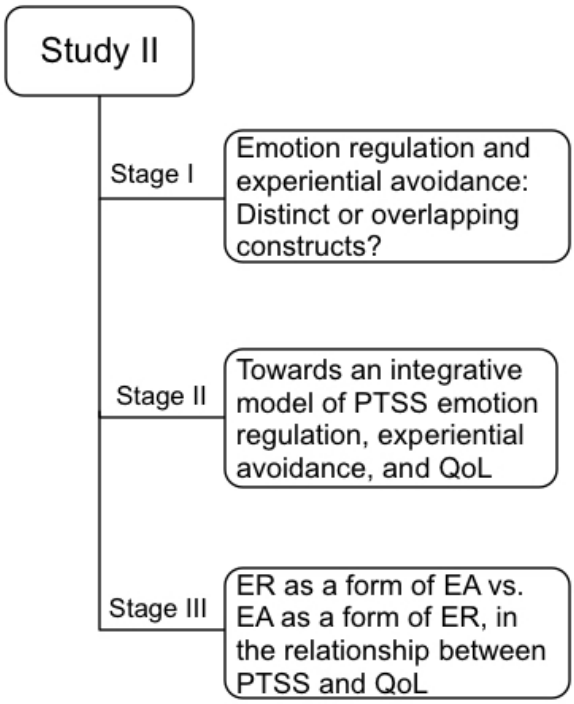

Figure 10.1 The three stages of Study's II aims. ER= Emotion regulation; EA = Experiential avoidance; QoL = Quality of life; PTSS = Posttraumatic stress symptoms.

10.1 Stage I: Experiential avoidance and emotion regulation: Overlapping or distinct constructs?

The evidence for the overlapping association between ER and EA can be placed in their common focus on values and goals, as their maladaptive effects are emphasized in their ability to constrain commitment toward valued goals (Hayes et al., 2006; Kashdan et al., 2006; Koole, 2009). Similarly, ER is believed to overlap with mindfulness (e.g. present moment awareness, non-judgmental acceptance) in its emphasis on observing, without necessarily acting on emotions, as well as participating in present moment activities even when distressed (i.e., engaging in goal-directed behavior) (Gratz & Tull, 2010a). This concurs with empirical evidence indicating the significant association between difficulties in ER and aspects of mindfulness (Roemer et al., 2009). Mindfulness and Acceptance-related therapies were, in fact, found to improve ER and functioning (Chambers, Gullone, & Allen, 2009; Gratz & Gunderson, 2006; Tull, Schulzinger, Schmidt, Zvolensky, & Lejuez, 2007c), providing further evidence for their efficacy in promoting adaptive forms of ER (Gratz & Tull, 2010a).

10.1.1 Stage I Aims

Prior to the measurement model, the intercorrelations of ER and EA were examined. Drawing from existing studies, suppression, reappraisal, and EA were expected to have moderate intercorrelations, however, stronger correlations were expected between EA and expressive suppression (Kashdan et al., 2006; Wolgast, Lundh, & Viborg, 2013).

Aim1: EA was hypothesized to have a negative and moderate correlation with cognitive reappraisal, and a stronger, but still moderate, positive association with expressive suppression.

The degree to which EA overlaps with the concept of cognitive reappraisal and expressive suppression was explored through EFA. Although this aim was mainly

exploratory, given the conceptual similarities between EA and suppression, a certain degree of overlap was expected between some of the items included in the AAQ-II (EA) and ERQ-Suppression subscale, especially between items concerning emotions (e.g. AAQ-II item 3: "I worry about not being able to control my worries and feelings").

Aim2: EFA was employed to explore the degree to which the AAQ-II, ERQ-Suppression, and ERQ-Reappraisal would form three distinct factors, or their items would present substantial overlap.

10.2 Stage II: Towards an integrative model of quality of life, experiential avoidance, emotion regulation, and posttraumatic stress

Evidence from Chapter 8 and the systematic review supports the toxic underlying effects of emotion dysregulation and EA following trauma. More precisely, EA and ER were found to explain the association between PTSD severity and negative psychological outcomes such as depression, poor social adjustment (Klemanski et al., 2012), alcohol use (Vujanovic et al., 2011), and impulsive behaviours (Tull et al., 2007a; Weiss et al., 2013). However, the degree to which these two mechanisms mediate the detrimental impact PTSD has on trauma survivors' QoL is unclear. The only study, to the authors' knowledge, that has explored this pathway is that of Kashdan et al. (2009) in which PTSD was found to be an indirect predictor of poor QoL in Albanian civilian war survivors, through the use of EA. However, information on the role of ER in this etiological pathway is limited.

In the area of QoL studies, it has been demonstrated that the habitual use of maladaptive forms of ER and EA is associated with low levels of QoL. Although limited research has been devoted to the impact of ER on trauma survivors' QoL, what evidence there is supports this association (Huijts, Kleijn, van Emmerik, Noordhof, & Smith, 2012). In other areas, both suppression and reappraisal were found to relate to QoL (e.g. Meule et al., 2013). Frequent use of reappraisal was

found to be associated with better QoL in multiple sclerosis patients (Phillips et al., 2009) and women undergoing breast cancer treatment (Li et al., 2015). Conversely, and in line with the theories of ER, suppression was found to be negatively associated with QoL (Ciuluvica, Amerio, & Fulcheri, 2014).

Similarly, research looking at the toxic effects of EA on QoL suggests that acceptance is associated with better QoL (Butler & Ciarrochi, 2007; Ferreira, Eugenicos, Morris, & Gillanders, 2013; Li et al., 2015) and EA with poor QoL (Karekla & Panayiotou, 2011). Unlike ER, the impact of EA on QoL within trauma has received more attention. More precisely, evidence suggests that individuals employing EA in the aftermath of trauma are more likely to display overall impaired functioning (Plumb et al., 2004). EA was found to be associated with lower levels of QoL (Morina, 2007) and to partially mediate somatic distress and QoL in civilian war survivors (Morina, Ford, Risch, Morina, & Stangier, 2010).

These findings suggest that EA and ER may be important factors in improving QoL in the aftermath of trauma. Research efforts of this nature have indicated that trauma survivors may benefit from interventions targeting avoidance-related behaviours, such as Mindfulness and Acceptance-based treatments. A study with veterans found enhanced mindfulness skills (e.g. non-judgmental acceptance) to mediate a mindfulness based stress reduction treatment and improved PTSD and QoL (Kearney, McDermott, Malte, Martinez, & Simpson, 2012). In fact, a major focus of ACT is on the improvement of QoL (Orsillo & Batten, 2005). Patients are encouraged to acknowledge their valued life directions and the ways in which avoidance and escape have prevented them from living the life they desire, and to commit to these goals (Orsillo & Batten, 2005). In another study, a woman with chronic PTSD who received 21 sessions of ACT managed to successfully shift her focus from attempting to manage her fear and anxiety, to focusing on improving her QoL (Twohig, 2009). Therefore, within ACT, improved QoL as an outcome is often emphasized over symptom reduction (Orsillo & Batten, 2005).

10.2.1 Stage II Aims

Drawing from previous findings, it is, therefore, possible that symptoms of PTSD lead to maladaptive strategies such as that of expressive suppression and EA, which in turn lead to impaired QoL. The enormous time and effort spent in suppression and EA appear to consume cognitive processes that would otherwise be useful for other meaningful tasks (Gross et al., 2006; Muraven & Baumeister, 2000), thereby diminishing individuals' contact with present experiences (Kashdan et al., 2006). Additionally, in an effort to avoid or suppress negative emotions, trauma survivors also avoid positive emotions (Hayes & Lillis, 2012; Roemer et al., 2001). Trauma survivors employing these strategies are, therefore, less likely to pursue valued goals (Hayes et al., 2006; Koole, 2009), they stop engaging in previously valued activities (e.g. exercising) (Kashdan et al., 2006), and they become socially withdrawn (Hayes et al., 1996) at the cost of favourable functioning and QoL.

Given the limited empirical evidence in this area of research, there is not a study to the authors' knowledge that has simultaneously assessed the mediating effects of ER and EA in the relationship between PTSD and QoL in one, parallel mediation model. In addition, many of the studies in the area of QoL have used health indices to assess QoL, which as mentioned in previous chapters, do not fully assess the comprehensive concept of QoL. Therefore, as seen in Figure 10.2, with the use of a reliable and valid measure of QoL (i.e. WHOQOL-BREF-R), the general aim of Study II was to examine a parallel mediation model in which ER strategies (i.e. reappraisal and suppression) and EA both mediate the association between PTSS and QoL in trauma survivors from the community.

Aim3: Prior to path analysis, the current study aimed at investigating the relationships between the variables of interest and the predicting effects of posttraumatic stress, suppression, reappraisal, and EA on QoL. It was hypothesized that:

a) QoL will be negatively associated with measures of PTSD symptoms, suppression, and EA, and positively associated with reappraisal.

b) PTSD symptoms, suppression, reappraisal, and EA will significantly predict the outcome variable of QoL. More precisely, higher levels of PTSD, suppression, and EA, and lower levels of reappraisal were expected to predict lower levels of QoL.

Aim4:

a) With the use of SEM, observed variable path analysis will be employed to explore the degree to which PTSD symptoms impact QoL indirectly through the simultaneous use of EA and ER. The direct effect of PTSD on QoL was expected to decrease with the addition of the mediating mechanisms.

b) The mediating effects of the three mediators were examined to determine which of the three has the strongest effect.

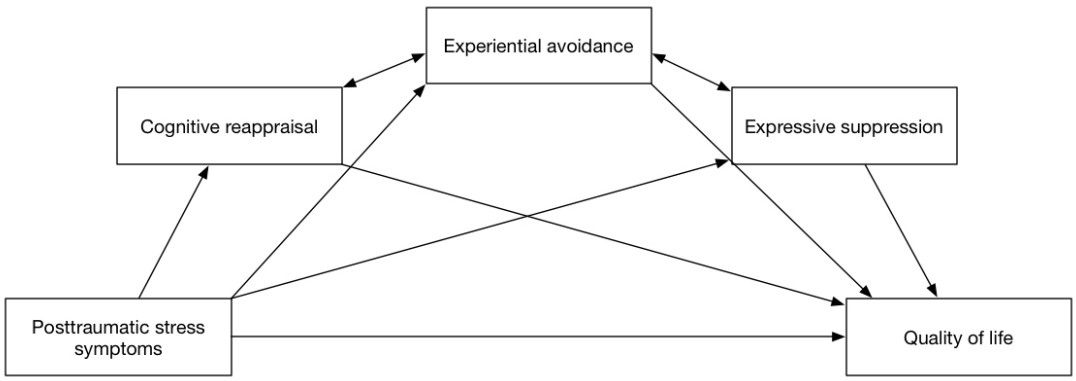

Figure 10.2. Parallel mediation model of posttraumatic stress symptoms and quality of life.

10.3 Stage III: Emotion regulation as a form of experiential avoidance, and vice versa

Despite the potential overlap between ER and EA, there is still no consensus as to whether EA should be conceptualized within ER, or vice versa. Given that these research efforts have remained mostly theoretical, this topic of research remains largely understudied. Generally, views as to whether ER and EA are forms of one another are divided into two opposing categories. Some have posited that EA can be thought of as a type of ER (Hayes & Feldman, 2004). More precisely Wolgast, Lundh, and Viborg (2011) suggest that acceptance is in part an antecedent-focused ER strategy. In their study, cognitive reappraisal and acceptance were compared in relation to aversive emotion states elicited by film clips. Given that they did not find many significant differences between participants in the two conditions, they concluded that acceptance and reappraisal both intervene early in the emotion generative process. Others, suggest that EA is a response-focused ER strategy (Hofmann & Asmundson, 2008).

On the other hand, some authors posit that ER is a component of EA (Kashdan et al., 2006). It has been suggested that it is not the failure of ER that produces behavioural harm per se, rather the failed attempts to avoid emotions (Blackledge & Hayes, 2001). Indeed, individuals high in EA were found to be less efficient in regulating emotional responses during a biological challenge (Feldner et al., 2003). Boulanger, Hayes, and Pistorello (2010) argue that it would be superficial to assume that EA is viewed as an ER strategy. In fact, they support that EA can be conceptualized to involve all five processes of ER specified by Gross (1998b). Yet, recent findings did not support this hypothesis (Wolgast et al., 2013). Instead, in the context of this study, EA was found to be closely related only to emotion-generative processes that are primarily response focused (i.e. suppression). Therefore, Stage III seeks to provide a better understanding of this relationship by exploring the degree to which ER can be conceptualized as an EA strategy, or vice versa, and especially within the association between PTSS and QoL. Whilst some hypotheses were made, the aims of

the third stage were largely exploratory.

10.3.1 Stage III Aims

Stage III sought to extend the model of Stage II by exploring the degree to which ER and EA mediate the relationship between PTSS and QoL, through one another (i.e. through their serial effects). Prior to the serial mediation models, two competing mediation models were explored so as to further examine the relationship between ER and EA. Consistent with previous theories (Boulanger et al., 2010; Kashdan et al., 2006; Wolgast et al., 2013) the first model examined the degree to which ER mediates the relationship between EA and QoL. Conversely, the second model assessed the degree to which EA mediates the relationship between ER strategies and QoL. This would imply that the degree to which suppression and reappraisal are adaptive or maladaptive depends on the extent to which they represent efforts to control and avoid private experiences (Wolgast et al., 2013).

Aim5: With the use of SEM two competing mediation models were explored:

a) ER mediates the relationship between EA and QoL
b) EA mediates the relationship between ER and QoL

Pursuing this line of research further, and given that the path model of Stage II (Aim4) was empirically supported, two competing serial models were explored. As seen in Figure 10.3 and 10.4 the current stage sought to extend the potential pathways of Aim4 into two competing serial models:

Aim6:

a) The first serial model (Figure 10.3) aimed to examine whether the mediating effects of EA in the relationship between PTSS and QoL can be explained through the use of ER strategies, such as that:

PTSS→EA→ER strategies→QoL

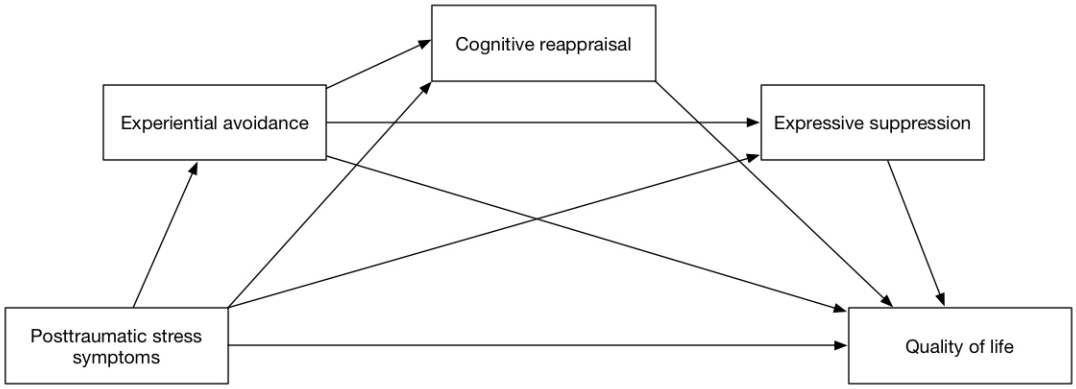

Figure 10.3. Serial mediation model of posttraumatic stress symptoms and quality of life: The effects of EA through ER strategies.

b) Conversely, the second serial model (Figure 10.4) aimed to examine whether the mediating effects of ER in the relationship between PTSS and QoL can be explained through the use of EA behaviours, such as that:

PTSS→ER strategies→EA→QoL

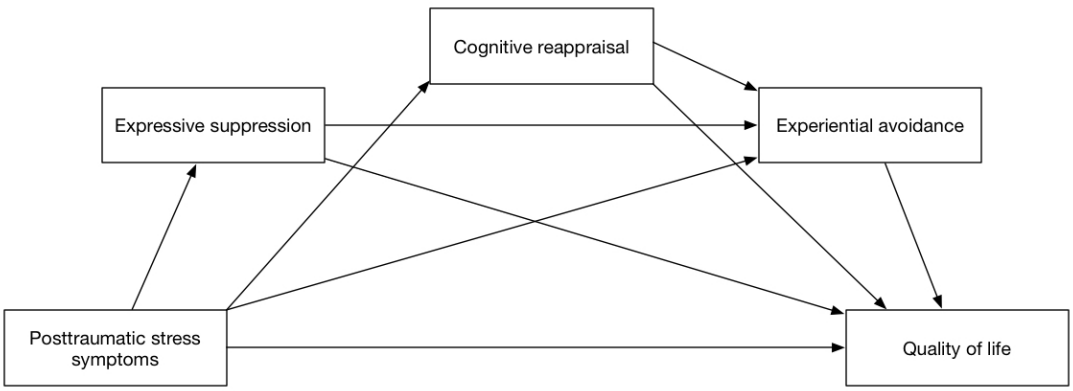

Figure 10.4 Serial mediation model of posttraumatic stress symptoms and quality of life: The effects of ER through EA behaviours.

Chapter 11

Study II Methodology

11.1 Introduction

As previously discussed, Study II sought to investigate a path analysis in which maladaptive mechanisms such as EA and ER mediate the relationship between PTSS and QoL, and the degree to which these mechanisms overlap with one another. In the current chapter, the methodological details of Study II, including the approach of the design, measurements used, sampling methods, participant characteristics, procedure, ethical concerns, and data analysis, will be described in detail.

11.2 Design

For Study II, a cross-sectional correlational design was used. This type of design can be applied when the observations are made at the same point in time and aim to evaluate how well conceptual models derived from previous research or theory fit the data (Barker et al., 2005). Therefore, such a design was deemed appropriate for assessing the correlations between the variables of interest and further investigating the mediation model.

11.3 Participants

11.3.1 Inclusion criteria

A number of inclusion criteria were set before and after the data collection. Eligibility criteria required individuals to be 1) at least 18 years of age, and 2) fluent in English. The final sample used for the analyses included only those who had experienced at least one traumatic event in their lifetime. To this end, the Life Events Checklist (LEC; Gray, Litz, Hsu, & Lombardo, 2004) was used in order to identify those eligible for Study II. That is, participants who indicated the response

"happened to me" to at least one of the 17 traumatic events listed in the LEC (Appendix 23).

11.3.2 Recruitment

The aims of Study II were investigated within a community sample, and thus the recruitment took place at the University of Edinburgh. The data collection occurred through an online web survey, which was conducted using the Bristol Online Survey (BOS). A web survey offers a quick and inexpensive way for data collection. Additionally, online surveys permit the secure storage of data, thereby maintaining confidentiality.

The secretaries of 15 randomly selected schools/departments of the University of Edinburgh were contacted to obtain permission to circulate an e-mail to students, containing the link to the online survey. Upon contact the secretaries were reassured that the study had obtained ethical approval while they were also informed about the aims, risks, and benefits of the study. The secretaries of 9 schools/departments (60%) responded positively and circulated an e-mail to the students containing information about the study and how to participate using the link to the online survey. Following the snowball sampling method, in which each respondent is asked to name other people who fit the research criteria (Barker et al., 2005), participants were asked to pass the link to the online survey on to their acquaintances.

11.4 Measures

The instruments used to address the aims of Study II included the pilot WHOQOL-BREF-R, the PCL-C, the LEC, the HADS-Anxiety, the AAQ-II, and the ERQ. All instruments were presented to each participant in a randomly varying order so as to decrease any response biases.

11.4.1 Demographics

In the first page of the online survey, participants were asked to answer some questions with respect to their gender, age, education, marital status, employment status, nationality, racial/ethnic background, and native language. Participants

responding positively to the question concerning health status ("Are you currently ill?") were asked to provide further information about their health (see Appendix 21).

11.4.2 PTSD Checklist – Civilian Version

The PCL is a 17-item scale initially developed by the National Centre for PTSD to assess PTSD symptomatology (see Weathers, Litz, Hermann, Huska, & Keane, 1993) (Appendix 22). Its items reflect the 17 PTSD symptoms described in DSM-IV (American Psychiatric Association, 2000), out of which 5 assess symptoms of re-experiencing (criterion B), 7 measure avoidance/numbing (criterion C), and 5 assess hyperarousal (criterion D). Participants are asked to indicate the degree to which they have been bothered by each symptom during the past month (e.g. by "repeated, disturbing dreams of a stressful experience from the past"), using a 5 Likert-type scale where 1 = "not at all" and 5 = "extremely" (Weathers et al., 1993). The PCL Civilian Version (PCL-C) is one of the three PCL versions available and can be applied to any population, as the symptom endorsements are not attributed to a specific traumatic event (McDonald & Calhoun, 2010). A new version of the PCL-C scale has been recently published in accordance to the DSM-5 (American Psychiatric Association, 2013) diagnostic criteria, however, the publication of DSM-5 and the latest version of PCL occurred after the data collection.

Total scores on PCL-C range from 17 to 85 and a cutoff score of 50 indicates a probable PTSD diagnosis (Weathers et al., 1993). Alternatively, the symptom cluster method can be used, in which individuals receive a PTSD diagnosis if they have been bothered by at least one re-experiencing symptom, three or more avoidance/numbing symptoms, and two or more hyperarousal symptoms over the past month (National Centre for PTSD, 2012). Still, there seems to be a lack of agreement on what would be the most appropriate cutoff score for the PCL-C. As opposed to the suggestions of Weathers et al. (1993), a number of studies have shown that a cutoff score lower than 50 might provide better sensitivity and specificity. For instance, in a study with individuals involved in automobile accidents or sexual assaults, Blanchard, Jones-Alexander, Buckley, and Forneris (1996) found that a cutoff score of 44 would enable them to correctly identify 17 out of 18

participants with PTSD. Yet in other studies a cutoff point near 30 was found to provide better results (Andrykowski, Cordova, Studts, & Miller, 1998; Lang, Laffaye, Satz, Dresselhaus, & Stein, 2003; Walker, Newman, Dobie, Ciechanowski, & Katon, 2002). It might be possible that lower cutoff values are more suitable for use with civilian populations as well as for populations known to have a greater elapsed time since their traumatic exposure (Walker et al., 2002). Nonetheless, the cutoff score of an assessment should always be chosen based on the user's purpose (McDonald & Calhoun, 2010). Since it is considered suitable for use within community samples, the PCL-C was employed in this study to assess posttraumatic symptomatology in participants previously exposed to traumatic events.

The psychometric qualities of the PCL-C have been extensively examined across a variety of populations (Andrykowski et al., 1998; Blanchard et al., 1996; Demirchyan et al., 2014; Elhai, Gray, Docherty, Kashdan, & Kose, 2007; Keen, 2008; Lang et al., 2003; Ruggiero, Del Ben, Scotti, & Rabalais, 2003; Schinka, Brown, Borenstein, & Mortimer, 2007). Despite being less sensitive to treatment gains (Forbes, Creamer, & Biddle, 2001), the PCL-C was found to have good accuracy with an AUC value above 0.86 (Keen, 2008; Lang et al., 2003). Evidence supports its good convergent validity (e.g. Keen, 2008; Ruggiero et al., 2003) and excellent internal consistency for the overall scale and its three domains (e.g. Blanchard et al., 1996). The reliability of the scale was also assessed through test-retest coefficients which were found to be high ($r > .80$) although they were found to be lower ($r = .68$) for the 2-week retest intervals (Ruggiero et al., 2003). CFA results were contradictory, as in some cases the model fit was found to be unacceptable (Schinka et al., 2007). Other studies showed a good model fit for the 3-factor model as proposed by DSM-IV but a better fit for a 5-factor model with five first-order intercorrelated factors of reexperiencing, avoidance, emotional numbing, dysphoric arousal and anxious arousal (Demirchyan et al., 2014; Elhai et al., 2007).

It is important to note that the PCL-C was found to be reliable in studies with similar objectives and populations to those of the current study (Maack et al., 2012; Palm & Follette, 2011; Tull et al., 2007b).

11.4.3 Life Events Checklist

The LEC was developed concurrently with the Clinician Administered PTSD Scale (CAPS; Blake et al., 1995) at the National Center for PTSD for use in both clinical and non-clinical samples. The LEC is designed to assess exposure to Potentially Traumatic Events (PTEs) by measuring participants' experience in different types of traumatic events (see Appendix 23). More precisely, the scale consists of 17 items, out of which 16 assess specific traumatic events (e.g. natural disasters, sexual assault, combat exposure, etc.) known to result in posttraumatic difficulties, while item 17 is used for capturing any other stressful experience that is not listed. For each one of the events, respondents are asked to indicate whether a) it has happened to them, b) they witnessed it, c) learned about it happening to someone close, d) they are not sure, and e) it does not apply. A score of 1 is assigned to direct exposure («happened to me») while 0 is assigned to any of the other responses endorsed. The total number of PTE occurring in one's lifetime is calculated by summing up all 17 items. As previously mentioned, the LEC was used as a screening instrument for the purposes of Study II. Despite the great number of available measures assessing traumatic exposure, the LEC was considered more appropriate for the purposes of the current study, as it covers a wide range of different events, it is relatively short and easy to use, and it is one of the few that assess general traumatic exposure.

Gray et al. (2004) found that LEC can provide information about PTEs that are otherwise overlooked, as it assesses multiple types of exposure to each PTE. For example, witnessing an event, which may be overlooked by other measures can be quite traumatic to some individuals. Still, it is worth noting that only the direct exposure ("happened to me") is scored. Additionally, even though it was originally developed concurrently with the Clinician-Administered PTSD Scale for DSM-IV (CAPS), it fails to take account the Criterion A of the DSM-IV PTSD diagnosis where the individual is considered to have been exposed to a traumatic event if that person the person experienced, witnessed, or was confronted with it. Nevertheless, the LEC can be a useful tool when comparisons between the different types of exposure are of interest (Gray et al., 2004). It has been used in numerous studies focusing on different types of traumatic events (e.g. Ghafoori et al., 2009; Kelley,

Weathers, McDevitt-Murphy, Eakin, & Flood, 2009) and on different populations (Meyer et al., 2012; Tosone, McTighe, Bauwens, & Naturale, 2011), including community (White et al., 2014) and clinical samples (Gratz & Tull, 2010b). Moreover, the LEC was found to work well with different age groups (e.g. Escueta, Whetten, Ostermann, O'Donnell, & The Positive Outcomes for Orphans (POFO) Research Team, 2014; Hudson, Beckford, Jackson, & Philpot, 2008). Despite its wide use in the area of traumatic exposure (Elhai, Gray, Kashdan, & Franklin, 2005) there are only few studies to the authors' knowledge that have examined its psychometric properties. In the original validation study (Gray et al., 2004) of college undergraduates and combat veterans, the LEC was found to demonstrate stability as a screening PTE tool and was shown to have acceptable test-retest reliability and convergent validity. Results were consistent with the Korean version that showed acceptable internal consistency, and good test-retest reliability and convergent validity (Bae, Kim, Koh, Kim, & Park, 2008).

Despite its adequate psychometric properties, Gray et al. (2004) suggest that the LEC should be used only as a screening measure as it can not offer any information as to whether the traumatic events were life threating or whether they were accompanied by extreme fear, helplessness or horror, as described in criteria A1 and A2 of DSM-IV (American Psychiatric Association, 2000). Therefore, one would have to obtain more information as to whether the events meet the DSM-IV criteria for traumatic stressors (Ford, 2009). However, that was not required for the purposes of the current study, as the LEC was only used as a screening measurement.

Following the guidelines of Gray et al. (2004) a score of 1 was attributed to events with direct exposure ("happened to me") and a score of 0 was assigned to the remaining four responses. Participants having experienced at least one traumatic event (total score greater than or equal to 1) were selected for the analyses of Study II. The total PTEs experienced by the individuals of the current study ranged from 1 to 10 (those having experienced 10 out of the 17 listed in LEC) with a mean PTE of 2.61.

11.4.4 Acceptance and Action Questionnaire-II

The first version of the AAQ (Hayes et al., 2004a) was developed within the ACT framework to capture characteristics related to the theory: Cognitive entanglement, excessively negative evaluations of private experiences, negative self-references, inability to take needed action in the face of private events, and a high need for emotional and cognitive control. Despite its popularity in the area of ACT and EA, the AAQ has received some limitations. Findings regarding the factorial structure of the scale have been inconsistent (Bond & Bunce, 2003) while its internal consistency and test-retest reliability have been unsatisfactory (Hayes et al., 2004a). On that account, Bond et al. (2011) developed a revised version of the scale, the AAQ-II, which as they argue addresses these limitations.

Whilst the AAQ measures were initially designed to assess EA, the latest 7-item AAQ-II is considered to measure both EA and psychological inflexibility, which is the core process of change in ACT (see Appendix 24). Items are rated on a 7-point Likert type scale from 1 ("never true") to 7 ("always true") and reflect one's unwillingness to experience unwanted emotions and thoughts (e.g. "I am afraid of my feelings"), the inability to be in the present moment (e.g. "I worry about not being able to control my worries and feelings") and commitment towards flexible actions when experiencing psychological events that could undermine them ("My painful experiences and memories make it difficult for me to live a life that I would value"; Bond et al., 2011). Scores on the AAQ-II range from 7 to 49 with higher scores indicating greater psychological inflexibility or EA (Bond et al., 2011).

The AAQ-II has demonstrated better psychometric properties than the AAQ, as results from three studies support the scale's concurrent validity and reliability with a mean Cronbach alpha value of .84, and a 3 and 12-month test–retest reliability of .81 and .79, respectively (Bond et al., 2011). The AAQ-II was found to be highly correlated with the original AAQ (r = .97) and although it consists of only seven items it was proven to be more psychometrically sound and more stable across different groups. Indeed, there is accumulating evidence that the AAQ-II is a valid and reliable scale of EA/psychological inflexibility across different populations

(Fledderus, Oude Voshaar, Ten Klooster, & Bohlmeijer, 2012; Meyer, Morissette, Kimbrel, Kruse, & Gulliver, 2013) and cultures (Pennato, Berrocal, Bernini, & Rivas, 2013; Pinto-Gouveia, Gregório, Dinis, & Xavier, 2012; Ruiz, Langer Herrera, Luciano, Cangas, & Beltran, 2013).

Nevertheless, some suggest that the AAQ and AAQ-II do not appear to measure EA as initially defined by Hayes et al. (1996). That is, instead of measuring avoidance of unwanted internal experiences, the AAQ-II may only measure secondary reactions to unwanted thoughts and emotions (Meyer et al., 2013). Similarly, as Schmalz and Murrell (2010) argue, the AAQ instruments seem to be focused on specific pathological domains and do not measure EA in a more global way.

The AAQ-II was used in Study II to measure EA in individuals exposed to traumatic events and was used as a mediator in the path analysis. As was the case with the current study, the AAQ-II has been used in the greater literature as a measure of EA. However, as described in Chapter 8, evidence has started to accumulate questioning what the AAQ-II is really measuring. More precisely, the AAQ-II was found to correlate more strongly with neuroticism, poor QoL (Gámez et al., 2011) and general distress (Wolgast, 2014), rather than EA. In fact, Wolgast (2014) found that all AAQ-II items loaded onto the same factor as items designed to measure distress. Given the above findings, the degree to which the AAQ-II captures EA and/or psychological inflexibility, is unclear.

11.4.5 Emotion Regulation Questionnaire

The Emotion Regulation Questionnaire (ERQ; Gross & John, 2003) is a 10-item self-report scale designed to capture the habitual use of two different ER strategies: cognitive reappraisal (e.g. “I control my emotions by changing the way I think about the situation I’m in”) and expressive suppression (e.g. “I control my emotions by not expressing them”) (see Appendix 25). Using a 7-item Likert type scale ranging from 1 = “strongly disagree” to 7 = “strongly agree”, the respondents are asked to indicate how they manage their emotions in different situations. Both subscales include at least one item concerning the regulation of a negative emotion and one item

assessing the regulation of a positive emotion. Total scores on the reappraisal subscale range from 6 to 42 and from 4 to 28 for the suppression subscale with higher scores indicating more frequent use of each strategy. The ERQ was used as one of the mediators in the path analyses explored in Study II.

The initial results in regard to the psychometric properties of the scale support its valid and reliable use (see Gross & John, 2003). The ERQ was characterized by acceptable internal consistency with Cronbach alpha values of .79 and .73 for the Reappraisal and Suppression subscale, respectively. Test-retest reliability was found to be .69 for both subscales, while scale intercorrelations and CFA results supported the bidimensional structure of the scale.

