Measuring Sense of Safety:

The Reliability and Validity of the Neuroception of Psychological Safety Scale (NPSS)

A thesis

submitted in partial fulfilment

of the requirements for the degree

of

Master of Science (Research) in Psychology

at

The University of Waikato

by

SHANTINI OORJITHAM

THE UNIVERSITY OF
WAIKATO
Te Whare Wānanga o Waikato

2024

Abstract

Despite growing interest in the clinical and theoretical implications of psychological safety, particularly from a Polyvagal Theory (PVT) perspective, there has been a lack of empirically validated measurement tools for this construct. The main aim of this study was to evaluate the reliability and construct validity of the Neuroception of Psychological Safety Scale (NPSS), a 29-item self-report scale designed to measure psychological safety, conceptualised from a PVT perspective. This study also explored how individuals define "feeling safe". A total of 423 participants completed an anonymous online survey. The sample consisted predominantly of undergraduate psychology students (n = 353), while the remaining participants were members of the New Zealand general population. An exploratory factor analysis was conducted to examine the factorial validity of the NPSS, while construct validity was evaluated through correlations with measures of theoretically related constructs. Internal consistency was assessed using Cronbach's alpha (α) and McDonald's omega (ω). The NPSS demonstrated good internal consistency and was found to have a three-factor structure consistent with that proposed by the scale's developers. Construct validity was evidenced by significant correlations in the expected directions with depression, anxiety, stress, negative affect, positive affect, difficulties in close relationships, awareness of physiological responses and traumatic life experiences. In addition, themes identified in participant definitions of safety aligned with the conceptualisation of psychological safety from a PVT perspective. Overall, the main findings of this study provide evidence that the NPSS is a psychometrically sound measure, supporting the use of the NPSS in clinical practice for measuring treatment outcomes and guiding intervention strategies, and in future research to advance the theoretical understanding of psychological safety from a PVT perspective.

Acknowledgements

First, I would like to thank my supervisor, Dr Carrie Barber, for patiently guiding and supporting me throughout this research project. Thank you for the valuable research and writing skills that you have taught me, and for challenging me to extend myself in an area of research that, while exciting, seemed daunting initially.

Thank you to all my research participants for your time and effort in participating in this study, as the study would not have been possible without you.

I am also thankful for the financial support of the University of Waikato Master's Research Scholarship.

Finally, thank you to my friends and family for your support and encouragement this past year.

Table of Contents

List of Tables

Chapter 1: Introduction

Overview

Psychological safety has been proposed to be an important contributor to mental health and well-being (Sullivan et al., 2018; Sweeney et al., 2018). This concept of safety has received increasing attention in recent years, with research highlighting how feeling unsafe can contribute to the development of psychological difficulties (Alavi, 2021; Kelly et al., 2012), particularly for people who have experienced trauma (Murphy et al., 2022; Sweeney et al., 2018). The polyvagal theory (PVT; Porges, 1995) has significantly contributed to understanding psychological safety by highlighting the important role that physiological state may play in our experience of safety. The PVT (Porges, 1995) focuses on autonomic nervous system (ANS) responses to safety (or threat) cues perceived in the environment, and the reciprocal relationship between these ANS responses and social behaviour. Understanding autonomic state as an intervening variable between safety (or danger) cues in the environment and an individual's thoughts and behaviours has led to clinical applications of the PVT in recent years (Dana, 2018; Dana, 2020; Porges & Dana, 2018).

Despite extensive theoretical discussion about the PVT's potential to improve understanding of psychological safety and inform clinical interventions (Porges, 2007; Geller & Porges, 2014; Porges & Dana, 2018), there has been very little empirical research investigating the clinical application of this theory. Recently, Morton et al. (2022a) developed the Neuroception of Psychological Safety Scale (NPSS), which could be an important tool to facilitate empirical research on psychological safety and measure outcomes of polyvagal-informed treatment approaches. However, being a relatively new scale, there is little data on its utility, reliability and validity. This study aims to evaluate the psychometric properties of the NPSS, which promises to be a useful measure of individual psychological safety in clinical and research applications.

Background: Psychological Safety

Researchers have described two types of psychological safety — team and individual (Morton et al., 2022a). Team psychological safety has been most widely investigated within the field of organisational psychology, where it is used to describe the interpersonal aspect of safety within the specific group context of the workplace (Edmondson & Lei, 2014; Frazier et al., 2017). Team psychological safety is defined as how comfortable people feel with taking interpersonal risks in a work team environment, such as speaking up when there is a problem, seeking feedback or admitting mistakes (Edmondson, 1999). The understanding and measurement of psychological safety in the work team environment are solely focused on feeling safe in interpersonal interactions within a specific group of people. Team psychological safety differs from psychological safety for the individual, which refers to a person's overall feeling of safety. This internal, individual experience of safety is present across multiple contexts (Porges, 2011; Wouters-Soomers et al., 2022).

