Measuring emotional reactivity, alexithymia, and emotion regulation as clinically relevant emotional constructs: theoretical considerations and the development of new psychometric measures

David A. Preece
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Measuring Emotional Reactivity, Alexithymia, and Emotion Regulation as Clinically Relevant Emotional Constructs: Theoretical Considerations and the Development of New Psychometric Measures

This thesis is presented for the degree of

Doctor of Philosophy

David A. Preece

Edith Cowan University
School of Arts and Humanities (Psychology)
2019
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Date: 27/11/2018
Abstract

Many psychopathologies are characterised by abnormalities in emotional functioning, so clinicians and researchers need to assess emotional functioning to inform case conceptualisations and treatments, and to develop theoretical understanding of the mechanisms behind these psychopathologies. A comprehensive profile of emotional functioning requires information about at least three constructs, emotional reactivity, alexithymia, and emotion regulation, as each has been independently identified as an important transdiagnostic risk factor. Clinicians’ and researchers’ ability to assess these three constructs is, however, currently hampered by a lack of conceptual or definitional clarity, and consequently a lack of comprehensive or accurate psychometric measures. My research project was therefore one of both construct validation and measurement validation, with two interrelated aims: first, to establish compatible and empirically supported definitions of emotional reactivity, alexithymia, and emotion regulation; second, to develop and validate a set of new, comprehensive self-report measures based on these definitions, called the Perth series of measures. I use Gross’s (2015a) extended process model of emotion regulation as an integrating conceptual framework, to delineate definitions of emotional reactivity, alexithymia, and emotion regulation that are compatible with each other and consistent with existing empirical data. I then present six papers that report on factor analytic studies I conducted to test this framework’s parameters and evaluate existing measures or the new Perth measures. I propose in these papers that emotional reactivity, alexithymia, and emotion regulation are conceptually separable but linked constructs, because they correspond to different stages in the emotion generation and emotion valuation sequences described by Gross. My studies’ results indicate that the new Perth measures are structurally consistent with this framework, and appear to be comprehensive and valid measures of emotional reactivity (Perth Emotional Reactivity Scale), alexithymia (Perth Alexithymia Questionnaire), and emotion regulation ability (Perth Emotion Regulation Competency Inventory). This thesis therefore helps to delineate the theoretical structure of emotional reactivity, alexithymia, and emotion regulation, and provides clinicians and researchers with a set of psychometric tools that can operationalise these three constructs in greater detail than was previously possible.
Acknowledgements

I would like to thank my four supervisors Dr Ken Robinson, A/Prof Rodrigo Becerra, A/Prof Justine Dandy, and Prof Alfred Allan for their substantial guidance and support, A/Prof Guillermo Campitelli for helping as a co-author on my first paper in this thesis, and Prof James Gross for helping as a co-author on my fifth paper and providing thoughtful feedback on an early draft of my sixth paper. It has been wonderful to work with and learn from you all.

I am also grateful to Dr Craig Harms and Prof Richard Zinbarg for their sharing of their statistical knowledge which has helped me to improve my factor analysis skills, to Christian Dinse, Teagan Morrow, Chene McNab, and Puanna Kapi for collecting some of the data that was used in Study 2 of my sixth paper, and to clinical psychology staff at Fremantle Hospital for collecting the psychiatric sample’s data used in my third paper.

Many journal editors and anonymous reviewers provided feedback on the six papers presented in this thesis, and I would like to thank all of them for giving up their time to help me improve my research. Similarly, many study participants gave up their time to make this research possible, and I would like to thank all of them too.

My PhD was financially supported by an Australian Government Research Training Program Stipend Scholarship, and I am grateful to the Australian government for making my PhD journey much easier in this way.

Finally, I am very grateful to my family and friends for the huge levels of support they have given me, especially my wife Erin and my Mum and Dad. Thank you.
Contribution Statement

This thesis contains six co-authored papers that have been published in peer-reviewed journals. I was the first author for all these papers and my contribution to each was as follows:


I was the author who was principally responsible for the conceptualisation of the study and the writing of the paper. I created the online survey, organised the data collection, organised the data-set, conducted all statistical analyses, interpreted the results, and selected which items from the 30-item Perth Emotional Reactivity Scale would be retained in the 18-item short-form.


I was the author who was principally responsible for the conceptualisation of the new theoretical model, the conceptualisation of the study, and the writing of the paper. I created the online survey, organised the data collection, organised the data-set, conducted all statistical analyses, and interpreted the results.


I was the author who was principally responsible for the conceptualisation of the study and the writing of the paper. I created the online survey for the nonclinical sample, organised the data collection for the nonclinical sample, organised the data-sets, conducted all statistical analyses, and interpreted the results.


I was the author who was principally responsible for the design of the Perth Alexithymia
Questionnaire (PAQ), the conceptualisation of the two studies, and the writing of the paper. I wrote the PAQ items, created the online surveys, organised the data collection, organised the data-sets, conducted all statistical analyses, interpreted the results, and selected which PAQ items would be retained in the final version of the measure.


I was the author who was principally responsible for the conceptualisation of the study and the writing of the paper. I created the online surveys, organised the data collection, organised the data-sets, conducted all statistical analyses, and interpreted the results.


I was the author who was principally responsible for the design of the Perth Emotion Regulation Competency Inventory (PERCI), the conceptualisation of the two studies, and the writing of the paper. I wrote the PERCI items, created the online surveys, organised most of the data collection (for Study 1 I organised all the data collection, for Study 2 I organised the data collection for 748 of the 1175 participants), organised the data-sets, conducted all statistical analyses, interpreted the results, and selected which PERCI items would be retained in the final version of the measure.
Ethics Statement

Ethics approval for all my studies was granted by the Edith Cowan University Human Research Ethics Committee. Ethics approval for the study in my third paper was also granted by the South Metropolitan Health Service Ethics Committee. The guidelines of these committees were followed.
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Chapter 1

Project Overview
Project Overview

Emotions are important to clinical psychology and psychiatry. Patients typically seek help because they feel emotionally unwell (Kring & Bachorowski, 1999; Lane & Schwartz, 1987). Patients might experience too much negative emotion, too little positive emotion, or react and respond to their emotions in unhelpful ways (Rottenberg & Johnson, 2007). Indeed, as Goldberg, Krueger, Andrews and Hobbs (2009) point out, some form of emotional disturbance characterises many diagnostic categories in the Diagnostic and Statistical Manual of Mental Disorders-Fifth Edition (DSM-5; American Psychiatric Association, 2013). People often present in clinical settings with symptoms from a variety of diagnostic categories (i.e., comorbidity) that can often be traced to common problems in emotional functioning (Aldao, Gee, De Los Reyes, & Seager, 2016; Brown, 2007; Brown, Chorpita, & Barlow, 1998; Goldberg et al., 2009; Kessler et al., 2005; Kring & Bachorowski, 1999). Transdiagnostic models of psychopathology and their corresponding treatment protocols that target processes or constructs that underlie a range of psychopathologies have hence become popular for their efficiency and parsimony in contemporary clinical work (e.g., Barlow et al., 2017; Ellard, Fairholme, Boisseau, Todd, & Barlow, 2010; Farchione et al., 2012; Nolen-Hoeksema & Watkins, 2011; Sauer-Zavala et al., 2017).

The prominence of problems in emotional functioning in many psychopathologies means that clinicians and researchers need to assess emotional functioning to inform case conceptualisations and treatments, and to develop theoretical understanding of the mechanisms behind these psychopathologies (Kring & Bachorowski, 1999). It follows that to be useful and comprehensive such assessments should ideally capture all aspects of emotional functioning where dysfunctions may occur (Groth-Marnat, 2009). Clinicians and researchers should therefore assess at least three emotional constructs: emotional reactivity, alexithymia, and emotion regulation. I highlight these three constructs in particular because, as I will argue
in Chapter 2, information about all three constructs is required to fully map how people experience and process their own emotions (Barrett, Gross, Christensen, & Benvenuto, 2001; Gross, 2014; Kring & Bachorowski, 1999), and moreover, abnormalities in each of these constructs have been separately identified as important risk factors and treatment targets for a range of psychopathologies (Campbell-Sills, Ellard, & Barlow, 2014; Linehan, 1993). Examples of these psychopathologies include affective (e.g., Foran & O’Leary, 2013; Gruber, Harvey, & Gross, 2012; Gruber, Harvey, & Purcell, 2011), anxiety (e.g., Goldin & Gross, 2010; Zeitlin & McNally, 1993; Zinbarg & Barlow, 1996), personality (e.g., Berenbaum, 1996; Sauer & Baer, 2010; Sauer-Zavala & Barlow, 2014), eating (e.g., Harrison, Sullivan, Tchanturia, & Treasure, 2010; Taylor, Parker, Bagby, & Bourke, 1996; Telch, Agras, & Linehan, 2001), substance use (e.g., Conklin et al., 2015; Khantzian, 1997; Thorberg, Young, Sullivan, & Lyvers, 2009), and psychosomatic disorders (e.g., Sifneos, 1973; Waller & Scheidt, 2006; van Dijke et al., 2010).

Clinicians’ and researchers’ ability to assess emotional reactivity, alexithymia, and emotion regulation appears, however, to be hampered currently by a lack of conceptual or definitional clarity, and a corresponding lack of comprehensive or accurate psychometric measures. Authors disagree about how these constructs should be defined, and how they relate to each other conceptually (John & Eng, 2014; Lane, Weihs, Herring, Hishaw, & Smith, 2015; Taylor, Bagby, & Parker, 2016; Vorst & Bermond, 2001). Some authors, for example, propose that alexithymia has four components (e.g., Taylor, Bagby, & Parker, 1999), whereas others add reduced emotional reactivity as a fifth component (e.g., Bermond, Vorst, Vingerhoets, & Gerritsen, 1999). Similar discrepancies exist in the emotion regulation subfield where Gross (2015a, p. 1) notes that “enthusiasm for this topic continues to outstrip conceptual clarity, and there remains considerable uncertainty as to what is even meant by emotion regulation”. Some emotion regulation authors, for example, in effect, consider
alexithymia to be part of the emotion regulation construct (e.g., Gratz & Roemer, 2004), whereas others differentiate between the two constructs (e.g., Gross, 2015a; John & Eng, 2014). Available psychometric measures of these constructs, consequently, often differ in terms of what components are included under the labels emotional reactivity, alexithymia, and emotion regulation (Becerra & Campitelli, 2013; Bermond, Oosterveld, & Vorst, 2015; John & Eng, 2014). Some available measures of these constructs moreover have subscales that have displayed low reliability (Cronbach’s alpha < .70; e.g., Kooiman, Spinhoven, & Trijsburg, 2002), or their statistical structure has been found to be inconsistent with the specifications of the conceptual models upon which they were based in factor analyses (e.g., Lee, Witte, Bardeen, Davis, & Weathers, 2016; Taylor, Ryan, & Bagby, 1985), suggesting problems with either these measures, the models, or both. Additionally, available measures mostly focus only on negative emotions (e.g., Bagby, Parker, & Taylor, 1994; Carver, Scheier, & Weintraub, 1989; Catanzaro & Mearns, 1990; Garnefski & Kraaij, 2006; Gratz & Roemer, 2004; Nock, Wedig, Holmberg, & Hooley, 2008), with few measures directly assessing emotional reactivity, alexithymia, or emotion regulation with respect to positive emotions. Recent work has highlighted that positive emotions have a prominent role in psychopathology (e.g., du Pont, Welker, Gilbert, & Gruber, 2016; Gruber, 2011; Gruber, Eidelman, Johnson, Smith, & Harvey, 2011), hence, the absence of the positive valence domain from these measures is a substantial limitation. There is a need to fix these conceptual ambiguities and measurement issues, because clear conceptual definitions and accurate measures are a necessary foundation for the confident use of these constructs in clinical and research settings (Groth-Marnat, 2009).

My research project therefore had two interrelated aims:

(1) To establish empirically supported definitions of emotional reactivity, alexithymia, and emotion regulation that are compatible with each other.
(2) To develop and validate a set of new, comprehensive self-report measures based on these definitions, called the Perth\textsuperscript{1} series of measures.