Such results are largely supported by in the literature, indicating the promising psychometric qualities of the ERQ. Collectively, the ERQ appears to be a valid and reliable scale across different cultures (Balzarotti, John, & Gross, 2010; Butler, Lee, & Gross, 2007; Matsumoto, Yoo, Nakagawa, & members of the Multinational Study of Cultural Display, 2008), in psychiatric and healthy individuals (Abler, Erk, Herwig, & Walter, 2007), as well as in adults and adolescents (John & Gross, 2004). Results suggest adequate internal consistency with alpha values exceeding the .7 threshold on both subscales, and with high item-total correlations and test-retest values of .4-.7 for both subscales (Balzarotti et al., 2010; Betts, Gullone, & Allen, 2009; Enebrink, Björnsdotter, & Ghaderi, 2013; Matsumoto et al., 2008). Further studies support the two-factor structure of the scale with very small (close to zero) correlations between the two subscales (Balzarotti et al., 2010; John & Gross, 2004; Matsumoto et al., 2008; Richards & Gross, 2000; Uphill, Lane, & Jones, 2012). However, a small but significant correlation between the two subscales was observed in some studies, which may suggest that some populations do not use either of the two strategies in isolation (Enebrink et al., 2013; Uphill et al., 2012).

11.5 Procedure

Individuals were able to take part in Study II by following the link to the online survey. Upon accessing the webpage, participants were presented with an

information sheet that contained the instructions, purpose, risks and benefits of the study, confidentiality issues, and contact information (see Appendix 26). Subsequently, participants agreed to the study by answering "Yes" or "No" to the question "I agree to take part in the above study" (see Appendix 27). Those agreeing to take part were asked to complete a battery of psychometrically sound self-report questionnaires including the ones described in studies I and II. The online survey took approximately 20-25 minutes to complete and for their participation participants were entered into a draw to win one £100 and two £50 Amazon vouchers. Those interested in taking part to the draw were instructed to follow a different link where they could provide their personal details. The draw was conducted after the end of the data collection, at which point the three winners received the electronic Amazon voucher via e-mail, and the personal data of all the participants were deleted. The data collection for Study II occurred within a timeframe of 8 months: May 2013 – January 2014.

11.6 Data analysis

11.6.1 Sample Characteristics

Prior to addressing the aims of Study II, descriptive statistics were undertaken so as to explore the sample demographics in terms of trauma exposure, PTSD prevalence, gender, age, health status, martial status, education, employment, and racial background.

11.6.2 Correlation and regression analyses

Pearson correlations were performed in order to explore the associations between QoL, ER, EA, and posttraumatic stress symptomatology. Also, multiple regression analysis was carried out to measure the contribution of the three independent variables (ER, EA, and posttraumatic stress symptomatology) on QoL as measured by the final version of the WHOQOL-BREF-R.

11.6.3 Structural Equation Modeling

All path analyses were assessed through SEM, which is a collection of statistical procedures that allows a set of relationships between multiple independent variables

and multiple depended variables, to be examined (Tabachnick & Fidell, 2013). A "path analysis" is part of SEM and concerns the "summary of theoretically suggested relationships among latent variables and indicator variables, and directional (regression) and nondirectional (i.e., correlational) relationships among latent variables" (Bowen & Guo, 2011, p. 5). SEM was chosen over hierarchical regression analysis because it has the capacity to simultaneously assess multiple equations and include multiple mediators and latent variables (Hoyle & Smith, 1994). In fact, it offers the possibility to investigate complex serial models like the ones tested in the current study (e.g. PTSS→EA→ER→QoL). In addition, given that the current study aimed at comparing the fit of competing models, SEM was considered a more suitable approach. Notably, compared to regression analysis, SEM controls for measurement error thereby avoiding any error complications (e.g. overestimation in the effect of the independent variable on the dependent variable), while all relevant paths are directly tested and none are omitted (Baron & Kenny, 1986). For the final aim of Study II and the degree to which EA and ER are overlapping or distinct constructs was explored through EFA. The mediation models and EFA were carried out using MPlus 7 for Mac (Muthén & Muthén, 1998-2012) whereas for all other analyses SPSS 20 for Mac was used.

11.7 Ethical Considerations

Following the BPS Code of Ethics and Conduct (The British Psychological Society, 2009) and the BPS Code of Human Research Ethics (The British Psychological Society, 2010), the present study identified and addressed any foreseeable ethical risks prior to data collection.

Confidentiality issues as well as the risks and discomforts of the study were made clear to the participants in the first page of the survey (see Appendix 26). Some of the questions included in the survey could have caused distress, in which case participants were advised to contact the researchers who would offer advice on how to seek help. Due to the anonymous nature of the study, personalized feedback could not be provided to the participants. Still, seeing that some of the measures included in the survey involved symptomatology related to psychopathology, participants

were advised to contact a mental health professional in the unlikely case that their participation aroused any concerns.

Participants were reassured that their participation would remain anonymous, their IP address would not be identified, and that their responses would be kept confidential in a secure location. Participants who chose to provide their personal details (e.g. e-mail address) for participating in the draw were assured that such details would not be connected to the rest of their responses and they would be deleted following the conduct of the draw. Finally, participants were reminded that they could withdraw from the study at any time. The contact details of the two researchers (Prof. Mick Power and Margarita Panayiotou) were available to the participants for any concerns or questions arising from their participation.

11.7.1 Ethical approval

Following the School of Health in Social Science and College of Humanities and Social Science ethical frameworks, ethical review was undertaken based on 3 levels. Level 1 applies to studies with no ethical concerns while Level 2/3 involves studies with particular ethical concerns. The current study was deemed as a Level 2/3 and was approved by the Section of Clinical Psychology Ethics Research Panel of the University of Edinburgh prior to the beginning of data collection (see Appendix 28).

11.7.2 Instruments permission

All instruments chosen for the current study could be used without explicit permission, except for the PCL-C. An online request with the proposed use of the scale was sent to the National Centre of PTSD, U.S. Department of Veteran Affairs (http://www.ptsd.va.gov) and after approval, a copy of the scale was sent to the researchers.

Chapter 12

Study II Results

12.1 Data analysis

Prior to the investigation of the three stages detailed in Chapter 10, the current study conducted preliminary data screening to ensure accuracy of data input. The sample characteristics, trauma and PTSD prevalence were explored through descriptive statistics. Additionally, internal consistency analysis and descriptive statistics were performed so as to examine the psychometric properties of the measures.

SEM methods were used for the analyses of the three stages. More precisely, the overlapping association between ER and EA as well as the post-hoc analyses mentioned in Stage I were conducted using EFA with WLSMV estimation. As mentioned in previous chapters WLSMV is a useful and a less time consuming method for large models involving categorical outcomes (Muthén & Muthén, 1998-2010). Justifications for the use of subsequent statistical analyses and methods are reported where necessary.

Stages II and III employed mediation models using primarily bias-corrected bootstrap ML estimation. Where inconsistent results occurred, the choice of different methods was made based on the greater literature and on recommendations by the authors of the MPlus (https://www.statmodel.com). Each analysis is justified in the appropriate section.

General analyses

12.2 Missing values

The quality of the data was assessed prior to data analysis. Preliminary data screening was performed in order to investigate the patterns of missing values and the accuracy of data input. Results indicated that all items had been correctly entered for all variables. Due to the nature of the second study (online survey) participants did not have the option to omit any of the questions, thus the analyses were performed on a full dataset with no missing values. One of the participants indicated a value of 0 for the variable "age", which was considered as missing.

12.3 Sample characteristics

Of the 475 participants that completed the online survey, 360 (75.79%) met inclusion criteria for exposure to traumatic events. The demographic characteristics of the 360 participants are summarized in Table 12.1. The age of participants ranged between 17 and 76 with a mean age of 25.95 (*SD* = 9.32). Age distribution was positively skewed with most values concentrating under the age of 40, which was not surprising as the majority of the participants were students (76.1%). A smaller percentage (21.9%) reported being employed while only 7 (1.9%) of them were either unemployed or retired.

Out of the 360 participants, 256 were female (71.1%) and 104 were male (28.9%) with a women-to-men ratio of 2.46:1. The great majority stated being healthy (*n* = 329, 91.4%) at the time of the data collection and only a small percentage (8.6%) reported being ill. Of those responding to the question "if something is wrong with your health what do you think it is?" 9 (2.5% of the total population) reported mental health problems such as depression.

Table 12.1 *Demographic sample characteristics N (%)*

Age	Range	17 - 76
	Mean (SD)	25.97 (9.32)
Gender	Male	104 (28.9)
	Female	256 (71.1)
Group	Ill	31 (8.6)
	Healthy	329 (91.4)
Marital Status	Single	266 (73.9)
	Married	40 (11.1)
	Living as married	48 (13.3)
	Separated	1 (.3)
	Divorced	3 (.8)
	Widowed	2 (.6)
Education	None	-
	Primary/elementary school	-
	Secondary/High school	64 (17.8)
	Tertiary/University	296 (82.2)
Employment	Full-time employed	41 (11.4)
	Part-time employed	34 (9.4)
	Self-employed	4 (1.1)
	Unemployed	4 (1.1)
	Retired	3 (.8)
	Student	274 (76.1)
Racial	Asian	22 (6.1)
	Caucasian	321 (89.2)
	North African	1 (.3)
	Latino/Latina	1 (.3)
	Multiracial	13 (3.6)
	Refuse to say	1 (.3)
	Other	1 (.3)

With regards to marital status, the majority of the participants were single (n = 266, 73.9%) and only a few (n = 6, 1.7%) reported being separated, divorced or widowed. All participants reported attending either high school (17.8%) or university (82.2%). Finally, regarding racial background and nationality, most were Caucasian (n = 321, 89.2%) from the United Kingdom (n = 206, 57.2%).

12.4 Trauma history

All participants reported having experienced at least one traumatic event with the majority of them having been exposed to multiple (M = 2.61, SD = 1.67). Most participants reported having experienced 1 (n = 101, 28.1%) to 2 (n = 112, 31.1%)

events as described in the LEC scale. Of those reporting multiple traumatic events, 65 (18.1%) were exposed to 3, and 39 (10.8%) to 4. The remaining 43 participants (11.94%) recorded 5 to 10 traumatic events, with only one reporting exposure to 10.

All 17 events described in LEC occurred to at least some of the participants among which the most prevalent were transportation accident (35.3%), physical assault (33.6%), other unwanted or uncomfortable sexual experience (31.1%), sudden, unexpected death of someone close (37.5%) and any other very stressful event or experience (42.2%). As for the least reported, they were combat or exposure to a war-zone (1.1%), causing serious injury, harm, or death to someone else (1.1%), and captivity (.8%).

12.5 Prevalence of disorders

Even though the sample was recruited from the general population, the prevalence of psychiatric disorders as measured by the PCL-C and HADS-Anxiety were examined. Following the initial recommendations by Weathers et al. (1993) a cutoff point of 44 on the PCL-C was used to indicate individuals with probable presence of PTSD diagnosis. Out of the 360 participants, 307 (85.3%) were identified as "healthy" with a cutoff value below 44 while the rest 53 (14.7%) met criteria for probable PTSD diagnosis (cutoff ≥ 44). However, despite the initial recommendations, a cutoff value near 30 was found to provide better results in general populations (e.g. Walker et al., 2002). Thus, based on that criterion, 52.2% of the participants (n = 188) were considered as being "healthy" (cutoff value < 30) and the rest 47.8% (n = 172) met screening criteria for a possible PTSD diagnosis (cutoff ≥ 30).

Following the cutoff criterion value proposed by Snaith (2003) for the HADS Anxiety subscale, participants were categorized into 3 groups. The majority were identified as being "healthy" with a cut-off point below 8 on the HADS Anxiety subscale (n = 164, 45.6%). Among those reporting symptoms of anxiety, 91 (25.3%) had a score between 8 and 10, indicative of probable presence of the disorder, while the remaining 105 (29.2%) met criteria for anxiety disorder (scores ≥ 11).

12.6 Psychometric properties of measures

Prior to data analysis, descriptive statistics and internal consistency analysis were carried out so as to examine the psychometric properties of all measures used in Study II.

12.6.1 Descriptive statistics

A first step was to investigate the quality of the data for all measurements, which indicated that responses were distributed across the full range of each Likert scale. The minimum and maximum score, mean, median, standard deviation, skewness and kurtosis of all measures are summarized in Table 12.2. As mentioned in previous chapters, large samples have the effect of increasing statistical power in statistics such as skewness and kurtosis by reducing the sampling error (Hair Jr. et al., 2010). Thus, the *z*-values and their level of significance of those statistics were not used for the inspection of normality. Instead, interpretations were made based on the absolute values of skewness and kurtosis and their visual representations.

Table 12.2 *Descriptive statistics and reliability analysis of measurements*

Measures	Min	Max	Median	Mean	*SD*	Skewness	Kurtosis	Cronbach's α
AAQ-II	7	49	20	20.72	9.07	.49	-.34	.92
ERQ - Cognitive Reappraisal	6	42	28	27.41	6.61	-.47	.47	.82
ERQ - Expressive Suppression	4	28	14	13.90	5.26	.15	-.55	.78
HADS Anxiety	0	21	8	8.56	4.29	.55	-.04	.84
PCL-C	17	84	29	31.74	12.37	1.36	2.02	.92
WHOQOL-BREF-R	23.10	100	71.14	71.05	12.66	-.55	.55	.87
WHOQOL - Physical	18.75	100	70	65.52	16.90	-.68	.44	.78
WHOQOL - Psychosocial	3.57	100	71.43	68.16	16.18	-.71	.68	.81
WHOQOL - Environment	25	100	71.43	72.72	13.41	-.25	-.10	.75

Note. AAQ-II = Acceptance and Action Questionnaire-II; ERQ = Emotion Regulation Questionnaire; HADS = Hospital Anxiety and Depression Scale; PCL-C = PTSD Checklist-Civilian Version; WHOQOL = World Health Organization Quality of Life scale.

The skewness values of all measurements were below 1 and all kurtosis values were below 3 (Bowen & Guo, 2011; Hair Jr. et al., 2010) except for PCL-C that appeared to be positively skewed with an absolute value greater than 1. This, however, should come as no surprise as the majority of the participants were identified as being healthy (n = 329, 91.4%). The histograms and P-P plots of each measurement can be found in Appendix 29. The visual representations could be considered as suggesting a normal distribution for the WHOQOL-BREF-R, REQ-Reappraisal and REQ-Suppression, but not for the PCL-C that was shown to have a clear deviation from normality. On the other hand, the HADS Anxiety and AAQ-II appear to exhibit slight deviations from normality. Thus, given the significant non-normal distribution of the PCL-C, the use of usual parametric analyses was deemed inappropriate.

Although data transformations were considered for dealing with non-normality, these methods have received much criticism for their treatment of non-normality. Several limitations have been reported including the fact that results based on transformed data become difficult to interpret, such techniques can reduce power, while they are also not able to restore normality and homoscedasticity or deal with outliers (Erceg-Hurn & Mirosevich, 2008; Grissom, 2000; Leech & Onwuegbuzie, 2002, November).

Rather than using transformations, researchers sometimes choose to use non-parametric tests which, however, are only suitable for analyzing simple designs (Erceg-Hurn & Mirosevich, 2008). Others, on the other hand, have proposed using so called 'robust procedures' for dealing with non-normal data (Erceg-Hurn & Mirosevich, 2008; Field, 2013; Yuan, Chan, & Bentler, 2000). For example, the Robust Maximum Likelihood (MLR) estimator offered by MPlus (Muthén & Muthén, 1998-2012) is a ML estimation with robust chi-square and standard errors. It produces the same parameters as with ML but it is assumed to be robust against moderate violations of assumptions (Hox, Maas, & Brinkhuis, 2010). In fact, MLR was found to perform well with non-normal data in large samples (> 100) (Maas & Hox, 2004). Given the aforementioned limitations and the

violation of normality assumptions of the current study, the use of robust estimators was considered a more suitable approach and was applied in subsequent analyses.

12.6.2 Reliability

The reliability of all measures was examined through internal consistency analysis, results of which can be found in Table 12.2. All measures had good to excellent total Cronbach alpha coefficients above the acceptable threshold of .70. It is worth noting that all items of all measures exhibited strong item-total correlation values and none fell below .30.

12.7 Stage I: Distinct or overlapping constructs?

Current evidence supports that the concepts of ER and EA are significantly related possibly measuring the same phenomenon. Given, however, that these considerations have been primarily conceptual, the degree to which they are distinct or overlapping constructs is yet to be examined. Correlation analysis using MLR and EFA using WLSMV were undertaken to explore such an investigation. It was expected that some of the items from the AAQ-II would cross load on the suppression factor, as suppression has been considered by some, a component process of EA (Kashdan et al., 2006).

12.7.1 Correlations

The correlations between all variables of interest are summarised in Table 12.3. Consistent with existing literature (Kashdan et al., 2006; Pepping, O'Donovan, Zimmer-Gembeck, & Hanisch, 2014; Roemer et al., 2009; Wolgast et al., 2013), and with the current hypotheses, the AAQ-II had significant moderate negative correlations with the ERQ-cognitive reappraisal (r = -.31, p < .001) and positive correlations with ERQ-expressive suppression (r = .33, p < .001) subscales. Notably, the AAQ-II correlated more highly with the PCL-C, HADS-Anxiety and WHOQOL-BREF-R. In accordance

with previous studies (e.g. Balzarotti et al., 2010; Gross & John, 2003) the two ERQ subscales were uncorrelated and thus were treated as two distinct variables in subsequent analyses.

Table 12.3 *Correlations between the variables of interest*

Variables	1	2	3	4	5
1. WHOQOL-BREF-R	-				
2. ERQ – Cognitive reappraisal	.34***	-			
3. ERQ – Expressive suppression	-.30***	-.04	-		
4. PCL-C	-.60***	-.32***	.26***	-	
5. AAQ-II	-.63***	-.31***	.33***	.75***	-
6. HADS-Anxiety	-.53***	-.30***	.19***	.68***	.69***

Note. WHOQOL-BREF-R = World Health Organization Quality of Life scale-BREF-Revised; ERQ = Emotion Regulation Questionnaire; PCL-C = PTSD Checklist-Civilian Version; AAQ-II = Acceptance and Action Questionnaire-II. Estimation = MLR; *** $p < .001$.

12.7.2 Exploratory factor analysis

Although expected, the correlations between reappraisal, suppression and EA were not too high to indicate overlap. Stage I of Study II, therefore, employed EFA to further investigate this association. First, using the AAQ-II and ERQ items, Velicer's MAP test and PCA PA were carried out in order to examine how many factors should be extracted, results of which can be found in Table 12.4. PA and the original MAP test pointed to a 3-factor solution, however, the revised MAP test suggested a 4-factor solution. When contradicting results occur, some suggest looking carefully at the two smallest average correlations from the MAP test for a close call (O'Connor, 2000; Wuensch, 2012). Taking into consideration the second smallest value (.0031) for the Revised MAP one can conclude that it would be possible to extract a 3-factor solution.

Table 12.4 *Factor extraction of the ERQ and AAQ-II items*

	Velicer's MAP Test		Parallel Analysis		
Factors	Original MAP test	Revised MAP test	Raw Data	50th Percentile	95th Percentile
.00	.1142	.0355			
1.00	.0556	.0077	5.6862	1.3950	1.4759
2.00	.0422	.0040	2.8301	1.3144	1.3663
3.00	.0276	.0031	1.9495	1.2539	1.2996
4.00	.0327	.0029	.9774	1.2019	1.2428

Note. ERQ = Emotion Regulation Questionnaire; AAQ-II = Acceptance and Action Questionnaire-II

Results from the rotated 3-factor EFA (Table 12.5) did not provide support for the hypothesis, as the items of each scale loaded onto a unique factor with no cross loadings. Surprisingly, the AAQ-II items did not overlap with any of the two ERQ subscales. The AAQ2 item ("I'm afraid of my feelings") was shown to have a high factor loading above .32 (Tabachnick & Fidell, 2013) on the suppression factor, perhaps due to similar wordings (e.g. "feeling") or because they measure similar things. Nevertheless, it was found to have a more substantial loading on its own domain (λ = .66). Such results suggest that the AAQ-II is a distinct construct and does not overlap with suppression or reappraisal as measured by the ERQ.

Table 12.5 *3-factor exploratory factor analysis with ERQ and AAQ-II items*

	Factors		
Items	1	2	3
Cognitive reappraisal			
ERQ1	**0.661**	-0.027	-0.114
ERQ3	**0.669**	0.023	0.046
ERQ5	**0.392**	0.202	0.101
ERQ7	**0.831**	-0.021	-0.050
ERQ8	**0.832**	-0.004	0.072
ERQ10	**0.781**	-0.020	0.037
Expressive suppression			
ERQ2	0.019	-0.088	**0.836**
ERQ4	-0.019	0.020	**0.466**
ERQ6	0.020	0.026	**0.806**
ERQ9	-0.009	-0.004	**0.736**
AAQ-II			
AAQ1	0.065	**0.867**	-0.014
AAQ2	-0.026	**0.663**	**0.392**
AAQ3	0.024	**0.771**	0.252
AAQ4	0.095	**0.893**	-0.017
AAQ5	0.006	**0.783**	0.222
AAQ6	-0.027	**0.775**	0.288
AAQ7	0.001	**0.797**	0.189

Note. In bold are the items of each factor. ERQ = Emotion Regulation Questionnaire; AAQ-II = Acceptance and Action Questionnaire-II; Estimator = WLSMV; Rotation = Geomin.

12.7.3 Post hoc analysis: What does the AAQ-II measure?

The fact that the AAQ-II was found to be more strongly correlated with items designed to measure QoL (r = -.62, p < .001) and PTSD symptoms (r = .75, p < .001) than suppression, adds to the doubts raised regarding the validity of the AAQ-II. It is important to note that the strong relationship between the AAQ-II and PCL-C might have occurred from an overlap between EA and PTSD avoidance symptoms (Meyer et al., 2013). Nevertheless, it was considered relevant to further investigate the controversy related to the AAQ-II by exploring its association with anxiety as measured by the HADS-Anxiety subscale. It is important to note that as with the WHOQOL-BREF and

PCL-C, results provided support for the strong correlation between the AAQ-II and items measuring anxiety ($r = .69, p < .001$).

Taking the current and previous findings (e.g. Wolgast, 2014) into consideration, an EFA was employed so as to investigate whether the AAQ-II items would overlap with items assessing anxiety. First, PCA PA and MAP test were undertaken in order to investigate the structure of the AAQ-II and HADS-Anxiety items. Results can be found in Table 12.6 and suggest a 2-factor structure.

Table 12.6 *Factor extraction of the AAQ-II and HADS-Anxiety items*

	Velicer's MAP Test		Parallel Analysis		
	Original	Revised		50th	95th
Factors	MAP test	MAP test	Raw Data	Percentile	Percentile
.00	.2309	.0704			
1.00	.0308	.0027	7.1452	1.2443	1.4201
2.00	.0296	.0025	1.3727	1.2627	1.3184

Note. ERQ = Emotion Regulation Questionnaire; AAQ-II = Acceptance and Action Questionnaire-II; HADS = Hospital Anxiety and Depression Scale

A 2-factor EFA with WLSMV estimation and Geomin rotation was carried out (see Table 12.7). The inspection of the rotated 2-factor EFA matrix revealed that most AAQ-II items highly overlap with the HADS-Anxiety factor. Notably, items AAQ1 ("my painful experiences and memories make it difficult for me to live a life that I would value") and AAQ4 ("my painful memories prevent me from having a fulfilling life") were the only ones that did not cross load onto the anxiety factor. These items appear to be in accordance to the ACT theory, where inflexible attention gets in the way of movement towards chosen values and goals (Hayes & Lillis, 2012). Given that the overlap between HADS-Anxiety and AAQ-II was unexpected, current findings were validated using Bayesian analysis.

Table 12.7 *WLSMV 2-factor Exploratory Factor Analysis*

	Factors	
	1	2
HADS-Anxiety		
HADS1	**0.762**	0.081
HADS3	**0.775**	-0.051
HADS5	**0.750**	0.056
HADS7	**0.658**	0.099
HADS9	**0.765**	-0.236
HADS11	**0.494**	0.101
HADS13	**0.840**	-0.005
AAQ-II		
AAQ1	0.023	**0.889**
AAQ2	**0.362**	**0.539**
AAQ3	**0.512**	**0.455**
AAQ4	0.006	**0.884**
AAQ5	**0.472**	**0.500**
AAQ6	**0.451**	**0.533**
AAQ7	**0.491**	**0.480**

Note. HADS = Hospital Anxiety and Depression Scale; AAQ-II = Acceptance and Action Questionnaire-II; Rotation = Geomin.

Bayesian Exploratory Factor Analysis

The key difference between Bayesian (or Bayes) method and other frequentist (e.g., ML, WLSMV) statistical methods relates to the nature of the unknown parameters (van de Schoot et al., 2014). While frequentist methods expect the parameter of interest (e.g. mean, regression coefficient) to be unknown but fixed (i.e. there is only one true population parameter), Bayes method treats all unknown parameters as uncertain and are, therefore, described by a probability distribution (van de Schoot et al., 2014). Bayesian "combines prior distributions for parameters with the data likelihood to form posterior distributions for the parameter estimates" (Muthén, 2010, p. 3). Therefore, in FA Bayes estimation incorporates prior information to provide more accurate parameter estimates which does not depend on normally distributed large samples (Schmitt, 2011). Overall, Bayes was found to outperform WLSMV estimation but especially in cases with missing data (Asparouhov & Muthén, 2010).

While WLSMV is considered to be the most popular method for estimating models with categorical variables, it uses all available data with limited pair-wise information, which is a more restrictive variation of the full information (Schmitt, 2011). Full-information estimators such as Bayes are, therefore, preferred over limited-information, as they are asymptotically the most efficient (i.e. they yield the minimal mean squared error; Asparouhov & Muthén, 2010). Although discrepancies between Bayes and WLSMV estimators are not expected to occur[9], surprisingly, Bayes EFA indicated no overlap between the AAQ-II and HADS-Anxiety items. In fact, as seen in Table 12.8 the Bayes findings indicated two distinct scales.

Table 12.8 *Bayes 2-factor Exploratory Factor Analysis*

	Factors	
	1	2
HADS-Anxiety		
HADS1	**0.608**	0.235
HADS3	**0.721**	0.044
HADS5	**0.665**	0.173
HADS7	**0.468**	0.284
HADS9	**0.881**	0.274
HADS11	**0.481**	-0.025
HADS13	**0.849**	-0.018
AAQ-II		
AAQ1	-0.013	**0.748**
AAQ2	-0.043	**0.850**
AAQ3	0.147	**0.746**
AAQ4	-0.006	**0.752**
AAQ5	0.046	**0.843**
AAQ6	0.002	**0.875**
AAQ7	0.136	**0.756**

Note. HADS = Hospital Anxiety and Depression Scale; AAQ-II = Acceptance and Action Questionnaire-II; Rotation = Geomin.

Although the discrepancy between results is unclear, given that Bayes EFA may provide more accurate results than those derived from WLSMV, the authors considered the

[9] In a personal communication with the main author, L. K. Muthén (personal communication, May 13, 2015) posited that it is unusual to see such differences, but in this case, Bayes or ML would be more advisable, as they are full-information estimators.

AAQ-II and HADS-Anxiety to be two distinct measures. These findings contradict those from other studies suggesting that the AAQ-II may be a measure of general distress (Gámez et al., 2011; Wolgast, 2014). Of course it is important to note that unlike the present study, Wolgast (2014) constructed his own items to measure distress. Additionally, the estimation used to conduct the EFA model was not reported, precluding the direct comparison between the two studies. Findings from the current study, however, indicate that the AAQ-II does not reflect a measure of general distress or anxiety. Although Bond et al. (2011) suggest that the AAQ-II is a measure of psychological inflexibility and EA, overall findings from the current study suggest that it may be better described as a measure of psychological inflexibility. More precisely, the lack of overlap between the AAQ-II and ERQ-Suppression may indicate that the AAQ-II does not fully assess the concept of EA as initially defined by Hayes et al. (1996). However, the significant relationship between the ERQ and AAQ-II may suggest that individuals who act more flexibly, thus scoring low on the AAQ-II (a measure of psychological inflexibility), would also score low on the ERQ-Suppression subscale, as they would suppress less often. The current findings should, of course, be replicated using clinical samples and different measures, which will provide a further insight on how the AAQ-II relates to measures of avoidant coping and ER and whether it is better conceptualised as a psychological inflexibility measure, as the current study suggests.

It is important to note that due to the discrepancy between WLSMV and Bayes, a 3-factor Bayes EFA was conducted to validate the results from section 12.7.2 (i.e. the overlap between AAQ-II and ERQ). Bayes analysis confirmed the initial findings, further supporting the distinct nature of the AAQ-II and ERQ.

12.8 Stage II: An integrative mediation model of PTSD, emotion regulation, experiential avoidance, and quality of life

As reviewed in Chapter 10, part of this study's objectives was to investigate whether ER strategies and EA act as mediators in the relationship between posttraumatic stress and QoL, in a sample of adults with previous traumatic experiences. Recent work has highlighted the toxic mediation effects of ER and EA in the context of psychopathology (Farach et al., 2008; Weiss et al., 2013), although most researchers have solely focused on the individual effects of such mediators. Clearly, however, models with only one mediator do not allow for comparisons between the probable effects of several mediators. On the other hand, the simultaneous investigation of multiple mediating effects in the relationship between an independent variable and an outcome, enables the test of competing theories of mechanisms against each other (Hayes, 2013). When several mediators are included in a model, one can determine the magnitude of the indirect effects associated with all other mediators (Preacher & Hayes, 2008).

Therefore, analyses from Stage II aimed at investigating a parallel mediation model in which EA and ER strategies (i.e. cognitive reappraisal and expressive suppression) mediate the direct effect of PTSS on QoL. Such a model would enable the comparison between the three mediators and provide enough information as to which has the strongest effect (Hayes, 2013). In addition, it would be possible to determine to what extend each mediator mediates the PTSS → QoL effect, conditional on the presence of the other two mediators. Prior to the parallel mediation analysis, correlation and multiple regression analysis were performed to examine the relationships between the variables of interest.

12.8.1 Correlation analysis and multiple regression

The correlations between the predictor, the three mediators, and the outcome variable were examined, results of which can be found in earlier sections (see Table 12.3). As

expected, QoL was found to have negative statistically significant associations with expressive suppression, EA, and symptoms of posttraumatic stress. Conversely, it was found to correlate positively with cognitive reappraisal.

The direction and statistical significance of PTSD symptoms, EA, cognitive reappraisal, and expressive suppression as predictors of QoL was examined through multiple regression analysis. To this end, SEM using MLR estimation was undertaken. MLR was used over other robust methods (e.g. MLM) as it is recommended for medium sample sizes (Muthén & Asparouhov, 2002; Yuan & Bentler, 2000).

The four predictors were simultaneously regressed on the outcome variable (QoL) (Table 12.9). As expected, all variables were found to be significant predictors of QoL, but with EA having the greatest contribution. Results suggest that an increase of 1 point in the AAQ-II measurement could predict a .48 decrease in the WHOQOL-BREF-R. Similarly, an increase in PCL-C and ERQ-Expressive suppression scales can result in decreased QoL levels. The ERQ-Cognitive reappraisal is positively associated with QoL, which means that an increase of 1 point would result in better QoL with a .27-point increase in the WHOQOL-BREF-R scale. Altogether, the four predictors accounted for 46% of the variance in QoL.

Table 12.9 *Multiple regression analysis with quality of life as the outcome*

Predictor variable	*B*	*SE (B)*	*β*
PCL-C	-.272	.07	-.265***
AAQ-II	-.481	.09	-.344***
ERQ – Cognitive reappraisal	.274	.09	.143**
ERQ – Expressive suppression	-.281	.10	-.117**

Note. ERQ = Emotion Regulation Questionnaire; PCL-C = PTSD Checklist-Civilian Version; AAQ-II = Acceptance and Action Questionnaire-II. Estimator used = MLR.
$R^2 = .46, p < .001$. ** $p < .01$, *** $p < .001$.