Individual psychological safety, sometimes referred to as "feeling safe" (Fleury et al., 2022; Larsson et al., 2023; Porges, 2022), has been a subject of growing interest in the clinical field over the past decade (Freeman et al., 2016; Podolan & Gelo, 2023; Valente & Crescenzi-Lanna, 2022). In subsequent discussion, "psychological safety" and "feeling safe" are used to refer to individual psychological safety. Feeling safe has been highlighted as a key component in recovering from trauma (Sweeney et al., 2018), building healthy relationships (Murray et al., 2021), and overcoming psychological distress (Gilbert et al., 2008a). Feeling safe is widely acknowledged to be more than simply the absence of a perceived physical or emotional threat (Larsson et al., 2023; Lovink et al., 2015; Mollon, 2014). However, instead of clearly defining the construct, many authors choose to describe the components that may contribute towards feeling safe, such as a sense of control (Larsson et al., 2023; Montgomery, 2013), being connected with others (Gilbert, 2009) and feelings of

warmth (Kelly et al., 2012). The lack of a clear definition presents challenges in better understanding and measuring this construct.

Defining Psychological Safety

The polyvagal theory (PVT; Porges, 1995) has significantly influenced the growing interest in psychological safety. In particular, the PVT provides a framework to better understand the concept of psychological safety and inform treatment approaches (i.e., polyvagal-informed interventions), which have become increasingly used in clinical settings over the last decade (Dana, 2020; Porges & Dana, 2018; Geller, 2018; Geller & Porges, 2014; Sanders & Hall, 2018). From a PVT perspective, feeling safe is an internal experience strongly influenced by our interpersonal environments and physiological state (Porges, 2007). The PVT suggests that feeling secure in interpersonal relationships is a key aspect of psychological safety. This is similar to the conceptualisation of team psychological safety, which is focused on feeling secure in relationships in a work team environment. However, according to the PVT, this feeling of safety is embedded in our physiology — the regulation of our nervous system. Acknowledging the bidirectional relationship between autonomic state and feelings of safety moves the study of psychological safety from subjective assessment to objective scientific study (Porges, 2007) and helps provide a framework for measuring individual psychological safety. Although the PVT does not appear to explicitly define what "safety" means, it does propose a conceptualisation of safety based on the hypothesis that physiological state acts as an intervening variable between safety (or danger) cues in the environment and interpersonal accessibility (social connection).

Polyvagal Theory (PVT)

The PVT (Porges, 1995) combines concepts from neurophysiology, psychology and evolutionary theory. It proposes a theoretical model of psychological safety that accounts for reciprocal associations between the autonomic nervous system (ANS) and social interaction.

According to the PVT, a person's ANS subconsciously assesses their physical and interpersonal (e.g., tone of voice and body language of others) environments for cues of safety and danger through a process called neuroception (Porges, 2022). Neuroception leads to different physiological responses based on the perceived safety or threat in the environment. A person's physiological state then influences their behaviour — either facilitating social engagement or activating survival responses, which inhibit social engagement (Porges, 2007). The process of neuroception is proposed to be affected by past experience, with people who have experienced trauma being more sensitive to detecting danger cues and less likely to detect safety cues (Porges, 2022).

For example, if someone approaches Person A with a smile, welcoming body language and a calm tone of voice, Person A's nervous system will likely pick up on these safety cues through neuroception. Without consciously realising, Person A will likely have a physiological response that reflects feelings of safety and promotes interest, attention, and positive interpersonal behaviours. On the other hand, if someone approaches Person A with a fixed stare and harsh tone of voice, Person A is likely to subconsciously pick up on subtle danger cues and have a physiological response that reflects feelings of unsafety. This physiological response promotes alertness for danger and readiness for a defensive response rather than positive social engagement. In terms of understanding the impact that experience of trauma can have on neuroception, consider Person B, who had experienced significant trauma and is faced with the same situations. Person B may be less sensitive to safety cues when approached by the person with a smile and welcoming body language and more sensitive to danger cues when approached by the person with a fixed stare and harsh tone of voice.

In order to appreciate how the neuroception of safety is proposed to influence social engagement according to the PVT, it is helpful to have an understanding of the ANS and the

proposed hierarchy of its responses to cues of safety and danger. The ANS has two complementary systems: the sympathetic nervous system (SNS; arousing) and the parasympathetic nervous system (PNS; calming; McCorry, 2007). The SNS helps mobilise the body to move when faced with danger by stimulating the fight-or-flight response and activating the adrenal glands (Tortora et al., 2019). In contrast, the PNS acts as a counterbalance to the SNS and is involved in calming the body to maintain homeostasis and support a "rest and digest" state (McCorry, 2007). Porges (2007) goes beyond the idea of a simple balance between the SNS and PNS to suggest a hierarchy of responses that the ANS can have to danger and safety.

Within the PNS, the vagus nerve (the 10th cranial nerve) is of particular interest in the process of neuroception and the proposed hierarchy of ANS responses to danger and safety. The vagus nerve (the longest cranial nerve) runs from the brain down through the chest, abdomen and intestines (Tortora et al., 2019). It is involved in regulating the cardiovascular, respiratory, digestive, endocrine and immune systems (Breit et al., 2018; Browning et al., 2017). The PVT (Porges, 1995) suggests that the ventral (front) branch of the vagus nerve is activated in response to cues of safety, and the dorsal (back) branch of the vagus nerve is activated in response to extreme threats. Both these vagal circuits within the PNS are seen to be involved in calming the ANS, but in different ways. The ventral vagal complex (the most recently evolved branch of ANS) supports our body's regulatory functions, including regulation of the muscles that control the expression and reception of safety cues (e.g., facial expressions, eye gaze, listening, and tone and pitch of voice; Porges, 2011). These functions help to convey emotions and to connect with others socially. On the other hand, the dorsal vagal complex (the evolutionarily oldest pathway) is involved in defensive reactions to extreme threats that move the nervous system into an immobilised state where dissociation, withdrawal and digestive issues are likely to occur (Porges, 2011).