I therefore follow the school of thought that construct validation and measure validation are best approached as ongoing and linked processes, whereby the initial conceptual models of a construct inform the development of psychometric measures (e.g., Comrey, 1988; Hogan & Nicholson, 1988; Nunnally, 1978; Taylor et al., 1999), and the results from studies using these newly created measures then allow for the conceptual models to be tested statistically (i.e., using factor analysis). Such results ultimately inform continued revisions and improvements to the construct and/or its measurement, or as Hogan and Nicolson (1988, p. 625) put it, authors “must continually work back and forth between the indictors [measures] and the construct without being swallowed up by either”. Researchers have long used the statistical technique of factor analysis to do this type of validation work in psychology, and it has prominently shaped models and measures of other key individual differences variables like personality (e.g., Cattell, 1943; Costa & McCrae, 1992; Eysenck, 1991) and intelligence (e.g., Cattell, 1963; McGrew, 2009; Spearman, 1904; Thorndike, 1936). To date, however, factor analysis has had a less prominent role in influencing conceptual models of emotional constructs. My project is therefore intended to more fully harness and apply this statistical technique to the domain of emotional functioning.

At a conceptual level, the observable discrepancies between the available models of emotional reactivity, alexithymia, and emotion regulation might also have occurred, at least in part, because each of these three subfields originally emerged somewhat separately (Gross, 1998; Davidson, 1998; Taylor et al., 1999). Conceptual clarity might therefore be improved by using a unified, broad conceptual framework that synthesises the empirically supported components from available models in all three subfields. I attempt to do this in this project by

\textsuperscript{1} Labelled as such because my co-authors and I are based in Perth, Australia.
using Gross’s (2015a) recently published extended process model of emotion regulation as a framework. Gross’s model provides a useful framework for this purpose, because despite its principal focus on emotion regulation, it also includes a hypothesised sequence of stages by which emotions are thought to be generated and processed (Gross, 2015a). It is therefore broad enough to facilitate the explicit mapping of the emotional reactivity and alexithymia constructs alongside emotion regulation. Gross’s model is also supported by a large body of empirical work in the emotion regulation subfield (for reviews of this work, see Gross, 2014; Gross, 2015a; Gross, 2015b), has already been successfully applied to understanding a range of other emotional phenomena (e.g., Aldao & Christensen, 2015; Diaz & Eisenberg, 2015; Giuliani & Berkman, 2015; Kuppens & Verduyn, 2015; Schmader & Mendes, 2015), and is a cognitive-based model so has excellent compatibility with the cognitive-behavioural techniques that feature in many contemporary psychopathology treatment programs (Beck & Dozois, 2011; Mennin & Fresco, 2014; Norcross & Karpiak, 2012).

I will therefore in this thesis, firstly outline Gross’s (2015a) model in Chapter 2 and explain how it might be used as a framework to organise the empirically supported components from a variety of other available models, and in so doing, inform compatible definitions for the emotional reactivity, alexithymia, and emotion regulation constructs. In Chapter 3, I will use this framework as a guide to specify a set of criteria by which psychometric measures of these three constructs may be judged, and will briefly evaluate existing measures against these criteria using current data. In Chapters 4, 5, 6, 7, 8 and 9, I will then present six papers that report on factor analytic studies some co-authors and I conducted to further test this framework’s parameters, and evaluate existing measures or develop the new Perth measures. All six of these papers have been published in peer-reviewed journals as stand-alone manuscripts (see Table 1.1), and can therefore be read separately, but are also designed to build on each other.
MEASURING EMOTIONAL FUNCTIONING

Paper 1 (Chapter 4) focuses on emotional reactivity. It reports on a study where I examined the psychometric properties of the Perth Emotional Reactivity Scale (PERS) and developed a short form of the measure. It should be noted that, unlike the Perth alexithymia and emotion regulation measures that I will introduce, much of the development work for the PERS took place prior to my PhD research (see Becerra & Campitelli, 2013; Becerra, Preece, Campitelli, & Scott-Pillow, 2017). Paper 1 is an extension of this earlier work.

Table 1.1.
The Chapter Numbers of the Six Papers Presented in this Thesis with their Citations and Topic Areas

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Papers 2, 3 and 4 (Chapters 5-7) focus on alexithymia. Paper 2 details the specifications of my model of alexithymia, and then reports on a study where I tested this
model by factor analysing multiple psychometric measures. Paper 3 reports on a study where I examined the psychometric properties of the 20-item Toronto Alexithymia Scale (TAS-20; Bagby et al., 1994), an existing self-report measure of alexithymia. Paper 4 introduces my own self-report measure of alexithymia, the Perth Alexithymia Questionnaire (PAQ), and reports on two studies in which I tested its psychometric properties.

Papers 5 and 6 (Chapters 8 and 9) focus on emotion regulation. Paper 5 reports on a study where I examined the psychometric properties of the Emotion Regulation Questionnaire (ERQ; Gross & John, 2003), an existing self-report measure of two emotion regulation strategies (cognitive reappraisal and expressive suppression). Paper 6 introduces my own self-report measure of overall emotion regulation ability, the Perth Emotion Regulation Competency Inventory (PERCI), and reports on two studies in which I tested its psychometric properties.

I conclude my thesis in Chapter 10 by integrating the findings from these six papers. I discuss their overall implications for clinical practice and emotion research, and suggest some future directions for work with the Perth series of measures across a diverse set of fields, including clinical psychology, organisational psychology, forensic psychology, developmental psychology, cross-cultural psychology, neuropsychology, and neuroscience.
Chapter 2

Conceptual Framework
Conceptual Framework

This Chapter documents my observations that there are commonalities between many of the available models within the emotional reactivity, alexithymia, and emotion regulation subfields, and that many of the components specified in these models appear to correspond to specific stages in the emotion generation and valuation sequence described by Gross (2015a). My premise is therefore that Gross’s extended process model of emotion regulation might be useful as a unifying, broad conceptual framework to integrate and differentiate between the emotional reactivity, alexithymia, and emotion regulation constructs.

I firstly outline Gross’s extended process model of emotion regulation and its parameters as a broad framework. I then propose a mapping of the emotional reactivity and alexithymia constructs (alongside the emotion regulation construct) onto this framework, and spend the remainder of the Chapter explaining the rationale behind this mapping; I outline the specifications of other existing models of emotional reactivity, alexithymia, or emotion regulation, briefly summarise the results of existing studies that have examined the statistical structure of these constructs, and detail how my mapping is informed by these existing models and data.

The Extended Process Model of Emotion Regulation

There are various definitions of emotion (e.g., Barrett, 2009; Harre, 1986; Lazarus, 1991; Panksepp, 1998), but most authors agree on several core features that are supported by empirical evidence (for a review, see Gross & Barrett, 2011). First, emotions are multifaceted (Mauss, Levenson, McCarter, Wilhelm, & Gross, 2005), consisting of experiential (e.g., a feeling of fear), behavioural (e.g., a fearful facial expression or an urge to flee), and physiological components (e.g., an increased heart-rate). Second, emotions unfold over time (Davidson, 1998). Third, emotions can be helpful or harmful, because they direct cognition and behaviour so can be adaptive in facilitating goal attainment (Panksepp, 2005), but
emotions can also be maladaptive if they are activated inappropriately, or are of the wrong type, intensity, or duration (Kring & Bachorowski, 1999). Fourth, whilst there is little consensus on exactly how many types of emotions exist (e.g., Ekman & Friesen, 1971; Montag & Panksepp, 2017), most authors agree that emotions can at least be broadly categorised in terms of whether they are negatively valenced (like sadness, fear, or anger) or positively valenced (like joy, amusement, or excitement; e.g., Becerra & Campitelli, 2013; Bradley & Lang, 2007; Gross, 2014; Gruber, Johnson, Oveis, & Keltner, 2008; Davidson, 1998).

Gross (2015a) uses these core features of emotion in his extended process model of emotion regulation. This model is labelled as “extended” because it is an extension of two of Gross’s earlier models, the modal model of emotion and the process model of emotion regulation (Gross, 1998). Gross (1998) first formulated the modal model of emotion to describe the emotion generation process, and in this model, he specified that emotions are generated through people’s valuation systems. These systems have four sequential situation-attention-appraisal-response stages that people use to evaluate (evaluate) stimuli in terms of what they mean for their goals (Ochsner & Gross, 2014). People generate emotions via valuation systems when meaningful stimuli are present (situation stage; e.g., a snake is in the room). They focus their attention on the stimuli (attention stage; e.g., looking at the snake) and appraise the stimuli in terms of what they represent and whether they are good or bad for their goals (appraisal stage; e.g., this snake in the room is bad for the goal of staying alive). If they appraise the stimuli as meaningful, an emotional response can result (response stage; e.g., the experiential, behavioural, and physiological manifestations of fear; Gross; 2014).

Gross (1998) stated in his original process model of emotion regulation that people can attempt to modify (i.e., regulate) the trajectory of their emotions at different stages in the generation process. Gross delineated five categories of emotion regulation strategies in this
model, based on how early in the emotion generation process they have their primary effect. People might, at the situation stage, try to regulate their emotions by changing what situations they are exposed to (situation selection) or modifying the properties of the situation (situation modification). They could, at the attention stage, change what aspects of the situation they focus their attention on (attentional deployment) and at the appraisal stage people might change the meaning they ascribe to the situation (cognitive change). Lastly, at the response stage, when the emotional response is more fully developed, people might try to change the experiential, behavioural, or physiological manifestations of the response (response modulation; Gross, 2014). These delineations have since been supported statistically in a variety of studies (e.g., Aldao, Nolen-Hoeksema, & Schweizer, 2010; Badcock, Paulik, & Maybery, 2011; Gross & John, 2003; Matsumoto, Yoo & Nakagawa, 2008).

As Gross (2015a, p. 9) notes, though, a limitation of the (non-extended) process model was that it did not attempt to describe “how these various emotion regulation strategies are actually started or stopped”, or what initiates emotion regulation. He recently addressed this conceptual limitation through the extended process model, by specifying that emotion regulation occurs when people use their valuation systems to evaluate their generated emotional responses. Gross (2015a) therefore now distinguishes between first-level and second-level valuation systems (see Panel A of Figure 2.1), whereby first-level valuation systems generate the emotional response (as described in the modal model of emotion; Gross, 1998) and second-level valuation systems valuate that emotional response (Gross, 2015a). In this second-level valuation system, people’s emotional responses (situation stage) become the stimuli that are the focus of their attention (attention stage), they appraise their emotional responses in terms of what they are and whether they are good or bad for their goals (appraisal stage), and based on this appraisal, they might activate a goal to try to modify the trajectory of the emotion (response stage). The response stage of this second-level valuation
system therefore represents emotion regulation, defined in this model as “the activation of a
goal to modify an unfolding emotional response” (Gross 2015b, p.130). Four components of
emotion regulation ability can ultimately be logically derived from this model, that explain
individual differences in people’s ability to regulate their emotions: because emotions
manifest across three channels of the emotion system (experiential, behavioural,
physiological), “modifying the unfolding emotional response” (Gross, 2015a, p. 11) in this
sense refers to people’s ability to modify the (1) experiential, (2) behavioural, and (3)
physiological manifestations of their emotions; and because emotion regulation involves “the
activation of a goal to modify” (Gross, 2015a, p. 11), good emotion regulation ability in this
model also involves (4) knowing when it is appropriate to activate a goal to regulate an
emotion in the first place. These regulation goals might be enacted by implementing any of
the five categories of emotion regulation strategies described in the original process model
(i.e., situation selection, situation modification, attentional deployment, cognitive change,
response modulation; Gross, 2015a).