12.8.2 Bootstrapping mediation analysis

As discussed in previous chapters, one of the most commonly used methods for assessing mediation models is referred to as the "causal steps" proposed by Baron and Kenny (1986). However, given its limitations (Krause et al., 2010; Zhao et al., 2010) and the fact that it has little utility in models with multiple mediators (Preacher & Hayes, 2008),, such as the ones being tested in the current study a bootstrapping SEM was considered a more suitable method for assessing the mediation models. Bootstrap methods consist of randomly creating samples, with replacement, from the original data set and estimating the indirect effect *ab* for each random sample (Preacher & Hayes, 2004). By repeating this process *k* times, an empirical approximation of the *ab* sampling distribution is estimated, which is then used to construct CI for the indirect effect (Preacher & Hayes, 2008). 95% CI are estimated for the population value of *ab* and an indirect effect is considered significant ($p < .05$) if zero is not contained within their lower and upper bound (Geiser, 2013). Such resampling methods, and especially the bias-corrected bootstrap, are considered to be powerful for obtaining confidence limits for specific indirect effects (Preacher & Hayes, 2008). Bootstrapping methods work well with small samples, while they can account for violations of assumptions (e.g. non-normal distribution, outliers, etc.) (MacKinnon, 2008).

There is not, however, an agreement as to how many samples should be generated. Some suggest bootstrapping at least 1000 (MacKinnon, 2008; Preacher & Hayes, 2008), others suggest 5000 (Hayes, 2013; Preacher & Hayes, 2004), while Geiser (2013) recommends 10000 for high precision. Usually, 5000 to 10000 samples are considered sufficient in most applications (Hayes, 2013).

Hence, for the purposes of the current study, all SEM mediation models were explored using ML estimation along with 10000 bias-corrected bootstrap samples. Bias-corrected bootstrapping, which does not rely on the indirect effects having normal distributions (Mackinnon, Lockwood, & Williams, 2004), was used to obtain asymptotic 95% CI. For the current study, an effect was considered to be statistically significant in the absence of

zeros within the lower and upper bounds of the CI (Preacher & Hayes, 2008). SEM was chosen over regression analysis, reasons of which can be found in Chapter 10.

Given the limitations of the causal steps, the interpretation of the mediation models was based on the overall direct and indirect effects as well as the specific indirect effects and their 95% (i.e. 2.5% and 75%) CI values. It should be noted that the data collected for this study were part of a cross-sectional design and thus were limited in their capacity to provide conclusions around causality. Hence, the path analyses employed in this study did not focus in establishing causal effects, but rather possible mediation paths that can account for the statistical relationship between PTSS and QoL.

Beta scores provided by MPlus were used to assess the magnitude of the indirect effects (i.e. effect size). The effect size of each indirect path was also described verbally, and inferences were drawn based on informal descriptors mentioned in the literature (e.g. partial/complementary mediation; MacKinnon et al., 2007; Mathieu & Taylor, 2006; Zhao et al., 2010). Results from mediation models have been reported in both unstandardized (raw) and standardized forms in the literature. Some suggest reporting both forms (Fritz & MacKinnon, 2007), yet it is not clear whether any of the two forms is preferable. Thus, for the current study all values were reported in standardized form, as this would enable comparisons between the mediators.

12.8.2.1 Path A: Parallel mediation model with quality of life as the outcome variable

As shown in Figure 12.1, PTSS act as the exogenous or independent variable, which has an influence on the endogenous or dependent variables (EA, cognitive reappraisal, expressive suppression and QoL). Notably, the model represented an excellent fit to the data (Table 12.10), while all paths presented in Figure 12.1 were found to be statistically significant. As expected, the direct effect between PTSS and QoL was negative and statistically significant, but considerably lower than when PTSS is the only predictor of QoL (β = -.59, $p < .001$). Results suggest that an increase of 1 SD in the PTSS variable

would result in a .27 SD decrease in QoL. In other words, those reporting more symptoms of posttraumatic stress also reported poorer QoL.

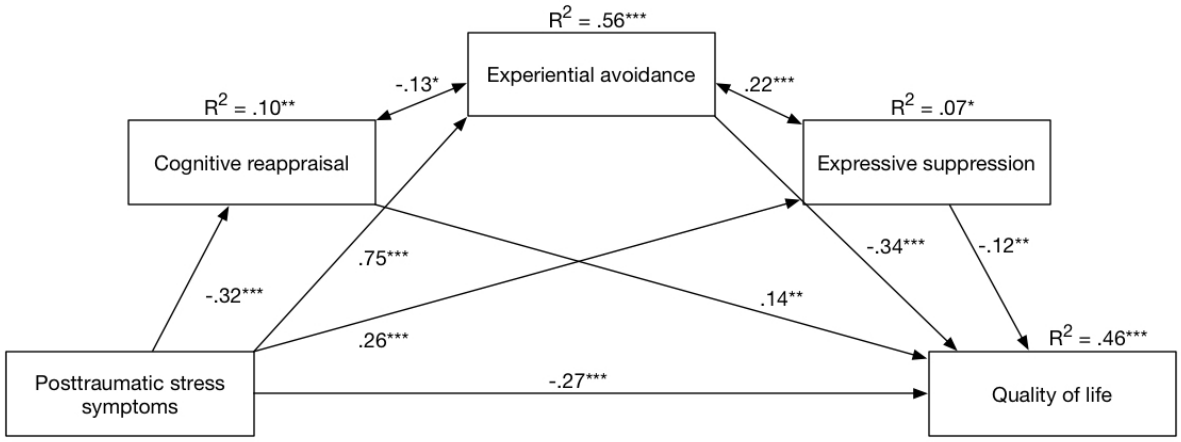

Figure 12.1 Path A: Experiential avoidance and emotion regulation as mediators between posttraumatic stress symptoms and quality of life; Path *c* = -.59.

The total effects from posttraumatic stress to QoL, which is the sum of the direct and indirect effects, was strong and statistically significant, indicating that posttraumatic stress along with ER and EA have a statistically significant effect on QoL levels. The three mediators were expected to significantly mediate the effect of posttraumatic stress on QoL and results provided support for this hypothesis. Consistent with the results found in the multiple regression analysis, the effect was more notable in the case of EA. The indirect effects of ER strategies were found to be smaller but statistically significant. Overall, the significant total indirect effects (β = -.33) support the claim that cognitive reappraisal, expressive suppression, and EA, collectively mediate the effect of PTSS on QoL (Hayes, 2013). No zero values were found in the 95% CI, further supporting the results ($p < .05$). It is worth noting that PTSS appeared to explain more variance in the EA variable ($R^2 = .56$, $p < .001$) compared to the ER variables ($R^2 = .07$ - .10)

Table 12.10 Standardized direct, indirect, total effects, and bootstrap CI of Path A

				BC Bootstrap 95% CI	
Effects	β	*SE*	*p*	Lower	Upper
From PTSS to QoL					
Total effect	-.60	.04	<.001	-.668	-.528
Total indirect effect	-.33	.05	<.001	-.430	-.237
Direct effect	-.27	.07	<.001	-.401	-.141
Specific indirect via:					
EA	-.26	.05	<.001	-.355	-.161
Expressive suppression	-.03	.01	<.05	-.054	-.006
Cognitive reappraisal	-.05	.02	<.01	-.077	-.014

Note. EA = Experiential avoidance; CI = Confidence Interval. χ^2 (1) = .82, p > .05; RMSEA = .000, 90% CI [.000 - .134], p > .05; CFI = 1.00; TLI = 1.00. AIC = 9483.97

It is important to note that despite the statistically significant indirect effect, the direct effect was also statistically significant. Some may refer to this as "partial" mediation (Gunzler, Chen, Wu, & Zhang, 2013; Little et al., 2007), while others call it "complementary" mediation (Zhao et al., 2010).

In fact, a figure proposed by Zhao et al. (2010) has offered the possibility of identifying the different types of mediation found in a path analysis (see Figure 12.2). The authors, who disagree with the premises of mediation as proposed by Baron and Kenny (1986), suggest that a statistically significant total effect (i.e. *ab* + *c*) does not necessarily indicate mediation, and a non-significant total effect does not necessarily indicate absence of mediation, as in fact, it could be possible to establish mediation without a significant total effect or a significant direct effect (Zhao et al., 2010). Using the three equations reported by Baron and Kenny (1986), the authors proposed a mediation "tree" in which the mediation hypothesis holds if the indirect path *ab* is statistically significant, even if the direct effect remains significant. In cases where the direct effect is found to be significant, then researchers are urged to consider having omitted one or more

mediators from the model (Shrout & Bolger, 2002). Clearly, a mediation model that contains both direct and indirect relationships is also plausible. Contrary to the causal steps, a significant direct effect based on the tree proposed by Zhao et al. (2010) implies complementary or competitive mediation. Such mediation models are proved to be valuable, as future studies may strive to find further mediators to better support the proposed models.

Therefore, for the current study, the interpretations of all mediation models were based upon the steps proposed by Zhao et al. (2010) for identifying mediation effects. For example, given the results of Path A (Table 12.10), one can conclude that all indirect paths *ab* were statistically significant confirming mediation. In addition, the products of the direct effect and all mediators (*a* x *b* x *c*) were positive, which indicates that ER strategies and EA have significant complementary mediating effects. This suggests that other mediators may also explain the relationship between PTSS and QoL.

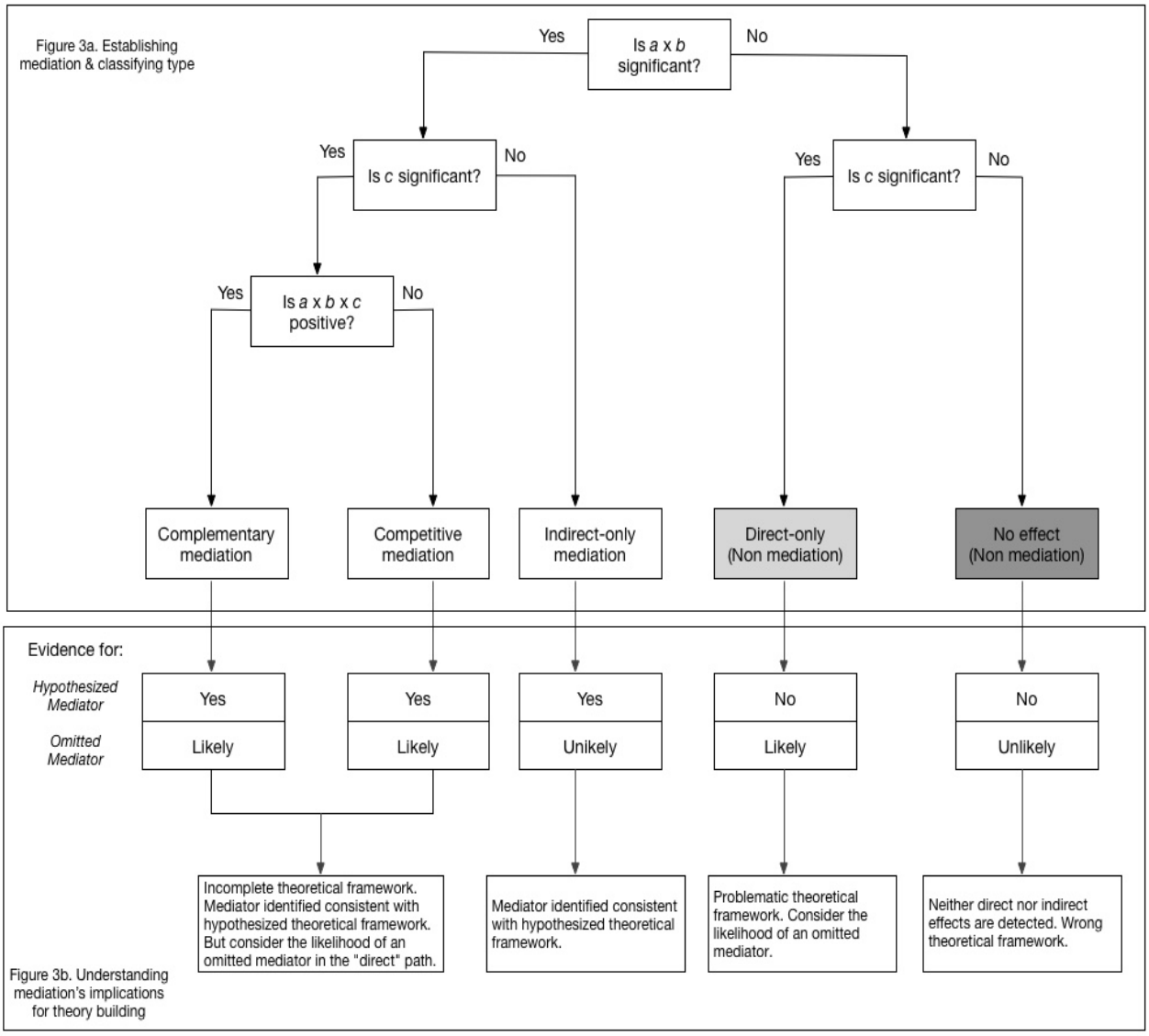

Figure 12.2 Decision tree for establishing and understanding types of mediation and nonmediation. Adapted from "Reconsidering Baron and Kenny: Myths and truths about mediation analysis" by Zhao et al. (2010).

12.9 Stage III: Is emotion regulation a form of experiential avoidance (or vice versa)?

Although results indicated that ER and EA are two distinct concepts, the exact mechanism through which they occur is unclear. Some attempts have been made into conceptualising ER as a form of EA. More precisely in a study by Kashdan et al. (2006) EA significantly mediated the relationship between ER and QoL. However, whilst such empirical findings may support a preferred model, that does not rule out a wide range of alternative models that may be equally consistent with the data (Little et al., 2007). That appears to be the case in cross-sectional designs where researchers are testing mediation models with non-experimental or longitudinal data (Little et al., 2007). Hence, for example, in the case of Kashdan et al. (2006) it would also be plausible that ER mediates the relationship between EA and QoL. Using SEM the current study attempted such an investigation through mediation analysis.

12.9.1 Competing mediation models

Pursuing the line of research by Kashdan et al. (2006) further, three competing mediation models were examined. Model 1 (Figure 12.3) presents the possibility that the effect of EA on QoL is mediated through ER while model 2 (Figure 12.4) and 3 (Figure 12.5) suggest the opposite. The ER strategies as predictors were tested in two different models due to the fact that they are both significantly correlated with the mediator (EA) and the outcome (QoL), and that could possibly cancel out each other's effects. As Hayes (2013) notes, when multiple predictors are included in the mediation model, they compete against one another in an attempt to explain variation in the mediator and outcome.

Model 1 in which ER acts as a mediator was shown to have an excellent model fit (Table 12.11) with significant indirect effects. Results suggest that EA exerts an effect on QoL directly (β = -.54) and indirectly through both expressive suppression (β = -.04) and

cognitive reappraisal (β = -.05). Results were further supported by the 95% CI. It is important to note, however, that the indirect effects were small.

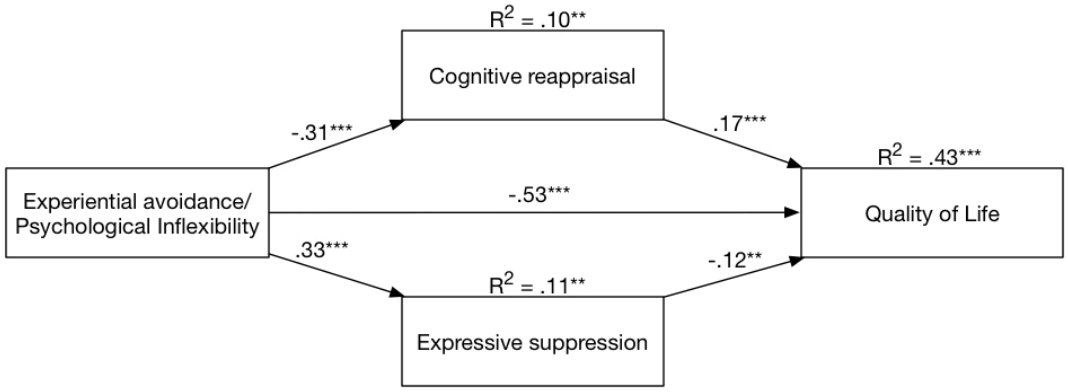

Figure 12.3 Model 1: Emotion regulation strategies as mediators of EA; Path *c* = -.63; Path coefficients are in standardized form; ***p* < .01, ****p* < .001.

Table 12.11 *Model 1: Emotion regulation as a mediator of experiential avoidance*

				BC Bootstrap 95% CI	
Effects	*β*	*SE*	*p*	Lower	Upper
From EA to QoL					
Total effect	-.63	.03	< .001	-.690	-.561
Total indirect effect	-.09	.02	< .001	-.134	-.051
Direct effect	-.54	.04	< .001	-.608	-.457
Specific indirect via:					
Cognitive reappraisal	-.05	.02	< .01	-.086	-.019
Expressive suppression	-.04	.02	< .01	-.070	-.010
Model fit	$\chi 2$ (1) = 1.825, *p* > .05; RMSEA = .048, 90% CI [.000 - .158], *p* > .05; CFI = .997; TLI = .982. AIC = 7187.47				

Note. EA = Experiential avoidance; QoL = Quality of life; AIC = Akaike Information Criterion; CI = Confidence Interval.

Models 2 and 3 were saturated (see Table 12.12). A SEM saturated or just-identified model is one in which the number of data points equals the number of parameters to be estimated (Ullman, 2006). The χ^2 statistic and degrees of freedom of such models are equal to 0. Thus, the model fit of the regression model could not be estimated. However, judgments of the model fit of saturated models can be made based on the estimated model parameters, such as the path coefficients, rather than the global fit (Geiser, 2013). Therefore, the model fit for models 2 and 3 was based on the direct and indirect paths, which were found to be significant. This suggests that the use of ER strategies can have a direct and indirect effect on QoL levels through the use of EA. Notably, the direct effect in both models 2 and 3 appears to be smaller than the mediating effect of EA. This is not the case with model 1 which indicates a more substantial direct than indirect effect.

Using AIC, the models 2 and 3 were compared. AIC can be used for the evaluation of competing non-nested models, where solutions with the smallest AIC values are judged to fit the data better in relation to alternative ones (Brown, 2015). Based on this criterion, model 3 in which cognitive reappraisal acts as the predictor, appears to perform better than model 2. Collectively, results suggest that in studies with cross-sectional designs all competing models like the current ones could, in fact, be supported by the data.

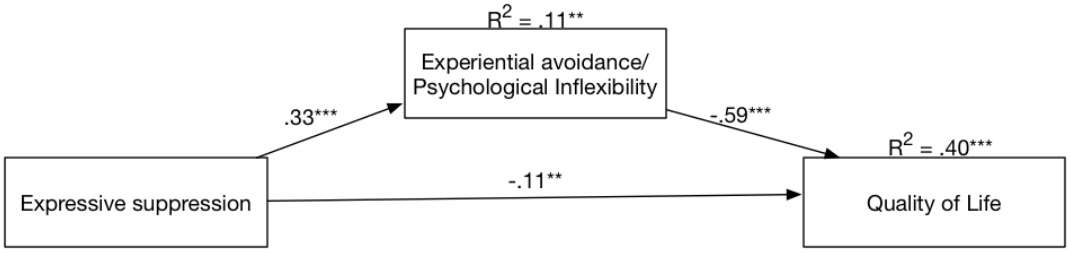

Figure 12.4 Model 2: Experiential avoidance as a mediator of expressive suppression; Path *c* = -.30. Path coefficients are in standardized form; ***p* < .01, ****p* < .001.

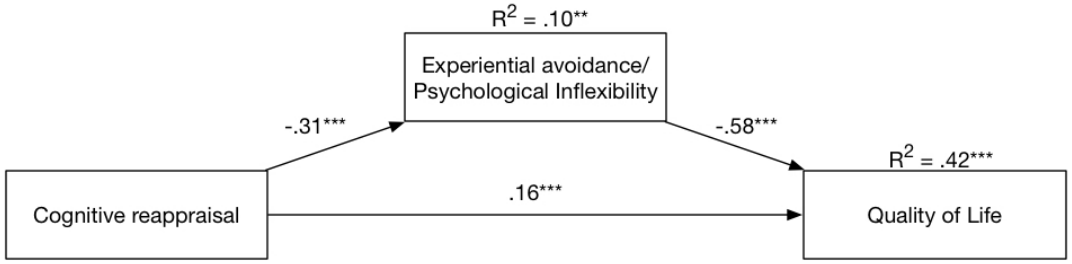

Figure 12.5 Model 3: Experiential avoidance as a mediator of cognitive reappraisal; Path *c* = .34. Path coefficients are in standardized form; ***p* < .01, ****p* < .001.

Table 12.12 *Standardized direct, indirect, total effects, and bootstrap CI of model 2 and 3*

	Model 2: EA as the mediator – Expressive suppression as the predictor				
				BC Bootstrap 95% CI	
Effects	*β*	*SE*	*p*	Lower	Upper
From suppression to QoL					
Total effect	-.30	.05	< .001	-.404	-.204
Direct effect	-.11	.04	< .05	-.197	-.023
Specific indirect via:					
EA	-.19	.03	< .001	-.257	-.130
Model fit	Saturated model, *df* = 0 AIC = 5244.40				
	Model 3: EA as the mediator – Cognitive reappraisal as the predictor				
				BC Bootstrap 95% CI	
Effects	*β*	*SE*	*p*	Lower	Upper
From reappraisal to QoL					
Total effect	.34	.05	< .001	.241	.439
Direct effect	.16	.05	< .001	.071	.248
Specific indirect via:					
EA	.18	.03	< .001	.117	.244
Model fit	Saturated model, *df* = 0 AIC = 5240.88				

Note. EA = Experiential avoidance; QoL = Quality of life; AIC = Akaike Information Criterion; CI = Confidence Interval.

12.9.2 Serial Path A vs. Path B

Despite the significant results found in the competing models, the present study, as with previous studies, examined the mediating effects of EA and ER in individual models. This however, does not allow for the investigation of the simultaneous mediating effects of EA and ER and their possible interaction. This could be achieved through serial models, which are based on the assumption that multiple mediators are in fact associated, thereby enabling the investigation of their interrelationships (Hayes, 2013).

Hence, the use of serial models was applied in subsequent analyses. More precisely, Path A was extended into two competing serial models where: a) ER strategies act as a secondary mediator: PTSS→ EA→ER→QoL and b) EA acts as a secondary mediator: PTSS→ER→EA→QoL.

12.9.2.1 Path B: Serial multiple mediation model: Emotion regulation as a secondary mediator

Path B (Figure 12.6) sought to examine the extent to which EA is a toxic strategy that functions indirectly through problems in ER, in individuals with PTSS. For example, it was examined whether elevated PTSS would lead to an increase in EA, which would in turn reduce cognitive reappraisal, which then would lead to poorer QoL. Such an analysis would support the PTSS → EA → Cognitive reappraisal → QoL causal sequence, while controlling for all other effects. A similar sequence would be examined for expressive suppression as well.

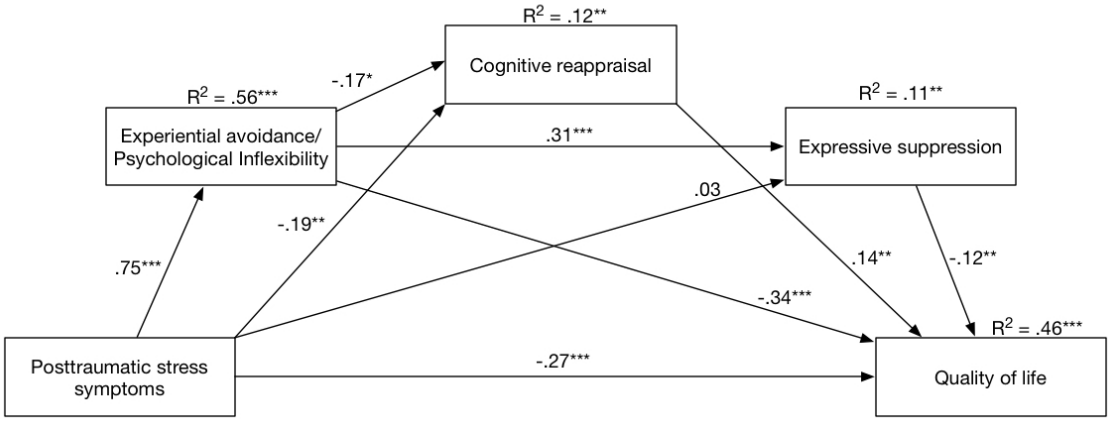

Figure 12.6 Path B: Emotion regulation strategies functioning as mediators in EA; Path *c* = -.59

As expected, the direct effect between PTSS and QoL was negative and significant, but considerably lower than when PTSS is the only predictor of QoL (β = -.59, p < .001).

Regardless of how many mediators are included in a model, the direct effect is *c'* and is interpreted in the same way as always (Hayes, 2013). The total effect and total indirect effect of PTSS on QoL was negative and significant indicating that fewer symptoms of posttraumatic stress would lead to better quality of life, through the three mediators and their serial effects (see Table 12.13). As seen in Figure 12.6 there are five possible indirect effects. As anticipated, the specific indirect effect through EA was significant and had the most notable effect (β = -26, $p < .001$). Although the indirect path through expressive suppression failed to reach significance levels, it was found to posses a small but statistically significant indirect effect in the PTSS→EA →QoL sequence. This may suggest that when controlling for the indirect effects of EA, the expressive suppression is no longer a significant mediator between PTSS and QoL. Nevertheless, it appears to be a significant mediator between EA and QoL, which is consistent to the results found in the competing models.

Table 12.13 *Standardized direct, indirect, total effects, and bootstrap CI of Path B*

				BC Bootstrap 95% CI	
Effects	*β*	*SE*	*p*	Lower	Upper
From PTSS to QoL					
Total effect	-.60	.04	<.001	-.668	-.528
Total indirect effect	-.33	.05	<.001	-.430	-.237
Direct effect	-.27	.07	<.001	-.395	-.134
Specific indirect via:					
EA	-.26	.05	<.001	-.355	-.161
Expressive suppression	-.00	.01	>.05	-.022	.016
Cognitive reappraisal	-.03	.01	<.05†	-.055	.000
EA via Expressive suppression	-.03	.01	<.05	-.052	-.001
EA via Cognitive reappraisal	-.02	.01	>.05	-.038	.002

Note. CI = Confidence Interval; EA = Experiential avoidance. † $p = .046$.
$\chi^2(1) = 2.003$, $p > .05$; RMSEA = .053, 90% CI [.000 - .161], $p > .05$; CFI = .998; TLI = .983. AIC = 9485.15

With respect to cognitive reappraisal, results were inconsistent. More specifically, the path PTSS→reappraisal→QoL was found to have a significant borderline effect. However, the 95% CI for this path contained zeros [-.055 -.000], which signifies non-significance. Thus, in cases with questionable results both the raw and standardized values were taken into consideration. Contrary to the standardized coefficients, the 95% CI of the raw values pointed to a significant path [-.065 - -.007]. However, as raw and standardized coefficients have different sampling distributions it is possible to get different significance levels (Muthén, 2014, September 20). In such cases, Muthén (2015, March 16) has suggested confirming arbitrarily results by using Bayesian estimation. With Bayesian estimation, as with Bias-Corrected bootstraps, the parameter distributions do not have to meet assumptions of normality (Muthén, 2011). As previously mentioned, with bootstrapping a parameter is assumed to be unknown but

fixed (i.e. there is only one true parameter) whereas with Bayesian estimation the parameters are viewed as uncertain random variables that should be described by a probability distribution (Enders, Fairchild, & Mackinnon, 2013; van de Schoot et al., 2014). Thus, instead of CI, Bayesian provides credible intervals that have more natural probability interpretations than CI, thereby making them more meaningful (Yuan & MacKinnon, 2009). The level of significance based on credible intervals is judged the same way as with CI. However, contrary to CI, a 95% credible interval means that there is a 95% chance that the lower and upper bounds contain the true value of the parameter based on the observed data (Yuan & MacKinnon, 2009).

Thus, a mediation model with Bayesian estimation was undertaken for Path B. The Bayesian model fit was found to be good with a Posterior Predictive P-value (PPP) of .42. PPP values above .05 reflect a good fit with a value of .50 indicating an excellent fit (Muthén, 2012, May 04). Contrary to the results found in ML BC-Bootstrap, the raw values for the PTSS→cognitive reappraisal→QoL path were in agreement with the standardized ones. The indirect effect was found to be significant for the raw coefficient (b = -.03, p < .001) with no zeros in the 95% credibility intervals [-.056 – -.008]. Similar results were found for the standardized values (β = -.04, p < .001), which were further supported by the 95% credibility intervals [-.075 – -.010]. Hence, it was concluded that cognitive reappraisal was in fact a significant mediator of the relationship between PTSS and QoL. However, whilst reappraisal was found to significantly mediate the relationship between PTSS and QoL, it failed to mediate the PTSS→EA→QoL path. This may indicate that whereas it can, in part, explain the relationship between PTSS and QoL, it cannot account for the effects of EA on QoL.

In short, results from Path B showed that when accounting for all possible mediations, only expressive suppression was able to significantly mediate the PTSS→EA→QoL path. Notably, the direct effect remained significant, which indicates that more mediators could possibly explain the relationships under study.

12.9.2.2 Path C: Serial multiple mediation model: EA as a secondary mediator

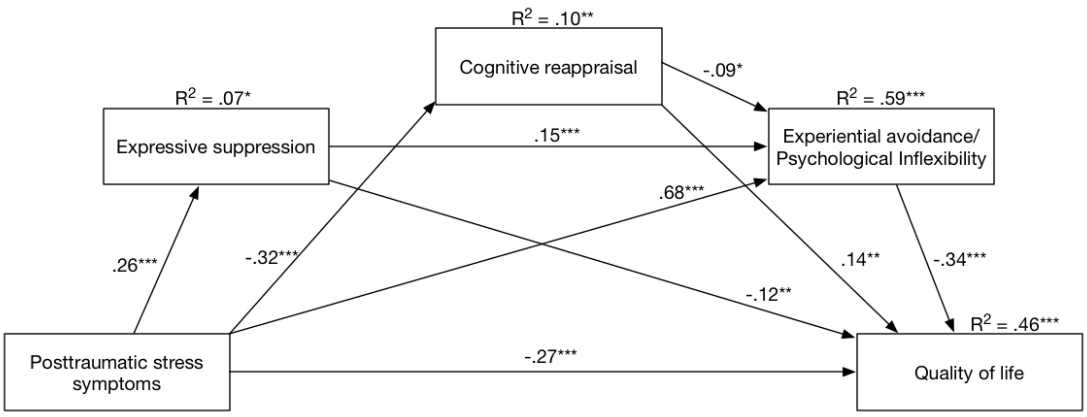

Figure 12.7 Path C: Experiential avoidance functioning as a mediator in emotion regulation strategies; Path *c* = -.59.

Path C (Figure 12.7) aimed at exploring a competing serial model in which EA acts as a second mediator in the indirect effects of ER strategies. Hence, the degree to which PTSS had an indirect effect on QoL was examined through two serial paths, while accounting for all possible mediators: a) PTSS→expressive suppression →EA→QoL and b) PTSS→cognitive reappraisal →EA→QoL.

As seen in Table 12.14, results pointed to the same direct, total indirect and total effects as with Model A. However, in this model, all five paths of mediation were found to be statistically significant. In accordance with model A, EA, expressive suppression, and cognitive reappraisal, were all found to be significant complementary mediators of the relationship between PTSS and QoL. Beyond that, EA was found to be a secondary mediator through which ER strategies mediate PTSS and QoL. The indirect effect PTSS → expressive suppression → EA → QoL, as well as the PTSS → cognitive reappraisal

→ EA → QoL, were both found to have equally small but significant effects in the model.

Table 12.14 Standardized direct, indirect, total effects, and bootstrap CI of Path C

				BC Bootstrap 95% CI	
Effects	*β*	*SE*	*p*	Lower	Upper
From PTSS to QoL					
Total effect	-.60	.04	<.001	-.668	-.528
Total indirect effect	-.33	.05	<.001	-.430	-.237
Direct effect	-.27	.07	<.001	-.395	-.134
Specific indirect via:					
EA	-.24	.05	<.001	-.324	-.145
Expressive suppression	-.03	.01	<.05	-.054	-.006
Cognitive reappraisal	-.05	.02	<.01	-.077	-.014
Expressive suppression via EA	-.01	.01	<.01	-.023	-.003
Cognitive reappraisal via EA	-.01	.01	<.05†	-.019	.000

Note. CI = Confidence Interval; EA = Experiential avoidance. † $p = .046$.
$\chi^2(1) = .82$, $p > .05$; RMSEA = .000, 90% CI [.000 - .134], $p > .05$; CFI = 1.00; TLI = 1.00. AIC = 9483.97

However, contradicting results were found for the PTSS→cognitive reappraisal→EA→QoL path, which was shown to have a borderline *p*-value (.046) with zeros in the upper bound of the 95% CI. In contrast, the unstandardized CI values pointed to a significant path with no zeros [-.023 – -.003]. Given the inconclusive results, a Bayes model was estimated to further examine the questionable significance levels of the mediation path. The Bayes model represented an excellent fit to the data (PPP = .50) and a significant unstandardized indirect effect ($b = -.01$, $p < .001$), which was further supported by the 95% credibility intervals [-.021 – -.003]. Similar results were found for the standardized coefficients ($\beta = -.013$, $p < .001$; 95% credibility

intervals range -.029 – -.004). Given the above findings, it was concluded that the PTSS→cognitive reappraisal→EA→QoL path was in fact significant.