The hierarchy of adaptive responses proposed by Porges (2011) is based on three autonomic subsystems: the immobilisation (dorsal vagal complex), mobilisation (SNS) and social engagement systems (ventral vagal complex). When safety cues are detected, the social engagement system is activated, which would lead an individual to feel safe and able to socially connect. On the other hand, detecting danger cues triggers defensive responses, which would take a person into the next stage of the hierarchy — mobilisation. This stage involves the fight-or-flight response of the SNS, preparing the individual to move towards a potentially safer context. If mobilisation strategies are not successful, the nervous system may move into the third (immobilised) state, where the dorsal vagal complex responds to cues of extreme danger and results in complete shutdown (also referred to as the "freeze" response; Porges, 2011). According to the PVT, people move up and down through this hierarchy as they face a variety of everyday situations where they detect cues of safety and danger through neuroception.

Returning to the example of Persons A and B, when safety cues are subconsciously detected via neuroception, Person A's ventral vagal complex is activated, promoting the social engagement system. Person A's physiological response would likely include a decrease in heart rate, deeper breathing, regulation of the facial and neck muscles that allow more facial expression and changes in the middle ear muscles that allow Person A to be more attuned to the typical frequencies of the human voice. This physiological experience leads Person A to feel in a safe and calm state, where and they are able to socially engage (i.e., use their facial expressions to convey warmth and engagement and engage in conversation effectively).

On the other hand, when Person A detects cues of threat (e.g., a fixed stare, harsh tone of voice, tense facial muscles, and furrowed brows) through neuroception, they are likely to move into a mobilisation state. In this mobilisation state, the SNS fight-or-flight response is

activated, resulting in physiological responses such as an increased heart rate, rapid and shallow breathing, slowed digestion and muscle tension. These physiological responses are associated with feeling unsafe and a defensive position, which leads to a focus on immediate self-protection or escaping the perceived danger. Person A likely feels anxious and guarded in this defensive state, making it less likely that they will make a social approach.

Suppose Person A is unable to escape or neutralise the threat (e.g., the person approaching with the threatening body language is much larger than Person A and physically holds Person A against a wall). In that case, Person A may move further down the hierarchy into the immobilisation subsystem, where the dorsal branch of the vagus nerve is activated. In this immobilisation state, Person A would likely experience a significant drop in heart rate and blood pressure and, in some cases, fainting. As a result, person A might feel as though they are unable to move or respond, and they might feel numb. This "freeze" response is captured in language like being 'struck dumb' or 'paralysed with fear'.

Person B, who had experienced significant past trauma and is likely more sensitive to danger cues, may move more quickly down the hierarchy from mobilisation to immobilisation in the situation of being approached by a person with aggressive body language or behaviour. Person B's heightened sensitivity to threat cues could also mean that they move into the mobilisation and immobilisation state when they are in other situations where there is no actual danger present, but there are cues that are associated with past experiences of trauma.

In sum, the PVT (Porges, 1995) proposes that the autonomic state is a central component of the subjective experience of feeling safe because it acts as an intervening factor that shapes how we interpret and respond to cues of safety and danger around us. Through neuroception, the nervous system continuously scans the environment for cues of safety and potential threat. This evaluation process, which can be affected by previous experience of

trauma, shapes our physiological state, emotions and social behaviours. Feeling safe is proposed to be reflected in a calm autonomic state, which promotes social connection and co-regulation, explaining the relationship between physiological and interpersonal components of psychological safety.

Implications for Clinical Work

Since Porges introduced the PVT in 1995, it has been used as a theoretical lens to explain research findings in various areas of psychology (Geller & Porges, 2014; Sanders & Hall, 2018) and other fields, including neonatology (Harrison et al., 2000) and neurophysiology (Duarte & Pinto-Gouveia, 2017; Porges et al., 1996). The last two decades have seen increased practical application of the PVT in mental health settings, with this theory becoming more widely used by clinicians as an approach to understanding the aetiology, presentation and informing the treatment of psychological disorders such as PTSD (Williamson et al., 2015), social anxiety (Alvares et al., 2013) and conduct disorder (Beauchaine et al., 2007). In addition to these specific disorders, the PVT is also being used more broadly as an approach to understanding psychological safety, particularly in the fields of trauma treatment (Blanning, 2024; Manzotti et al., 2024) and attachment (Manzotti et al., 2024).

The use of the PVT to inform treatment approaches has become more accessible to clinicians in recent years through the writing of Deb Dana (Dana, 2018; Dana, 2020). Dana (2018) translates the more complex ideas of PVT into client-friendly terminology, which helps therapists understand and discuss the role the client's autonomic responses play in their presenting difficulties. Dana (2020) provides resources for understanding and regulating the nervous system. These include worksheets for mapping and tracking ANS reactivity, as well as exercises like meditations for regulating the ANS. Books like these have been central to

the increase in the clinical application of the PVT by providing therapists with structure and guidelines on practising polyvagal-informed therapy.