Using the Extended Process Model as an Integrating Framework

My thesis is that the components from other existing models of emotional reactivity,
alexithymia, and emotion regulation conceptually fit into specific stages in the valuation
systems that Gross (2015a) hypothesised people use to generate, process, and regulate their
emotions. I will, in the remainder of this Chapter, present my rationale for a proposed
mapping of the emotional reactivity and alexithymia constructs, alongside the emotion
regulation construct, onto Gross’s framework (see Panel B of Figure 2.1). I will, for the sake
of clarity, use the acronym REALER (emotional REactivity-ALexithymia-Emotion
Regulation) to refer to this mapping that is intended to integrate the specifications of a variety
of existing models and align with the results of existing factor analytic studies. In the
REALER mapping, these three constructs are represented as separable but linked in that they
each correspond to different stages in the emotion generation and valuation sequence described by Gross. Together, these constructs can cover (almost) the full set of stages in this sequence.
Figure 2.1. Gross’s (2015a) extended process model of emotion regulation (Panel A) and the REALER mapping, a proposed mapping of the emotional reactivity and alexithymia constructs within this framework (Panel B). EOT = externally orientated thinking, DIF = difficulty identifying feelings, DDF = difficulty describing feelings. All valuation systems are comprised of four sequential stages; a situation (s), attention (at), appraisal (ap) and response (r) stage (Gross, 1998, 2015a). Panel A: valuation system 1 represents an emotion being generated, whereby an emotion inducing stimulus is present (s1), the person’s attention is focused on the stimulus (at1), the stimulus is appraised in terms of what it is and what it means for his or her goals (ap1), and an emotional response results (r1). In valuation system 2, this emotional response can itself become the stimulus that is the target of valuation (s2), whereby the person focuses their attention on the emotion (at2), it is appraised in terms of what it is and whether it is a desired state (ap2), and then a goal might be activated to modify this unfolding emotional response (r2). The response stage (r2) of this latter valuation system is emotion regulation in this model. Panel B: in my view, the components of the emotional reactivity (ease of activation, intensity, duration) and alexithymia (DIF, DDF, EOT) constructs also fit within this framework. In valuation system 1, emotional reactivity can be conceptualised as how strong of a stimulus at s1 is required to elicit an emotional response and how quickly an individual progresses from the s1 stage to the r1 stage (ease of activation), how intense the emotional response is at r1 (intensity), and how long the emotional response at r1 persists for (duration). In valuation system 2, alexithymia can be conceptualised as how much difficulty a person has at the at2 (EOT) and ap2 (DIF, DDF) stages of emotion valuation.
Fitting emotional reactivity into the Gross (2015a) framework. Much of the existing work on the emotional reactivity construct comes from the affective neuroscience (e.g., Davidson, 1998, 2015) and psychopathology literature (e.g., Linehan, 1993; Sauer & Baer, 2010). Groups of authors from these areas have independently converged on a conceptual model of a construct that has three hypothesised components that describe the typical properties of people’s emotional responses (e.g., Becerra & Campitelli, 2013; Boyes, Carmody, Clarke, & Hasking, 2017; Davidson, 1998; Eisenberg, Fabes, Gunthrie, & Reiser, 2000; Linehan, 1993; Nock et al., 2008; Sauer & Baer, 2010). Across authors’ models these three components are consistently the: (1) typical threshold for how strong of a stimulus is required to elicit people’s emotional responses and how quickly their levels of emotional arousal rise to peak magnitude (ease of activation); (2) the peak magnitude of people’s emotional arousal responses (intensity); and (3) how long it takes people to return to baseline levels of emotional arousal (duration). As noted by Becerra and Campitelli (2013) and others (e.g., Davidson, 1998, 2015; Linehan, 1993; Nock et al., 2008), these three components, together, conceptually describe the temporal dynamics of emotional responses (see Figure 2.2). Authors use different nomenclature to describe what appears to be this same hypothesised construct, including the labels emotional reactivity (e.g., Becerra & Campitelli, 2013; Davidson, 1998; Nock et al., 2008; Lannoy et al., 2014), affective style (e.g., Davidson, 1998), emotional vulnerability (Linehan, 1993; Sauer & Baer, 2010), and emotional responding (Boyes et al., 2017). I will use the term emotional reactivity, because it is a commonly used label in this subfield and is what was used in the published papers introducing the Perth Emotional Reactivity Scale (Becerra & Campitelli, 2013; Becerra et al., 2017).
Figure 2.2. A visual representation of the three hypothesised components of emotional reactivity (ease of activation, intensity, duration), and how they correspond to the properties of an emotional response unfolding over time. Adapted with permission from Becerra and Campitelli (2013).

Available statistical data presently support that these three components can form three parts of a coherent latent construct (Becerra & Campitelli, 2013). Factor analyses of psychometric measures designed to measure these three components, for example, consistently show that their items cluster into clear subscale groupings (i.e., ease of activation, intensity, duration), and that in turn, these subscales can load together well on a higher-order “emotional reactivity” factor (e.g., Becerra et al., 2017; Lannoy et al., 2014; Claes, Smits, & Bijttebier 2014). Much of this factor analytic work has, however, so far only looked at emotional reactivity for negative emotions (i.e., negative reactivity; Claes et al.,
2014; Nock et al., 2008; Lannoy et al., 2014), with only one study having examined all
components in the positive valence domain (i.e., positive reactivity; Becerra et al., 2017).

Conceptually, all three of these hypothesised components of emotional reactivity
(Becerra & Campitelli, 2013; Davidson, 1998; Linehan, 1993; Sauer & Baer, 2010) appear to
fit within the Gross (2015a) framework (see Panel B of Figure 2.1), specifically into the
stages of a valuation system that generates an emotional response. The ease of activation
component can be represented in the Gross framework as the strength of the stimulus that is
required at the situation stage to illicit an emotional response, and how quickly people
progress from the situation stage to the response stage; the intensity component can be
represented as the intensity of the emotional response at the response stage; and the duration
component can be represented as how long the response stage persists for. There
consequently appears to be good compatibility between the REALER mapping and the results
of existing studies on the structure of the emotional reactivity construct (e.g., Becerra et al.,
2017; Lannoy et al., 2014; Sauer & Baer, 2010).

**Fitting alexithymia into the Gross framework.** The alexithymia (from the Greek, α
= lack, λexis = word, thymos = feeling) construct was first coined by psychoanalytic
practitioners in the 1970s (see Nemiah & Sifneos, 1970; Sifneos, 1973) to describe a cluster
of emotion processing deficits they often observed in their patients with psychosomatic
disorders. Such patients were often unable to “describe their feelings or to differentiate
among them” and displayed “an absence of the capacity to produce fantasies with the result
that [their] thought content [was] restricted to a preoccupation with external objects, people,
and environmental events” (Nemiah, 1984, p. 127). Early clinical observations such as these
informed the development of two conceptual models of alexithymia, that I will refer to as the
Toronto model (Taylor et al., 1985; Taylor et al., 1999) and the Amsterdam model (Bermond
et al., 1999; Vorst & Bermond, 2001) with reference to the cities where the researchers work.
Almost all contemporary alexithymia authors select between these two models.

The Toronto group’s model (Taylor et al., 1985) is most commonly used. The Toronto group specify that the alexithymia construct consists of four interrelated (positively correlated) components: (1) *difficulty identifying one’s own feelings* (DIF); (2) *difficulty describing feelings* (DDF); (3) an *externally orientated thinking style* (EOT) marked by an excessive focus on external stimuli rather than internal experiences; and (4) *difficulty fantasising* (DFAN) marked by an absence or scarcity of daydreams and fantasies (Taylor et al., 1999). The Amsterdam group (Vorst & Bermond, 2001) follow the Toronto group in also specifying these four components in their model, but they also add reduced levels of emotional reactivity or *difficulty emotionalising* (DEMO) as a fifth component. They justify this addition based on their interpretation that these five components were originally described by Nemiah and Sifneos (1970) in their clinical observations of the alexithymia phenomenon (Vorst & Bermond, 2001). The Amsterdam group therefore hypothesise that people with high levels of alexithymia do not experience their emotions as intensely as other people (Bermond et al., 2015).

Factor analytic studies using psychometric measures of alexithymia (e.g., Bagby, Taylor, & Parker, 1994; Bermond et al., 2007) have supported many of the specifications shared by the Toronto and Amsterdam models. DIF, DDF, and EOT subscale scores from measures like the 20-item Toronto Alexithymia Scale (TAS-20; Bagby et al., 1994), for example, are consistently found to correlate positively (e.g., Bagby et al., 1994; Bagby, Taylor, Parker, & Dickens, 2006; Vorst & Bermond, 2001) and can load on the same higher-order “alexithymia” factor in factor analysis (e.g., Gignac, Palmer, & Stough, 2007; Meganck, Vanheule, & Desmet, 2008). There has, however, so far been few results that statistically support the inclusion of DFAN and/or DEMO in these models (e.g., Watters, Taylor, Quilty, & Bagby, 2016). In most studies, DFAN subscale scores have been
uncorrelated or negatively correlated with DIF and DDF subscale scores (e.g., Haviland, Shaw, MacMurray, & Cummings, 1988; Rosenberg et al., 2016; Vorst & Bermond, 2001), and have not fit well within the same statistical network as DIF, DDF or EOT items when network analyses have been conducted (Watters, Taylor, & Bagby, 2016; Watters, Taylor, Quilty, & Bagby, 2016). Similarly, to the best of my knowledge, DEMO (i.e., reduced emotional reactivity) subscale scores have not loaded on the same higher-order “alexithymia” factor as the DIF, DDF and EOT subscale scores in any existing studies (see Bermond et al., 2007), and in laboratory-based experiments, people reporting high levels of DIF, DDF and EOT have usually reported more (not less) intense levels of negative emotion (e.g., Connelly & Denney, 2007; Eastabrook, Lanteigne, & Hollenstein, 2013; Pollatos et al., 2011).

It should be noted that the possible influence of emotional valence on the structure of alexithymia remains unclear, because these existing factor analytic studies have used alexithymia measures that do not specify an emotional valence in most of their items (i.e., whether the emotions in question are negative or positive). Researchers have also tended to factor analyse single alexithymia measures in isolation rather than analysing multiple measures together (meaning that the extracted factor structures are more vulnerable to being influenced by the intricacies of the particular measure used; Podsakoff, MacKenzie, Lee, & Podsakoff, 2003), but the patterns reported in the paragraph above have nonetheless emerged across multiple studies and assessment tools (e.g., Bermond et al., 2007; Meganck et al., 2008; Watters, Taylor, Quilty, & Bagby, 2016). Indeed, this growing body of evidence that only DIF, DDF, and EOT statistically cohere has recently led some authors to question whether DFAN and/or DEMO are components of alexithymia (e.g., Bausch et al., 2011; Gignac et al., 2007; Watters, Taylor, Quilty, & Bagby, 2016), and some test developers have either totally removed DFAN items from their alexithymia measures (Bagby et al., 1994) or changed their scoring procedures so that DFAN and DEMO items are excluded when...
calculating a total scale score (Vorst & Bermond, 2001). To date, however, neither the Toronto (see Taylor et al., 2016) nor Amsterdam (see Bermond et al., 2015) groups have modified their conceptual models.

My decision to include only DIF, DDF and EOT as the alexithymia construct in the REALER mapping (see Panel B of Figure 2.1) therefore reflects the above statistical findings that only these three components cluster together. There is however also a conceptual rationale for this definitional refinement to alexithymia; because only DIF, DDF and EOT represent deficits in the emotion valuation process described by Gross (2015a). Specifically, in a second-level valuation system that is valuating an emotional response, EOT can be represented as a deficit at the attention stage (i.e., an emotional response has occurred, but the person has difficulty focusing their attention on it); and DIF and DDF can be represented as deficits at the appraisal stage (i.e., an emotional response has occurred, but the person has difficulty accurately appraising what it is and what it means). Fitting EOT into Gross’s framework in this manner requires a shift in emphasis relative to early psychoanalytic definitions of EOT (e.g., Nemiah, 1984), in that the pertinent point is no longer that the alexithymic individual focuses excessively on external objects or events, but rather, the reverse perspective, that they do not properly focus their attention on their emotions. DFAN and DEMO cannot fit conceptually within this same valuation system cluster, because they are not deficits in the emotion valuation process, and DFAN and DEMO are therefore not considered components of alexithymia in the REALER mapping.

**Fitting other emotion regulation models into the Gross framework.** Most contemporary emotion regulation work uses either Gross’s (1998, 2015a) extended process model or Gratz and Roemer’s (2004) model of the emotion regulation construct (e.g., Aldao & Christensen, 2015; Edwards & Wupperman, 2017; Ehring & Quack, 2010; Fox, Hong, & Sinha, 2008; John & Eng, 2014). There are conceptual similarities between these two models,
but also some key differences that have implications for how those using them operationalise emotion regulation in clinical and research settings.