Overall, results could be considered as suggesting that both ER strategies have a significant mediating effect in the relationship between PTSS and QoL, but also appear to function through the use of EA. It is worth noting that as with previous models, despite the significant mediating paths, the direct effect remained significant and all *axbxc* products were positive (i.e. complementary mediators). Such results indicate that although ER seems to be an important mediator whose effects can accounted for through EA, there are likely more mediators that could explain these relationships. Notably, Path C was found to have a smaller AIC value (Table 12.14) than Path B (Table 12.13), therefore, from this standpoint, Path C appears to present a more favourable solution. Interestingly, Path C was shown to have the same AIC value as Path A, indicating that they both have equally well fitting models. It is important to note, however, that AIC does not provide a statistical comparison of competing models like the χ^2difference test, but rather a comparison of the overall fit of models (Brown, 2015).

Chapter 13

Study II Discussion

Given the detrimental consequences of trauma exposure and PTSD on trauma survivors' overall functioning and QoL, the necessity for identifying potential risk factors and underlying mechanisms has been widely acknowledged. Therefore, the current study sought to bring together existing theory and findings into the development of an integrative mediation model of posttraumatic stress, ER, EA, and QoL. Recent efforts have been focused on the mediating effects of ER and EA at different stages following exposure, and found that they can significantly account for the relationship between trauma exposure and psychopathology (Burns et al., 2010; Gold et al., 2011; Ullman et al., 2014), and trauma-related psychopathology (e.g. PTSD) and negative psychological outcomes (Kashdan et al., 2009; Klemanski et al., 2012). However, the mediating effects of ER and EA in the association between PTSD and QoL remained largely understudied. Data on this area of research focused mainly on EA, and to the authors' knowledge, only one study has examined its underlying effects in the relationship between PTSD and QoL (see Kashdan et al., 2009). Therefore, Study II sought to fill this gap by exploring the mediating effects of EA and ER in PTSD and QoL. Rather than focusing on examining the individual effects of each mediator, like most studies have, the current study employed a parallel mediation model in which each mediator mediates the relationship conditional on the presence of the other.

An additional focus of Study II was to explore the overlapping or distinct association between ER and EA, and the degree to which ER strategies can be conceptualised as a form of EA, or vice versa. For instance, the present study examined whether expressive suppression and cognitive reappraisal have an impact on individuals' QoL indirectly

through EA behaviours. Such a model would imply that it is not the suppression of emotional expression or the limited use of cognitive reappraisal that leads to impaired QoL per se rather the inflexible behaviours of avoidance and escape. Existing studies have solely focused on this model (Kashdan et al., 2006; Wolgast, 2014), and have, thus, failed to account for competing ones. Given that there are competing theories about these phenomena it would be critical to consider specifying alternative models that reflect them (Kline, 2011). It is possible, for instance, that EA impacts QoL indirectly through ER strategies. This is the first study to the authors' knowledge to examine such opposite models.

In general, findings from Study II show that ER and EA are two distinct concepts and together partially account for the relationship between posttraumatic stress and QoL. These findings highlight that PTSD severity has a direct and indirect impact on individuals' QoL through the way individuals choose to avoid, suppress or reappraise emotions, thoughts, and bodily sensations. Notably, the model in which ER impacts QoL indirectly through EA, was found to be superior to its opposite. Therefore, in the present study, strategies of expressive suppression and cognitive reappraisal can be conceptualised to be functioning through EA.

13.1 Emotion regulation and experiential avoidance as distinct concepts

One important issue recently examined is whether the attempts to regulate one's emotions are the same as EA. From an ACT standpoint, EA includes the efforts to reduce contact with, or alter the form or frequency of private events, including emotions (Hayes et al., 1996). EA behaviours could be considered to act in an antecedent manner by avoiding cues that may elicit emotions. Once emotions have been generated EA may also act in a response-focused fashion through the avoidance and escape of private events and emotional expression. It would therefore be expected, at least to some extent, that cognitive reappraisal, but mostly expressive suppression (i.e. inhibiting or decreasing ongoging emotional response; Gross, 2002) would overlap with EA.

However, in contrast to the hypotheses and the theory underlying EA, findings found no support for an overlap between the items of EA and ER as measured by the AAQ-II and ERQ, respectively. Instead, the two measures were found to form three distinct factors capturing expressive suppression, cognitive reappraisal, and EA. One possible explanation of these findings is that that the current measures of ER and EA do not fully represent the theoretical and conceptual background of the concepts which they measure. It is also plausible that the two measures merely assess common phenomena and whilst they share common variance their association is not very strong. This is supported by the statistically significant but moderate correlation found in the current study between the two measures, which indicates that even though they do not assess they same phenomenon, individuals appear to respond to their items in a similar fashion. In fact, one of the questions included in the AAQ-II (i.e. item2: "I am afraid of my feelings") was found to cross load on the suppression subscale (with a medium factor loading). It would of course make sense that those who are afraid of their feelings would engage in attempts to suppress their expression (e.g. avoid crying).

In light of the absence of overlap, it was, therefore, considered relevant to pursue recent concerns regarding the validity of the AAQ-II. Certainly, the absence of overlap is not necessarily concerning, as it may, in fact, support the discriminant validity of the AAQ-II items. Nevertheless, it was considered important to investigate whether the lack of overlap indicates the low precision of the AAQ-II in fully capturing the concept of EA, as supported by other studies (Gámez et al., 2011).

Interestingly, while items such as "I worry about not being able to control my worries and feelings" (AAQ-II item 3) indicate the unwillingness to experience such thoughts and feelings (Bond et al., 2011), they do not appear to reflect the cognitive, emotional, or behavioral avoidance included in EA (Boeschen et al., 2001). Some, however, may argue the opposite. Given, for instance, that worry (as presented in item 3) is considered to be a cognitive attempt to solve possible threatening private events, worrying may function to avoid the occurrence of such events (Borkovec, Alcaine, & Behar, 2004).

Indeed, it is possible that some of the items included in the AAQ-II are intended to indirectly measure avoidance. However, the absence of overlap may indicate that such items are perceived differently by the respondents, which is a key issue in the area of scale development. Validity problems often ensue when respondents do not interpret a question in the way the researcher intended (Collins, 2003). "Understanding a question in a way that allows an appropriate answer requires not only an understanding of the literal meaning of the question but also involves inferences about the questioner's intention to determine the pragmatic meaning of the question" (Schwarz, 1999, p. 94). Therefore, it is possible that the lack of explicit avoidance items is affecting the scale's validity. For instance, a straightforward question targeting avoidant behaviours would be something along the lines of "I control my worries and feelings by avoiding them".

Notably, as with item3, most items do not appear to be explicitly measuring avoidance, rather distress aversion and unwillingness (e.g. "I'm afraid of my feelings") (Gámez et al., 2011) or dysfunction and interruption of goals (e.g. "My painful experiences and memories make it difficult for me to live a life that I would value"). Indeed, these items indicate the unwillingness of the individual to remain in contact with feelings, which interferes with valued goals. While such items represent a very important aspect of EA as described by Hayes et al. (1996), that is, being "…unwilling to remain in contact with private experiences…" (p. 1155), they appear to be lacking the behavioural aspect of EA, that is, "…the steps to alter the form or frequency of these events and contexts that occasion them" (Hayes et al., 1996, p. 1155). This view can explain the low correlation between the AAQ-II and the ERQ-Suppression. Unlike AAQ-II the ERQ-Suppression is focused explicitly on the behaviours taken to control emotions (e.g. "I control emotions by not expressing them"). Additionally, the lack of focus on avoidance and escape may justify the weaker correlations between the AAQ-II and measures of avoidance/acceptance compared to measures of well-being, QoL, distress, and anxiety (Gámez et al., 2011; Meyer et al., 2013; Wolgast, 2014).

It is, therefore, likely that the measure's focus on dysfunction and unwillingness have resulted to criterion deficiency (Gámez et al., 2011). Although the AAQ-II captures some important and crucial aspects of EA (i.e. unwillingness, psychological inflexibility, lack of committed action), it may warrant the addition of items that parallel behaviours of avoidance and escape (e.g. see previous versions; Hayes et al., 2004a). Some suggest that rather than tapping avoidance of unwanted experiences, the AAQ-II items tap secondary reactions to those experiences (Meyer et al., 2013). Therefore, although the AAQ-II was initially developed to assess EA, and in some aspects does, it appears to be a measure of psychological inflexbility, rather than a pure index of EA. Taking this into consideration, the importance and centrality of psychological flexibility in psychological health (Kashdan & Rottenberg, 2010) would justify the strong associations between the AAQ-II and measures of QoL and anxiety found in the current study. This would also explain the significant correlation between the AAQ-II and ERQ-Suppression, as suppression is believed to be interfering with movement toward goals (Koole, 2009).

To confirm the above theory, and to address recent concerns regarding the validity of the AAQ-II, a post-hoc EFA assessed the degree to which items from the AAQ-II overlap with the items of HADS-Anxiety. In contrast to some reports in the literature, the current study found no evidence of overlap between the AAQ-II and HADS-Anxiety. It is important to note, however, that the EFA model was focused on the item-level, thus, the absence of overlap merely refers to the individual items of the two measures. Their total scores, on the other hand, were found to be highly correlated. Therefore, although the absence of overlap suggests that the AAQ-II is not a measure of anxiety, the high correlation between the total scores may indicate that it, in fact, reflects psychological inflexibility, which is a process theorized in psychological health (Kashdan & Rottenberg, 2010).

Of course, the question of what the AAQ-II really measures may not have a simple answer. Wolgast (2014) compared the AAQ-II with items measuring distress (e.g "I worry a lot") and acceptance ("I often try to control or change my thoughts and

feelings") and found that the AAQ-II items load on the factor measuring distress rather than on the one measuring acceptance. Although, as Wolgast suggests, this may signify problems with the validity of the scale, it should not be implied that a valid measure of EA would be one that solely includes items of avoidance/acceptance. EA appears to be a complex multidimensional concept and its assessment should consider all features that characterize it. Even if the AAQ-II included items of acceptance, some of its items would likely load on the distress factor, because many of the items constructed by Wolgast appear to entail aspects of psychological inflexibility. For example, one of the distress items concerning worry (i.e. "I worry a lot") may indicate dominance of feared future and interference with the present moment, which is similar to items of the AAQ-II (i.e. item7 "Worries get in the way of my success"). Failure to come into the present is in fact associated with numerous clinical patterns (Hayes & Lillis, 2012).

Therefore, the focus of this area of work should not be on whether the AAQ-II is a measure of distress but whether it fully assesses the concept of EA. It would certainly be superficial to argue that high correlations between the AAQ-II and measures of distress prove that that the AAQ-II is a measure of dysfunctional distress (as Gámez et al., 2011 suggested). This view is inconsistent with findings from Study II suggesting that the AAQ-II would be better described as a measure of psychological inflexibility. Future research should, therefore, consider introducing items that assess efforts to avoid and escape feelings, thoughts, and private events, if the concept of EA is to be thoroughly assessed.

13.2 An integrative mediation model of PTSD, emotion regulation, experiential avoidance, and quality of life

Results from EFA provided important insight regarding the relationship between ER and EA/Psychological inflexibility [10] (EA/PI), and enabled the assessment of several

[10] Given that results from Study II suggest that the AAQ-II is a measure of psychological inflexibility with indirect forms of avoidance, the variable of interest will be referred to as experiential avoidance/psychological inflexibility from this point onwards.

mediation models that investigate their underlying effects and interactions in the areas of PTSD and QoL. Overall, findings from the current study concur with findings from the wider literature, and highlight the important role of ER and EA/PI in the aftermath of trauma. Findings from correlation and regression analysis confirmed the expected relationships in such a way that lower levels of cognitive reappraisal, and higher levels of PTSD severity, expressive suppression, and EA/PI were associated with lower levels of QoL. Therefore, in line with the study's hypotheses, individuals who reported higher levels of PTSD symptoms also reported lower levels of QoL (Olatunji et al., 2007). Similarly, those employing more EA/PI and expressive suppression, and less cognitive reappraisal were more likely to report poorer QoL. These findings can be placed in the theory of ACT and ER suggesting that individuals who engage in more efforts to avoid or suppress their experiences lose contact with present experience, and have limited cognitive resources left toward accomplishing their goals, at the expense of a favourable functioning and QoL (Kashdan & Breen, 2007; Koole, 2009). Of course, it is important to note that these interpretations are merely based on theory. One can only speculate that this is the exact mechanism by which EA/PI and ER affect QoL.

An important finding that has been receiving increasing attention in the literature of coping is the adaptive properties of cognitive reappraisal. Confirming the results of previous studies, participants who reappraised more reported better QoL in the current study. Individuals who reappraise may successfully influence their emotional responses or diminish their emotional relevance (Gross, 2014), thus leaving room for other activities other than the constant regulation of their emotions (Gross & John, 2003). Reappraisal in the current study is, therefore, suggested to impact one's QoL positively.

Consistent with existing literature, the current study indicated that trauma survivors with posttraumatic stress do not only struggle with their symptoms but also with poor QoL. This was expected, as symptoms such as sleep disturbance, inability to experience positive emotions, detachment, along with the re-experience of traumatic memories can significantly impair one's QoL. However, what if the way individuals' approach and

coping styles can explain the low QoL caused by their symptoms? It is possible that no matter how toxic these experiences are, they lead to impaired functioning and QoL only under specific contexts. Such a theory was explored through the parallel mediation model, which highlighted the significance of ER and EA/PI as underlying mediating mechanisms in trauma. These findings extend previous research and show that EA/PI, cognitive reappraisal, and expressive suppression partially mediate the association between PTSD severity and QoL. In fact, controlling for the effects of ER and EA/PI, the impact of PTSD on QoL was reduced by 54%. Individuals struggling with PTSD are believed to process and appraise the traumatic event and trauma-related experiences in a way that creates a continual feeling of threat (Ehlers & Clark, 2000). In an effort to control this and the painful experiences associated with the event, they often engage in maladaptive behaviours, which provide short-term relief, thereby reinforcing the use of similar behaviours in the future (Hayes et al., 1996).

It is important to interpret the parallel mediation from the theoretical standpoint of ACT and ER. It has been observed that trauma survivors with negative beliefs do not reappraise often, but instead engage in chronic avoidant behaviours by suppressing or avoiding, while being psychologically inflexible and unwilling to remain in contact with or accept their painful thoughts, feelings, and experiences. For example, a trauma survivor who avoids thoughts and suppresses emotions related to the event may experience relief by the temporary removal of the painful experiences. However, as ample empirical evidence suggests the chronic use of such behaviours often lead to an increase of the frequency, severity, and accessibility of the same experiences individuals strive to avoid (Hayes et al., 2006). Therefore, from an ACT standpoint, the more an individual is trying to escape these experiences, the more their functional importance increases (Hayes et al., 2006). By not accepting these internal events, they are unwilling to use their energies formerly given over to resignation, avoidance, or control of the events, to act in a way that is congruent with their values and goals (Bond & Bunce, 2003). Acceptance, which is promoted through psychological flexibility, involves the transfer of attentional resources from controlling internal events to observing one's

environment consciously and completing the right course of action for goal attainment (Bond & Bunce, 2003). However, to be able to enact this transfer, individuals would have to be willing to experience unwanted internal events (Bond & Bunce, 2003). Findings from the parallel mediation model, therefore, imply that trauma survivors who are psychologically flexible would be able to live the life they want with an optimal QoL.

On the other hand, from an ER perspective, the capacity of trauma survivors to regulate their appraisals or the expression of their emotions is overrun by the constant efforts to escape intense negative emotions (Burns et al., 2010). Given that individuals with PTSD tend to over-use ineffective forms of ER such as suppression (Boden et al., 2013), while under-use helpful mechanisms such as cognitive reappraisal, they lose contact with other meaningful goals (Kashdan et al., 2010) that would otherwise promote QoL. Therefore, when trauma survivors try to suppress, they have less cognitive and attentional resources to notice the opportunities that are present at a given time, and to act towards a favourable QoL. Both EA and ER (but especially suppression) strategies can interfere with the movement towards that goal. Thus, it is possible that trauma survivors can still live a meaningful life with their symptoms and experiences, as long as they can still move towards their values and goals, whether that involves resolving interpersonal relationships, or going back to work.

Importantly, however, the fact that ER and EA/PI were complementary mediators indicates that despite their important role in explaining the impact of PTSD on QoL, there are other potentially direct and indirect mechanisms that influence this relationship. Recently, research in this area has received increased attention, and has found that depression, anxiety (Gudmundsdottir, Beck, Coffey, Miller, & Palyo, 2004), coping, resilience, and hope (Wu, 2011) are important mediators in the relationship between PTSD and QoL.

Additionally, it is noteworthy that although all three mediators were statistically significant, ER strategies were found to have a small contribution in the total effect and total indirect effect, above the contribution of EA/PI. More precisely, reappraisal and suppression contributed an additional 5% and 8% in the total effect, respectively. In fact, almost half of the total effect (45%) was accounted for by EA/PI. These findings show that in the presence of EA/PI, ER strategies do not explain much more of the relationship between PTSD severity and QoL.

13.3 The relationship between experiential avoidance and emotion regulation

An important question recently examined is the degree to which ER can be better described as a form of EA behaviour. Results from the measurement and mediation models enabled the investigation of more complex models for a more comprehensive analysis of this relationship. Consistent with previous studies (Kashdan et al., 2006) results from the final stage of Study II found EA/PI to partially mediate the impact of suppression and reappraisal on QoL. Remarkably, however, the opposite was also observed: both suppression and reappraisal were found to be significant partial mediators in the relationship between EA/PI and QoL. These findings concur with existing suggestions that several alternative models may exist in a given relationship (Hayes, 2013; Kline, 2011) and confirm the necessity of exploring competing models before drawing definite conclusions.

Some interesting findings resulted from the three competing models. Controlling for reappraisal and suppression, the direct effect of EA/PI on QoL decreased by 14%, but remained larger than the indirect effect of ER. Remarkably, however, the direct effects of reappraisal and suppression were reduced by 53% and 63%, respectively, after controlling for EA/PI, but did not exceed the indirect effect. These findings suggest that ER strategies have a greater effect on QoL through EA/PI than on their own. Therefore, results from Stage II and III of Study II are converging on the idea that EA/PI is a more powerful underlying mechanism than ER. This is in accordance with the study by

Kashdan et al. (2006) in which EA better accounted for psychological functioning as opposed to ER.

Given that the competing models could not be directly compared, it was considered necessary to ensure that this pattern would hold in a model including both ER and EA/PI. Two competing serial models were, therefore, explored with QoL as the outcome variable and PTSD as the predictor. One of the most noteworthy findings of Model B (PTSD→EA→ER→QoL) is that only suppression accounted for the mediating effect of EA/PI between PTSD and QoL. In fact, the mediating role of suppression in the relationship between PTSD and QoL (PTSD→suppression→QoL) was cancelled out when controlling for the serial effects of EA/PI. Consistent with previous studies, these findings suggest that EA/PI can be conceptualised as a form of ER, and more precisely a response-focused strategy, in individuals with PTSD (Hofmann & Asmundson, 2008). Although, as evident from EFA, the two mediators do not measure the same phenomenon, once emotions have been generated, EA/PI can operate at the response-focused stage of the ER process indirectly through the suppression of emotional expression.

In the competing model C (PTSD→ER→EA→QoL) EA/PI was found to be a significant secondary mediator through which suppression and reappraisal mediated PTSD and QoL. These findings concur with the view that EA can be conceptualised to involve both antecedent- and response-focused ER strategies. For instance, in the context of ACT, cognitive change (reappraisal) may depend on whether individuals flexibly think of their problems (Boulanger et al., 2010). Therefore, ER strategies can be, and often are, attempts to avoid or reduce the frequency or intensity of aversive emotions (Boulanger et al., 2010). This highlights that the way ER impacts QoL is through inflexible efforts to avoid unwanted private events (Kashdan et al., 2006). In those cases, ER is associated with greater psychopathology (Chawla & Ostafin, 2007). The outcomes deriving from the use of ER strategies, therefore, depends on whether they are used inflexibly or not (Boulanger et al., 2010). For instance, suppression can be

effective such as when keeping a straight face prior to a surprise party. In these contexts suppression is unlikely to generalise to other contexts in an unhealthy way (Boulanger et al., 2010).

A comparison of the two serial models indicated that the latter model (PTSD→ER→EA→QoL) performed better than its opposite one. Findings from the competing models (see section 12.9.1) and the two serial models are converging on the idea that it is not just the ER per se that impacts QoL, rather the inflexible attempts to avoid, or reduce contact with unwanted experiences. As previously mentioned, while ER is not always harmful, when individuals are not flexible and mindful, and their actions are not aligned with their goals, then they can become toxic. This is supported by the current results that seem to convey that ER can be dysfunctional when used inflexibly. While ER theory, similarly to ACT, is centred in valued goals (see Campbell-Sills et al., 2006; Koole, 2009), findings from the PTSD→ER→EA→QoL model suggest that goal-directed behaviour might not be enough for being healthy, but being mindful is key (Bond, Lloyd, & Guenole, 2013). Mindfulness concerns being attentive to and aware of what is taking place in the present, observing internal experiences on a moment-to-moment basis, in an open and non-judgmental way (Brown & Ryan, 2003). As a result, individuals have more attentional resources to notice the goal directed opportunities that are present and they are well placed to act towards those opportunities, since they no longer avoid or control situations that can trigger unwanted experiences, as they normally would (Bond et al., 2013). Often, PTSD trauma sufferers are attached to the past, to the moment the traumatic event occurred, or they are often worried about the future (dominance of the conceptualised past and feared future) (Walser, 2012, March 17). It is as if they forget that they have a pre-trauma and post-trauma self. They often remain in the "victim role", thus their ability to be mindful, and open to current experiences, living in a moment-to-moment basis tends to get lost (Walser, 2012, March 17). Losing contact with the present can be very costly, as opportunities such as dealing with physical pain, do activities that once loved, or meet with a friend, get lost, thereby leading to impaired psychosocial functioning and QoL. While goal-directed behaviours

are important, individuals must also remain mindful and fully aware of their internal experiences, if those experiences are not to interfere with their actions for goal attainment in difficult times (Bond et al., 2013). It is, therefore, not surprising that mindfulness in itself, is believed to improve psychological functioning (see Baer, 2003 for a review).

Still, it is certainly important to acknowledge the small effect sizes of the serial paths. The serial effects were found to explain only a small part of the total indirect effect in models B and C, and thus may not be directly applicable in practice. Given that the serial models were examined within the association between PTSD and QoL, it is possible that the non-clinical sample of the current study have influenced the results. Future research is, therefore, needed to replicate the current findings in a clinical PTSD sample and in other mental health problems.

Interestingly, model C was found to be as good as model A (PTSS→ER, EA→QoL) suggesting that the related strategies of ER and EA/PI act as important mediators in the relationship between PTSD and QoL, with the mediating impact of ER being explained through the use of EA/PI.

13.4 Limitations and future research

Several limitations need to be acknowledged when interpreting the findings of Study II. One of the main limitations concerns the low external validity due to the population sampling. Although the sample was certainly not distress-free, the majority of participants were Caucasian female students, thus, limiting the generalization of findings. Additionally, it is likely that due to the online survey, the sample was not truly representative of the general population (Evans & Mathur, 2005). The samples responding to online surveys are often limited to those who have e-mails and/or internet access (Sue & Ritter, 2007).

Although almost half of the participants met screening criteria for a possible PTSD diagnosis, the degree to which the findings can be directly applied to PTSD patients is unclear. The fact that the data collection occurred within a community sample might have influenced the findings and increased the risk for Type II error. Still, the importance of measuring clinically relevant phenomena in non-clinical samples prior to validating their significance in clinical samples has been acknowledged by previous studies (Maack et al., 2012). Future research should, therefore, focus on replicating the current findings in patients with chronic PTSD. As raised by the systematic review in Chapter 9, future studies should also examine the mediating effects of ER and EA/PI in patients receiving treatment.

Another limitation concerns the reliance on self-reported measures. Although all measures demonstrated good reliability in the current sample, it is well acknowledged that responses on these measures are often influenced by the willingness and ability of the respondents to respond accurately (Gawronski & de Houwer, 2014). Future researchers should, therefore, consider experimentally manipulating EA and ER by instructing participants to avoid/accept or suppress/reappraise, for instance, emotions and thoughts. It is important to note, however, that the validity of such designs may be limited by the artificial nature of laboratory tasks (Kashdan & Breen, 2007).

Given that the data collection of the current study occurred prior to the development of DSM-5, the LEC and PCL-C measures parallel the PTSD DSM-IV criteria. As a result, fewer participants were identified as having experienced a traumatic event. Taking this into account, future research should consider replicating the findings of Study II with the use of psychometrically sound measures consistent with the DSM-5 PTSD diagnostic criteria. Another drawback concerns the use of AAQ-II. Although findings from the current study suggest that it is distinct from measures of anxiety and ER, the question of whether it captures the full concept of EA and/or psychological inflexibility remains unanswered. Although, more research is warranted to address the doubts raised in regards to AAQ-II, researchers are encouraged to consider employing various measures

to capture the full concept of EA. For instance, SEM models permit the use of multiple tools to construct a latent variable reflecting EA. Nevertheless, given the previous successful use of AAQ-II and the fact that only recently doubts were raised regarding its validity (e.g. Wolgast, 2014) its inclusion as a measure of EA in the current study was well justified.

The interpretation of the results, in respect to the mediation models, is limited by the cross-sectional nature of the data. Although mediation analysis enables the test of possible causal mechanisms (Shrout & Bolger, 2002) cross-sectional studies preclude inferences about causality. Taking this into consideration, the mediation models should be interpreted as plausible links between the relationships under study and not as causal pathways. Future longitudinal research is, therefore, warranted to provide a better picture of the temporal order or direction that may exist between posttraumatic stress, ER, EA, and QoL. For instance, studies following trauma survivors over time may permit the measurement of early posttraumatic stress symptoms and how these lead to avoidant behaviours and to decreased QoL. Additionally, studies assessing levels of ER and EA pre- and post-exposure to traumatic events may provide further insight into the exact nature of these relationships.

Finally, despite the importance of the mediation models under study, it is possible that there are other models that may successfully explain the impact of PTSD severity on QoL. Alternative and competing models were considered, where applicable, but given that the indirect effects were complementary, there are other possible mediators that can further explain this relationship. Thus, future work should focus on elucidating the mechanisms through which PTSD impacts trauma survivors' functioning and QoL. To this end, researchers should consider employing multiple/parallel mediation models as they permit direct comparison between the mediators.

13.5 Strengths and implications

Despite the aforementioned limitations, the current study had several noteworthy methodological strengths with important implications in clinical practice. The structural and measurement models explored in the current study are important and useful additions to the literature of trauma and coping. Additionally, the use of the WHOQOL-BREF-R has enhanced current findings given its favourable psychometric properties.

An important aspect of this study included its statistical techniques. Analyses were explored using robust and modern methods as a way of dealing with non-normal data. Given the limitations pertaining to data transformation techniques and non-parametric tests, robust procedures are considered to maximise the accuracy and power of the results, as they control Type I error and also maintain adequate statistical power (Erceg-Hurn & Mirosevich, 2008). Another related strength concerns the mediation technique. As reported in the systematic review, a great part of existing work has employed the causal steps by Baron and Kenny (1986) and Kenny et al. (1998) for mediation testing, despite its several drawbacks. Thus, unlike previous research on this topic, the current study complied with the advancement in the statistical methods by employing SEM, which is a more robust and powerful way of assessing mediation models (Hayes, 2009).

Given that current research on EA and ER has focused primarily on individual mediation models, this is the first study to the authors' knowledge that has simultaneously explored the underlying effects of EA/PI and ER. The parallel mediation model employed by the current study enabled for comparisons between the two mediators. Testing ER and EA/PI in the same model presents a more accurate representation of reality, as often such mechanisms co-occur and possibly affect one another. Thus, the examination of multiple mediators in the same model may provide important guidance for practice. Although the importance of ER in this relationship is acknowledged, therapists should consider focusing on promoting acceptance and willingness, as it would be an efficient way of enhancing QoL and ER skills. Human emotions, although phenomenologically distinct from other forms of psychological events (e.g. thoughts, beliefs, sensations)

should be attended to with the same behavioural principles and sources of control as these other types of human action (Boulanger et al., 2010). Indeed, existing studies indicate that ACT-based and Mindfulness-based treatments that promote willingness, flexibility and acceptance were found to improve functioning, QoL, and ER (Gratz & Gunderson, 2006; Price & Herting, 2013; Tull et al., 2007c).

Remarkably, the majority of existing studies have focused on the difficulties in ER using the DERS measure. Therefore, to date, studies have not examined the mediating role of the antecedent- and response-focused ER strategies as proposed by Gross (1998a). Despite the dearth of previous research in this area, to the authors' knowledge this is the first work of its kind to examine the mediating role of cognitive reappraisal and expressive suppression in the trauma literature, and more specifically in the association between PTSD and QoL. These findings contribute to our understanding of how precedent- and response-focused ER strategies are implicated in such relationships. Given, however, that the low power might have occurred from the inclusion of non-clinical samples, these results should be replicated in clinical samples with chronic PTSD. Future research efforts should consider focusing on EA/PI, as current results indicated that relative to EA/PI, ER is a weak mediator.

Another strength of the current study involves the consideration of current theories around EA/PI and ER and the investigation of competing models. Given that currently, there is no consensus as to whether ER is better described as a form of EA, or vice versa, it was considered important to explore both scenarios. In fact, "…success in SEM is determined by whether the analysis dealt with substantive theoretical issues regardless of whether a model is retained" (Kline, 2011, p.190). In fact, this was the first study to the authors' knowledge to achieve this through complex serial mediation models.

Although preliminary, results from Study II addressed some of the questions raised in the greater literature of coping by highlighting the relationship between ER and EA/PI. To the authors' knowledge, this study is the first to employ EFA in order to examine

whether EA/PI (AAQ-II) and ER (ERQ) measure the same phenomenon. Although findings supported their distinct relationship, this topic awaits further analysis with different measures before reaching definite conclusions.

Another strength of this study relates to the data collection method. Despite their drawbacks, online surveys are superior to other methods when it comes to response bias. They are believed to be well suited in situations where participants' tendency toward providing socially desirable answers may threaten data validity (Sue & Ritter, 2007). The fact that participants were prohibited from looking ahead to later questions may have reduced survey bias (Evans & Mathur, 2005). Additionally, the fact the participants were not allowed to omit any questions, has eliminated item non-response (Evans & Mathur, 2005).

Finally, the sample size of the current study satisfied the proposed minimum sample size of 150-200 for mediation and SEM models (Kline, 2011; Warner, 2013). It also exceeded the ideal sample-to-parameters ratio (N:q) of 20:1, with a 25.7:1 ratio (based on the serial models with 14 parameters).

13.6 Conclusions

The findings of the current study add to the body of knowledge regarding the important role of ER and EA/PI in psychological trauma. Given the limitations reported in common mediation techniques, Study II implemented robust and modern techniques for addressing the aims set out for the current study through three stages. The first stage included the investigation of the overlapping relationship between ER and EA/PI. Using a robust methodology, ER and EA/PI were found to be two distinct concepts, with further analyses indicating EA/PI to be a more powerful predictor and underlying mechanism in trauma than ER. Results from Stage II can be considered as a first step towards an integrative mediation model that enables the examination of multiple mediators in the association between PTSD and QoL in individuals exposed to traumatic events. Findings highlighted the maladaptive underlying mechanisms of ER and EA/PI, and that can explain the impact of posttraumatic stress symptoms on individuals' QoL.

Importantly, the final stage of Study II explored the degree to which ER can be better conceptualised as an EA/PI behaviour, or vice versa through competing simple and serial mediation models. Although preliminary, results emphasized that it is not the dysfunctional ER per se that leads to impaired QoL, but the use of inflexible and avoidant behaviours.