Other books highlight how polyvagal-informed techniques can be integrated into other treatment approaches, such as cognitive behaviour therapy (CBT), dialectical behaviour therapy (DBT) and psychodynamic therapy (Dana, 2018; Porges, 2021; Porges & Dana, 2018). Incorporating a PVT perspective in understanding psychological difficulties enables therapists to develop individualised formulations that include explanations of how people's autonomic responses might be contributing to their difficulties. This inclusion of autonomic responses in formulations alongside the more commonly used behavioural, emotional and cognitive explanations of people's difficulties is proposed to give a more comprehensive formulation to inform treatment approaches. Based on these formulations, therapists can draw on polyvagal-informed techniques that target the ANS and help clients understand and re-pattern their nervous systems to better detect safety cues (Dana, 2018).

Overall, polyvagal-informed techniques are based on a theoretical understanding of how feeling safe is influenced by autonomic state and these techniques are being increasingly used in clinical settings. However, there is limited empirical evidence for their effectiveness. Therefore, there is a need to evaluate the effectiveness of these treatment techniques, and to better understand clients' experience of these techniques by using tools that measure the relevant concepts.

Measures of Psychological Safety

Various tools have been developed to measure feelings of safety. Team psychological safety is most widely measured using the Team Psychological Safety Scale (Edmondson, 1999), used extensively in organisational contexts to predict positive work outcomes (Edmondson & Lei, 2014; Frazier et al., 2017). Individual psychological safety, on the other hand, tends to either be measured in specific contexts (e.g., the Self-Perceived Safety of

Orthopedic Post-Surgery Inpatients Scale [Yu et al., 2022] and the Safe During Surgery Scale [Larsson et al., 2021]) or as subscales of broader scales (e.g., the Feeling Safe with Others subscale in the Therapeutic Environment Scales [TESS; Veale et al., 2016] and the Safe Affect subscale in the Activation and Safe/Content Affect Scale [Gilbert et al., 2008]). Each of these tools has evidence to support their psychometric reliability and validity. However, these scales and subscales are either designed to be used in a specific context or as a sub-component of a measure for a broader construct, limiting their utility in measuring individual psychological safety overall. In addition, these measures are solely focused on a person's conscious perception of their environment or people around them, which does not include the physiological aspect of feeling safe proposed by the PVT.

Recently, Morton et al. (2022a) developed the Neuroception of Psychological Safety Scale (NPSS), a new measure of individual psychological safety informed by the PVT. The NPSS was designed to be a comprehensive measure of psychological safety because it aims to capture a person's thoughts and feelings about interpersonal relationships while also measuring an individual's awareness of physiological sensations associated with feeling safe. Morton et al. (2022a) found the 29-item NPSS to have good internal consistency for the total score and its subscales with a non-clinical sample of 455 participants, which included Scottish university students and other participants recruited through social media platforms. The three subscales proposed by Morton et al. (2022a) include (a) Social Engagement, which encompasses feeling accepted, understood and able to express oneself freely in a social environment; (b) Body Sensations, which reflects internal physiological states of calm and relaxation, including steady breathing and heartrate; and (c) Compassion, characterised by the ability to feel empathetic and motivated to help and care for others.

According to the NPSS Manual and scoring guide (Morton et al., 2022b), the NPSS can be administered with various instructions. The original study by Morton et al. (2022a, p.

3) instructed participants to “Think about a recent specific situation when you felt safe, and please rate the following statement items in relation to this”, which likely led to participants responding to items based on a situation where they felt optimally safe. However, the NPSS Manual and Scoring Guide (Morton et al., 2022b, p. 3) provides variations of the NPSS-Generic Version (NPSS-G) instruction (“Please rate how well the following statements describe your feelings over the past week”), which can be modified to suit the context of a research question (i.e., a particular situation, timeframe, or experience can be specified).

A recent study by Poli and Miccoli (2024) evaluated the psychometric properties of an Italian translation of the NPSS with a non-clinical community sample of 338 participants, using the translated version of the NPSS-G instruction (“Please rate how well the following statements describe your feelings over the past week”). Despite using a different prompt to Morton et al. (2022a), their findings supported the same three-factor structure as Morton et al.’s (2022a) study and demonstrated good test-retest and internal reliability, and convergent and discriminant validity. This more general NPSS-G instruction that Poli and Miccoli (2024) used in their study may be better suited for clinical settings, where it is helpful to measure and track progress of how safe a client feels on average over a specified period (e.g., over the past week). Additionally, some clients with a trauma background may struggle to recall feeling safe, making the original instruction used by Morton et al. (2022a), which prompted respondents to recall a recent specific situation when they felt safe, potentially problematic.

Evaluation of the psychometric properties of the English version of the NPSS using the NPSS-G instruction could be valuable for clinical applications. This would be important because as yet, there are no published papers evaluating the properties of the English version of the NPSS. Alongside investigating the NPSS’ factor structure and internal consistency reliability, further investigation into the validity of this scale is needed, especially as there are currently no other comprehensive measures of individual psychological safety. In situations

like this, where there are no other measures of a construct, Boateng et al. (2018) suggest that the best way to examine construct validity is to make comparisons with scales that measure theoretically related constructs to see whether the pattern of associations is as expected based on the theory.