Gross (2015a, p. 11) defines emotion regulation in his model as “the activation of a goal to modify the unfolding emotional response”. So from this perspective, as aforementioned, people’s emotion regulation ability consists of four interrelated components: their ability to modify the (1) experiential, (2) behavioural, and (3) physiological manifestations of their emotions, and (4) their ability to know when it is appropriate to activate a goal to modify an emotion in the first place.

Gratz and Roemer (2004), though, offer a slightly different set of components in their model. Their stated aim was to outline a multidimensional set of competencies that were conceptually and/or empirically relevant to understanding psychopathologies characterised by emotion dysregulation. Based on their review of other’s work (e.g., Cole, Michel, & Teti, 1994; Hayes, Strosahl, & Wilson, 1999; Thompson & Calkins, 1996), they specify four components of emotion regulation ability, defining it as:

The (a) awareness and understanding of emotions, (b) acceptance of emotions, (c) ability to control impulsive behaviors and behave in accordance with desired goals when experiencing negative emotions, and (d) ability to use situationally appropriate emotion regulation strategies flexibly to modulate emotional responses as desired in order to meet individual goals and situational demands.  
(Gratz & Roemer, 2004, p. 42)

I present my comparison of Gross’s (2015a) and Gratz and Roemer’s models of emotion regulation in Table 2.1.
Table 2.1

*Conceptual Alignment between the Components of Emotion Regulation Ability in Gross’s (2015a) and Gratz and Roemer’s (2004) Models of Emotion Regulation*

<table>
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<tr>
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<tbody>
<tr>
<td><strong>Ability to modify the experiential manifestations of emotions.</strong></td>
<td>Ability to use situationally appropriate emotion regulation strategies flexibly to modulate emotional responses as desired in order to meet individual goals and situational demands.</td>
</tr>
<tr>
<td><strong>Ability to modify the behavioural manifestations of emotions.</strong></td>
<td>Ability to control impulsive behaviors and behave in accordance with desired goals when experiencing negative emotions.</td>
</tr>
<tr>
<td><strong>Ability to modify the physiological manifestations of emotions.</strong></td>
<td>Ability to use situationally appropriate emotion regulation strategies flexibly to modulate emotional responses as desired in order to meet individual goals and situational demands.</td>
</tr>
<tr>
<td>Knowing when it is appropriate to <em>activate a goal</em> to regulate emotions in the first place.</td>
<td>Acceptance of emotions.</td>
</tr>
<tr>
<td>N/A (not considered emotion regulation)</td>
<td>Awareness and understanding of emotions.</td>
</tr>
</tbody>
</table>

*Note.* In this table I positioned those components from the two models that I think are conceptually very similar or equivalent next to each other (horizontally).

Both models appear to be similar in that the ability to manage and modify emotions is considered central to emotion regulation ability (Gratz & Roemer, 2004; Gross, 2015a), and that good emotion regulation ability also involves people knowing when to *not* activate a goal to modify emotions (i.e., accepting emotions, because excessive or inappropriate regulation attempts can be maladaptive; McHugh, Reynolds, Leyro, & Otto, 2013). The key difference between the models though, is that Gratz and Roemer (2004, p. 42) specify “awareness and
understanding of emotions” as a component of emotion regulation, whereas Gross (2015a) does not.

Gross (2014) and proponents of his model (e.g., Barrett et al., 2001; John & Eng, 2014; Vine & Aldao, 2014) do acknowledge emotional awareness, however, they view it as different from emotion regulation, because emotional awareness is not “the activation of a goal to modify the unfolding emotional response” (i.e., emotion regulation in Gross’s model; Gross, 2015a, p. 11), it is just people’s degree of awareness that an emotional response is unfolding. Gratz and Roemer’s (2004, p. 42) “awareness and understanding” component also appears to be conceptually very similar to what other authors (e.g., Lane & Schwartz, 1987; Sifneos, 1996; Nemiah & Sifneos, 1970; Taylor et al., 1999; Vorst & Bermond, 2001) have called the alexithymia construct. This can be demonstrated with reference to the way in which Gratz and Roemer operationalise this component in their 36-item self-report measure of emotion regulation called the Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004). The 11 DERS items designed to assess it load on two correlated factors (subscales) in factor analysis, which Gratz and Roemer call Clarity (e.g., “I am confused about how I feel”) and Awareness (e.g., “I pay attention to how I feel [reverse-scored]”).

These two subscales have content that is, in my view, conceptually equivalent to the DIF (e.g., TAS-20 item “I am often confused about what emotion I am feeling”) and EOT (e.g., TAS-20 item “Being in touch with emotions is essential [reverse-scored]”) subscales of widely used alexithymia measures like the TAS-20 (Bagby et al., 1994).

My decision to give preference to Gross’s (2015a) model of emotional regulation over that of Gratz and Roemer’s (2004) is therefore ultimately influenced by the statistical support for alexithymia as a construct that is distinct from emotional regulation. Specifically, the factor analytic studies examining the higher-order structure of the emotion regulation construct (e.g., Zelkowitz & Cole, 2016) have so far suggested that alexithymia is not a
component of the latent emotion regulation construct. These studies have all been conducted recently and have mostly relied on testing Gratz and Roemer’s DERS, finding that the DERS’s Clarity and/or Awareness subscales tend to load on a different higher-order factor to the other subscales that measure the ability to modify or accept emotions (Bardeen, Fergus, & Orcutt, 2012; Lee et al., 2016; Osborne, Michonski, Sayrs, Welch, & Anderson, 2017; Zelkowitz & Cole, 2016). Based on these factor analysis results, several authors have recently questioned the viability of using the DERS total scale score (that sums all subscales into a composite score) as an overall index of emotion regulation ability, and have recommended the Awareness items be removed (e.g., Bardeen et al., 2012; Lee et al., 2016; Osborne et al., 2017). Whilst these factor analyses should be interpreted with care because they are limited by DERS items’ exclusive focus on negative emotions, the findings do nonetheless align well with Gross’s definition of emotion regulation. Thus, to be consistent with available factor analytic findings, the REALER mapping replicates Gross’s definition of the emotion regulation construct and specifies this construct as separable from alexithymia.

Summary

By using Gross’s (2015a) extended process model of emotion regulation as broad conceptual framework, the REALER mapping specifies a set of conceptually compatible definitions for the emotional reactivity, alexithymia, and emotion regulation constructs. This mapping integrates the specifications from a variety of existing models, and is consistent with the results of existing factor analyses. It could therefore be a useful formulation to use and test in future work.
Chapter 3
Criteria for Judging and Developing Psychometric Measures of Emotional Reactivity,
Alexithymia, and Emotion Regulation
Criteria for Judging and Developing Psychometric Measures of Emotional Reactivity, Alexithymia, and Emotion Regulation

My intention in this Chapter is to use existing data to begin to determine whether the psychometric tools available to measure emotional reactivity, alexithymia, or emotion regulation are satisfactory, or whether they have limitations that warrant the development of new tools. I firstly use the REALER mapping and the principles of psychometric assessment to specify three broad measurement criteria that can guide my evaluation of relevant psychometric measures. I then identify available psychometric measures by conducting a search of scholarly publications available in English in July 2017 (a date which preceded the publication of my six PhD papers), and end the Chapter by using the three criteria to evaluate these published tools.

Measurement Criteria

My premise in proposing the following three criteria is that measures of emotional reactivity, alexithymia, or emotion regulation that can meet all these criteria should be conceptually comprehensive and psychometrically sound, and therefore close to optimal in their clinical and research utility (Groth-Marnat, 2009).

1. Measures should have subscales for each component of the construct. As Reise, Moore and Haviland (2010) and others (e.g., Costa & McCrae, 1995; Wechsler, 2008) note, when constructs are conceptualised as multidimensional this assumes that there is some theoretical or statistical value in being able to assess each of their individual components separately, as well as being able to assess each construct as a whole. Like other authors’ models (e.g., Gratz & Roemer, 2004; Linehan, 1993; Taylor et al., 1999), the REALER mapping conceptualises emotional reactivity, alexithymia, and emotion regulation as being multidimensional. The first criterion for their measurement is therefore that a measure of any of these constructs should ideally: allow separate subscale scores to be derived for all (or at
least most) components of the construct, and these subscales should also be able to be combined into a composite score as an overall marker of the construct. The REALER mapping therefore requires that measures should have subscales designed to assess the following components. Emotional reactivity measures should have subscales measuring the ease of activation, intensity, and duration of emotional responses. Alexithymia measures should have subscales measuring difficulty identifying feelings (DIF), difficulty describing feelings (DDF), and externally orientated thinking (EOT). Measures of emotion regulation should ideally focus either on the processes (i.e., what specific regulation strategies are used) or outcomes (i.e., overall effectiveness) of emotion regulation attempts (see John & Eng, 2014). Depending on what type of information is desired about emotion regulation, the measures should therefore either have process subscales measuring how frequently people use specific categories of emotion regulation strategies (e.g., cognitive reappraisal; Gross & John, 2003), or they should have outcome subscales that measure people’s overall ability to modify the experiential, behavioural, and physiological manifestations of their emotions and their ability to know when it is appropriate to activate a goal to regulate in the first place.

2. Measures should assess the construct across negative and positive valences. Many authors agree that emotions can be either negatively or positively valenced (e.g., Gross, 2014; John & Eng, 2014; Mauss et al., 2005), so a second criterion for measures of emotional reactivity, alexithymia, or emotion regulation is that they should ideally: assess the construct across both negative and positive emotions, and be able to produce valence-specific scores. Indeed, there is growing evidence that people’s levels of emotional reactivity (e.g., Gruber, Harvey, & Purcell, 2011; Rosenthal et al., 2008), alexithymia (e.g., Barrett et al., 2001; van der Velde et al., 2013), and emotion regulation ability (e.g., Kim & Hamann, 2007; Zou, Plaks, & Peterson, 2017) can differ markedly depending on whether the emotion is negatively or positively valenced. People’s levels of negative reactivity and positive reactivity have, for
example, been found to usually be significantly negatively correlated (see Becerra et al., 2017), and neuroimaging data has indicated that the neural correlates of emotional constructs can differ depending on the valence of the emotion (see van der Velde et al., 2013). Laboratory-based psychophysiological experiments have, furthermore, suggested that certain psychopathologies are characterised by more prominent difficulties in one valence domain (see Gruber, Harvey, & Purcell, 2011).

3. Measures should have sound psychometric properties. Lastly, many authors agree that to have good clinical and research utility a measure must have good psychometric properties (e.g., Groth-Marnat, 2009; Lezak, Howieson, & Loring, 2004; Strauss, Sherman, & Spreen, 2006), hence a third criterion is that measures should ideally: display high levels of validity and reliability when their psychometric properties are tested statistically. Groth-Marnat (2009) and others (e.g., Nunnally & Bernstein, 1994) propose, for example, that reliability coefficients should be at least .70 if a measure is to be used in research and ideally around .90 or higher if it is to be used in clinical decision making, since reliability coefficients below .70 indicate that more than 50% of the variance in a measure’s score is attributable to error. Many authors also agree that a measure should display factorial validity by having all its items load well (i.e., factor loadings ≥ .40) on their intended factor in factor analysis, and should display concurrent and discriminant validity by correlating in theoretically congruent ways with established measures of other constructs (e.g., Groth-Marnat, 2009; Nunnally & Bernstein, 1994; Stevens, 1992).

Evaluating Existing Measures Using These Three Criteria

Emotional Reactivity. My literature search identified eight existing psychometric measures that were specifically designed to assess emotional reactivity, or were designed to assess a broader construct but include some emotional reactivity subscales (see Table 3.1). This list of eight measures already includes one of the Perth measures (Perth Emotional
Reactivity Scale; PERS), because some co-authors and I first validated it in early 2017 prior to this review.