Overall, Study II suggests that the impact of PTSD severity on the deterioration of QoL can be explained through the use of ER and EA/PI, and that the use of ER can be explained through the use of EA/PI behaviours. These findings may permit a better understanding of underlying mechanisms in the aftermath of trauma, and their possible interaction. Study II provides guidance for improved future research and promotes the application of treatments designed to promote flexibility and acceptance for tackling EA/PI and ER, and for improving QoL in trauma survivors with PTSD.

Chapter 14

General discussion and conclusions

The two studies of the current thesis brought together existing theoretical and empirical findings into an integrative model of posttraumatic stress and QoL. Overall, findings address important gaps and limitations mentioned in the literature and make a significant contribution in the area of trauma and QoL. The current thesis aimed to explore a mediation model in which several post-trauma risk factors act as underlying mechanisms to explain the exacerbation of symptoms and the deterioration of QoL in trauma survivors. Considering, however, the complexity of the QoL concept, and the concerns raised regarding its measurement, it was considered essential to investigate this potential pathway using a robust QoL measure. Therefore, rather than using existing tools of QoL, the current thesis aimed to revise the existing WHOQOL-BREF QoL measure, prior to the investigation of path models. To this end, the aims of the current thesis were divided into two studies.

Study I sought to address the limitations and concerns related to the widely used WHOQOL-BREF by revising one of its most problematic domains, that of social relationships. In comparison to the original studies, Study I took into consideration the advancements in statistics with the use of modern and robust methods for the development of the revised measure. The thorough psychometric analysis employed for the revision of the scale highlighted several important limitations about its overall structure. Despite the improvement of the social relationships domain, results suggested that the structure of the scale was problematic as a whole. A 3-factor, and not a 4-factor as initially thought, WHOQOL-BREF provided a better representation of the concept with more favourable psychometric qualities. The WHOQOL-BREF-R represents an adequate revision of the existing measure and it is believed to provide an accurate and comprehensive measurement of QoL. Its short form and

favourable psychometric qualities make it a powerful tool for use in research and clinical practice.

With the use of the more valid and reliable WHOQOL-BREF-R Study II sought to bring together existing theories and empirical findings from the trauma literature into an integrative model. Study II provided a thorough and critical review of the literature focusing on PTSD symptomatology, ER strategies and EA. Drawing on previous findings, it was considered important to examine the relationship between strategies of ER and EA and whether they can be incorporated into one model assessing the impact of PTSD on QoL. Confirming the study hypotheses, both ER and EA/PI were found to be core mechanisms pertaining to the aetiology of decreased QoL in trauma survivors. Despite their similarities and their important role in explaining the association between PTSD and QoL, ER and EA/PI were found to be two related, but distinct concepts. Data supported that EA/PI may be a more powerful underlying mechanism compared to ER, and most importantly, ER can be conceptualised to be functioning through behaviours of EA/PI. More precisely, the impact of ER on QoL was found to be mediated through EA/PI. Although preliminary, these results suggest that it is not only the unsuccessful ER that impacts QoL, but also the inflexible attempts to avoid or remain in contact with unwanted experiences (Blackledge & Hayes, 2001). Whilst they can be adaptive, the rigid and inflexible use of ER strategies place them in the center of psychopathology and impaired QoL. The conceptualization of ER as a form of EA/PI may be particularly important in the area of acceptance and mindfulness, as future studies can focus on promoting flexibility and acceptance for diminishing the use of maladaptive forms of EA/PI and ER, and for improving QoL in trauma survivors with PTSD.

Certainly, findings from the current thesis still await further analyses resorting to different populations, measures and designs. However, both studies provide guidance to improved future research and make a significant contribution in the areas of trauma and QoL, which can be considered as a step towards a better conceptualization of these concepts and respective treatment.

THE UNIVERSITY
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Development of the Revised WHOQOL-BREF Quality of Life Assessment: Towards a Mediation Model on Quality of Life and Posttraumatic Stress

Study I & II

Appendices

Appendix 1

The WHOQOL-BREF-R Group

Table 1. *The WHOQOL-BREF-R Group*

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Appendix 2

Pilot WHOQOL-BREF-R

Measure not available due to copyright restrictions

Appendix 3

The Satisfaction with Life Scale

Measure not available due to copyright restrictions

Appendix 4

The Hospital Anxiety and Depression Scale

Measure not available due to copyright restrictions

Appendix 5

Cutoff criteria in the assessment of SEM model fit

The degree to which a model fits the data well is of central importance to researchers who use SEM (Tomarken & Waller, 2003). In general, most can agree that a model fits well when there is a minimal discrepancy between the model-implied population covariance matrix and the observed sample covariance matrix (Barrett, 2007; Hayduk, Cummings, Boadu, Pazderka-Robinson, & Boulianne, 2007; Kline, 2011; Tomarken & Waller, 2003). There are two ways in which one can assess the fit of the model. First, the chi-square statistic (χ^2) tests the null hypothesis (H0) that the specified model fits perfectly in the population. In practice, however, some discrepancy is highly likely. By accepting the H0 ($p > .05$) one can argue that the model "fits" the data well. A "non-fitting" model would entail a statistically significant chi-square.

One of the limitations around the χ^2 statistic concerns the fact that researchers in the model testing do not strive for perfection but to a close approximation of reality (Kline, 2011; Tomarken & Waller, 2003). To some degree, that discrepancy might even appear by chance alone (Hayduk et al., 2007). As Steiger (2007) points out, SEM models are highly restrictive, and thus have very low likelihood of fitting precisely to the data. Bigger correlations between observed variables may lead to inflated χ^2 values (Kline, 2011), while with large samples even very small deviations often lead to model rejection (Kline, 2011; Millsap, 2007; Tomarken & Waller, 2003). Such small deviations could be attributed to minor misspecification in an otherwise sound model (Millsap, 2007). Therefore, due to the limitations of the χ^2, the second, and most commonly used alternative way is the fit indices. Approximate Fit Indices (AIF) are considered to assess the degree of fit or misfit on a more continuous metric (Tomarken & Waller, 2003) compared to the dichotomous χ^2 statistic.

Many SEM textbooks (e.g. Kline, 2011; Tabachnick & Fidell, 2013; Wang & Wang, 2012) propose using the cutoff criteria for AFI proposed by Hu and Bentler (1999), who substituted the existing flexible rules of thumb with more stringent ones. In brief, they suggested that values ≥ .95 for TLI, BL89, CFI, RNI, and Gamma Hat, ≥ .90 for Mc; ≤. 08 for SRMR, and ≤ .06 for RMSEA are needed before we can conclude that there is a relatively good fit between the hypothesized model and the observed data. However, and despite the fact that the authors pointed to potential limitations in the application of such guidelines (e.g. concerns regarding generalizability), many have adopted their proposed criteria almost as "golden rules". Thus currently, they are the most commonly used cutoff values in the area of SEM. However, as Markland (2007) notes, golden rules are elusive. Many have challenged this (Barrett, 2007; Kline, 2011; Marsh, Hau, & Wen, 2004) on the grounds that very often researchers adopt criteria that describe their models as fitting, rather than criteria that assess whether or not their models fit (Markland, 2007). In one of his papers on the matter, Barrett (2007) has highly criticized the use of cutoff values, as he argues that many researches have "actively avoided the statistical test of fit of their models, in favor of a collection of ad hoc indices which are forced to act like 'tests of fit' rather than indices of 'degree of approximation discrepancy'" (p. 819). In fact, he proposed to solely rely on the χ^2 statistic and even ban any kind of AFI. Many have criticized his recommendations, while a study by Miles and Shevlin (2007) supported that relying on the χ^2 alone is not the best approach. Barrett (2007) does not appear to take account of the fact that the χ^2 null hypothesis significance test is unreasonable, as it proposes that the SEM model should be expected to have a perfect fit (Goffin, 2007). This is not the standard researchers aim to reach. SEM models are best considered as "potentially useful approximations of reality, not perfect reflections of it" (Goffin, 2007, p. 835). Besides, a perfect fit does not suggest by any means that the model is actually the correct model, at most one can conclude that it may be one of the several potentially plausible models that are consistent with the data (Hayduk et al., 2007; Tomarken & Waller, 2003). As Steiger (2007) cautiously suggests, failure to reject the H0 should never be mistaken for "good fitting models".

In his paper, Barrett (2007) raises some important concerns regarding the AFI (see Kline, 2011), however, SEM is not merely about the AFI. One can use SEM to "ascertain the extent to which the endogenous variables, which often comprise real-world outcomes such as behaviours, are predicted by the exogenous variables, simply by examining the total effects, direct effects, indirect effects and proportions of variance accounted for" (Goffin, 2007, p. 834). Kline (2011) suggests that since a favourable value of a statistic is not able by itself to indicate acceptable fit, and since AFI do not provide information as to whether the results are theoretically meaningful, other diagnostic information should be reported about the model, of the type that are not indicated by fit statistics alone (e.g. variance correlation matrix). Along the same line, Marsh et al. (2004) suggested that instead of searching for a golden rule, researchers should interpret their models based on substantive and theoretical issues that are likely to be idiosyncratic to a particular study (e.g. by comparing competing models).

Thus, it can be concluded that AFI are not the universal truth and therefore should not be used arbitrarily as "golden rules", nor should they be generalized. However, they are still useful in providing information in determining model fit (Miles & Shevlin, 2007), at least to the extent they can facilitate progress in research (Markland, 2007). Miles and Shevlin (2007) make an important argument that, as with so much else, "we should never behave like automatons and rely on any one measure of fit… Instead we should consider our fit indices as a whole, in conjunction with the sample size, the estimated reliability of our measures (estimated from the size of the correlations) and the model complexity" (p. 874). As Markland (2007) concludes, the cutoff criteria proposed by Hu and Bentler (1999) are at least more stringent than others, and are less likely to lead to accepting poor-fitting model.

Appendix 6

Self-audit checklist for Level 1 ethics review

University of Edinburgh,

School of Health in Social Science

RESEARCH ETHICS COMMITTEE

The audit is to be conducted by investigators:

- ***For funded research***: *the Principal Investigator.*
- ***For other research conducted by members of academic staff:*** *the academic staff member.*
- ***Postdoctoral research fellows:*** *the research fellow in collaboration with the mentor or proposed mentor.*
- ***Postgraduate research students*** *(PhD and Masters by Research): the student in collaboration with the supervisor(s).*
- ***Taught Masters dissertation students*** *and* ***Undergraduate dissertation/project students:*** *the student in collaboration with the dissertation/project supervisor*

Note: all members of staff and students should conduct the self-audit level of ethics review of their proposed research as part of the proposal process.

1. IRAS or LOCAL AUTHORITY/SOCIAL WORK ethical review
Does the project require IRAS review or other external review including by bodies abroad? **NO**

2. Protection of research subject confidentiality
Are there any issues of CONFIDENTIALITY which are not ADEQUATELY HANDLED by normal tenets of academic confidentiality? **NO**

These include well-established sets of undertakings that may be agreed more or less explicitly with collaborating individuals/organisations, for example, regarding:
(a) Non-attribution of individual responses;
(b) Individuals and organisations anonymised in publications and presentation;
(c) Specific agreement with respondents regarding feedback to collaborators and publication.

3. Data protection and consent
Are there any issues of DATA HANDLING and CONSENT which are not ADEQUATELY DEALT WITH and compliant with established procedures? **NO**

These include well-established sets of undertakings, for example regarding:
(a) Compliance with the University of Edinburgh's Data Protection procedures (see www.recordsmanagement.ed.ac.uk);

(b) Respondents giving consent regarding the collection of personal data;
(c) No special issues arising about confidentiality/informed consent;
(d) application for Caldicott Guardian approval.

4. Moral issues and Researcher/Institutional Conflicts of Interest
Are there any SPECIAL MORAL ISSUES/CONFLICTS OF INTEREST? **NO**

(a) An example of conflict of interest would be a financial or non-financial benefit for him/herself or for a relative of friend.
(b) Particular moral issues or concerns could arise, for example where the purposes of research are concealed, where respondents are unable to provide informed consent, or where research findings would impinge negatively/differentially upon the interests of participants.

5. Potential physical or psychological harm, discomfort or stress
(a) Is there a SIGNIFICANT FORSEEABLE POTENTIAL FOR PSYCHOLOGICAL HARM OR STRESS for participants? **NO**
(b) Is there a SIGNIFICANT FORSEEABLE POTENTIAL FOR PHYSICAL HARM OR DISCOMFORT? **NO**
(c) Is there a SIGNIFICANT FORSEEABLE RISK TO THE RESEARCHER? **NO**

6. Bringing the University into disrepute
Is there any aspect of the proposed research which might bring the University into disrepute? **NO**

7. Vulnerable participants
Are any of the participants or interviewees in the research vulnerable, e.g. children and young people, people who are in custody or care, such as students at school, self help groups, residents of nursing home? **NO**

8. Duty to disseminate research findings
Are there issues which will prevent all participants and relevant stakeholders having access to a clear, understandable and accurate summary of the research findings? **NO**

Overall assessment

If all the answers are NO, the self-audit has been conducted and confirms the ABSENCE OF REASONABLY FORESEEABLE ETHICAL RISKS.

All students (undergraduate, Masters and Doctoral) lodge completed self-audit forms electronically with their supervisor and/or the Subject Area Research Ethics Co-ordinator as advised in information provided by the subject area. The subject area considers the information provided and either confirm ethical approval or refer the request back to the student.

Postdoctoral research fellows lodge completed self-audit forms electronically with their mentor and/or the Subject Area Research Ethics Co-ordinator as advised in information provided by the subject area. The subject area will consider the information provided and either confirms ethical approval or refers the request back to the postdoctoral researcher.

Academic staff (excluding postdoctoral research fellows) lodge completed self-audit forms electronically with the Subject Area Research Ethics Co-ordinator as advised in information provided by the subject area. The subject area will consider the information provided and log the information or confirm ethical approval or refer the request back to the staff member as appropriate.

If one or more answers to the self-audit is YES, level 2 assessment is required. See the School Research Ethics Policy and Procedures for full details. http://www.ed.ac.uk/schools-departments/health/research/policyandprocedures

Appendix 7

WHOQOL centres in each dataset

Table 7.1 *Original WHOQOL-BREF dataset (N = 11830)*

Centres	*N*
Argentina	106
Brazil	306
Croatia	406
Germany	2408
Hungary	471
Israel	751
Italy	379
India_Madras	420
Malaysia	320
Norway	1047
Russia	300
Spain	659
UK	475
Japan	1453
Australia	211
USA	159
China	50
Greece	48
India_New Delhi	1456
Netherlands	41
Nigeria	50
Romania	50
Turkey	48
Bulgaria	216

Table 7.2 *LIDO dataset (N = 2359)*

Centres	*N*
Israel	383
Spain	472
Australia	437
Brazil	391
USA	366
Russia	310

Table 7.3 *WHOQOL-Old (N = 5566)*

Centres	*N*
Edinburgh	116
Bath	145
Leipzig	354
Barcelona	271
Copenhagen	384
Paris	164
Prague	325
Budapest	333
Oslo	324
Victoria	202
Melbourne	376
Seattle	295
Be'er Sheva	250
Tokyo	188
Umea	455
Brazil	328
Uruguay	248
Turkey	327
Switzerland	139
Lithuania	342

Table 7.4 *WHOQOL-Dis (N = 3772)*

Centres	*N*
Edinburgh	231
Barcelona	248
Paris	19
Prague	283
Tromsø	30
Izmir	307
Vilnius	302
Sicily	341
Hamburg	141
Tilburg	109
Guangzhou	1000
Porto Alegre	319
Montevideo	125
Budapest	317

Appendix 8

Sociodemographic characteristics of each WHOQOL dataset

Table 8.1 *Original WHOQOL-BREF dataset (N = 11830)*

Continuous variables	Min	Max	*M (SD)*
Age	12	97	45.32 (16.42)

Categorical variables	Groups	Frequency	Percentage
Gender	Male	5600	47.3
	Female	6164	52.1
	Missing	66	0.6
Marital status	Single	2375	20.1
	Married	5460	46.2
	Living as married	318	2.7
	Separated	199	1.7
	Divorced	504	4.3
	Widowed	786	6.6
	Missing	2188	18.5
Education level	Did not finish school	731	6.2
	Primary school	2666	22.5
	Secondary school	3743	31.6
	University and postgraduate	2264	19.1
	Missing	2426	20.5
Health status	Ill/poor health	3857	32.6
	Healthy	4483	37.9
	Missing	3490	29.5

Table 8.2 *LIDO dataset (N = 2359)*

Continuous variables	Min	Max	*M* (*SD*)
Age	17	83	41.61 (14.90)
Years of education	0	20	11.78 (3.48)

Categorical variables	Groups	Frequency	Percentage
Gender	Male	740	31.4
	Female	1619	68.6
Marital status	Never married	635	26.9
	Married	1158	49.1
	Separated	146	6.3
	Divorced	246	10.4
	Widowed	165	7.0
	Missing	9	0.4
Depression group	Depressive symptoms	1177	49.9
	Depressed	1182	50.1

Table 8.3 *WHOQOL-Old dataset (N = 5566)*

Continuous variables	Min	Max	*M (SD)*
Age	57	100	72.52 (8.01)

Categorical variables	Values	Frequency	Percentage
Gender	Male	2298	41.3
	Female	3235	58.1
	Missing	33	0.6
Marital status	Single	295	5.3
	Married	2865	51.5
	Partnered	259	4.7
	Separated	420	7.5
	Widowed	1462	26.3
	Missing	265	4.8
Education level	Unable to read or write	141	2.5
	Primary school	1559	28.0
	Secondary school	1132	20.3
	Trade or technical	936	16.8
	College diploma or	629	11.3
	University degree	907	16.3
	Other	115	2.1
	Missing	147	2.6
Health status	Unhealthy	1534	69.0
	Healthy	3843	27.6
	Missing	189	3.4

Table 8.4 *WHOQOL-Dis dataset (N = 3772)*

Continuous variables	Min	Max	*M (SD)*
Age	16	95	46.10 (17.17)

Categorical variables	Values	Frequency	Percentage
Gender	Male	1984	52.6
	Female	1788	47.4
Marital status	Single	1590	42.2
	Married	1547	41
	Living as married	144	3.8
	Separated	70	1.9
	Divorced	177	4.7
	Widowed	228	6.0
	Missing	16	0.4
Education level	None at all	442	11.7
	Special school	467	12.4
	Primary school	993	26.3
	Secondary school/High school	1297	34.4
	College/University	427	11.3
	Other	120	3.2
	Missing	26	0.7
Health status	Ill/poor health	1861	49.3
	Healthy	1885	50.0
	Missing	26	0.7

Table 8.5 *Russia dataset (N = 9807)*

Continuous variables	Min	Max	*M (SD)*
Age	14	101	41.97 (18.50)

Categorical variables	Values	Frequency	Percentage
Gender	Male	4202	42.8
	Female	5605	57.2
Marital status	Single	2118	21.6
	Married	4677	47.7
	Living as married	974	9.9
	Separated	111	1.1
	Divorced	640	6.5
	Widowed	1061	10.8
	Missing/No answer	226	2.3
Education level	Primary school	2511	25.6
	Secondary school	5401	55.1
	University	1684	17.2
	Post-graduate	25	0.3
	Missing/No answer	186	1.9
Health status	Ill	7454	76.0
	Healthy	2167	22.1
	Missing/No answer	186	1.9

Appendix 9

Item distribution of WHOQOL-BREF items for each dataset

Table 9.1 *Original WHOQOL-BREF (N = 11830)*

	Likert Type Scale %					
Items	1	2	3	4	5	Missing
3 Pain	3.6	12.8	21.3	26.8	35.1	0.4
4 Medication	5.7	15.7	18.5	24.4	35.2	0.5
10 Energy	2.9	11.5	31.3	36.4	17.5	0.2
15 Mobility	3.6	10.7	21.6	35.6	27.0	1.4
16 Sleep	4.6	16.7	22.5	38.5	17.5	0.1
17 Activities	2.7	13.5	24.5	44.4	14.8	0.2
18 Work	4.8	15.4	24.5	40.0	14.8	0.5
5 Positive Feelings	4.9	11.9	35.6	34.9	12.2	0.5
6 Spirituality	4.0	10.6	27.7	38.5	18.4	0.7
7 Think	1.7	11.2	33.9	41.2	11.6	0.4
11 Body	2.8	9.5	29.2	36.1	22.1	0.3
19 Esteem	3.0	12.1	27.9	43.5	12.9	0.5
26 Negative Feelings	3.2	12.7	25.3	41.5	16.9	0.4
20 Relationships	2.4	9.7	23.0	46.2	18.4	0.4
21 Sex	8.3	11.3	30.4	31.0	13.1	6.0
22 Support	2.5	8.3	26.3	44.6	17.7	0.5
8 Safety	3.8	9.9	31.9	41.7	12.3	0.4
9 Environment	3.9	9.5	36.6	38.0	11.5	0.5
12 Finances	8.1	19.0	36.9	24.9	10.8	0.3
13 Information	2.9	11.1	31.9	38.1	15.3	0.6
14 Leisure	7.3	21.2	31.1	28.1	12.0	0.3
23 Home	3.5	9.3	20.9	43.1	22.8	0.4
24 Services	2.9	10.1	25.9	45.5	15.1	0.4
25 Transport	4.4	11.3	22.4	42.0	19.7	0.3

Table 9.2 *LIDO (N = 2359)*

	Likert Type Scale %					
Items	1	2	3	4	5	Missing
3 Pain	4.9	20.6	25.7	25.5	23.1	0.2
4 Medication	4.9	17.9	22.9	26.6	27.2	0.5
10 Energy	5.4	20.3	37.0	30.3	6.7	0.3
15 Mobility	2.5	7.4	22.8	39.1	27.9	0.3
16 Sleep	13.1	32.0	23.2	24.6	6.7	0.4
17 Activities	6.4	25.8	29.7	32.5	5.3	0.3
18 Work	10.0	24.4	26.7	30.7	7.4	0.8
5 Positive Feelings	6.0	23.6	42.0	24.0	4.0	0.4
6 Spirituality	4.6	16.9	36.1	32.0	9.7	0.7
7 Think	2.8	19.1	44.9	26.5	6.4	0.3
11 Body	6.4	14.9	26.6	35.8	15.9	0.4
19 Esteem	8.1	24.0	32.6	27.8	7.2	0.3
26 Negative Feelings	5.2	26.7	36.8	28.0	3.1	0.3
20 Relationships	8.3	18.7	27.5	33.0	12.2	0.3
21 Sex	12.9	20.5	31.8	22.8	8.3	3.6
22 Support	5.6	13.0	29.1	37.6	14.2	0.6
8 Safety	5.0	17.3	41.3	29.8	6.1	0.3
9 Environment	4.7	13.9	41.7	32.0	7.0	0.8
12 Finances	18.7	25.7	32.6	17.2	5.6	0.3
13 Information	1.6	12.5	32.4	41.7	10.0	1.7
14 Leisure	12.8	35.7	28.4	17.8	5.0	0.3
23 Home	8.4	14.6	20.6	40.4	15.6	0.3
24 Services	4.5	9.8	21.8	46.6	17.0	0.3
25 Transport	6.5	13.6	23.1	41.6	14.7	0.5

Table 9.3 *WHOQOL-Old (N = 5566)*

	Likert Type Scale %					
Items	1	2	3	4	5	Missing
3 Pain	2.9	12.9	21.8	28.4	31.7	2.3
4 Medication	4.2	15.5	23.6	28.6	26.0	2.2
10 Energy	2.4	8.5	27.6	41.7	18.1	1.7
15 Mobility	2.6	8.7	17.6	39.1	29.8	2.3
16 Sleep	3.7	14.8	23.2	40.6	16.1	1.7
17 Activities	1.9	8.5	21.0	49.4	16.9	2.1
18 Work	4.0	12.1	24.3	43.6	13.1	2.9
5 Positive Feelings	2.7	6.7	29.0	46.4	13.0	2.3
6 Spirituality	3.7	7.2	27.4	44.7	14.1	2.9
7 Think	1.5	7.8	34.0	43.9	10.6	2.2
11 Body	2.1	6.9	25.6	41.1	22.4	1.9
19 Esteem	1.3	6.2	27.5	49.7	12.9	2.5
26 Negative Feelings	1.5	7.8	23.1	46.9	18.3	2.4
20 Relationships	0.7	4.1	18.3	54.5	19.8	2.5
21 Sex	10.1	12.3	33.4	23.4	6.5	14.2
22 Support	1.4	3.9	21.5	51.7	18.4	3.1
8 Safety	2.0	5.8	29.2	46.8	14.2	2.1
9 Environment	2.0	5.3	28.6	44.8	16.6	2.6
12 Finances	4.7	11.0	31.8	31.8	19.0	1.7
13 Information	1.7	6.9	23.0	44.3	21.6	2.5
14 Leisure	5.0	12.6	23.9	38.1	18.7	1.7
23 Home	1.0	3.5	12.5	45.8	35.4	1.8
24 Services	2.0	6.7	19.3	45.7	24.1	2.1
25 Transport	2.4	7.7	18.1	44.6	23.9	3.2

Table 9.4 *WHOQOL-Dis (N = 3772)*

	Likert Type Scale %					
Items	1	2	3	4	5	Missing
3 Pain	9.1	28.8	33.5	14.7	12.4	1.4
4 Medication	22.6	28.4	26.9	11.3	9.7	1.1
10 Energy	8.5	27.1	38.6	19.6	5.5	0.6
15 Mobility	11.9	23.9	40.7	16.4	6.3	0.8
16 Sleep	7.6	21.7	39.2	23.5	7.3	0.8
17 Activities	8.0	24.3	44.6	19.1	3.2	0.8
18 Work	13.5	26.8	38.1	16.0	3.1	2.5
5 Positive Feelings	8.0	19.6	45.6	20.7	5.4	0.7
6 Spirituality	6.4	20.0	41.7	21.5	8.9	1.4
7 Think	6.8	21.7	42.6	21.1	7.0	0.8
11 Body	8.1	18.9	41.5	21.0	9.8	0.7
19 Esteem	6.3	21.3	43.5	23.0	4.9	1.1
26 Negative Feelings	8.5	27.7	33.3	24.1	5.5	1.0
20 Relationships	5.8	15.1	37.7	30.6	9.8	1.0
21 Sex	16.3	14.8	31.7	14.5	3.9	18.8
22 Support	6.5	16.1	37.0	27.7	11.0	1.6
8 Safety	6.8	17.7	46.4	22.4	5.9	0.8
9 Environment	7.4	17.6	43.5	23.9	6.3	1.2
12 Finances	19.6	29.0	33.3	12.4	4.9	0.8
13 Information	8.6	21.4	38.9	21.6	8.2	1.3
14 Leisure	11.6	26.6	35.2	18.6	6.7	1.4
23 Home	4.5	15.2	40.7	27.6	10.9	1.1
24 Services	4.7	18.6	43.9	25.4	6.2	1.2
25 Transport	7.2	19.1	41.0	24.9	6.7	1.1

Table 9.5 *Russia (N = 9807)*

	Likert Type Scale %					
Items	1	2	3	4	5	Missing
3 Pain	3.5	11.4	34.1	19.8	20.7	0.5
4 Medication	4.5	13.0	30.5	21.0	30.5	0.4
10 Energy	3.3	11.4	34.3	37.2	13.7	0.0
15 Mobility	1.3	5.9	19.9	39.5	32.6	0.7
16 Sleep	6.0	15.2	17.9	41.7	19.1	0.1
17 Activities	3.3	11.6	17.6	50.4	16.9	0.3
18 Work	5.6	10.4	15.2	47.6	20.6	0.6
5 Positive Feelings	11.2	17.9	47.4	16.7	5.3	1.5
6 Spirituality	5.3	9.3	40.0	31.8	13.5	0.2
7 Think	1.6	6.2	35.7	44.1	12.4	0.1
11 Body	2.3	6.4	29.6	42.8	18.7	0.2
19 Esteem	3.8	10.3	22.8	44.3	18.3	0.5
26 Negative Feelings	1.5	25.9	35.3	32.9	4.0	0.4
20 Relationships	2.5	7.0	19.5	50.7	19.8	0.5
21 Sex	9.9	8.4	21.8	31.1	21.0	7.7
22 Support	4.7	9.5	27.7	45.4	12.2	0.5
8 Safety	3.9	9.7	49.5	29.5	7.3	0.1
9 Environment	3.0	12.6	45.3	32.0	6.8	0.3
12 Finances	25.5	37.4	24.4	10.7	2.0	0.1
13 Information	1.9	7.0	35.8	44.5	10.4	0.4
14 Leisure	17.2	29.8	30.1	17.0	4.6	1.3
23 Home	7.6	13.7	19.1	44.1	15.4	0.2
24 Services	8.6	19.3	29.8	34.7	7.4	0.2
25 Transport	14.1	13.9	25.1	32.7	9.8	4.5