Constructs Theoretically Related to Feeling Safe

Individual psychological safety is often referred to as "feeling safe" in the literature (Armstrong et al., 2021; Fleury et al., 2022; Larsson et al., 2023) as distinct from the term psychological safety often used to refer to feeling safe within groups in the workplace (Frazier et al., 2017; Newman et al., 2017; Edmondson & Lei, 2014). It is important to note, however, that just as safety is not explicitly defined in discussions about the PVT, many articles discussing theoretically related constructs also use terms like "feeling safe" or "feeling unsafe" without providing clear definitions (Armstrong et al., 2021; Clark & Beck, 2010; Craske et al., 2009; Wouters-Soomers et al., 2022). Although some articles do provide definitions, these definitions tend to vary considerably. For example, Larsson et al. (2023, para. 1) state that "Feeling safe is defined as: a person that does not feel worried or threatened"; Fleury et al. (2022, para. 3) state that "Feeling safe is characterised by warmth and affiliative connection"; and Minartz et al. (2024, para. 1) state that "Feeling safe refers to the perception of how an individual is affected by external threats but also having an inner sense of safety, which is one's ability to authentically express one's inner strength". This lack of a clear, consistent definition should be taken into consideration when studying the relationships between feeling safe and theoretically related constructs.

There has been growing interest in how feeling safe is associated with psychological distress, positive and negative affect, traumatic experiences and people's experiences in close relationships and physiological sensations. Therefore, investigating the relationships between

these constructs and psychological safety as measured by the NPSS could provide valuable evidence about the construct validity of the NPSS.

Traumatic Experiences

Traumatic experiences can be broadly defined as severely distressing events that could cause a person harm, are life-threatening, or severely emotionally disturbing (Krupnik, 2020). These events include childhood adversity, domestic violence, neglect or serious accidents, which can have ongoing adverse effects on a person's wellbeing and functioning (Duros & Crowley, 2014). Traumatic experiences are processed consciously as well as subconciously in the nervous system, which can trigger physiological responses (Porges, 2022). Therefore, the psychological and physiological responses to traumatic experiences go hand in hand, contributing to a person's overall feeling of safety.

When a person experiences a traumatic event, they are likely to feel threatened. This causes a stress response where the amygdala raises an alarm, triggering a series of neuroendocrine reactions involving the ANS and hypothalamic-pituitary-adrenal (HPA) axis (Barlow et al., 2016; Godoy et al., 2018; McCorry, 2007). The stress response involves two main components. Initially, a quick response occurs where the SNS is activated, and chemical messengers are released from the adrenal gland (e.g., epinephrine and norepinephrine; McCorry, 2007). In a slower response by the HPA axis, a series of reactions trigger the adrenal cortex to release cortisol. The release of adrenaline and cortisol (among other hormones) puts the body in a fight-or-flight state and results in physiological changes (e.g., increased heart rate, blood pressure and breathing rate; McCorry, 2007). These physiological responses prepare a person for action (Godoy et al., 2018). Being in a fight-or-flight state can be adaptive if there is real threat, but if the stress response is experienced for prolonged periods of time or very frequently, it can leave a person feeling unsafe even when they are not in danger.

While it is clear that a person is likely to feel unsafe at the time of and immediately after a traumatic experience due to the stress response, there may also be ongoing cognitive and physiological effects of being exposed to traumatic events that can cause a person to feel unsafe in the long-term. A person who has experienced trauma may become hypervigilant where they have increased awareness and are more sensitive to perceiving threat in their environment (Craske et al., 2009). Hypervigilance can be seen as the brain's way of trying to keep a person safe by being highly aware of the environment. However, people who are hypervigilant are likely to overestimate the threat that is objectively present in the environment (Craske et al., 2009), leading them to feel unsafe often, even in situations where they are not in any objective danger.

If traumatic experiences are ongoing, a person can also experience long-term physiological changes to their HPA axis functioning (Murphy et al., 2022) and amygdala sensitivity (Zhang et al., 2018), which can lead them to feel unsafe more frequently than the actual situation merits. Childhood adversity in particular has been associated with hyperactivity of the HPA axis (Heim et al., 2008; Peng et al., 2014). This dysfunction in the HPA axis and increased amygdala sensitivity means that the fight-or-flight response is more easily triggered. This physiological response elevates a person's heartrate and blood pressure, which sends signals to the body that the environment or situation is unsafe, even when there is no threat present. Given the important role the HPA axis and amygdala play in autonomic arousal processes (Mueller et al., 2022), the PVT perspective also offers a related theoretical explanation for the association between trauma and feeling safe. Porges (2007) suggests that repeated exposure to threat as part of ongoing trauma can result in a person's ANS being "stuck" in a defensive state. In this defensive state, a person may feel unsafe and experience decreased access to soothing neural pathways via the ventral vagal complex that is associated with social connection. Overall, someone who has had traumatic experiences in the past is

likely to have felt unsafe at the time and also more likely to feel less safe in everyday life, due to long-term physiological and psychological changes. Therefore, it is expected that a history of traumatic experiences would be negatively associated with feelings of safety.

Psychological Distress

Psychological distress can be defined as a state of emotional discomfort or suffering characterised by symptoms of depression, anxiety and stress (Belay et al., 2021; Kraiss et al., 2023; Lovibond & Lovibond, 1995; Viertiö et al., 2021). Many of the physiological and cognitive responses to traumatic experiences which can affect feelings of safety such as changes to the HPA axis, increased amygdala sensitivity and hypervigilance have also been associated with increased psychological distress (Murphy et al., 2022).