Table 3.1

Existing Psychometric Measures of Emotional Reactivity

<table>
<thead>
<tr>
<th>Measure name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affect Intensity Measure (AIM; Larsen &amp; Diener, 1987).</td>
</tr>
<tr>
<td>Early Adolescent Temperament Questionnaire (EATQ; Capaldi &amp; Rotherbart, 1992)</td>
</tr>
<tr>
<td>Emotion Intensity Scale (EIS; Bachorowski &amp; Braaten, 1994).</td>
</tr>
<tr>
<td>Bermond-Vorst Alexithymia Questionnaire (BVAQ; Vorst &amp; Bermond, 2001)</td>
</tr>
<tr>
<td>Emotion Reactivity Scale (ERS; Nock et al., 2008).</td>
</tr>
<tr>
<td>Emotion Vulnerability-Child Scale (EVCS; Sauer &amp; Baer, 2009).</td>
</tr>
<tr>
<td>Perth Emotional Reactivity Scale (PERS; Becerra &amp; Campitelli, 2013; Becerra et al., 2017)</td>
</tr>
<tr>
<td>Emotional Reactivity and Perseveration Scale (ERPS; Boyes et al., 2017).</td>
</tr>
</tbody>
</table>

Note. All listed measures are self-report measures. The EVCS has a slightly different purpose to the other measures, in that it asks respondents to indicate what their levels of emotional reactivity were in the past (childhood), rather than their current levels of emotional reactivity. The BVAQ was originally designed to assess alexithymia, but is listed here because it also includes an emotional reactivity subscale.

Of these eight measures, only the PERS seems to meet all three measurement criteria. The PERS meets the first criterion because it has subscales designed to assess all three components of emotional reactivity (i.e., ease of activation, intensity, duration), and meets the second criterion as it has separate subscales to do so for negative and positive emotions (Becerra & Campitelli, 2013). It meets the third criterion because it has performed well psychometrically, though this has so far only been tested in one study (Becerra et al., 2017).

Of the other measures, the EIS, AIM, ERPS, EATQ and BVAQ do not meet the first criterion, because the EIS, AIM, and ERPS only measure one or two of the components of emotional reactivity, and the BVAQ and EATQ do not differentiate between the components. The ERS and EVCS do have sets of items for all three components, but they assess them only for negative emotions and they therefore do not meet the second criterion. In the case of the
ERS, it has 10 items that specify a negative valence and 11 items that specify no valence (e.g., “I tend to get emotional very easily”), but available data suggest that participants typically interpret these non-valenced items as meaning a negative valence (see Becerra et al., 2017), so I classify the ERS here as only assessing negative emotions.

**Alexithymia.** My literature search identified 14 existing psychometric measures that were specifically designed to assess alexithymia, or were designed to assess a broader construct but include some alexithymia subscales (see Table 3.2).

Table 3.2

<table>
<thead>
<tr>
<th>Measure name</th>
<th>Self-report measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Levels of Emotional Awareness Scale (LEAS; Lane et al., 1990)</td>
<td></td>
</tr>
<tr>
<td>20-item Toronto Alexithymia Scale (TAS-20; Bagby et al., 1994)</td>
<td></td>
</tr>
<tr>
<td>Trait Meta-Mood Scale (TMMS; Salovey, Mayer, Goldman, Turvey, &amp; Palfai, 1995)</td>
<td></td>
</tr>
<tr>
<td>Bermond-Vorst Alexithymia Questionnaire (BVAQ; Vorst &amp; Bermond, 2001)</td>
<td></td>
</tr>
<tr>
<td>Difficulties in Emotion Regulation Scale (DERS; Gratz &amp; Roemer, 2004)</td>
<td></td>
</tr>
<tr>
<td>Emotion Awareness Questionnaire (EAQ-30; Rieffe, Oosterveld, Miers, Terwogt, &amp; Ly, 2008)</td>
<td></td>
</tr>
<tr>
<td>Psychological Treatment Inventory-Alexithymia Scale (PTI-AS; Gori et al., 2012)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Observer-rated measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>California Q-set Alexithymia Prototype (CAQ-AP; Haviland &amp; Reise, 1996)</td>
</tr>
<tr>
<td>Alexithymia Scale for Children (ASC; Fukunishi, Yoshida, &amp; Wogan, 1998)</td>
</tr>
<tr>
<td>Modified Beth Israel Hospital Psychosomatic Questionnaire (M-BIQ; Taylor et al., 1999)</td>
</tr>
<tr>
<td>Observer Alexithymia Scale (OAS; Haviland, Warren, &amp; Riggs, 2000)</td>
</tr>
<tr>
<td>Toronto Structured Interview for Alexithymia (TSIA; Bagby et al., 2006)</td>
</tr>
<tr>
<td>Children’s Alexithymia Measure (CAM; Way et al., 2010)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Projective tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rorschach Alexithymia Scale (RAS; Porcelli &amp; Mihura, 2010)</td>
</tr>
</tbody>
</table>

*Note.* The TMMS and DERS were not specifically designed to assess alexithymia, but are listed here because they have some subscales that conceptually correspond to components of alexithymia.
None of these 14 measures meet all three measurement criteria. The TAS-20, BVAQ, TSIA, and EAQ-30 can provide separate DIF, DDF and EOT subscale scores, and therefore meet the first measurement criterion, though in the case of the TSIA its overall composite score also includes difficulty fantasising items. None of these 14 measures meet the second measurement criterion though, because they do not provide any valence-specific scores. The TAS-20 and BVAQ may also not meet the third measurement criterion because they have EOT subscales that have displayed low reliability in some samples (e.g., Bermond et al., 2007; Kooiman et al., 2002; Müller, Bühner, & Ellgring, 2004).

**Emotion Regulation.** My literature search identified 14 existing psychometric measures that were specifically designed to assess emotion regulation, or were designed to assess a broader construct but include some emotion regulation subscales (see Table 3.3).

I will follow John and Eng’s (2014) example here in distinguishing between process measures and competence measures, as these two categories of tools are designed to provide different types of information about emotion regulation. Process measures assess how frequently people use specific types of emotion regulation strategies (i.e., the processes by which people regulate their emotions). Competence measures do not assess specific regulation strategies, but rather are designed to assess the typical outcomes or effectiveness of people’s emotion regulation attempts (i.e., provide an overall index of emotion regulation ability).
### Existing Psychometric Measures of Emotion Regulation

<table>
<thead>
<tr>
<th>Name and type of measure</th>
<th>Process measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ways of Coping Checklist (WCC; Folkman &amp; Lazarus, 1980)</td>
<td></td>
</tr>
<tr>
<td>COPE inventory (COPE; Carver et al., 1989)</td>
<td></td>
</tr>
<tr>
<td>Emotion Regulation Questionnaire (ERQ; Gross &amp; John, 2003)</td>
<td></td>
</tr>
<tr>
<td>Cognitive Emotion Regulation Questionnaire (CERQ; Garnefski &amp; Kraaij, 2007)</td>
<td></td>
</tr>
<tr>
<td>Emotion Regulation Profile-Revised (ERP-R; Nelis, Quoidbach, Hansenne, &amp; Mikolaiczak, 2011)</td>
<td></td>
</tr>
<tr>
<td>Emotion Regulation Questionnaire for Children and Adolescents (ERQ-CA; Gullone &amp; Taffe, 2012)</td>
<td></td>
</tr>
<tr>
<td>Regulation of Emotion Systems Survey (RESS; De France &amp; Hollenstein, 2017)</td>
<td></td>
</tr>
<tr>
<td>Heidelberg Form for Emotion Regulation Strategies (HFERST; Izadpanah, Barnow, Neubauer, &amp; Holl, 2017)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name and type of measure</th>
<th>Competence measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generalized Expectancies for Negative Mood Regulation Scale (NMR; Catanzaro &amp; Mearns, 1990)</td>
<td></td>
</tr>
<tr>
<td>Trait Meta-Mood Scale (TMMS; Salovey et al., 1995)</td>
<td></td>
</tr>
<tr>
<td>Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT; Mayer, Salovey, &amp; Caruso, 2002)</td>
<td></td>
</tr>
<tr>
<td>Difficulties in Emotion Regulation Scale (DERS; Gratz &amp; Roemer, 2004)</td>
<td></td>
</tr>
<tr>
<td>Difficulties in Emotion Regulation Scale-Positive (DERS-positive; Weiss, Gratz, &amp; Lavender, 2015)</td>
<td></td>
</tr>
<tr>
<td>Revised Regulatory Emotional Self-Efficacy Scale (r-RESE; Zou et al., 2017)</td>
<td></td>
</tr>
</tbody>
</table>

**Note.** All listed measures are self-report measures except for the MSCEIT (which is an emotional intelligence test). Process measures and competence measures are designed to provide different types of information about emotion regulation. Process measures are those measures designed to assess how frequently people use a specific emotion regulation strategy. Competence measures are those measures designed to assess whether people are, overall, able to regulate their emotions successfully.

Of the eight process measures, only the ERQ and its child and adolescent variant the ERQ-CA seem to meet all three measurement criteria, or at least are the closest to doing so. The ERQ and ERQ-CA meet the first criterion because they both have two subscales designed to assess the use of two emotion regulation strategies (cognitive reappraisal or expressive suppression) that correspond to the cognitive change or response modulation categories of strategies from Gross’s (1998, 2015a) process model. The ERQ and ERQ-CA are the closest process measures to meeting the second criterion, because they have items for
both negative and positive emotions (and these items have loaded together well on the
cognitive reappraisal and expressive suppression subscales in existing factor analytic studies;
e.g., Gross & John, 2003), though there are no valence-specific subscales. The ERQ and
ERQ-CA seem to meet the third criterion because their two subscales have so far displayed
good psychometric properties, though for the ERQ this has mostly been examined in
university student samples to date (e.g., Gross & John, 2003). Of the other six process
measures (WCC, COPE, CERQ, ERP-R, RESS, HFERST), all seem to meet the first criterion
as they have subscales assessing a variety of specific emotion regulation strategies, but they
do so only for negative emotions and therefore do not meet the second criterion.

Of the six competence measures, none meet all three criteria. In terms of assessing the
four components of emotion regulation ability (i.e., ability to modify the [1] experiential, [2]
behavioural, and [3] physiological manifestations of emotions, and [4] know when it is
appropriate to activate a goal to modify emotions), the NRM, TMMS, MSCEIT, DERS-
positive, and r-RESE do not meet this first criterion, because they have subscales for no more
than half of these components or do not differentiate between these components. The DERS
has subscales to assess most of these components, but it only assesses them for negative
emotions and therefore does not meet the second criterion. Only the r-RESE has separate
subscale for both negative and positive emotions; all the other competence measures do not
meet the second criterion because the DERS and NRM only assess negative emotions, the
DERS-positive only assesses positive emotions, and the TMMS and MSCEIT do not
differentiate between the valence types.

Summary

Most existing measures of emotional reactivity, alexithymia, or emotion regulation
meet some of the three measurement criteria, but very few are able to meet all three. Based on
existing data, the recent introduction of the PERS (Becerra & Campitelli, 2013; Becerra et al.,
2017) might have provided an emotional reactivity measure that can meet all three criteria, but there are no existing measures of alexithymia or (competence type) measures of emotion regulation ability that can meet all three criteria. It should therefore be useful to develop some new measures of these constructs using the REALER mapping as a conceptual base. This is what I and some co-authors will try to do with the Perth series of measures.
Author Note

I now present six papers\(^2\) that report on studies some co-authors and I conducted to further test the structure of the emotional reactivity, alexithymia, or emotion regulation constructs, and examine the psychometric properties of existing measures or develop the Perth measures. I begin with a statistical examination of the emotional reactivity construct, whereby I conduct a study exploring the psychometric properties of the Perth Emotional Reactivity Scale and a new short form that I develop.

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\(^2\) These six papers were originally written to conform to the formatting requirements of different journals, so occasionally there are minor formatting differences between them.

Further information about this publication and a link to the published version can be found here: https://ro.ecu.edu.au/ecuworkspost2013/5916/
Author Note

I now transition to three papers looking at the alexithymia construct. Throughout these three papers, I refer to the alexithymia part of the REALER mapping as the *attention-appraisal model of alexithymia*. I begin with a paper where I explain this attention-appraisal model in more detail, and conduct a study to explore its parameters statistically. My previous work on the emotional reactivity construct becomes helpful here, because I use the Perth Emotional Reactivity Scale when examining of the relationship between alexithymia and emotional reactivity.
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Author Note

I now conduct a psychometric study of the most widely used measure of alexithymia, the 20-item Toronto Alexithymia Scale (TAS-20). I use the attention-appraisal model of alexithymia as my conceptual framework when trying to interpret and explain the TAS-20’s psychometric performance.