Appendix 10

Histogram of total WHOQOL-BREF score for each dataset

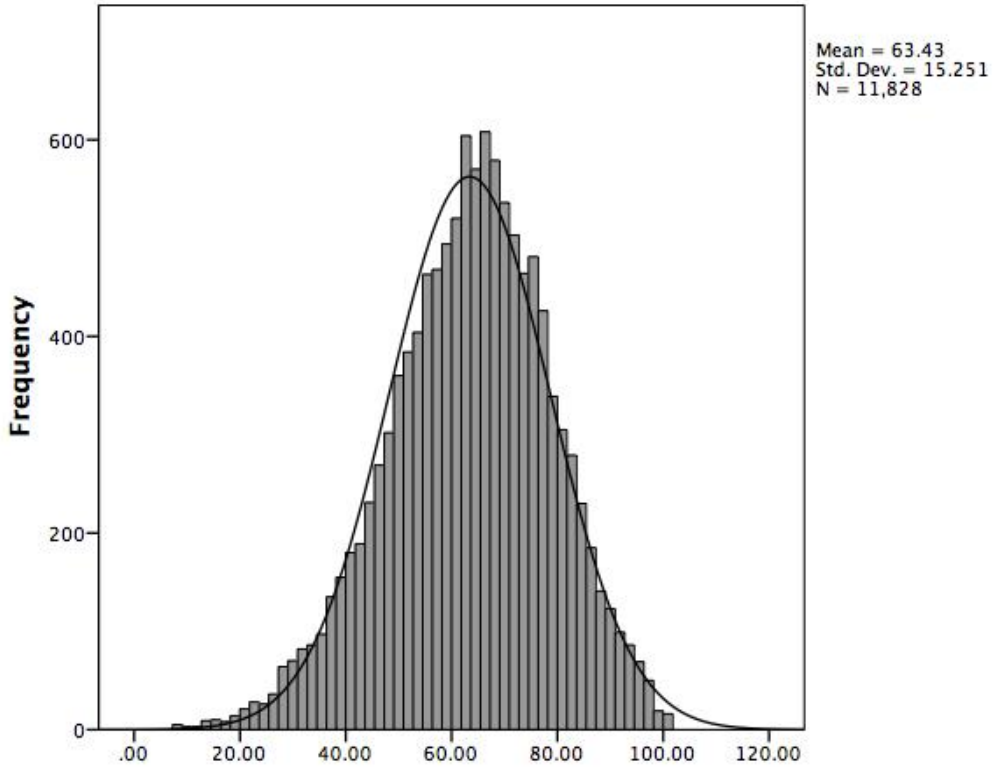

Figure 10.1 Original WHOQOL-BREF dataset

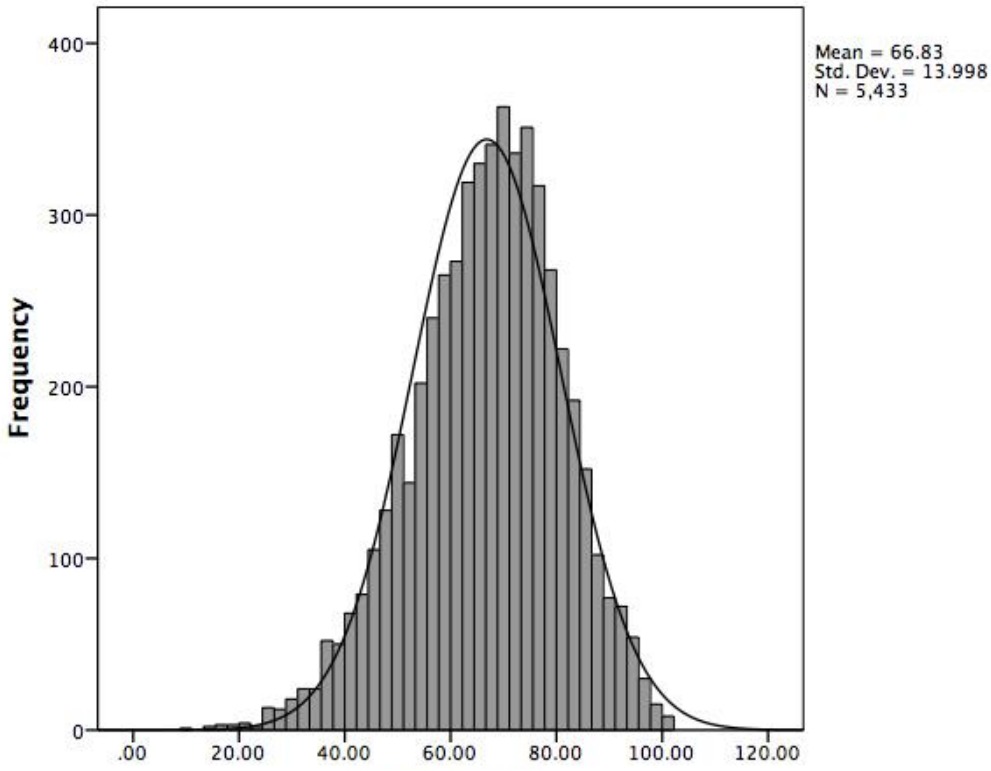

Figure 10.2 WHOQOL-Old dataset

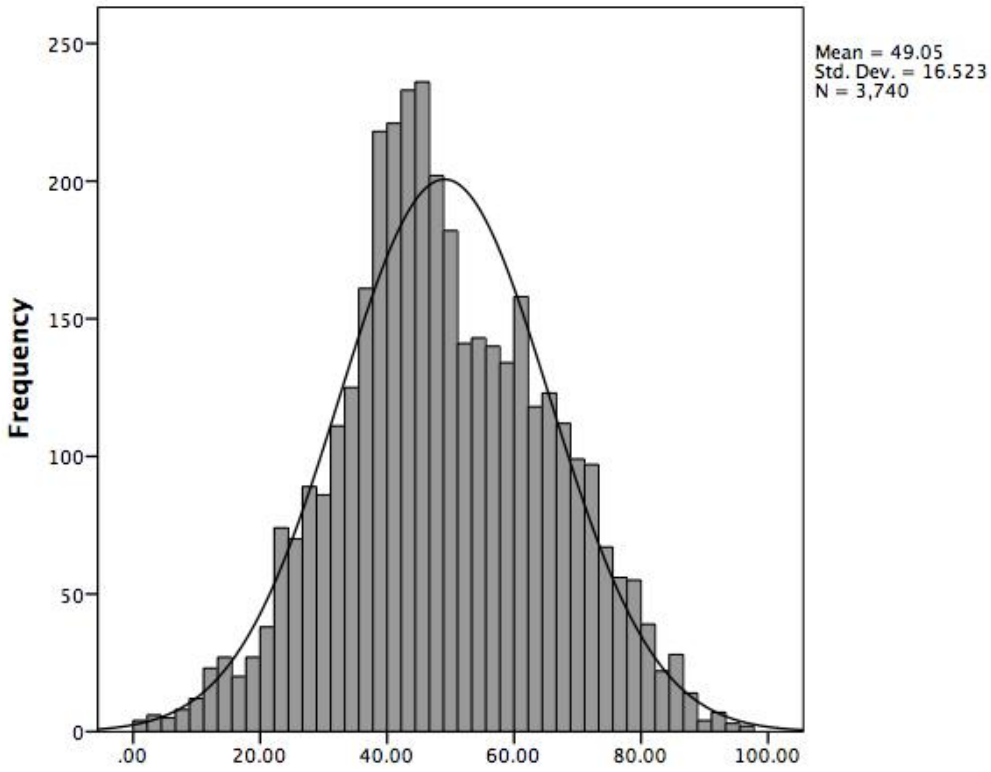

Figure 10.3 WHOQOL-Dis dataset

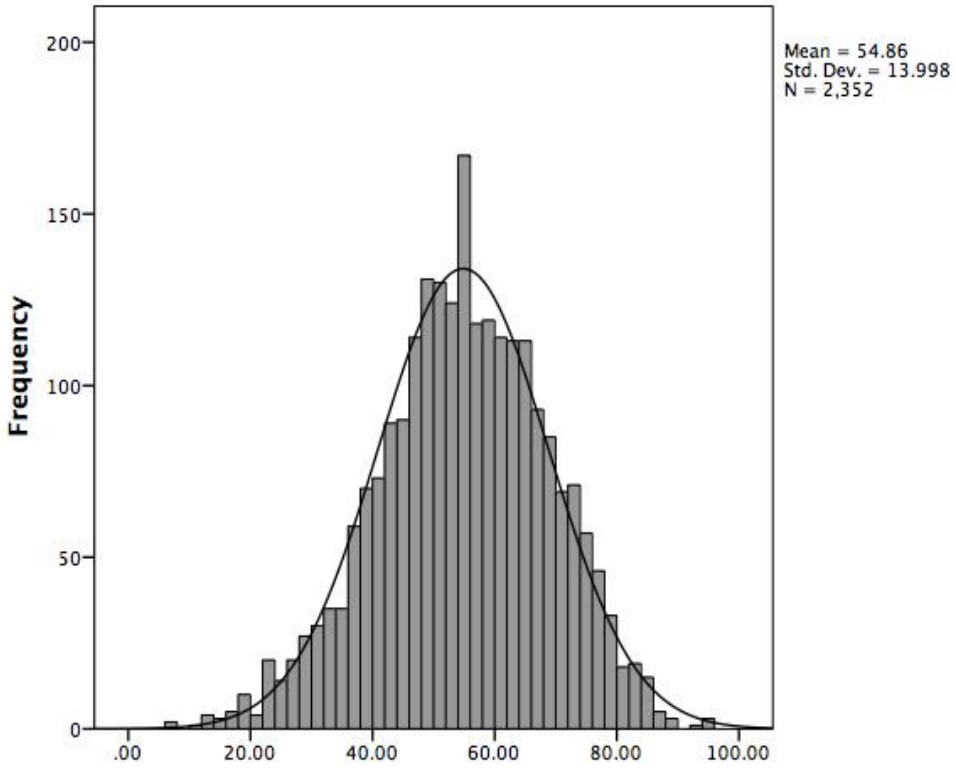

Figure 10.4 LIDO dataset

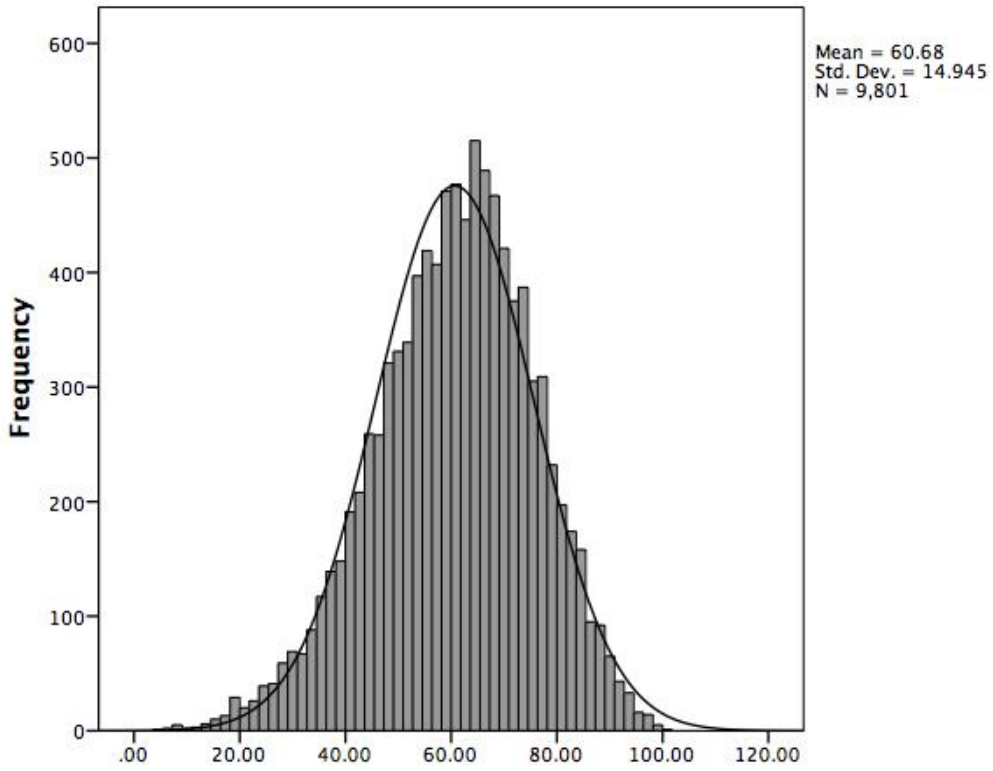

Figure 10.5 Russia dataset

Appendix 11

Correlation analyses for each dataset

Table 11.1 *Original WHOQOL-BREF (N = 11830)*

	Domain 1: Physical	Domain 2: Psychological	Domain 3: Social Relationships	Domain 4: Environment
3 Pain	**0.49**	0.31	0.16	0.28
4 Medication	**0.49**	0.31	0.17	0.22
10 Energy	**0.64**	0.65	0.42	0.51
15 Mobility	**0.55**	0.50	0.35	0.49
16 Sleep	**0.47**	0.47	0.35	0.40
17 Activities	**0.70**	0.61	0.46	0.50
18 Work	**0.66**	0.57	0.43	0.43
5 Positive Feelings	0.53	**0.64**	0.48	0.54
6 Spirituality	0.46	**0.65**	0.47	0.49
7 Think	0.48	**0.54**	0.38	0.45
11 Body	0.45	**0.52**	0.40	0.47
19 Esteem	0.57	**0.64**	0.55	0.50
26 Negative Feelings	0.48	**0.50**	0.38	0.39
20 Relationships	0.40	0.59	**0.57**	0.50
21 Sex	0.38	0.44	**0.45**	0.35
22 Support	0.32	0.44	**0.48**	0.46
8 Safety	0.49	0.58	0.40	**0.50**
9 Environment	0.35	0.42	0.33	**0.50**
12 Finances	0.35	0.45	0.35	**0.56**
13 Information	0.41	0.47	0.37	**0.55**
14 Leisure	0.45	0.43	0.32	**0.47**
23 Home	0.31	0.40	0.43	**0.53**
24 Services	0.25	0.31	0.32	**0.49**
25 Transport	0.33	0.35	0.32	**0.51**

Note. In bold are the corrected-r values

Table 11.2 *LIDO (N = 2359)*

	Domain 1: Physical	Domain 2: Psychological	Domain 3: Social Relationships	Domain 4: Environment
3 Pain	**0.50**	0.19	0.05	0.20
4 Medication	**0.48**	0.22	0.06	0.23
10 Energy	**0.59**	0.57	0.32	0.37
15 Mobility	**0.51**	0.32	0.18	0.33
16 Sleep	**0.40**	0.42	0.29	0.26
17 Activities	**0.69**	0.55	0.33	0.35
18 Work	**0.63**	0.47	0.27	0.32
5 Positive Feelings	0.42	**0.59**	0.42	0.46
6 Spirituality	0.32	**0.55**	0.37	0.35
7 Think	0.38	**0.44**	0.33	0.32
11 Body	0.35	**0.44**	0.31	0.30
19 Esteem	0.49	**0.63**	0.49	0.41
26 Negative Feelings	0.37	**0.52**	0.37	0.31
20 Relationships	0.26	0.51	**0.53**	0.37
21 Sex	0.25	0.39	**0.39**	0.23
22 Support	0.19	0.34	**0.38**	0.39
8 Safety	0.33	0.53	0.36	**0.42**
9 Environment	0.20	0.30	0.27	**0.43**
12 Finances	0.30	0.33	0.24	**0.51**
13 Information	0.24	0.31	0.24	**0.43**
14 Leisure	0.28	0.32	0.25	**0.42**
23 Home	0.23	0.29	0.33	**0.45**
24 Services	0.24	0.24	0.22	**0.40**
25 Transport	0.21	0.19	0.17	**0.41**

Note. In bold are the corrected-r values

Table 11.3 *WHOQOL-Old (N = 5566)*

	Domain 1: Physical	Domain 2: Psychological	Domain 3: Social Relationships	Domain 4: Environment
3 Pain	**0.61**	0.38	0.25	0.36
4 Medication	**0.55**	0.33	0.22	0.28
10 Energy	**0.68**	0.62	0.37	0.55
15 Mobility	**0.69**	0.50	0.33	0.49
16 Sleep	**0.40**	0.42	0.32	0.36
17 Activities	**0.76**	0.60	0.41	0.54
18 Work	**0.71**	0.57	0.39	0.47
5 Positive Feelings	0.50	**0.64**	0.46	0.53
6 Spirituality	0.42	**0.62**	0.44	0.45
7 Think	0.43	**0.47**	0.33	0.45
11 Body	0.42	**0.47**	0.34	0.45
19 Esteem	0.53	**0.61**	0.46	0.46
26 Negative Feelings	0.44	**0.45**	0.35	0.38
20 Relationships	0.38	0.55	**0.51**	0.46
21 Sex	0.36	0.39	**0.38**	0.31
22 Support	0.32	0.43	**0.48**	0.45
8 Safety	0.45	0.58	0.38	**0.59**
9 Environment	0.37	0.45	0.31	**0.54**
12 Finances	0.34	0.40	0.31	**0.57**
13 Information	0.43	0.49	0.38	**0.61**
14 Leisure	0.50	0.46	0.33	**0.47**
23 Home	0.34	0.43	0.42	**0.58**
24 Services	0.32	0.34	0.32	**0.55**
25 Transport	0.40	0.40	0.35	**0.55**

Note. In bold are the corrected-r values

Table 11.4 *WHOQOL-Dis (N = 3772)*

	Domain 1: Physical	Domain 2: Psychological	Domain 3: Social Relationships	Domain 4: Environment
3 Pain	**0.57**	0.47	0.33	0.43
4 Medication	**0.47**	0.38	0.30	0.30
10 Energy	**0.66**	0.63	0.44	0.51
15 Mobility	**0.52**	0.42	0.29	0.37
16 Sleep	**0.43**	0.46	0.37	0.42
17 Activities	**0.72**	0.58	0.42	0.45
18 Work	**0.66**	0.57	0.41	0.43
5 Positive Feelings	0.56	**0.71**	0.52	0.56
6 Spirituality	0.55	**0.74**	0.55	0.56
7 Think	0.51	**0.57**	0.49	0.54
11 Body	0.54	**0.61**	0.48	0.54
19 Esteem	0.60	**0.67**	0.55	0.52
26 Negative Feelings	0.49	**0.57**	0.50	0.51
20 Relationships	0.47	0.66	**0.65**	0.61
21 Sex	0.40	0.45	**0.43**	0.38
22 Support	0.43	0.58	**0.59**	0.62
8 Safety	0.52	0.62	0.48	**0.56**
9 Environment	0.39	0.52	0.45	**0.60**
12 Finances	0.39	0.44	0.42	**0.58**
13 Information	0.44	0.53	0.50	**0.64**
14 Leisure	0.44	0.46	0.42	**0.54**
23 Home	0.38	0.53	0.54	**0.65**
24 Services	0.38	0.45	0.45	**0.62**
25 Transport	0.37	0.42	0.42	**0.53**

Note. In bold are the corrected-r values

Table 11.5 *Russia (N = 9807)*

	Domain 1: Physical	Domain 2: Psychological	Domain 3: Social Relationships	Domain 4: Environment
3 Pain	**0.62**	0.44	0.26	0.31
4 Medication	**0.64**	0.47	0.30	0.37
10 Energy	**0.68**	0.68	0.42	0.49
15 Mobility	**0.69**	0.59	0.36	0.39
16 Sleep	**0.60**	0.54	0.39	0.41
17 Activities	**0.74**	0.62	0.45	0.45
18 Work	**0.73**	0.62	0.42	0.42
5 Positive Feelings	0.49	**0.58**	0.42	0.49
6 Spirituality	0.45	**0.59**	0.41	0.41
7 Think	0.54	**0.54**	0.37	0.39
11 Body	0.52	**0.53**	0.39	0.42
19 Esteem	0.66	**0.64**	0.54	0.49
26 Negative Feelings	0.44	**0.42**	0.34	0.38
20 Relationships	0.41	0.52	**0.52**	0.42
21 Sex	0.37	0.43	**0.44**	0.33
22 Support	0.34	0.41	**0.32**	0.43
8 Safety	0.38	0.45	0.30	**0.43**
9 Environment	0.33	0.36	0.27	**0.41**
12 Finances	0.32	0.42	0.32	**0.52**
13 Information	0.30	0.36	0.30	**0.39**
14 Leisure	0.42	0.48	0.37	**0.51**
23 Home	0.20	0.29	0.32	**0.42**
24 Services	0.35	0.36	0.30	**0.51**
25 Transport	0.25	0.28	0.29	**0.39**

Note. In bold are the corrected-r values

Appendix 12

Correlation analyses for the module items of WHOQOL-Dis

Table 12 *Overall correlations between the 4 domains of WHOQOL-BREF and module items*

Disabilities module Items		Domain 1: Physical	Domain 2: Psychological	Domain 3: Social Relationships	Domain 4: Environment
28	Discrimination	0.35	0.47	0.48	0.54
29	Advocacy	0.36	0.47	0.40	0.47
30	Future prospects	0.42	0.46	0.35	0.42
31	Control	0.51	0.60	0.50	0.51
32	Choice	0.48	0.59	0.54	0.56
33	Autonomy	0.43	0.57	0.56	0.56
34	Communication ability	0.41	0.58	0.59	0.56
35	Social acceptance	0.40	0.58	0.61	0.61
36	Respect	0.39	0.56	0.58	0.60
37	Social network and interaction	0.51	0.55	0.52	0.59
38	Social inclusion and contribution	0.48	0.52	0.48	0.55
39	Personal potential	0.47	0.57	0.48	0.49

Appendix 13

Correlation analyses for the module items of WHOQOL-Old

Table 13 *Overall correlations between the 4 domains of WHOQOL-BREF and module items*

Old module items		Domain 1: Physical	Domain 2: Psychological	Domain 3: Social Relationships	Domain 4: Environment
1	Senses impairments	0.42	0.35	0.25	0.31
2	Loss of sensory abilities	0.46	0.36	0.25	0.33
10	Sensory functioning problems	0.34	0.28	0.20	0.24
20	Rate sensory functioning	0.47	0.42	0.30	0.39
03	Own decisions	0.32	0.40	0.26	0.41
04	Control of future	0.38	0.44	0.31	0.41
05	People respect freedom	0.27	0.38	0.32	0.44
11	Doing things I like	0.55	0.48	0.32	0.45
12	Continue achieving	0.51	0.57	0.39	0.50
13	Received recognition	0.30	0.47	0.40	0.46
15	Satisfied with achievements	0.26	0.45	0.36	0.39
19	Happy to look forward	0.45	0.54	0.43	0.49
14	Have enough to do	0.43	0.45	0.35	0.39
16	Satisfied with use of time	0.45	0.53	0.42	0.42
17	Satisfied with activities	0.57	0.54	0.40	0.45
18	Satisfied with participation	0.46	0.45	0.39	0.43
6	Concern about way of dying	0.23	0.25	0.17	0.21
7	Afraid-unable to control death	0.20	0.23	0.17	0.18
8	Scared of dying	0.17	0.21	0.17	0.22
9	Fear pain before death	0.15	0.17	0.13	0.14
21	Sense of companionship	0.30	0.44	0.43	0.36
22	Experience love	0.25	0.42	0.44	0.34
23	Opportunities to love	0.25	0.37	0.40	0.31
24	Opportunities to be loved	0.24	0.40	0.44	0.34

Appendix 14

Item distribution of measures used in Study I

Table 14.1 *Frequencies of HADS items (N = 986)*

	Likert-type scale %				
Items	0	1	2	3	Missing
Anxiety1	8.6	45.3	12.7	4.4	0.0
Anxiety2	24.3	24.5	15.1	6.8	0.2
Anxiety3	8.7	34.0	18.1	10.2	0.0
Anxiety4	18.2	29.5	21.3	2.0	0.0
Anxiety5	23.4	36.5	8.4	2.6	0.0
Anxiety6	27.9	28.6	10.9	3.4	0.2
Anxiety7	37.5	25.1	6.4	2.0	0.0
Depression1	33.6	27.3	7.9	2.0	0.2
Depression2	43.9	19.4	5.9	1.5	0.3
Depression3	30.4	27.4	12.4	0.7	0.1
Depression4	14.9	38.9	11.3	5.8	0.1
Depression5	37.7	21.8	8.6	2.6	0.2
Depression6	40.2	17.6	10.1	2.6	0.4
Depression7	39.6	21.5	7.4	2.5	0.0

Table 14.2 *Frequencies of SWLS items (N = 986)*

	Likert-type Scale %							
Items	1	2	3	4	5	6	7	Missing
SWLS1	3.8	9.5	12.1	16.9	22.8	24.3	8.1	1.5
SWLS2	4.3	9.8	13.1	19.7	21.2	23.3	6.9	1.4
SWLS3	2.5	8.4	11.0	16.2	19.2	30.5	9.6	1.6
SWLS4	3.0	8.8	13.6	15.4	16.9	27.4	12.6	1.3
SWLS5	11.4	14.8	14.2	13.8	15.2	17.1	11.1	1.5

Table 14.3 *Frequencies of Pilot WHOQOL-BREF-R items (N = 986)*

	Likert Type Scale %					
Items	1	2	3	4	5	Missing
3 Pain	3.9	14.3	20.1	27.5	33.9	0.4
4 Medication	6.6	13.6	13.0	24.0	42.2	0.6
10 Energy	1.8	8.9	34.1	40.0	15.1	0.1
15 Mobility	2.4	8.0	17.7	36.3	34.5	1.0
16 Sleep	5.4	16.1	28.0	37.7	12.5	0.3
17 Activities	2.9	10.1	25.9	45.6	15.1	0.3
18 Work	4.5	10.2	24.5	45.7	14.5	0.5
5 Positive Feelings	2.1	8.3	31.4	43.	14.6	0.3
6 Spirituality	2.6	4.7	25.7	41.0	25.7	0.4
7 Think	1.4	8.5	37.3	43.0	9.5	0.2
11 Body	2.2	6.8	31.2	40.1	19.0	0.7
19 Esteem	2.5	8.5	29.4	44.6	14.2	0.7
26 Negative Feelings	2.9	11.3	33.2	43.1	9.1	0.4
20 Relationships	1.5	5.5	23.6	49.8	19.4	0.2
21 Sex	6.5	11.1	28.8	35.3	14.1	4.3
22 Support	1.9	7.1	21.8	49.3	19.9	0.0
8 Safety	1.7	7.1	30.8	47.5	12.4	0.5
9 Environment	2.8	8.2	40.4	39.7	8.7	0.2
12 Finances	5.9	19.4	48.4	16.4	9.4	0.5
13 Information	1.2	10.0	35.6	38.5	14.0	0.6
14 Leisure	4.3	21.0	36.1	29.3	9.0	0.3
23 Home	3.1	9.4	24.5	41.7	21.1	0.1
24 Services	3.9	8.2	26.7	42.6	18.2	0.5
25 Transport	4.6	9.1	23.9	45.0	17.3	0.0
27 - Dis33	1.7	11.9	31.7	34.2	20.3	0.2
28 - Dis34	1.5	6.6	29.5	42.9	19.3	0.2
29 - Dis35	0.9	7.0	28.5	45.8	17.5	0.2
30 - Dis36	1.1	5.3	29.7	45.3	18.5	0.1
31 - Old03	1.0	7.1	23.4	46.5	21.9	0.1
32 - Old04	4.1	10.1	37.4	35.3	12.9	0.2
33 - Old05	1.5	8.4	31.6	45.6	12.8	0.0
34 - Old21	5.2	9.4	21.5	40.3	3.0	0.6
35 - Old23	4.3	8.3	20.7	34.8	31.8	0.1