Stress can be defined as a persistant state of psychological and physiological arousal with a decreased threshold for becoming frustrated or irritated (Lovibond & Lovibond, 1995). It is a normal response to difficult situations and often involves activation of the fight-or-flight response. It can be useful to help us find motivation to complete tasks and deal with threats in our lives. However, if stress is experienced for prolonged periods of time (chronic stress) or very frequently, it can have detrimental effects on physical and mental health (Smith & Pollak, 2020; Yaribeygi et al., 2017). Experiencing chronic stress means that a person is in a constant state of physiological arousal, which according to the PVT (Porges, 1995) is associated with feeling unsafe.

In addition to these physiological factors, there are also cognitive processes that may explain the relationship between feelings of safety and psychological distress. In particular, hypervigilance and a negative interpretation bias may link anxiety and depression to feelings of safety. People with anxiety are proposed to experience hypervigilance and be more likely to interpret neutral or ambiguous stimuli as being threatening, leading to an overestimation of the threat that is objectively present in the environment (Clark & Beck, 2010; Craske et al.,

2009; Krahé et al., 2019). This self-perpetuating cycle of anxiety and increased threat perception likely leaves a person feeling unsafe often and constantly scanning the enviornment for threat cues.

People with depression are also likely to have a negative interpretation bias that affects their perception of how others view them (Everaert et al., 2017), which can lead to withdrawal from social relationships (Normansell & Wisco, 2017). According to the PVT, social engagement is a key component of feeling safe — when a person feels safe, social engagement behaviours are readily available to them. The availability of social engagement behaviours helps maintain a sense of safety through positive social interactions because positive social cues and interpersonal connection signals safety. A depressed individual who socially withdraws likely receives fewer positive social cues, leading to lower levels of social engagement, which is proposed to be associated with lower feelings of safety (Porges, 2022).

Overall, the physiological arousal associated with chronic stress may indicate the perception of threat or a lack of safety, while people with high levels of anxiety or depression are more likely to feel persistently unsafe than healthy individuals because they are likely hypervigilant to threat cues and may have a tendency to perceive neutral or ambiguous situations as negative or threatening, even when they are not. Therefore, psychological distress, including stress, anxiety, and depression would be expected to be negatively associated with feelings of safety.

Positive and Negative Affect

Feeling safe has been proposed to be associated with positive affect. Early theoretical models such as the Self-determination Theory (Ryan & Deci, 2000) and Attachment Theory (Bowlby, 1969) suggest that feeling safe through secure relationships and having our needs met can result in positive emotions. More recent longitudinal research by Armstrong et al. (2021) found that feeling safe and content, particularly in close social relationships, predicted

higher positive affect. The reverse of this relationship has also been suggested whereby positive affect could lead to feeling safe. The broaden and build theory (Fredrickson, 2001) suggests that when individuals experience a positive emotion, they are able to open their mind to experience a variety of exploratory thoughts and actions. These exploratory thoughts and actions are proposed to help build physical, social and psychological resources and likely facilitate social connection (Fredrickson, 2001), which, from a PVT perspective, is associated with psychological safety.

Positive affect may also be associated with feelings of safety through its effect on ANS reactivity (Porges, 2007; Wager et al., 2009). Early research on positive emotions led to the proposition of the undoing hypothesis (Fredrickson & Levenson, 1998), which suggests that positive emotions may be involved in down-regulating physiological responses to stress through increasing PNS activity. The idea of positive affect inhibiting stress-related responses is further explored in more recent theoretical work, which suggests that positive affect increases vagal parasympathetic responses (Cosley et al., 2010; Porges, 2011). These theoretical writings are consistent with findings of experimental studies where positive affect resulted in increased parasympathetic activity and in turn decreased physiological arousal (Kop et al., 2011; McCraty et al., 1995). Overall, the undoing hypothesis and experimental studies supporting this theory suggest positive affect is associated with increased feelings of safety via the down-regulation of the body's stress response (i.e., decreased physiological arousal). Therefore, positive affect would be expected to be positively associated with feeling safe.

Negative affect may also influence a person's feelings of safety through physiological responses to negative affect and by increasing a person's perception of threat. In an experimental study that elicited negative affect using mental imagery, Sobkow et al. (2016) found that negative affect was associated with increased physiological arousal. This increased

physiological arousal is expected to be associated with feeling unsafe (Porges, 2022). Negative affect has also been found to increase an individual's perception of risk on topics such as terrorism, the health effects of genetically modified foods, nuclear waste and mobile phones (Sjöberg, 2007). This means that someone experiencing negative affect could be more sensitive to detecting threat cues in everyday life. In sum, the physiological responses and increased perception of threat due to negative affect may lead an individual to feel less safe. Therefore, negative affect would be expected to be negatively associated with feeling safe.

Close Relationships

As social beings (Vrtička & Vuilleumier, 2012), it is not surprising that our feelings of safety are associated with their close relationships with others. When an individual detects cues of danger in their environment, their SNS fight-or-flight response is activated (Barlow et al., 2016). According to the PVT (Porges, 1995), being in this defensive state results in a decreased ability to socially connect. Individuals are also more likely to interpret neutral social situations as threatening when they are in this autonomically aroused state (Krahé et al., 2019). A decreased ability to socially engage with others and misinterpreting neutral situations as threatening can hinder the development and maintenance of close relationships that fulfil the human need to feel connected to others, which, according to the PVT, is associated with feeling safe.