Further information about this publication and a link to the published version can be found here: https://ro.ecu.edu.au/ecuworkspost2013/3697/
Author Note

In this next paper, I try to address the psychometric limitations of existing alexithymia measures like the 20-item Toronto Alexithymia Scale, by developing my own measure of alexithymia called the Perth Alexithymia Questionnaire.
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I now transition to two papers looking at the emotion regulation construct. The distinction that I mentioned in Chapter 3 between *process* measures (i.e., measures designed to assess how frequently people use specific emotion regulation strategies) and *competence* measures (i.e., measures designed to provide an overall index of people’s emotion regulation ability) is important here. My first paper examines the psychometric properties of the most widely used process measure, the Emotion Regulation Questionnaire.
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Author Note

To provide a comprehensive competence (rather than process) type measure of emotion regulation based on the same conceptual framework as the Emotion Regulation Questionnaire (ERQ), in this next paper I develop the Perth Emotion Regulation Competency Inventory (PERCI). My previous work with the ERQ is helpful here because I use it as a concurrent validity measure when developing the PERCI. Similarly, my previous work on the alexithymia construct is helpful, because I also use my Perth Alexithymia Questionnaire as a concurrent validity measure, and the alexithymia and emotion regulation parts of the REALER mapping inform my critique of older competence measures.
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Chapter 10

Concluding Comments
Concluding Comments

This research project had two overall aims. The first aim was to resolve the conceptual ambiguities surrounding how emotional reactivity, alexithymia, and emotion regulation should be defined, by using a common framework to establish compatible and empirically supported definitions for these three constructs (i.e., construct validation). The second aim was to use these definitions to develop and validate a set of new, comprehensive self-report measures that could enhance the measurement of these constructs (i.e., measure validation).

I addressed the first aim by specifying and statistically testing the REALER mapping. I used Gross’s (2015a) extended process model of emotion regulation as a broad conceptual framework, to develop a set of definitions that integrated components from a variety of existing models that had been developed separately in the emotional reactivity, alexithymia, or emotion regulation subfields. The findings from all my factor analyses, taken together, were consistent with all the specifications of the REALER mapping. Paper 1 confirmed the emotional reactivity part of this mapping, Papers 2, 3 and 4 confirmed the alexithymia part, and Papers 5 and 6 confirmed the emotion regulation part. My findings therefore reinforced those of previous factor analyses done in the negative (or a non-specified) valence domain, but importantly, my studies extended this previous research by establishing the structure of all these constructs in the positive valence domain as well. Thus, by synthesising the components of emotional reactivity, alexithymia, and emotion regulation within a common framework, my thesis does successfully delineate a set of compatible and empirically supported definitions.

I dealt with the second aim by using these definitions from the REALER mapping to develop the Perth series of measures with my co-authors. Each of these measures performed well psychometrically. On present evidence, the 30-item and 18-item variants of the Perth
Emotional Reactivity Scale (PERS; PERS-S), the 24-item Perth Alexithymia Questionnaire (PAQ), and the 32-item Perth Emotion Regulation Competency Inventory (PERCI), meet all three of the measurement criteria outlined in Chapter 3 (i.e., have subscales for all or most components of the construct, provide valence-specific scores for both negative and positive emotions, and have good psychometric properties). Thus, when each Perth measure is viewed individually, their introduction advances the field by enabling their intended emotional construct to be operationalised in more detail than was previously possible, particularly with respect to making the crucial step of extending psychometric measurement into the positive valence domain. If the Perth measures are administered in combination though, their potential impact becomes even greater, because they can then provide a comprehensive profile of the full emotion generation and valuation process. The PERS (or PERS-S) provides information on emotion generation, and the PAQ and PERCI provide information on the different stages of emotion valuation (see Figure 10.1). Given that the emotion generation and valuation process is hypothesised to be a system of linked stages (Gross, 2015a), it follows that theoretical understanding of this system is likely to be enhanced by gathering information on all its stages, rather than considering only a few in isolation. The common underlying framework and resulting compatibility between the Perth measures is therefore a key advantage of these tools.
Figure 10.1. A visual representation of how the subscales of the Perth measures correspond to the different stages in the emotion generation and valuation sequence. All valuation systems are comprised of four sequential stages; a situation (s), attention (at), appraisal (ap) and response (r) stage (Gross, 2015a). Valuation system 1 represents an emotion being generated, whereby an emotion inducing stimulus is present (s1), the person’s attention is focused on the stimulus (at1), the stimulus is appraised in terms of what it is and what it means for his or her goals (ap1), and an emotional response results (r1). In valuation system 2, this emotional response itself becomes the stimulus that is the target of valuation (s2), whereby the person focuses their attention on the emotion (at2), it is appraised in terms of what it is and whether it is a desired state (ap2), and then a goal might be activated to modify this unfolding emotional response (r2). PERS = Perth Emotional Reactivity Scale, PAQ = Perth Alexithymia Questionnaire, PERCI = Perth Emotion Regulation Competency Inventory. EOT = externally orientated thinking, DIF = difficulty identifying feelings, DDF = difficulty describing feelings.

Like all psychometric tools and frameworks, the validation process for these Perth measures and the REALER mapping will need to be an ongoing one (see Hogan & Nicolson, 1988), but my initial validation studies provide enough information about the Perth measures to allow me to consider how they might be used in combination in research and practice. A key application is in clinical psychology settings, where future administrations of all the Perth measures to large groups of patients should help to improve theoretical understanding of the mechanisms underlying various psychopathologies. Such studies could specifically determine at what stages (and valences) in the emotion generation and valuation process different psychopathology categories typically have their most pronounced deficits. Mental health
treatment programs are often comprised of various modules designed to teach emotional awareness and/or emotion regulation skills (see Barlow et al., 2010, 2017; Bullis et al., 2015), so the comprehensive score profiles produced by the Perth measures should help improve treatment effectiveness by identifying patients’ specific emotional dysfunctions, in turn allowing interventions to be better tailored to the emotional dysfunctions they most need help with (e.g., Sauer-Zavala, Cassiello-Robbins, Ametaj, Wilner, & Pagan, 2018). This is of particular relevance to the transdiagnostic assessment and treatment of those psychiatric disorders where emotional dysfunction is directly listed as part of their diagnostic criteria (e.g., affective disorders, anxiety disorders, personality disorders), as well as to those disorders where their principal symptoms are hypothesised to be influenced by underlying emotional dysfunction (e.g., substance use disorders, eating disorders, psychosomatic disorders; Rottenberg & Johnson, 2007).

Fields other than clinical psychology are also starting to investigate emotional reactivity, alexithymia, and emotion regulation, and there are still many unknown aspects about emotional functioning in these contexts (Gross, 2014; John & Eng, 2014). Organisational psychologists and researchers, for example, are interested in learning more about the role emotional functioning plays in effective leadership (e.g., Boss & Sims, 2008; van Kleef, Homan, Beersma, & van Knippenberg, 2010), social functioning (e.g., Brackett, Rivers, & Salovey, 2001), and workplace performance (e.g., Grandey, 2000). Organisations are also using older psychometric measures to try to screen for personnel with good emotional awareness and regulation skills (e.g., Goleman, Boyatzis, & McKee, 2013). Similarly, forensic researchers are investigating how deficits in emotional functioning might be associated with criminal behaviour (e.g., Strickland, Parry, Allan, & Allan, 2017). Some developmental researchers are mapping how emotional functioning develops over the lifespan (e.g., Consedine & Mauss, 2014; Silvers et al., 2012), whilst others are trying to
determine the relative contributions of genetic and environmental factors in explaining individual differences in emotional functioning (e.g., Jorgensen, Zachariae, Skytthe, & Kyvik, 2007). Cross-cultural researchers are increasingly focusing on how cultural factors might influence the manifestations of emotional reactivity, alexithymia, and emotion regulation (e.g., Butler, Lee, & Gross, 2007; Grossman, Karasawa, Kan, & Kitayama, 2014), and neuropsychologists and neuroscientists are interested in establishing the neural correlates of emotional functioning (e.g., Etkin, Buchel, & Gross, 2015; van der Velde et al., 2013), as well as the patterns of emotional dysfunction associated with different categories of brain injury (e.g., Williams & Wood, 2010). All these researchers need clear conceptual and operational definitions of emotional reactivity, alexithymia, and emotion regulation, and accurate methods of measuring them. They should therefore find the Perth measures, used individually or in combination, useful in their future research.

In short, there is a lot of exciting work left to do. It is an important time to be researching these emotional constructs, and the empirically supported definitions and comprehensive psychometric tools offered in this thesis provide a vital conceptual and measurement foundation to be used and tested in future work.
References


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New York, NY: Guilford.


Appendix A

Copies of the Perth Measures and their Scoring Instructions
This questionnaire is designed to measure different aspects of how you typically react to experiencing emotional events. Please score the following statements according to how much they apply or do not apply to you on a typical day. Circle one answer for each question.

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I tend to get happy very easily.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>I tend to get upset very easily.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>When I’m happy, the feeling stays with me for quite a while.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>When I’m upset, it takes me quite a while to snap out of it.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>I think I experience happiness more intensely than my friends.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>If I’m upset, I feel it more intensely than everyone else.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>7</td>
<td>My emotions go automatically from neutral to positive.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>8</td>
<td>I tend to get disappointed very easily.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>9</td>
<td>When I’m feeling positive, I can stay like that for a good part of the day.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>10</td>
<td>It takes me longer than other people to get over an anger episode.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>11</td>
<td>When I am joyful, I tend to feel it very deeply.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>12</td>
<td>I experience the feeling of frustration very deeply.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>13</td>
<td>I tend to get enthusiastic about things very quickly.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>14</td>
<td>I tend to get frustrated very easily.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Very unlike me</td>
<td>Somewhat unlike me</td>
<td>Neither like or unlike me</td>
<td>Somewhat like me</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>----------------</td>
<td>--------------------</td>
<td>--------------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>15.</td>
<td>I can remain enthusiastic for quite a while</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>16.</td>
<td>It’s hard for me to recover from frustration</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>17.</td>
<td>I experience positive mood very strongly</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>18.</td>
<td>Normally, when I’m unhappy I feel it very strongly</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>19.</td>
<td>I feel good about positive things in an instant</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>20.</td>
<td>My emotions go from neutral to negative very quickly</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>21.</td>
<td>I stay happy for a while if I receive pleasant news</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>22.</td>
<td>Once in a negative mood, it’s hard to snap out of it</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>23.</td>
<td>When I’m enthusiastic about something, I feel it very powerfully</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>24.</td>
<td>When I’m angry I feel it very powerfully</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>25.</td>
<td>I react to good news very quickly</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>26.</td>
<td>I tend to get pessimistic about negative things very quickly</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>27.</td>
<td>If someone pays me a compliment, it improves my mood for a long time</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>28.</td>
<td>When annoyed about something, it ruins my entire day</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>29.</td>
<td>I experience positive feelings more deeply than my relatives and friends</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>30.</td>
<td>My negative feelings feel very intense</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
Scoring the PERS

The Perth Emotional Reactivity Scale (PERS; Becerra & Campitelli, 2013; Becerra, Preece, Campitelli, & Scott-Pillow, 2017) is a 30-item self-report measure of people’s trait levels of emotional reactivity. The PERS assesses the emotional reactivity construct as it is defined by Davidson (1998) and Becerra and Campitelli (2013); that is, it measures the typical ease of activation, intensity, and duration of one’s emotional responses, and does so for positive (e.g., happiness) and negative (e.g., sadness) emotions separately.

Two composite scores and six subscale scores can be derived by summing a participant’s responses (i.e., the number they select on the 5-point answer scale) for the relevant items. For all composites and subscales, higher scores indicate higher levels of reactivity in that domain; in other words, that emotions are more easily/quickly activated, more intense, and longer in their duration. The table below describes these subscale and composite scores and how to calculate them.