Appendix 15

P-P Plots and histograms of measures used in Study I – Revised dataset

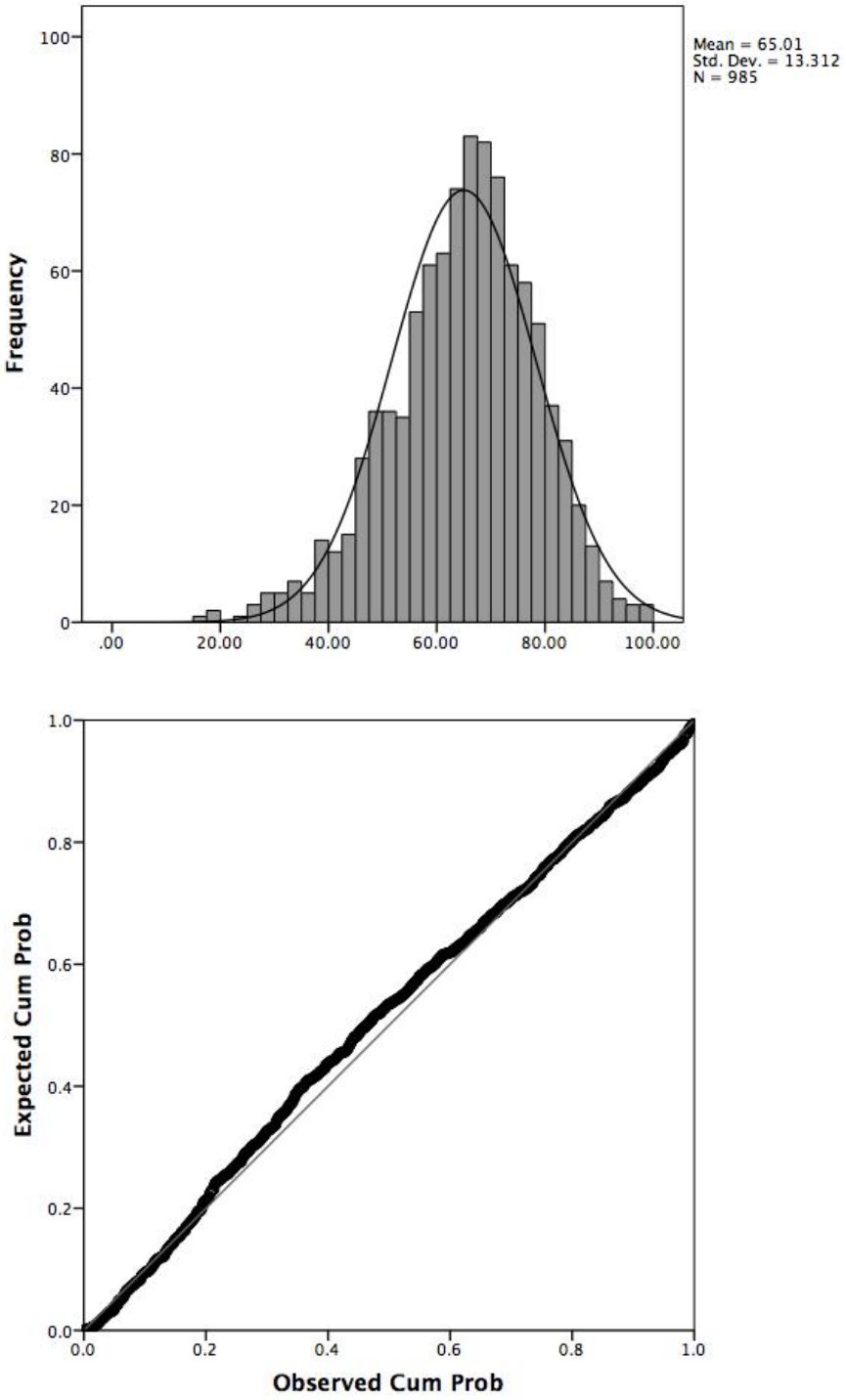

Figure 15.1 WHOQOL-BREF

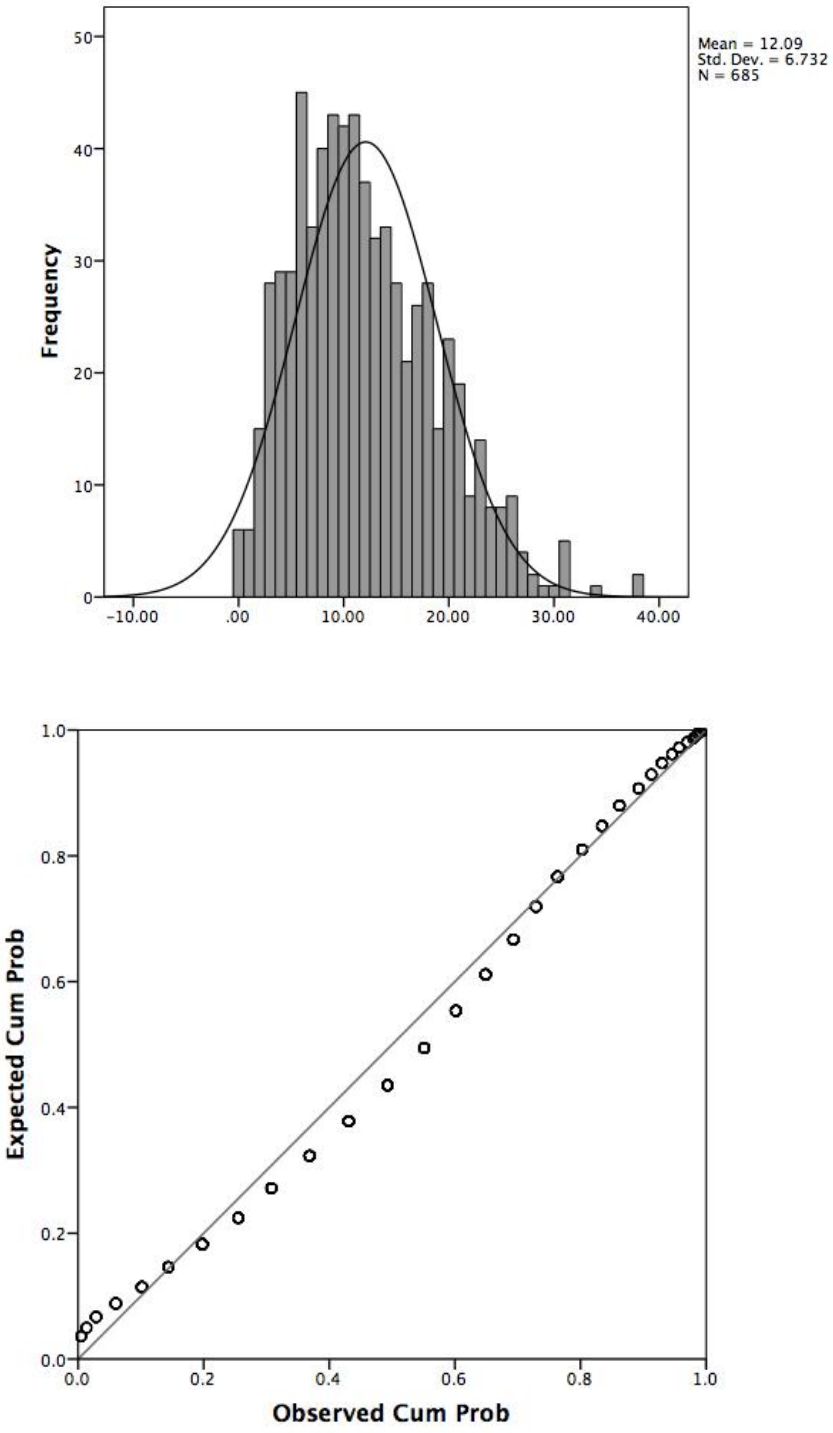

Figure 15.2 HADS total score

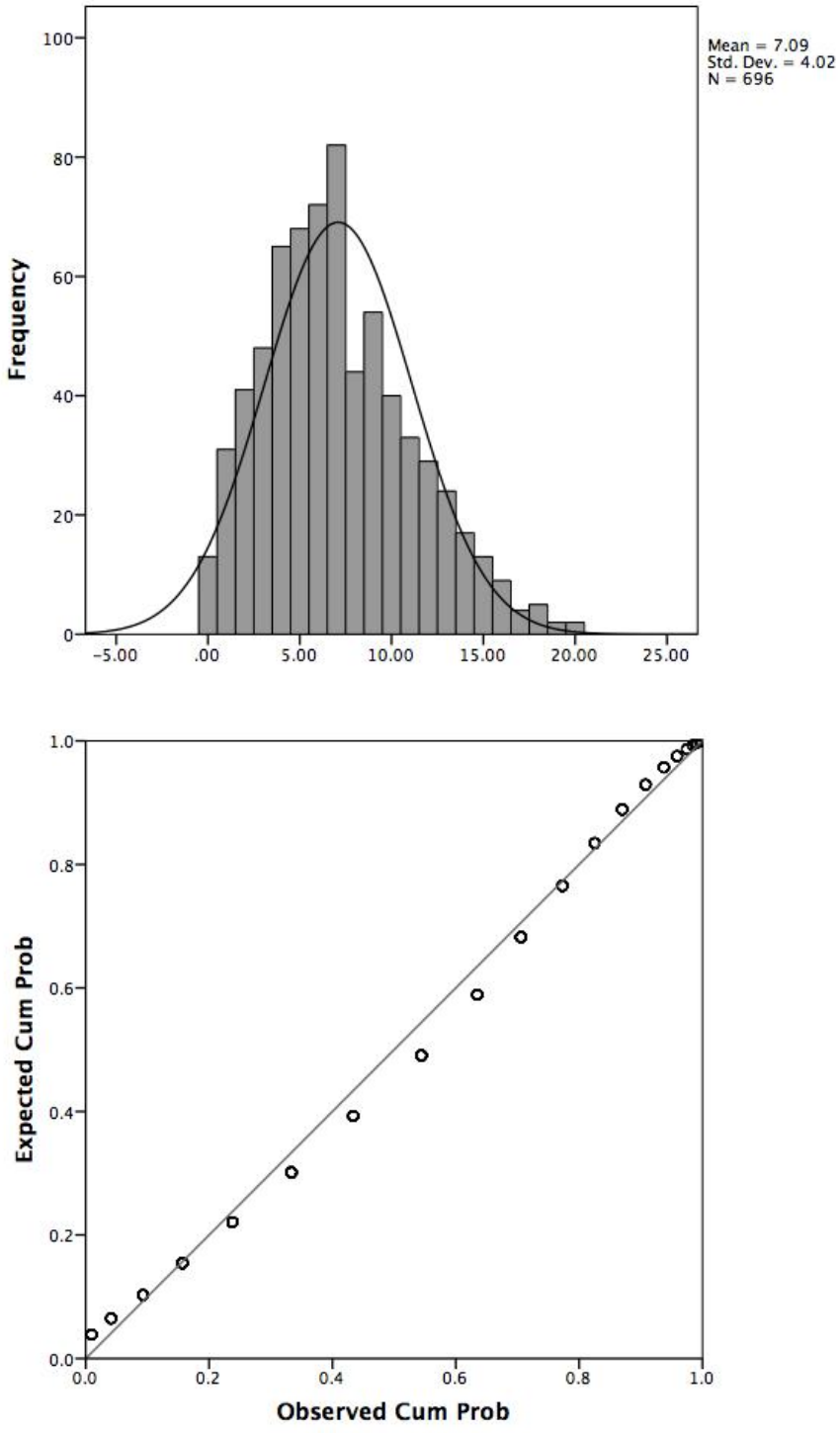

Figure 15.3 HADS-Anxiety subscale

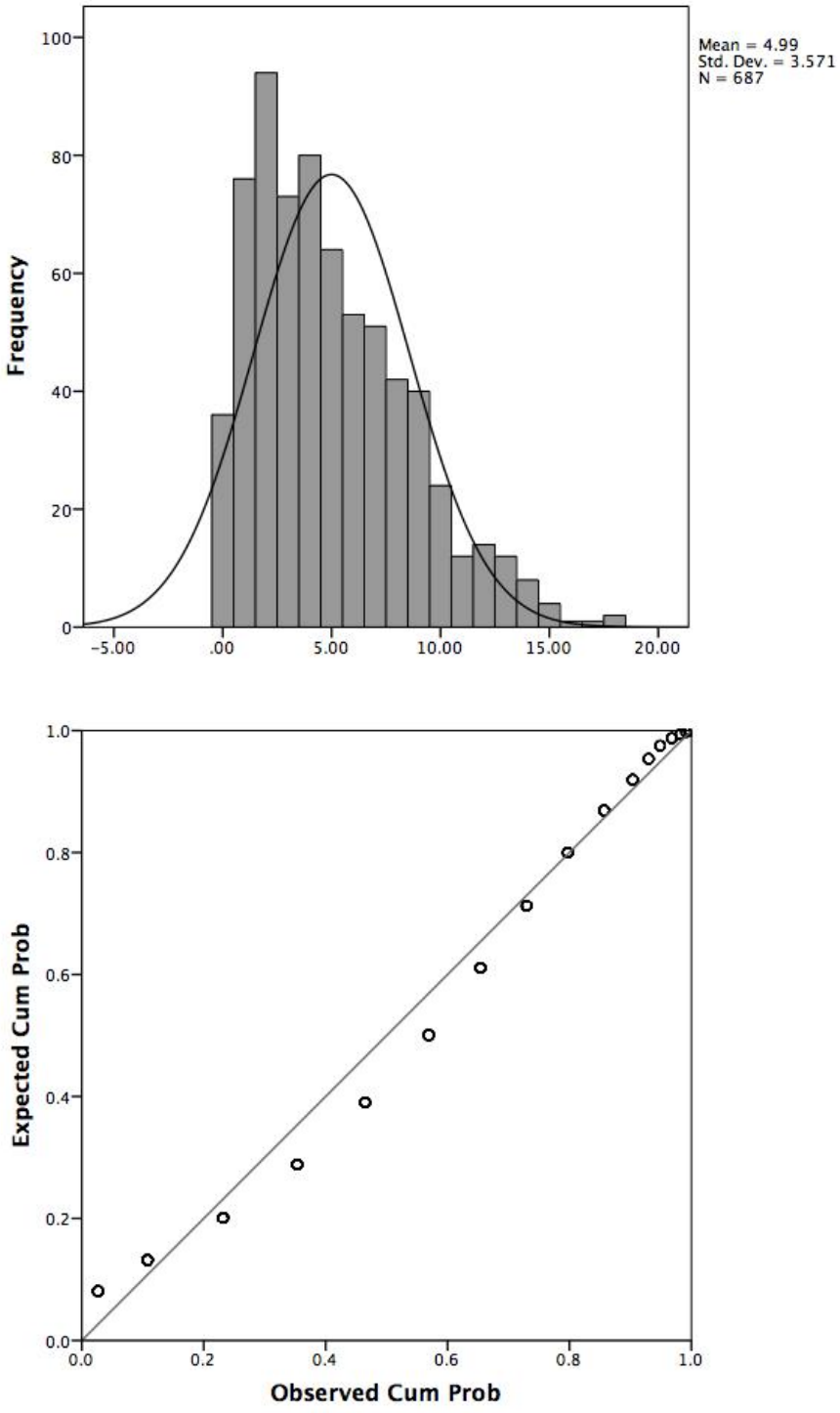

Figure 15.4 HADS-Depression subscale

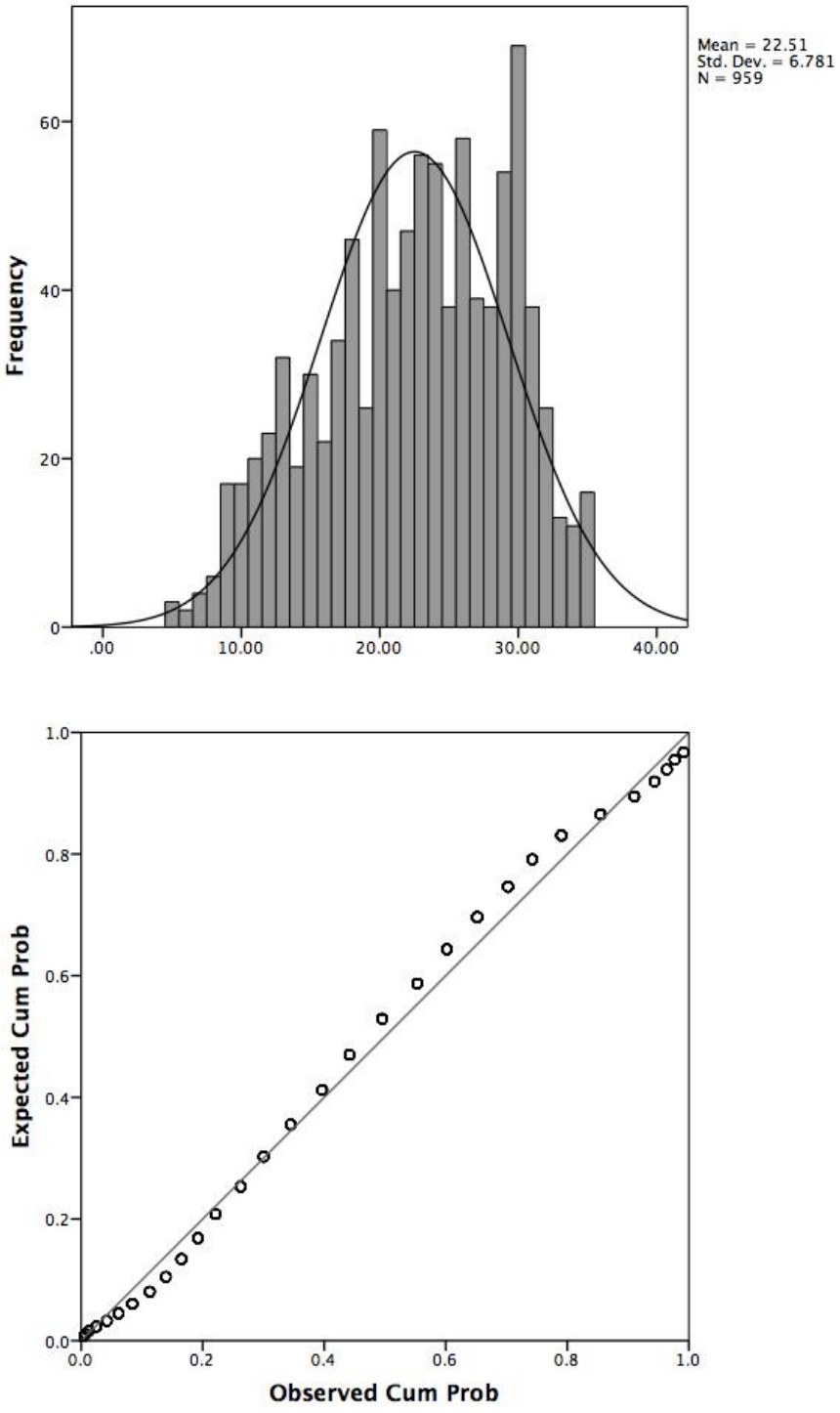

Figure 15.5 SWLS

Appendix 16

Factor extraction methods

16.1 Introduction

Researchers are presented with several important choices when determining the number of factors to extract (Steger, 2006), as the factorial structure of psychological measures has long been considered an important aspect of construct validity (Nunnally, 1978). However, one issue that sometimes escapes scrutiny is choosing the most appropriate method for factor extraction. Due to the extensive methods available and the controversial issues around factor extraction, it was deemed important to describe such methods and detail the strategy applied in this study.

16.2 Methods

16.2.1. The eigenvalue rule

Various methods have been proposed over the years but the Kaiser's criterion, also known as the eigenvalue > 1 rule (Kaiser, 1960), is the most widely used method for retaining factors (Costello & Osborne, 2005; Thompson & Daniel, 1996). Kaiser's criterion is based on the assumption that an eigenvalue represents the amount of information captured by a factor. Given that an eigenvalue of 1.0 contains the same proportion of total information as a typical item (DeVellis, 2012), factors with eigenvalues below 1.0 account for less variance than a single item, and thus should not be retained (Kaiser, 1960). The majority of researchers, including the WHOQOL Group, have been using the eigenvalue rule as it is the default option in many statistical packages and it is a very appealing method because of its simplicity and objectivity (Brown, 2015; Costello & Osborne, 2005). However, as DeVellis (2012) questions "…what about factors that are only slightly above 1.0? Does a factor that explains 1% more information of than the typical items really offer the sort of condensation of information we are after?" (p. 128). Oftentimes it does not, while in fact in many occasions the eigenvalue rule has been found to overestimate the number of factors to retain (Brown, 2015; Costello & Osborne, 2005; DeVellis,

2012; Henson & Roberts, 2006). As there has been a unanimous criticism regarding the accuracy of this method (Costello & Osborne, 2005), researchers have been discouraged from using it (Patil et al., 2008; Velicer, Eaton, & Fava, 2000).

16.2.2 Scree test

Whilst the scree test (Cattell, 1966) is based on the eigenvalues, it was shown to be more accurate than the eigenvalue rule (Henson & Roberts, 2006). It is a graphical representation in which the eigenvalues lie on the vertical axis and the factors lie on the horizontal axis. The right number of factors can be determined by looking at the drop, sometimes referred to as the "elbow", in eigenvalue magnitude (i.e. amount of information across factors).

The scree plot is good at separating the important factors from the rest (Fayers & Machin, 2007) and despite being more accurate than the eigenvalue rule it has received some criticisms. More precisely, it was found to overextract factors (Henson & Roberts, 2006) while problems may arise when there is not an obvious drop or when there are in fact several drops (Velicer et al., 2000). Results on the scree test under such circumstances can be ambiguous and open to subjective judgment and representation (Brown, 2015; Costello & Osborne, 2005; Hayton et al., 2004; Tabachnick & Fidell, 2013; Velicer et al., 2000). Raîche, Walls, Magis, Riopel, and Blais (2013) recently proposed some numerical solutions with promising results that deal with the limitations of the scree tests, although more research is needed to validate this method.

16.2.3 MAP test

Even though the majority of researchers have a preference for the eigenvalue rule and the scree test, other more accurate methods such as the Minimum Average Partial Test (MAP; Velicer, 1976) and Parallel Analysis (PA; Horn, 1965) are available for retaining factors. MAP was developed for use with Principal Component Analysis and computes the average squared off-diagonal partial correlations, after each component/factor is partialed out. Factors are extracted until the minimum average squared partial correlation is reached. This indicates how

much common variance remains in the data after extracting *n* components. Velicer et al. (2000) proposed a revision of the procedure that works in the exact same way but uses the average partial correlations raised to the 4th power, which was found to perform better than the original method. MAP was shown to be a more valid method than the eigenvalue rule and the scree test (Zwick & Velicer, 1986), and despite not being part of common statistical softwares, O'Connor (2000) has provided the syntax for conducting MAP analysis using SPSS, SAS or MATLAB. It has, however, been suggested that at times it extracts too few factors, which is why it may be better to be used alongside PA (McCoach et al., 2013).

16.2.4 Parallel analysis

PA as initially proposed by Horn (1965) and later revised by others (e.g. Glorfeld, 1995) is considered to be one of the most accurate methods for deciding the right number of factors to retain (Hayton et al., 2004; O'Connor, 2000; Zwick & Velicer, 1986). As with MAP test, PA has been undermentioned in the literature as it is not implemented in conventional statistical packages (Costello & Osborne, 2005; Thompson & Daniel, 1996). However, O'Connor (2000) has provided the syntax for SPSS, SAS, and MATLAB needed for conducting Parallel Analysis (PA), while Watkins (2006) presented two freeware programs that implement PA on Macintosh and Windows operating systems.

In short, PA "involves extracting eigenvalues from random data sets that parallel the actual data set with regards to the number of cases and variables… The eigenvalues derived from the actual data are then compared to the eigenvalues derived from the random data" (O'Connor, 2000, p. 397). Factors retained are those with eigenvalues greater than the eigenvalues from the random data (O'Connor, 2000). Thus, unlike any other method, PA ensures that the factors retained can account for more variance that what would be expected by chance alone. PA is based on a statistical criterion and thus has wider acceptability than other subjective methods (DeVellis, 2012). In fact, this makes it probably one the most accurate procedures for retaining factors (Henson & Roberts, 2006).

In their study, Zwick and Velicer (1986) compared the performance of several

criteria for factor retention, and found that the eigenvalue rule was consistently overestimating the number of factors. The scree test was found to be more accurate than the eigenvalue rule but also showed a tendency towards overextraction. MAP was found to be accurate under many conditions while PA was shown to be the most accurate method for retaining factors.

16.2.4.1 Parallel analysis with Principal Components Analysis vs. Principal Axis Factoring

O'Connor's syntax enables the conduct of PA with either the use of Common/Principal Axis Factoring (PAF) or Principal Components Analysis (PCA). A detailed reference in the difference between the two is beyond the scope of this chapter. However, in short, they both aim at reducing a number of items into factors/components, although in PCA all the variance (including error and unique variance) for each of the observed variables is used for analysis, whereas in PAF only the shared common variance between observed variables is available for use (Tabachnick & Fidell, 2013). McCoach et al. (2013) argue that trying to explain the total variance may be more reasonable than trying to explain only the common/shared variance, which will probably be quite small. However, there is limited consensus as to which of the two methods should be implemented in PA. It was shown that PCA-PA tends to underfactor (McCoach et al., 2013) while PAF-PA tends towards overextraction (Buja & Eyuboglu, 1992; McCoach et al., 2013). Velicer et al. (2000) suggests using PCA-PA in the initial stages of the analysis, especially since PA and MAP were developed primarily for PCA (Patil et al., 2008). Others recommend conducting PA using both the PCA and PAF methods and compare the results (McCoach et al., 2013). However, given the lack of consensus on the matter, many suggest using PA in conjunction with the MAP test (Hayton et al., 2004; Velicer et al., 2000).

16.3 Conclusion

Given the recommendations on this matter, there is a clear agreement that one should use multiple methods for retaining factors (McCoach et al., 2013; Velicer et al., 2000) (Thompson & Daniel, 1996; Williams, Brown, & Onsman, 2010). Ultimately,

the aforementioned methods should be used as a guide only, as the interpretability of the final solution is also an important part (Velicer et al., 2000). The researchers should always base their decision on their knowledge of the subject area and the results of the analyses (McCoach et al., 2013).

Appendix 17

Factor extraction for 19-item WHOQOL-BREF-R

Table 17.1 *Parallel analysis for 19-item WHOQOL-BREF-R (N = 986)*

		Random EV	
Factors	EV	Median EV	95th EV
1	5.82	1.26	1.30
2	1.70	1.21	1.24
3	1.58	1.17	1.20
4	.99	1.14	1.17

Note. Based on 10000 random datasets. EV = eigenvalues; 95th = 95th percentile

Table 17.2 *MAP test for 19-item WHOQOL-BREF-R (N = 986)*

	Average partial correlations	
No. of components	Squared	Fourth power
.00	.0804	.0111
1.00	.0190	.0013
2.00	.0192	.0013
3.00	.0163	.0008
4.00	.0194	.0011

Appendix 18

Final WHOQOL-BREF-R

Measure not available due to copyright restrictions

Appendix 19

DSM PTSD diagnostic criteria

Table 19 *DSM PTSD diagnostic criteria*

	DSM-III American Psychiatric Association (1980)	DSM-IV American Psychiatric Association (2000)	DSM-V American Psychiatric Association (2013)
A.	The person has experienced an event that is outside the range of usual human experience and that would be markedly distressing to almost anyone	The person has been exposed to a traumatic event in which both of the following have been present: 1. The person has experienced, witnessed, or been confronted with an event or events that involve actual or threatened death or serious injury, or a threat to the physical integrity of oneself or others. 2. The person's response involved intense fear, helplessness, or horror. Note: in children, it may be expressed instead by disorganized or agitated behavior.	Exposure to actual or threatened death, serious injury, or sexual violence in one (or more) of the following ways: 1. Directly experiencing the traumatic event(s). 2. Witnessing, in person, the event(s) as it occurred to others. 3. Learning that the traumatic event(s) occurred to a close family member or close friend. In cases of actual or threatened death of a family member or friend, the event(s) must have been violent or accidental. 4. Experiencing repeated or extreme exposure to aversive details of the traumatic event(s) (e.g., first responders collecting human remains: police officers repeatedly exposed to details of child abuse). Note: Criterion A4 does not apply to exposure through electronic media, television, movies, or pictures, unless this exposure is work related.

B.	The traumatic event is persistently re-experienced in at least one of the following ways: 1. Recurrent and intrusive, distressing recollections of the event (in young children, repetitive play in which themes or aspects of the trauma are expressed) 2. Recurrent distressing dreams of the event 3. Sudden acting or feeling as if the traumatic event were recurring (including "flashback" or dissociative episodes, whether or not intoxicated) 4. Intense psychological distress at exposure to events that symbolize or resemble an aspect of the traumatic event, including anniversaries	The traumatic event is persistently re-experienced in at least one of the following ways: 1.Recurrent and intrusive distressing recollections of the event, including images, thoughts, or perceptions. 2.Recurrent distressing dreams of he event. 3.Acting or feeling as if the traumatic event were recurring (includes a sense of reliving the experience, illusions, hallucinations, and dissociative flashback episodes, including those that occur upon awakening or when intoxicated). 4. Intense psychological distress at exposure to internal or external cues that symbolize or resemble an aspect of the traumatic event. 5. Physiologic reactivity upon exposure to internal or external cues that symbolize or resemble an aspect of the traumatic event	Presence of one (or more) of the following intrusion symptoms associated with the traumatic event(s), beginning after the traumatic event(s) occurred: 1.Recurrent, involuntary, and intrusive distressing memories of the traumatic event(s) 2. Recurrent distressing dreams in which the content and/or affect of the dream are related to the traumatic event(s). 3. Dissociative reactions (e.g., flashbacks) in which the individual feels or acts as if the traumatic event(s) were recurring. (Such reactions may occur on a continuum, with the most extreme expression being a complete loss of awareness of present surroundings.) 4. Intense or prolonged psychological distress at exposure to internal or external cues that symbolize or resemble an aspect of the traumatic event(s). 5. Marked physiological reactions to internal or external cues that symbolize or resemble an aspect of the traumatic event(s)

C.	Persistent avoidance of stimuli associated with the trauma or numbing of general responsiveness, as indicated by at least three of the following: 1. Efforts to avoid thoughts or feeling associated with the trauma 2. Efforts to avoid activities or situations that arouse recollections of the trauma 3. Inability to recall an important aspect of the trauma (psychogenic amnesia) 4. Markedly diminished interest in significant activities (in young children, loss of recently acquired developmental skills such as toilet training or language skills) 5. Feeling of detachment or estrangement from others 6. Restricted range of affect 7. Sense of foreshortened future (e.g., the patient does not expect to live very long or to have a successful career)	Persistent avoidance of stimuli associated with the trauma and numbing of general responsiveness (not present before the trauma), as indicated by at least three of the following: 1. Efforts to avoid thoughts, feelings, or conversations associated with the trauma 2. Efforts to avoid activities, places, or people that arouse recollections of the trauma 3. Inability to recall an important aspect of the trauma 4. Markedly diminished interest or participation in significant activities 5. Feeling of detachment or estrangement from others 6. Restricted range of affect (e.g., unable to have loving feelings) 7. Sense of foreshortened future (e.g., does not expect to have a career, marriage, children, or a normal life span)	Persistent avoidance of stimuli associated with the traumatic event(s), beginning after the traumatic event(s) occurred, as evidenced by one or both of the following: 1. Avoidance of or efforts to avoid distressing memories, thoughts, or feelings about or closely associated with the traumatic event(s). 2. Avoidance of or efforts to avoid external reminders (people, places, conversations, activities, objects, situations) that arouse distressing memories, thoughts, or feelings about or closely associated with the traumatic event(s).

D.	Persistent symptoms of increased arousal (not present before the trauma), as indicated by at least two of the following: 1. Difficulty falling or staying asleep 2. Irritability or outbursts of anger 3. Difficulty concentrating 4. Hyper vigilance 5. Exaggerated startle response 6. Physiological activity upon exposure to events that symbolize or resemble an aspect of the traumatic event	Persistent symptoms of increasing arousal (not present before the trauma), indicated by at least two of the following: 1.Difficulty falling or staying asleep 2. Irritability or outbursts of anger 3. Difficulty concentrating 4. Hyper-vigilance 5. Exaggerated startle response	Negative alterations in cognitions and mood associated with the traumatic event(s), beginning or worsening after the traumatic event(s) occurred, as evidenced by two (or more) of the following: 1. Inability to remember an important aspect of the traumatic event(s) (typically due to dissociative amnesia and not to other factors such as head injury, alcohol, or drugs). 2. Persistent and exaggerated negative beliefs or expectations about oneself, others, or the world (e.g., "I am bad," "No one can be trusted," 'The world is completely dangerous," "My whole nervous system is permanently ruined"). 3. Persistent, distorted cognitions about the cause or consequences of the traumatic event(s) that lead the individual to blame himself/herself or others. 4. Persistent negative emotional state (e.g., fear, horror, anger, guilt, or shame). 5. Markedly diminished interest or participation in significant activities. 6. Feelings of detachment or estrangement from others. 7. Persistent inability to experience positive emotions (e.g., inability to experience happiness, satisfaction, or loving feelings).

E.	Duration of disturbance (symptoms in "B," "C," and "D") of at least one month.	Duration of the disturbance (symptoms in B, C, and D) is more than one month.	Marked alterations in arousal and reactivity associated with the traumatic event(s), beginning or worsening after the traumatic event(s) occurred, as evidenced by two (or more) of the following: 1. Irritable behavior and angry outbursts (with little or no provocation) typically expressed as verbal or physical aggression toward people or objects. 2. Reckless or self-destructive behavior. 3. Hypervigilance. 4. Exaggerated startle response. 5. Problems with concentration. 6. Sleep disturbance (e.g., difficulty falling or staying asleep or restless sleep).
F.		The disturbance causes clinically significant distress or impairment in social, occupational, or other important areas of functioning.	Duration of the disturbance (Criteria B, C, D, and E) is more than 1 month.
G.			The disturbance causes clinically significant distress or impairment in social, occupational, or other important areas of functioning.
H.			The disturbance is not attributable to the physiological effects of a substance (e.g., medication, alcohol) or another medical condition.

Appendix 20

Risk of bias assessment checklist

Risk of bias assessment for cross-sectional and longitudinal studies

Assessed by: _____ Date: _____

Study: _____

	Bias Assessment	
Q1[c]	Was the research question or objective in this paper clearly relevant to the focus of the review? Notes:	Yes □ No □ Cannot determine □ Not reported □ Not applicable □
	Selection bias	
Q2[c]	Were inclusion/exclusion criteria appropriate and not likely to introduce sources of bias? Notes:	Yes □ Partially □ No □ Cannot determine □ Not reported □ Not applicable □
Q3[a]	Were inclusion/exclusion criteria pre-specified and applied uniformly to all participants? Notes:	Yes □ No □ Cannot determine □ Not reported □ Not applicable □
Q4[a,c]	Was the study population clearly specified and defined, and was it relevant to the key question of the review? Notes:	Yes □ No □ Cannot determine □ Not reported □ Not applicable □
*Q5[c]	Was the sampling and recruitment strategy likely to lead to bias? Notes:	Yes □ Partially □ No □ Cannot determine □ Not reported □ Not applicable □
*Q6[b]	Did the strategy for recruiting participants into the study differ across participants? Notes:	Yes □ No □ Cannot determine □ Not reported □ Not applicable □

*Q7[c]	Was the percentage of missing data high? *(e.g. above 10%)* Notes:	Yes ☐ No ☐ Cannot determine ☐ Not reported ☐ Not applicable ☐
Q8[c]	Have missing data been handled using appropriate methods? Notes:	Yes ☐ No ☐ Cannot determine ☐ Not reported ☐ Not applicable ☐
	Measures used	
Q9[c]	Were the independent variable(s), outcome variable(s), and mediator(s) clearly defined? Notes:	
	9a. Independent variables	Yes ☐ No ☐ Cannot determine ☐ Not reported ☐ Not applicable ☐
	9b. Outcome variables	Yes ☐ No ☐ Cannot determine ☐ Not reported ☐ Not applicable ☐
	9c. Mediators	Yes ☐ No ☐ Cannot determine ☐ Not reported ☐ Not applicable ☐
Q10[b]	Were valid and reliable measures used to assess inclusion/exclusion criteria, independent/outcome/mediator variables? Notes:	
	10a. Inclusion/exclusion criteria	Yes ☐ Partially ☐ No ☐ Cannot determine ☐ Not reported ☐ Not applicable ☐
	10b. Independent variables	Yes ☐ Partially ☐ No ☐ Cannot determine ☐ Not reported ☐ Not applicable ☐
	10c. Outcome variables	Yes ☐ Partially ☐ No ☐ Cannot determine ☐ Not reported ☐

		Not applicable ☐
	10d. Mediators	Yes ☐ Partially ☐ No ☐ Cannot determine ☐ Not reported ☐ Not applicable ☐
Q11[b]	Were measures implemented consistently across all study participants?	Yes ☐ No ☐ Cannot determine ☐ Not reported ☐
	Notes:	Not applicable ☐
	Confounding	
Q12[b]	Were important confounding variables taken into account in the design and/or analysis?	Yes ☐ Partially ☐ No ☐ Cannot determine ☐ Not reported ☐
	Notes:	Not applicable ☐
	Outcome reporting	
*Q13[b]	Are any primary outcomes missing from the results?	Yes ☐ No ☐ Cannot determine ☐ Not reported ☐
	Notes:	Not applicable ☐
Q14[c]	Were the statistical methods used to assess the mediation adequate, limiting potential for the presentation of invalid results?	Yes ☐ No ☐ Cannot determine ☐ Not reported ☐ Not applicable ☐
	Notes:	
	Overall assessment	
Q15[b]	Are results believable taking study limitations into consideration?	Yes ☐ No ☐
	Notes:	

Overall rating for cross-sectional studies: _____

	Additional questions for longitudinal studies – Attrition bias	
*Q16[c]	Was loss to follow-up rates after baseline concerning?	Yes ☐ No ☐ Cannot determine ☐ Not reported ☐
	Notes:	Not applicable ☐
Q17[d]	Comparison was made between full participants and those lost follow-up	Yes ☐ Partially ☐ No ☐ Cannot determine ☐ Not reported ☐
	Notes:	Not applicable ☐

Overall rating for longitudinal studies: _____

Note: * Reversed items; [a] National Institutes of Health (NIH) - Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies; [b] Agency for Healthcare Research and Quality (AHRQ) - Item Bank for Assessing Risk of Bias and Confounding for Observational Studies of Interventions or Exposures; [c]additional questions relevant to the current review; [d] Scottish Intercollegiate Guidelines Network (SIGN) – Checklist for cohort studies

Questions and instructions for principal investigators

Q1	Did the authors describe their goal in conducting this research? Is it easy to understand what they were looking to find and was it relevant to the focus of the review? For example, was posttraumatic stress either an independent variable or an outcome? Was experiential avoidance explored for its mediating effects in adults with posttraumatic stress?
Q2	Are the inclusion/exclusion criteria adequately described and appropriate for the population of interest and each study's key questions? Were they likely to introduce sources of bias?
Q3	Were the inclusion and exclusion criteria developed prior to recruitment or selection of the study population? Were the same inclusion/exclusion criteria used for all of the participants involved?
Q4	Did the authors describe the group of people from which the study participants were selected or recruited, using demographics and location? If you were to conduct this study again, would you know who to recruit and from where? Also, was the study population relevant to the key objectives of the review? In this case, samples consisted of adults having experienced at least one traumatic event would be considered relevant to the study.
Q5	Were the sampling frame and recruitment described in detail? Details such as setting, type, place and period of recruitment are important, as results may not be useful without sufficient information about the population from which they were obtained. Were these details likely to introduce sources of bias? (e.g. could results be generalized in the population studied?)
Q6	Was the recruitment strategy the same across all participants included in the study?
Q7	With large samples and variables, there is frequently a percentage of missing data. Usually a rate of 5%[1] to 10%[2] of missing data is considered to be an acceptable number. Results may be biased when based on data with missing values greater than 10%. Studies with high values of missing data should also report whether the data were missing at random or not.
Q8	How were missing values dealt with? If only a few cases have missing data, several techniques can be used to handle missing data including deletion (listwise, pairwise) and replacement (using prior knowledge, regression, expectation-maximization, multiple imputation, and inserting mean values)[3]. A well-conducted study should report both the number of missing values and the techniques followed to handle them.
Q9	The independent variable(s), the outcome(s), and the mediator(s) should be clearly defined.
Q10	Were all measures described in detail? Were the measures used reliable and valid? Clearly described and reliable measures should increase the confidence in the quality of the study. In general, measures should be considered valid and reliable if their psychometric properties (reliability, validity) were established in previous studies with similar populations. *Reliability:* In general, the reliability of a measure could be established through internal consistency with a Cronbach alpha cutoff value of .70[4], or through test-retest reliability with a correlation coefficient cutoff of .80[4]. *Validity:* A measure will be known to possess good known-groups validity if it was found to differentiate between two groups that were expected to differ (e.g. healthy vs. clinical). Good convergent validity is demonstrated when the measure of interest is correlated strongly with relevant

	measures. A correlation coefficient above .30 - .40 would be desirable. However, correlations above .80 would indicate poor discriminant validity[5]. The validation of a scale through Confirmatory Factor Analysis would be important but not essential.
Q11	Were all measures applied consistently across participants? It is important whether the variables of interest (independent variables, outcomes, and mediators) were assessed in the same manner across all participants; if not, bias may result.
Q12	Confounding, whereby additional factors are associated with the independent variable(s) and the outcome(s), may distort the relationship between the variables of interest. Each study should indicate whether potential confounders have been considered, and how they have been appropriately accounted for.
Q13	Are any of the primary outcomes that one would expect be reported in the study, missing?
Q14	Were adequate statistical methods implemented to address the mediation limiting potential for the presentation of invalid results?
Q15	This question is intended to capture the overall quality of the study. Consider issues that may limit your ability to interpret the results of the study. Review responses to earlier questions for specific criteria.
Q16	The number of participants that drop out of a study should give concern if the number is very high. Conventionally, a 20% drop out rate is regarded as acceptable, however in longitudinal studies conducted over a long period of time, a higher drop out rate is to be expected. In fact, follow up loss rates up to 70% have been reported for longitudinal studies[6].
Q17	Since higher rates of drop out are expected for longitudinal studies, the decision on whether to downgrade or reject a study should be based on the reasons why participants dropped out. It is always possible that participants who dropped out of the study will differ in some significant way from those who remained part of the study throughout. Serious bias can arise if the reason of withdraw is related to the objectives of the study. In general, a well-conducted study should make efforts in following up participants that withdrew and make any relevant comparisons with those that remained in the study.