The reverse of this relationship has also been suggested where feeling secure in close relationships could increase feelings of safety. When in a healthy close relationship, individuals experience positive social interactions because both people in the relationship are likely to give and receive safety cues and have opportunities to co-regulate (Porges, 2022). According to the PVT, cues of safety such as warm facial expressions, a gentle tone of voice and loving body language help downregulate the body's defensive strategies and move a person into an autonomic state that reflects feelings of safety (Porges, 2022). Essentially,

having healthy social connections with close others can help downregulate physiological defensive states and leave a person feeling safe (Porges & Dana, 2018). Therefore, healthy close relationships are expected to be positively associated with feeling safe.

Body Sensations

Autonomic arousal affects physiological systems both in the short and long term. When the SNS is activated in response to a perceived threat, people experience immediate physiological responses such as increased heart rate and respiration rate and more blood flow toward skeletal muscles and away from other organs, such as those involved in digestion (McCorry, 2007). Chronic sympathetic arousal, on the other hand, has been associated with long-term gastrointestinal (GI) symptoms, in particular, those found in irritable bowel syndrome (IBS), such as abdominal pain and diarrhea (Hamrefors et al., 2019; Nakata et al., 2022). Therefore, when an individual feels unsafe, they may experience immediate physiological sensations such as increased heart and respiration rates. If this physiological arousal associated with feeling unsafe is ongoing, they may also experience bodily sensations such as abdominal pain and digestive issues.

Some other studies have found that stimulation of the vagus nerve is associated with improved gastrointestinal functioning (Frøkjær et al., 2016), reduced somatic pain sensitivity (Frøkjær et al., 2016) and reduced gastrointestinal pain (Kovacic et al., 2017). Based on a PVT perspective where the vagus nerve plays a role in feelings of safety, feeling safe can be associated with improved gastrointestinal functioning and decreased somatic pain sensitivity (Porges, 2011). The vagus nerve is also responsible for a variety of reflexes, including coughing, swallowing and vomiting (Babic & Browning, 2014), which suggests that feelings of safety as defined by the PVT are likely associated with these reflexes. Therefore, overall, physiological symptoms related to sympathetic arousal and other autonomic symptoms,

including gastrointestinal pain and other digestive issues, are expected to be negatively associated with feelings of safety.

Present Study

Although there has been extensive theoretical writing about individual psychological safety, particularly from a PVT perspective (Geller & Porges, 2014; Manzotti et al., 2024; Porges & Dana, 2018; Porges, 2022), there have been few empirical studies involving psychological safety due to the lack of psychometrically validated tools measuring this construct. Therefore, the present study aimed to evaluate the psychometric properties of the NPSS to provide information about its reliability and validity as a tool for measuring psychological safety. In particular, this study aimed to examine the factor structure (factorial validity) of the NPSS with a non-clinical New Zealand sample, and examine internal consistency and construct (convergent) validity. As part of measuring convergent validity, associations betweeen NPSS scores and scales measuring theoretically related constructs were examined. After reviewing literature in this area, the following hypotheses were proposed:

1. Lower levels of psychological safety would be associated with an increased occurrence of traumatic life experiences
2. Lower levels of psychological safety would be associated with higher levels of psychological distress
3. Lower levels of psychological safety would be associated with higher levels of negative affect
4. Lower levels of psychological safety would be associated with lower levels of positive affect
5. Lower levels of psychological safety would be associated with increased experience of difficulties in close relationships

6. Lower levels of psychological safety would be associated with higher levels of awareness of physiological responses associated with autonomic arousal

In addition to the main aim of this study to evaluate the reliability and validity of the NPSS, we had a secondary aim to understand how people define the concept of feeling safe by exploring the themes that were present in participant definitions of feeling safe.

Chapter 2: Method

Participants and Procedures

The data for this study were collected between January and June 2024. A total of 445 participants, consisting of undergraduate psychology students from the University of Waikato and members of the New Zealand general population, completed the survey. Excluding participants who did not live in New Zealand and those who were missing 20% or more responses from any of the measures in this study, this number was reduced to 423 participants. The sample size in this study was considered adequate because it met the recommendations proposed by Mundfrom et al. (2005) of 3-20 participants per item on the scale being examined, which in this case was the 29-item NPSS.

The psychology students (n = 353) were recruited via an online university research participation platform and offered course credit after completing the survey. The participants from the general population were recruited by sharing study posters on social media platforms and recruitment through community clubs and social groups. These participants were given the opportunity to go into a draw to win a $100 voucher. All participants completed an anonymous online survey, which consisted of the Neuroception of Psychological Safety Scale (NPSS) and measures of other constructs that were expected to be related to the NPSS. Demographic information was also collected, which included items about the participants' age, ethnicity, gender, work/study status and country of residence.

Prior to participating in this study, participants read and agreed to an online consent form informing them of the purpose of the study. This study was approved by the University of Waikato Division of Arts, Law, Psychology and Social Sciences Human Research Ethics Committee (approval number: FS2023-06). The age of participants in this study ranged from 17 to 65 years (M = 23.83; SD = 9.06; Mdn = 20), with 75.4% of the participants under the age of 25. The ethnicity predominantly given was NZ European. More detailed demographic characteristics of the participants are shown in Table 1.