<table>
<thead>
<tr>
<th>Subscale /composite scores</th>
<th>How to calculate</th>
<th>Content measured</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Subscale scores</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negative-activation</td>
<td>Sum items 2, 8, 14, 20, 26.</td>
<td>The ease/speed of activation of one’s negative emotions.</td>
</tr>
<tr>
<td>Negative-intensity</td>
<td>Sum items 6, 12, 18, 24, 30.</td>
<td>The intensity of one’s negative emotions.</td>
</tr>
<tr>
<td>Negative-duration</td>
<td>Sum items 4, 10, 16, 22, 28.</td>
<td>The duration of one’s negative emotions.</td>
</tr>
<tr>
<td>Positive-activation</td>
<td>Sum items 1, 7, 13, 19, 25.</td>
<td>The ease/speed of activation of one’s positive emotions.</td>
</tr>
<tr>
<td>Positive-intensity</td>
<td>Sum items 5, 11, 17, 23, 29.</td>
<td>The intensity of one’s positive emotions.</td>
</tr>
<tr>
<td>Positive-duration</td>
<td>Sum items 3, 9, 15, 21, 27.</td>
<td>The duration of one’s positive emotions.</td>
</tr>
</tbody>
</table>

| **Composite scores**      |                  |                 |
| General negative reactivity | Sum all even numbered items. | Overall level of reactivity (ease of activation, intensity, and duration) of one’s negative emotions. |
| General positive reactivity | Sum all odd numbered items. | Overall level of reactivity (ease of activation, intensity, and duration) of one’s positive emotions. |

For more information about the psychometric properties and development of the PERS, see Becerra et al. (2017) and Preece, Becerra and Campitelli (2018).

References


This questionnaire is designed to measure different aspects of how you typically react to experiencing emotional events. Please score the following statements according to how much they apply or do not apply to you on a typical day. Circle one answer for each question.

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>I tend to get happy very easily.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>2.</td>
<td>I tend to get upset very easily.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>3.</td>
<td>When I’m happy, the feeling stays with me for quite a while.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>4.</td>
<td>When I’m upset, it takes me quite a while to snap out of it.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>5.</td>
<td>When I am joyful, I tend to feel it very deeply.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>6.</td>
<td>If I’m upset, I feel it more intensely than everyone else.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>7.</td>
<td>I feel good about positive things in an instant.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>8.</td>
<td>I tend to get disappointed very easily.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>9.</td>
<td>When I’m feeling positive, I can stay like that for a good part of the day.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>10.</td>
<td>It’s hard for me to recover from frustration.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>11.</td>
<td>I experience positive mood very strongly.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>12.</td>
<td>Normally, when I’m unhappy I feel it very strongly.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>13.</td>
<td>I react to good news very quickly.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>14.</td>
<td>I tend to get pessimistic about negative things very quickly.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>15.</td>
<td>I can remain enthusiastic for quite a while.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>16.</td>
<td>Once in a negative mood, it’s hard to snap out of it.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>17.</td>
<td>When I’m enthusiastic about something, I feel it very powerfully.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>18.</td>
<td>My negative feelings feel very intense.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

© Preece, Becerra & Campitelli (2018)
Scoring the PERS-S

The Perth Emotional Reactivity Scale—Short Form (PERS-S; Preece, Becerra, & Campitelli, 2018) is an 18-item self-report measure of people’s trait levels of emotional reactivity. The PERS-S assesses the emotional reactivity construct as it is defined by Davidson (1998) and Becerra and Campitelli (2013); that is, it measures the typical ease of activation, intensity, and duration of one’s emotional responses, and does so for positive (e.g., happiness) and negative (e.g., sadness) emotions separately.

Two composite scores and six subscale scores can be derived by summing a participant’s responses (i.e., the number they select on the 5-point answer scale) for the relevant items. For all composites and subscales, higher scores indicate higher levels of reactivity in that domain; in other words, that emotions are more easily/quickly activated, more intense, and longer in their duration. The table below describes these subscale and composite scores and how to calculate them.

<table>
<thead>
<tr>
<th>Subscale /composite scores</th>
<th>How to calculate</th>
<th>Content measured</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Subscale scores</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negative-activation</td>
<td>Sum items 2, 8, 14.</td>
<td>The ease/speed of activation of one's negative emotions.</td>
</tr>
<tr>
<td>Negative-intensity</td>
<td>Sum items 6, 12, 18.</td>
<td>The intensity of one's negative emotions.</td>
</tr>
<tr>
<td>Negative-duration</td>
<td>Sum items 4, 10, 16.</td>
<td>The duration of one's negative emotions.</td>
</tr>
<tr>
<td>Positive-activation</td>
<td>Sum items 1, 7, 13.</td>
<td>The ease/speed of activation of one's positive emotions.</td>
</tr>
<tr>
<td>Positive-intensity</td>
<td>Sum items 5, 11, 17.</td>
<td>The intensity of one’s positive emotions.</td>
</tr>
<tr>
<td>Positive-duration</td>
<td>Sum items 3, 9, 15.</td>
<td>The duration of one’s positive emotions.</td>
</tr>
<tr>
<td><strong>Composite scores</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General negative reactivity</td>
<td>Sum all even numbered items.</td>
<td>Overall level of reactivity (ease of activation, intensity, and duration) of one’s negative emotions.</td>
</tr>
<tr>
<td>General positive reactivity</td>
<td>Sum all odd numbered items.</td>
<td>Overall level of reactivity (ease of activation, intensity, and duration) of one’s positive emotions.</td>
</tr>
</tbody>
</table>

The PERS-S is a short form of the original 30-item PERS (Becerra & Campitelli, 2013; Becerra, Preece, Campitelli, & Scott-Pillow, 2017). For more information about the psychometric properties and development of the PERS-S, see Preece et al. (2018).

References


The table below displays the item numbering in the PERS-S, and how it corresponds to the item numbering in the PERS.

<table>
<thead>
<tr>
<th>PERS-S item number</th>
<th>PERS item number</th>
<th>Item content</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>I tend to get happy very easily.</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>I tend to get upset very easily.</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>When I’m happy, the feeling stays with me for quite a while.</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>When I’m upset, it takes me quite a while to snap out of it.</td>
</tr>
<tr>
<td>5</td>
<td>11</td>
<td>When I am joyful, I tend to feel it very deeply.</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td>If I’m upset, I feel it more intensely than everyone else.</td>
</tr>
<tr>
<td>7</td>
<td>19</td>
<td>I feel good about positive things in an instant.</td>
</tr>
<tr>
<td>8</td>
<td>8</td>
<td>I tend to get disappointed very easily.</td>
</tr>
<tr>
<td>9</td>
<td>9</td>
<td>When I’m feeling positive, I can stay like that for a good part of the day.</td>
</tr>
<tr>
<td>10</td>
<td>16</td>
<td>It’s hard for me to recover from frustration.</td>
</tr>
<tr>
<td>11</td>
<td>17</td>
<td>I experience positive mood very strongly.</td>
</tr>
<tr>
<td>12</td>
<td>18</td>
<td>Normally, when I’m unhappy I feel it very strongly.</td>
</tr>
<tr>
<td>13</td>
<td>25</td>
<td>I react to good news very quickly.</td>
</tr>
<tr>
<td>14</td>
<td>26</td>
<td>I tend to get pessimistic about negative things very quickly.</td>
</tr>
<tr>
<td>15</td>
<td>15</td>
<td>I can remain enthusiastic for quite a while.</td>
</tr>
<tr>
<td>16</td>
<td>22</td>
<td>Once in a negative mood, it’s hard to snap out of it.</td>
</tr>
<tr>
<td>17</td>
<td>23</td>
<td>When I’m enthusiastic about something, I feel it very powerfully.</td>
</tr>
<tr>
<td>18</td>
<td>30</td>
<td>My negative feelings feel very intense.</td>
</tr>
</tbody>
</table>
This questionnaire asks about how you perceive and experience your emotions. Please score the following statements according to **how much you agree or disagree that the statement is true of you**. Circle one answer for each statement.

Some questions mention **bad** or **unpleasant** emotions, this means emotions like sadness, anger, or fear. Some questions mention **good** or **pleasant** emotions, this means emotions like happiness, amusement, or excitement.

<table>
<thead>
<tr>
<th></th>
<th>Strongly disagree</th>
<th></th>
<th>Neither agree nor disagree</th>
<th></th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>When I’m feeling <strong>bad</strong> (feeling an unpleasant emotion), I can’t find the right words to describe those feelings.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>When I’m feeling <strong>bad</strong>, I can’t tell whether I’m sad, angry, or scared.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>I tend to ignore how I feel.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>When I’m feeling <strong>good</strong> (feeling a pleasant emotion), I can’t find the right words to describe those feelings.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>When I’m feeling <strong>good</strong>, I can’t tell whether I’m happy, excited, or amused.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>I prefer to just let my feelings happen in the background, rather than focus on them.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>7</td>
<td>When I’m feeling <strong>bad</strong>, I can’t talk about those feelings in much depth or detail.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>8</td>
<td>When I’m feeling <strong>bad</strong>, I can’t make sense of those feelings.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>9</td>
<td>I don’t pay attention to my emotions.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>10</td>
<td>When I’m feeling <strong>good</strong>, I can’t talk about those feelings in much depth or detail.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>11</td>
<td>When I’m feeling <strong>good</strong>, I can’t make sense of those feelings.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>12</td>
<td>Usually, I try to avoid thinking about what I’m feeling.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Strongly disagree</td>
<td></td>
<td>Neither agree nor disagree</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>-------------------</td>
<td>---</td>
<td>---------------------------</td>
<td>---</td>
</tr>
<tr>
<td>13</td>
<td>When something <em>bad</em> happens, it’s hard for me to put into words how I’m feeling.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>14</td>
<td>When I’m feeling <em>bad</em>, I get confused about what emotion it is.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>15</td>
<td>I prefer to focus on things I can actually see or touch, rather than my emotions.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>16</td>
<td>When something <em>good</em> happens, it’s hard for me to put into words how I’m feeling.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>17</td>
<td>When I’m feeling <em>good</em>, I get confused about what emotion it is.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>18</td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>19</td>
<td>When I’m feeling <em>bad</em>, if I try to describe how I’m feeling I don’t know what to say.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>20</td>
<td>When I’m feeling <em>bad</em>, I’m puzzled by those feelings.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>21</td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>22</td>
<td>When I’m feeling <em>good</em>, if I try to describe how I’m feeling I don’t know what to say.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>23</td>
<td>When I’m feeling <em>good</em>, I’m puzzled by those feelings.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>24</td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

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Perth Alexithymia Questionnaire (PAQ) scoring instructions

Alexithymia is a multidimensional construct comprised of three components: difficulty identifying one’s own feelings (DIF); difficulty describing feelings (DDF); and an externally orientated thinking style (EOT) whereby one tends to not focus their attention on their emotions. In other words, people with high levels of alexithymia have difficulty focusing attention on their emotional states (EOT), and difficulty accurately appraising what those states are (DIF, DDF) (Preece et al., 2017).

The PAQ (Preece et al., 2018) is a 24-item self-report measure of alexithymia. It is designed to assess all components alexithymia, and do so across negative and positive emotions. Five subscale scores and six composite scores can be derived from the measure, with higher scores indicating higher levels of alexithymia. The table below describes each of these subscale and composite scores and how to calculate them. For more information about the development and psychometric properties of the PAQ, see Preece et al. (2018).