Scoring instructions

General scoring	
Yes	3
Partially	2
No	0
Cannot determine	0
Not reported	0
Not applicable	0
Scoring for Question 12	

Note: Reversed items = 5,6,7,13,16 (i.e. reverse YES/NO responses); Possible scoring for cross-sectional studies = 0 – 60; Possible scoring for longitudinal studies = 0 – 66.

Generally, when you evaluate a study, you will not see a "fatal flaw," but you will find some risk of bias. By focusing on the concepts underlying the questions in the quality assessment tool, you should ask yourself about the potential for bias in the study you are critically appraising. For any question you should ask, "What is the potential risk of bias resulting from this flaw in study design or execution?" That is, does this factor cause you

to doubt the results that are reported in the study or doubt the ability of the study to accurately assess an association between exposure and outcome?

The best approach is to think about the questions in the tool and how each one tells you something about the potential for bias in a study. The more you familiarize yourself with the key concepts, the more comfortable you will be with critical appraisal. Examples of studies rated good, fair, and poor are useful, but each study must be assessed on its own based on the details that are reported and consideration of the concepts for minimizing bias.

Good (++) Low risk
Fair (+) Some risk but not sufficient to invalidate the results
Poor (-) High risk
Unclear (?) Unclear risk

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Appendix 21

Online survey demographics questionnaire

Table 21 *Demographic characteristics questionnaire*

About you Are you fluent in English? • Yes • No If your answer was NO then please exit the survey If your answer was YES then please continue
Before you begin we would like to ask you to answer a few general questions about yourself: by choosing the correct answer or by filling in the space provided. Remember: You need to be fluent in English in order to participate
1. Is English your first language? • Yes • No
2. What is your gender? • Male • Female
3. What is your age?
4. What is the highest education you received?

- Not at all
- Primary School
- Secondary School
- Tertiary

5. What is your marital status?

- Single
- Married
- Living as married
- Separated
- Divorced
- Widowed

6. What is your current employment status?

- Full-time employed
- Part-time employed
- Self-employed
- Student
- Unemployed
- Retired

7. Are you currently ill?

- Yes
- No

If something is wrong with your health what do you think it is?

8. What is your nationality?

- 196 Countries[11]
- Other

If you selected "Other" please specify:

9. What is your racial/ethnic background?

- White

[11] A list of 196 countries was provided

- Black/African American
- Asian
- Latino/Latina
- Multiracial
- Other (please specify):

Appendix 22

The PTSD Checklist – Civilian

Measure not available due to copyright restrictions

Appendix 23

The Life Events Checklist

Measure not available due to copyright restrictions

Appendix 24

The Acceptance and Action Questionnaire – II

Measure not available due to copyright restrictions

Appendix 25

The Emotion Regulation Questionnaire

Measure not available due to copyright restrictions

Appendix 26

Online survey participant information sheet

Stressful Life Events, Quality of Life, and Emotions

Welcome!

You are being invited to participate in a research project. Before you decide if you would like to take part, it is important for you to understand why the research is being done and what it will involve.

If you have already completed this online survey, then please exit the survey.

Please take time to read the following information carefully

Purpose of the study:

This study is being conducted by Margarita Panayiotou PhD student in Clinical Psychology under the supervision of Prof. Mick Power at the University of Edinburgh, UK.

The purpose is to:

1. Develop a new scale that measures quality of life and
2. Explore how previous difficult/stressful experiences or events are connected with peoples' quality of life, thoughts, and emotions.

The study has been approved by the School of Health in Social Science Research Ethics Committee, of University of Edinburgh.

What you will do:

You are asked to complete an online survey, which will take approximately 20-25 minutes to complete. The survey includes general demographic information (e.g. age, gender, etc.) and questionnaires concerning your emotions, thoughts, quality of life, and previous difficult/stressful life events.

In order to participate you NEED TO BE FLUENT in ENGLISH as the survey is in english.

Benefits:

You will be contributing in the development of a quality of life scale and a better understanding of the connection between difficult/stressful life events and quality of life, feelings, and thoughts.

As a thank you for your participation, you will be entered into a draw to win one of 3 Amazon vouchers: One £100 voucher, and two £50 vouchers. At the end of the survey, you will be asked to follow a link, where you will provide your e-mail address for the draw purposes.

After the completion of the data collection, we will conduct the draw and the three winners will receive the Amazon voucher via e-mail.

Risks/discomforts:

No risks or discomforts are anticipated from taking part in this survey. However, some questions might cause distress. In case this happens, you can contact the researchers who they will offer you support, and advice on how to seek help. Remember you can also withdraw from the study at any time.

Some questions included in the survey involve symptomatology related to psychopathology. Since your participation is anonymous, we will not be able to provide you with personalised feedback. However, if some of the questions arouse any concerns, you are advised to contact a mental health professional. You can contact the researchers if you need further advice.

Confidentiality

Your responses will be kept strictly confidential and your data will be accessed only by the main researchers. Be assured that we will not know your IP address when you take part in the online survey.

At the end of the survey you will be asked to provide your name (optional) and e-mail address by following a link, so that we can enter you into the draw to win vouchers. However, your personal data will not be connected to the rest of your responses. Instead, they will be stored in a password-protected folder to which only the researchers will have access and they will be used only for the draw purposes. After conducting the draw, your personal information (e-mail and name) will be deleted.

Decision to quit:

Your participation in this study is voluntary and you are free to withdraw at any time. If you do not wish to continue just simply exit this website and your responses will not be used.

How the results of this study will be used:
The results of this study will be written up as part of a PhD thesis, presented in academic conferences and may be published in academic journals. However, you will not be identified in any report or publication.

Contact information:
If you have any concerns or questions regarding the study, please contact Margarita Panayiotou at M.Panayiotou@sms.ed.ac.uk or Prof. Mick Power at mjpower@staffmail.ed.ac.uk.

Appendix 27

Online survey informed consent form

Stressful Life Events, Quality of Life, and Emotions

Informed Consent

1. I have read and understood the information regarding the study
2. I understand that my name will never be connected to my responses on the questionnaires and my e-mail will be used only for the draw purposes.
3. I understand that participation is voluntary and that I am free to withdraw at any time, without giving any reason
4. I understand that my data will be accessible only to the researchers of this research project.
5. I give permission for my data to be kept for use in future ethically approved research.

I agree to take part in the above study

Yes ☐
No ☐

By clicking 'continue' you acknowledge that you have read the information above and AGREE to participate in this study, with the knowledge that you are free to withdraw at any time.

Please note: It is not possible to return to a page once it has been completed. Therefore, please think carefully before responding to the questions so that your views are accurately represented. When you arrive at the final 'thank you' page, you will know that your responses have been recorded.

Appendix 28

Ethical approval letter

SCHOOL *of* HEALTH IN SOCIAL SCIENCE
CLINICAL PSYCHOLOGY

The University of Edinburgh
Medical School
Doorway 6, Teviot Place
Edinburgh EH8 9AG

Telephone 0131 651 3969
Fax 0131 650 3891
Email submitting.ethics@ed.ac.uk

Margarita Panayiotou
Flat 305
56 Lady Lawson Street
Edinburgh
EH3 9DH

29 April 2013

Dear Margarita,

Re: Development of the revised WHOQOL-BREF Quality of Life assessment: The relationship between quality of life and posttraumatic stress symptoms

Application for Level 2/3 Approval

Thank you for submitting the above research project for review by the Section of Clinical Psychology Ethics Research Panel. I can confirm that the submission has been independently reviewed and was approved on the 22nd April 2013.

Should there be any change to the research protocol it is important that you alert us to this as this may necessitate further review.

Yours sincerely,

Kirsty Gardner

Secretary
Clinical Psychology

Appendix 29

P-P Plots and histograms of measures used in Study II

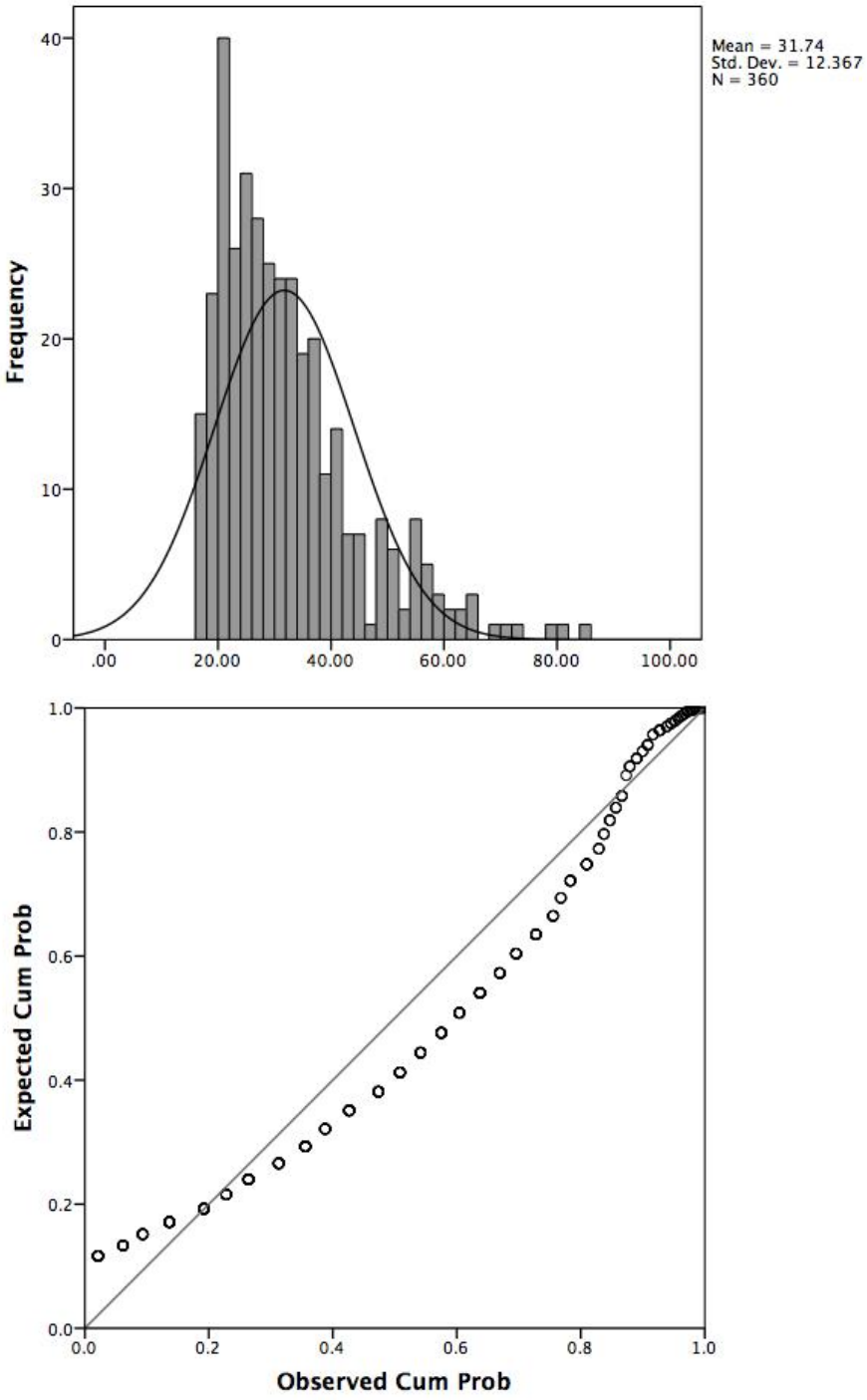

Figure 29.1 PCL-C

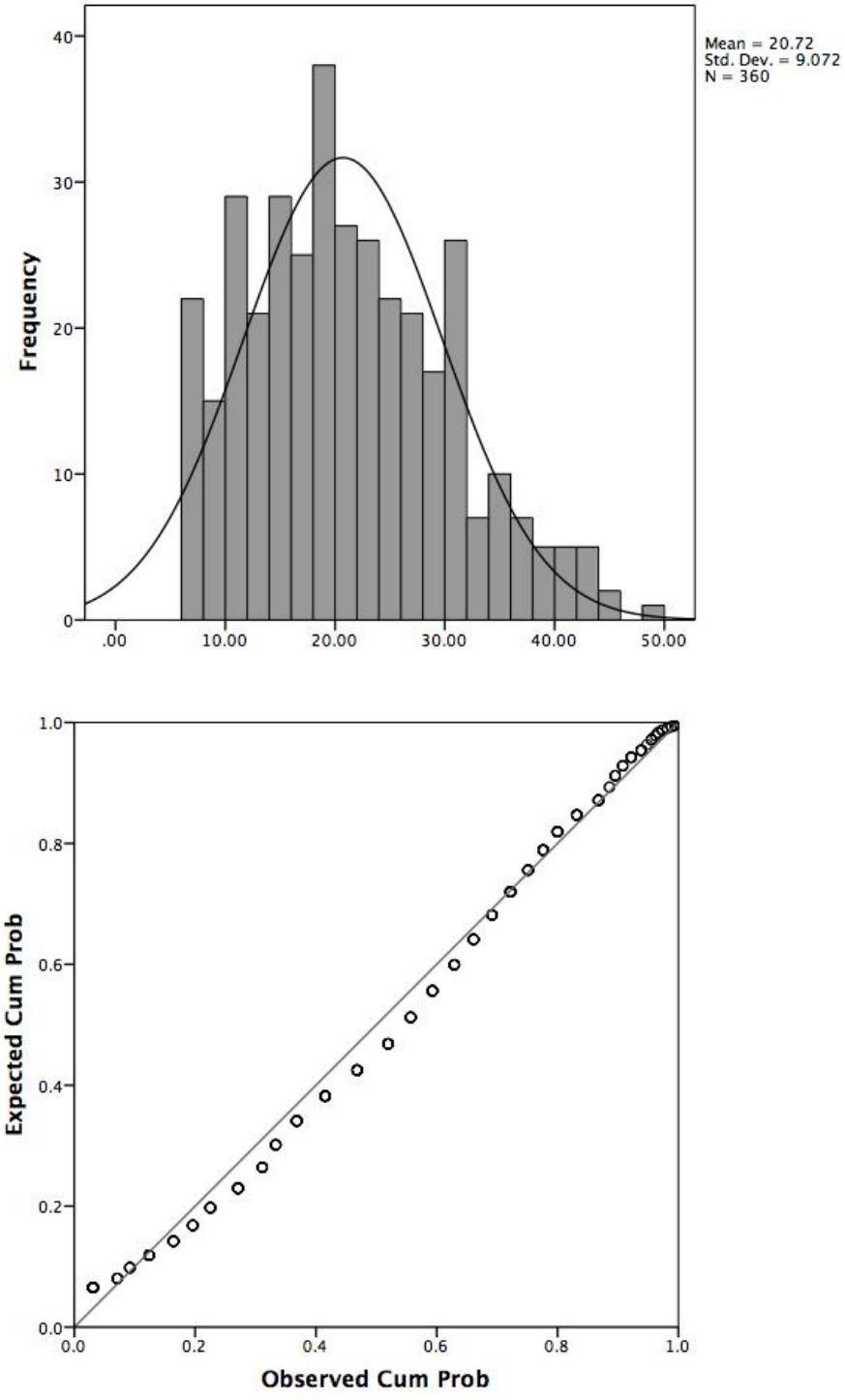

Figure 29.2 AAQ-II

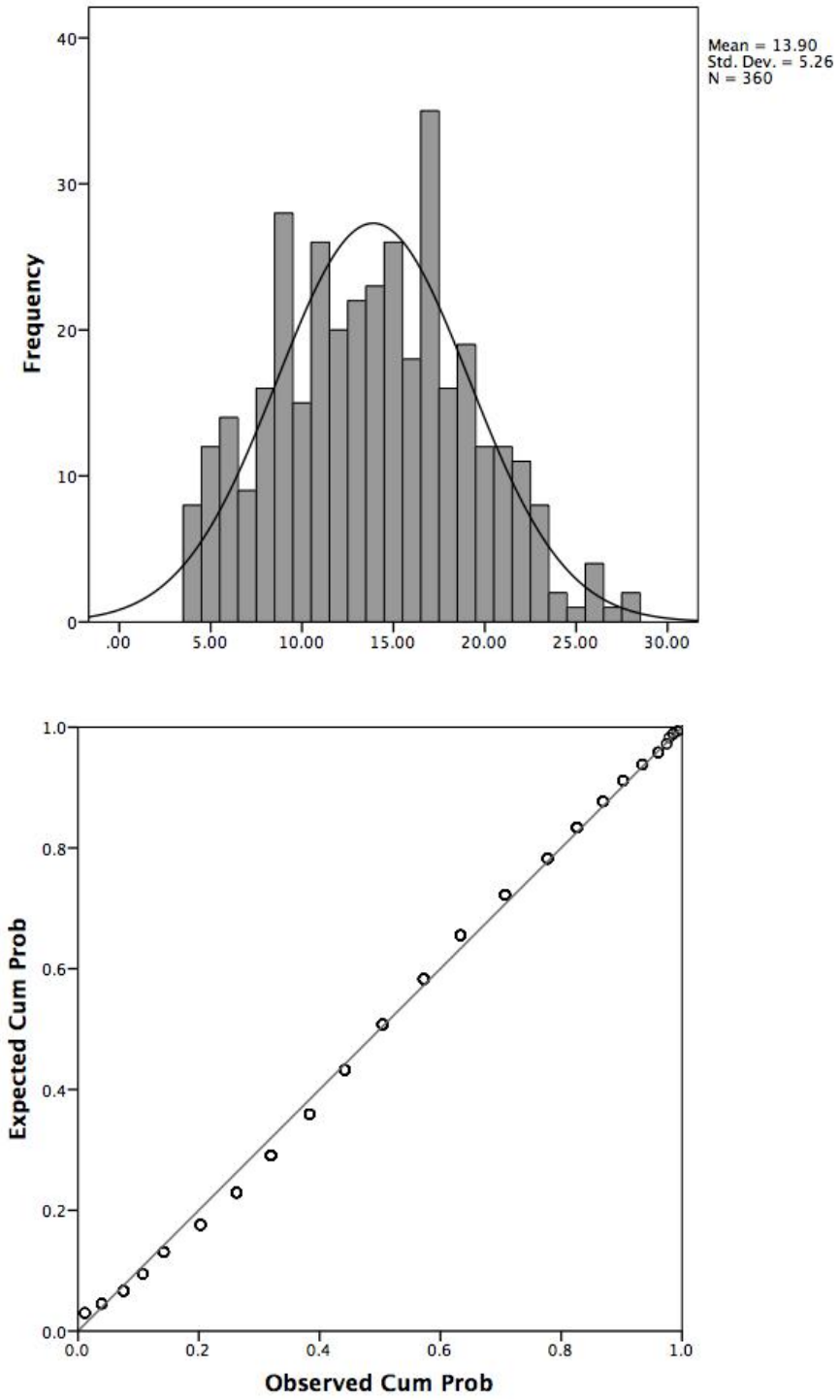

Figure 29.3 ERQ-Suppression

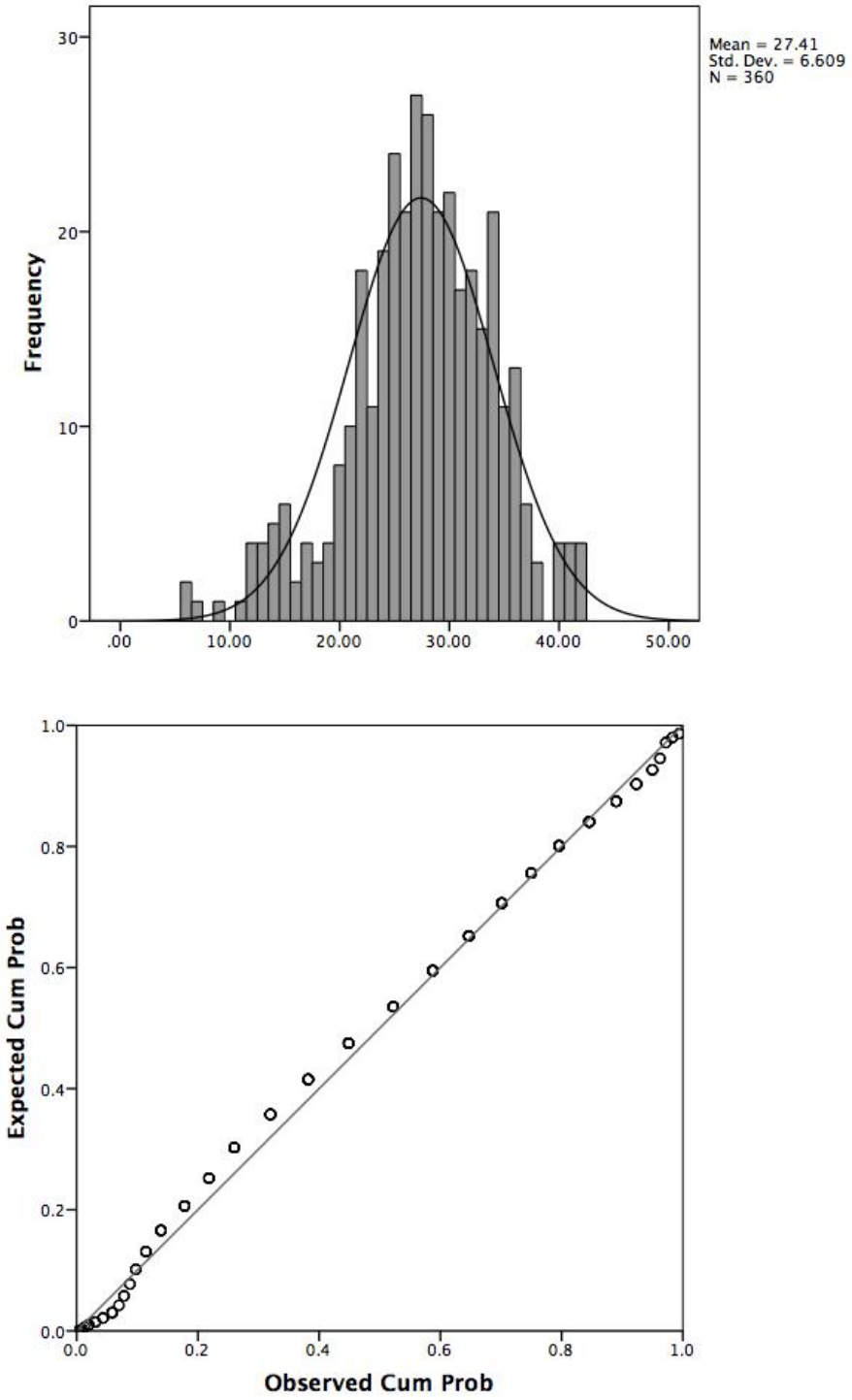

Figure 29.4 ERQ-Reappraisal

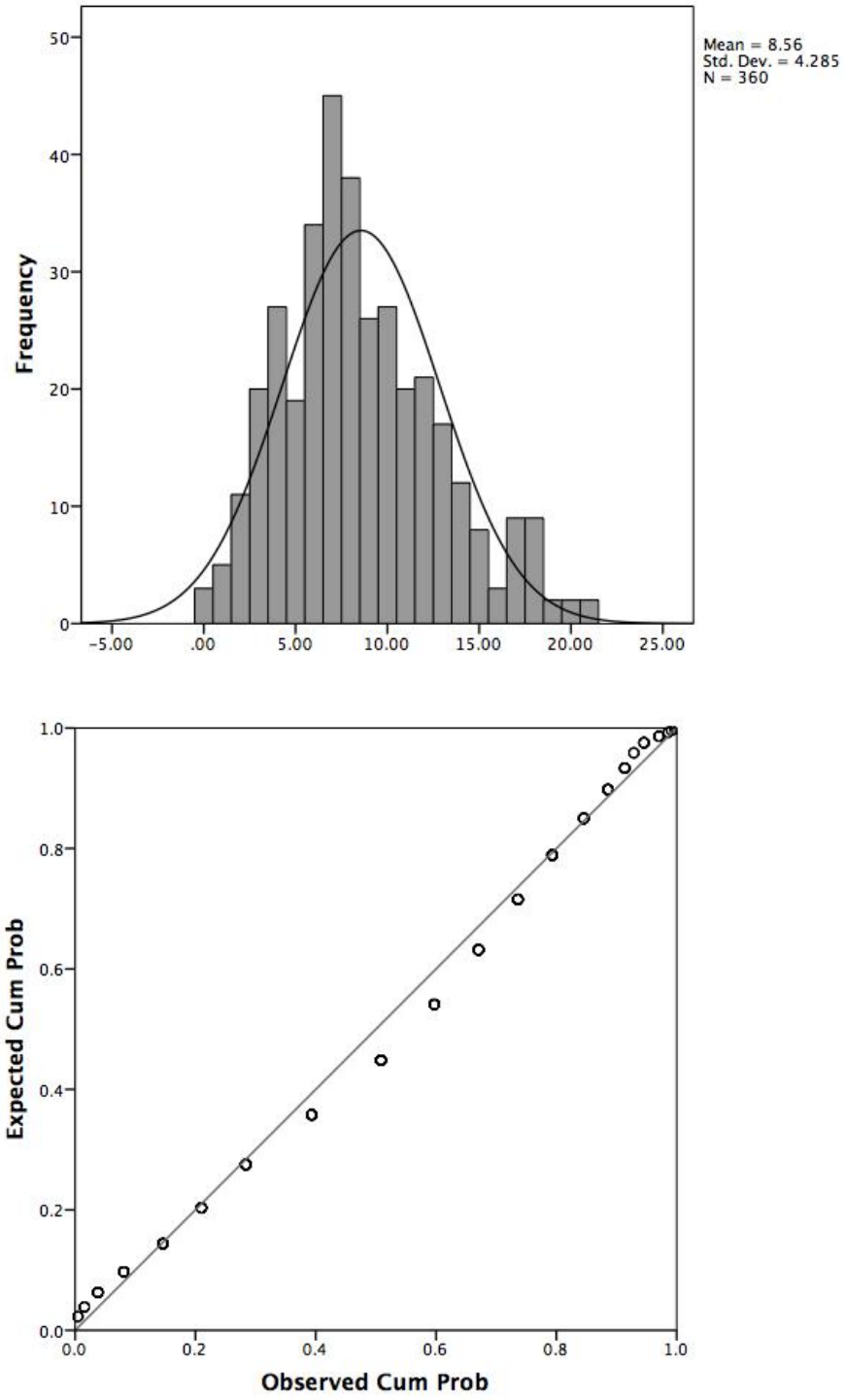

Figure 29.5 HADS-Anxiety

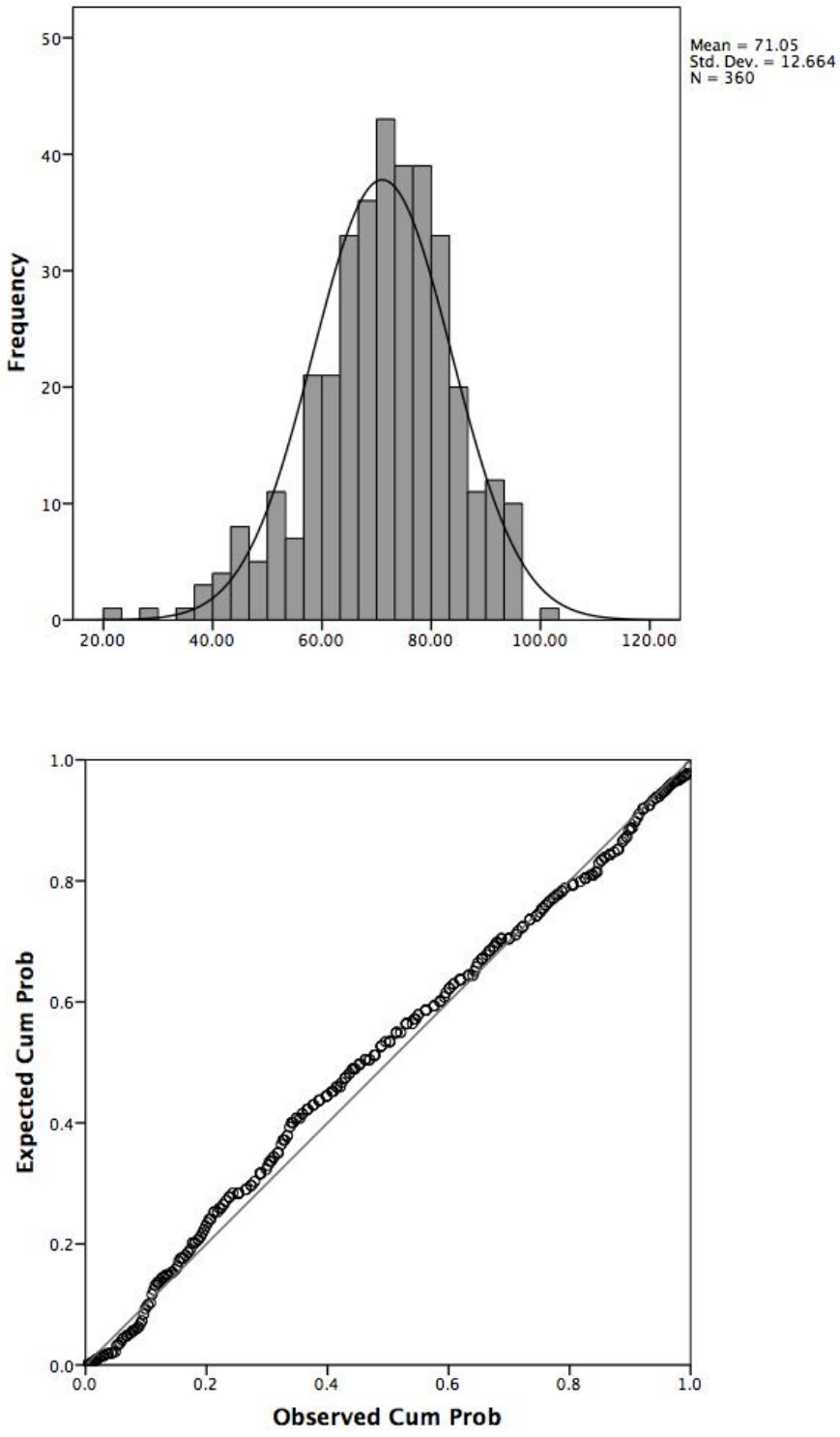

Figure 29.6 WHOQOL-BREF-R

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