<table>
<thead>
<tr>
<th>Subscale / composite scores</th>
<th>How to calculate</th>
<th>Content measured</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Subscale scores</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negative-Difficulty identifying feelings (N-DIF)</td>
<td>Sum items 2, 8, 14, 20</td>
<td>Difficulty identifying, understanding, and differentiating between one’s own negative feelings.</td>
</tr>
<tr>
<td>Positive-Difficulty identifying feelings (P-DIF)</td>
<td>Sum items 5, 11, 17, 23</td>
<td>Difficulty identifying, understanding, and differentiating between one’s own positive feelings.</td>
</tr>
<tr>
<td>Negative-Difficulty describing feelings (N-DDF)</td>
<td>Sum items 1, 7, 13, 19</td>
<td>Difficulty describing and communicating one’s own negative feelings.</td>
</tr>
<tr>
<td>Positive-Difficulty describing feelings (P-DDF)</td>
<td>Sum items 4, 10, 16, 22</td>
<td>Difficulty describing and communicating one’s own positive feelings.</td>
</tr>
<tr>
<td>General-Externally orientated thinking (G-EOT)</td>
<td>Sum items 3, 6, 9, 12, 15, 18, 21, 24</td>
<td>Tendency to not focus attention on one’s own emotions (negative and positive).</td>
</tr>
<tr>
<td><strong>Composite scores</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General-Difficulty identifying feelings (G-DIF)</td>
<td>Sum N-DIF and P-DIF subscales</td>
<td>Difficulty identifying, understanding, and differentiating between one’s own feelings (negative and positive).</td>
</tr>
<tr>
<td>General-Difficulty describing feelings (G-DDF)</td>
<td>Sum N-DDF and P-DDF subscales</td>
<td>Difficulty describing and communicating one’s own feelings (negative and positive).</td>
</tr>
<tr>
<td>Negative-Difficulty appraising feelings (N-DAF)</td>
<td>Sum N-DIF and N-DDF subscales</td>
<td>Difficulty identifying and describing (i.e., appraising) one’s own negative feelings</td>
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<tr>
<td>Positive-Difficulty appraising feelings (P-DAF)</td>
<td>Sum P-DIF and P-DDF subscales</td>
<td>Difficulty identifying and describing (i.e., appraising) one’s own positive feelings</td>
</tr>
<tr>
<td>General-Difficulty appraising feelings (G-DAF)</td>
<td>Sum N-DIF, P-DIF, N-DDF and P-DDF subscales</td>
<td>Difficulty identifying and describing (i.e., appraising) one’s own feelings (negative and positive)</td>
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<tr>
<td>Alexithymia (ALEXI)</td>
<td>Sum all items</td>
<td>Overall alexithymia; difficulty focusing attention on and appraising one’s own feelings (negative and positive).</td>
</tr>
</tbody>
</table>

References


This questionnaire asks about how you manage and respond to your emotions. Please score the following statements according to **how much you agree or disagree that the statement is true of you**. Circle one answer for each statement.

The first half of the questionnaire asks about **bad** or **unpleasant** emotions, this means emotions like sadness, anger, or fear. The second half asks about **good** or **pleasant** emotions, this means emotions like happiness, amusement, or excitement.

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<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>1</td>
<td>When I’m feeling bad (feeling an unpleasant emotion), I don’t know what to do to feel better.</td>
<td>1</td>
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<tr>
<td>2</td>
<td>When I’m feeling bad, those feelings stop me from getting work done.</td>
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<tr>
<td>3</td>
<td>When I’m feeling bad, I do stupid things.</td>
<td>1</td>
<td>2</td>
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<tr>
<td>4</td>
<td>When I’m feeling bad, I believe I need to get rid of those feelings at all costs.</td>
<td>1</td>
<td>2</td>
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<tr>
<td>5</td>
<td>When I’m feeling bad, I’m powerless to change how I’m feeling.</td>
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<tr>
<td>6</td>
<td>When I’m feeling bad, I can’t complete tasks that I’m meant to be doing.</td>
<td>1</td>
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<tr>
<td>7</td>
<td>When I’m feeling bad, my behavior becomes out of control.</td>
<td>1</td>
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<td>7</td>
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<tr>
<td>8</td>
<td>When I’m feeling bad, I can’t allow those feelings to be there.</td>
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<tr>
<td>9</td>
<td>When I’m feeling bad, I don’t have many strategies (e.g., activities or techniques) to help get rid of that feeling.</td>
<td>1</td>
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<tr>
<td>10</td>
<td>When I’m feeling bad, I can’t get motivated to do important things (work, chores, school etc.).</td>
<td>1</td>
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<tr>
<td>11</td>
<td>When I’m feeling bad, I have trouble controlling my actions.</td>
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<tr>
<td>12</td>
<td>When I’m feeling bad, I must try to totally eliminate those feelings.</td>
<td>1</td>
<td>2</td>
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<tr>
<td>13</td>
<td>When I’m feeling bad, I have no control over the strength and duration of that feeling.</td>
<td>1</td>
<td>2</td>
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<tr>
<td>14</td>
<td>When I’m feeling bad, I have trouble getting anything done.</td>
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<td>6</td>
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<tr>
<td>15</td>
<td>When I’m feeling bad, I have strong urges to do risky things.</td>
<td>1</td>
<td>2</td>
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<tr>
<td>16</td>
<td>When I’m feeling bad, I believe those feelings are unacceptable.</td>
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<tr>
<td>17</td>
<td>When I’m feeling <strong>good</strong> (feeling a pleasant emotion), I do stupid things.</td>
<td>1</td>
<td>2</td>
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<tr>
<td>18</td>
<td>When I’m feeling good, I don’t have many strategies (e.g., activities or techniques) to increase the strength of that feeling.</td>
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<td>2</td>
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<tr>
<td>19</td>
<td>When I’m feeling good, I have trouble completing tasks that I’m meant to be doing.</td>
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<td>20</td>
<td>When I’m feeling good, part of me hates those feelings.</td>
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<td>21</td>
<td>When I’m feeling good, my behavior becomes out of control.</td>
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<tr>
<td>22</td>
<td>I don’t know what to do to create pleasant feelings in myself.</td>
<td>1</td>
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<tr>
<td>23</td>
<td>When I’m feeling good, I end up neglecting my responsibilities (work, chores, school etc.).</td>
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<td>24</td>
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<td>When I’m feeling good, I have strong urges to do risky things.</td>
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<td>26</td>
<td>When I’m feeling good, I have no control over whether that feeling stays or goes.</td>
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<td>27</td>
<td>When I’m feeling good, I have difficulty staying focused during important stuff (at work or school, etc.).</td>
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<tr>
<td>28</td>
<td>When I’m feeling good, I believe those feelings are unacceptable.</td>
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<td>29</td>
<td>When I’m feeling good, I can’t keep control over myself (in terms of my behaviors).</td>
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<td>30</td>
<td>When I’m feeling good, I don’t have any useful ways to help myself keep feeling that way.</td>
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<td>31</td>
<td>When I’m feeling good, I have trouble getting anything done.</td>
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<tr>
<td>32</td>
<td>When I’m feeling good, I must try to eliminate those feelings.</td>
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Scoring the Perth Emotion Regulation Competency Inventory (PERCI)

Emotions manifest as responses across three channels of the emotion system: the experiential (e.g., feeling of fear), behavioral (e.g., urge to run), and physiological channels (e.g., increased heart rate). Emotions can be positively valenced, like happiness and amusement, or negatively valenced, like sadness and anger. Emotion regulation is defined in the extended process model of emotion regulation as “the activation of a goal to modify an unfolding emotional response” (Gross, 2015, p. 130). Applied to the three channels of the emotion system, people’s ability to regulate their emotions therefore refers to their ability to successfully modify the trajectory of emotions with respect to their (1) experiential, (2) behavioral and (3) physiological manifestations, and (4) know when it is appropriate to activate a goal to modify emotions in the first place.

The PERCI (Preece et al., 2018) is a 32 item self-report measure of people’s ability to regulate their own emotions. It assesses most of the components of the emotion regulation construct and does so for both negative and positive emotions. The PERCI measures people’s ability to modify the experiential and behavioral manifestations of their emotions, as well as people’s ability to know when it is appropriate to activate a goal to regulate their emotions in the first place. The PERCI does not directly assess regulation of the physiological channel.

The PERCI features eight subscales designed to assess different aspects of emotion regulation ability. Four subscales correspond to the regulation of negative emotions, and four correspond to the regulation of positive emotions. The emotional valence of each subscale is denoted in its name via the prefix “Negative” or “Positive”. These PERCI subscales can, moreover, be combined into several theoretically meaningful composite scores. A list of these subscale and composite scores, and how to calculate them, is provided in the table on the next page. For all subscale and composite scores, higher scores indicate a higher level of emotion regulation difficulties.

For information about the development and psychometric properties of the PERCI, see Preece et al. (2018).

References


<table>
<thead>
<tr>
<th>Subscale/composite</th>
<th>How to calculate</th>
<th>Content measured</th>
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<td><strong>Subscales</strong></td>
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<td>Negative-Controlling experience</td>
<td>Sum items 1, 5, 9, 13</td>
<td>Difficulties controlling (down-regulating) the experiential manifestations of negative emotions; e.g., “When I’m feeling bad, I don’t know what to do to feel better”.</td>
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<tr>
<td>Negative-Inhibiting behavior</td>
<td>Sum items 3, 7, 11, 15</td>
<td>Difficulties controlling the behavioral manifestations of negative emotions in terms of inhibiting dominant behavioral response tendencies when experiencing negative emotions; e.g., “When I’m feeling bad, I have trouble controlling my actions”.</td>
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<td>Negative-Activating behavior</td>
<td>Sum items 2, 6, 10, 14</td>
<td>Difficulties controlling the behavioral manifestations of negative emotions in terms of activating non-dominant behavioral response tendencies when experiencing negative emotions; e.g., “When I’m feeling bad, I can’t get motivated to do important things (work, chores, school etc.)”.</td>
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<tr>
<td>Negative-Tolerating emotions</td>
<td>Sum items 4, 8, 12, 16</td>
<td>Difficulties tolerating negative emotions, and therefore difficulty knowing when it is appropriate to activate a goal to regulate these emotions; e.g., “When I’m feeling bad, I must try to totally eliminate those feelings”.</td>
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<tr>
<td>Positive-Controlling experience</td>
<td>Sum items 18, 22, 26, 30</td>
<td>Difficulties controlling (up-regulating) the experiential manifestations of positive emotions; e.g., “I don’t know what to do to create pleasant feelings in myself”.</td>
</tr>
<tr>
<td>Positive-Inhibiting behavior</td>
<td>Sum items 17, 21, 25, 29</td>
<td>Difficulties controlling the behavioral manifestations of positive emotions in terms of inhibiting dominant behavioral response tendencies when experiencing positive emotions; e.g., “When I’m feeling good, I can’t keep control over myself (in terms of my behaviors)”.</td>
</tr>
<tr>
<td>Positive-Activating behavior</td>
<td>Sum items 19, 23, 27, 31</td>
<td>Difficulties controlling the behavioral manifestations of positive emotions in terms of activating non-dominant behavioral response tendencies when experiencing positive emotions; e.g., “When I’m feeling good, I have trouble completing tasks that I’m meant to be doing”.</td>
</tr>
<tr>
<td>Positive-Tolerating emotions</td>
<td>Sum items 20, 24, 28, 32</td>
<td>Difficulties tolerating positive emotions, and hence difficulty knowing when it is appropriate to activate a goal to regulate these emotions; e.g., “When I’m feeling good, I believe those feelings are unacceptable”.</td>
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<td><strong>Composites</strong></td>
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<td>Negative-Emotion regulation</td>
<td>Sum all 4 negative subscales</td>
<td>Overall level of difficulty regulating negative emotions.</td>
</tr>
<tr>
<td>Positive-Emotion regulation</td>
<td>Sum all 4 positive subscales</td>
<td>Overall level of difficulty regulating positive emotions.</td>
</tr>
<tr>
<td>General-Facilitating hedonic</td>
<td>Sum all 4 negative subscales and the Positive-Controlling experience subscale</td>
<td>Overall level of difficulty down-regulating negative emotions and up-regulating positive emotions (i.e., obtaining pleasure and avoiding pain).</td>
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<td>Positive-Containing emotions</td>
<td>Sum the Positive-Inhibiting behavior, Positive-Activating behavior, and Positive-</td>
<td>Overall level of difficulty down-regulating (i.e., containing) positive emotions.</td>
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<td>Tolerating emotions subscales.</td>
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<tr>
<td>General-Emotion regulation</td>
<td>Sum all 8 subscales</td>
<td>Overall level of difficulty regulating negative and positive emotions.</td>
</tr>
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</table>
Appendices B-E have been removed from this version of the thesis as they contain copyrighted material.