Table 1

Participant Demographic Characteristics

Characteristic	Frequency (*n*)	Percent (%)
Gender		
Male	73	17.3
Female	339	80.1
Non-binary	6	1.4
Prefer not to say	3	0.7
Prefer to self-describe	2	0.5
Age (years)		
16-19	191	45.2
20-24	105	24.8
25-34	57	13.5
35+	49	11.6
Did not specify	21	5.0
Ethnicity		
NZ/European	303	71.6
Maori	111	26.2
Asian	55	13.0
Middle-Eastern	3	0.7
Latin American/Hispanic	7	1.7
African	4	0.9
Other	26	6.1
Work/study status		
Student	375	88.7
Part-time work	160	37.8
Full-time work	51	12.1

Note. The Ethnicity and Work/study status questions allowed participants to select more than one option.

Measures

The online survey consisted of sections gathering information on: (1) informed consent; (2) feelings of safety (Neuroception of Psychological Safety Scale [NPSS]; Morton et al., 2022a); (3) awareness of physiological responses (Body Perception Questionnaire [BPQ]; Porges, 1993); (4) psychological distress (Depression, Anxiety and Stress Scale 21 [DASS-21]; Lovibond & Lovibond, 1995); (5) positive and negative affect (International Positive and Negative Affect Scale Short Form [I-PANAS-SF]; Thompson, 2007); (6) experiences in close relationships (Experiences in Close Relationships-Short Form [ECR-SF]; Wei et al., 2007); (7) intimate partner violence (Hurt, Insult, Threaten and Scream [HITS] Screening Tool; Sherin et al., 1998); (8) exposure to adverse childhood experiences (Adverse Childhood Experience Questionnaire [ACE-Q]; Felitti et al., 1998); and (9) participant demographics: age, gender, work/study status, ethnicity and country of residence.

Three additional questions were also asked: (1) "How safe do you feel in general? Rate yourself from 1 (*extremely unsafe)* to 10 (*extremely safe)*"; (2) "In answering the previous question, how did you define or think about what it means to feel safe?"; and (3) "What is something/an activity that you do that brings you enjoyment/positive feelings? Please describe in a few words below". The first two questions were placed near the beginning of the survey, directly after the NPSS items, to collect information about how safe a person felt in general (global rating of safety) and gather information about how the person defined safety respectively. The third question, on the other hand, was the final item in the survey and was included to end the survey on a positive note by getting participants to think about activities that elicit positive affect. This item was not analysed. See Appendix A for a list of all survey items.

Neuroception of Psychological Safety Scale (NPSS)

Given our aim to evaluate the psychometric properties of the NPSS, this scale was the main measure in the study. The instructions used in this study were those specified in the

NPSS - Generic Version: “Please rate how well the following statements describe your feelings over the past week”.

The NPSS is a 29-item self-report measure that evaluates the degree to which people experience physiological responses and thoughts and feelings about their interpersonal environment that are hypothesised to be associated with sense of safety. Morton et al. (2022a) found three subscales within the NPSS: Social Engagement (e.g., “I didn’t feel judged by others” and “I felt cared for”), which includes 14 items; Compassion (e.g., “I felt able to empathise with other people” and “I felt like I could comfort a loved one”), which includes seven items; and Bodily Sensations (e.g., “My body felt relaxed” and “My stomach felt settled”), which includes eight items. The NPSS items are rated on a five-point Likert-type scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*), and are worded in such a way that reverse coding is not required (i.e. higher scores indicate greater psychological safety). The NPSS has previously been found to have good internal consistency overall (α = .95) and for its subscales: Social Engagement (α = .93), Compassion (α = .94) and Bodily Sensations (α = .92; Morton et al., 2022a). In this study, the NPSS total score demonstrated good internal consistency overall (α = .93, ω = .93).

Body Perception Questionnaire Body Awareness Very Short Form (BPQ-VSF) and Body Perception Questionnaire 20 – Autonomic Nervous System (BPQ20-ANS)

The original BPQ is a 122-item measure developed by Porges (1993) and measures the two domains of Body Awareness and Autonomic Symptoms. In this study, two short versions of the domains of the BPQ were used: The BPQ-VSF, which captures the Body Awareness domain of the BPQ, and the BPQ20-ANS, which captures the Autonomic Symptom domain of the original BPQ (Kolacz et al., 2023). Responses for the BPQ Body Awareness VSF and the BPQ20-ANS scales were recorded using a five-point Likert-type scale ranging from 1 (*never*) to 5 (*always*).

The BPQ Body Awareness VSF is a 12-item scale that measures a person's sensitivity to internal body functions. Examples of items in this scale include "My mouth being dry" and "How fast I am breathing". A higher score on the BPQ-VSF indicates higher sensitivity to body sensations. The BPQ Body Awareness VSF has previously been found to have excellent internal consistency (ω =.91; Cabrera et al., 2018). In the current study, the BPQ Body Awareness VSF demonstrated excellent internal consistency (α =.91;. ω = .91)

The BPQ20-ANS is a 20-item scale that measures the responses of a person's autonomically innervated organs. Examples of items in this scale include "When I am eating, I have difficulty talking" and "I am constipated". A higher score on the BPQ20-ANS indicates an increased experience of physiological responses of autonomically-innervated organs. The BPQ20-ANS has previously been found to have good internal consistency (ω =.87; Cabrera et al., 2018). In the current study, the BPQ20-ANS demonstrated excellent internal consistency (α =.91, ω = .91).

Depression, Anxiety and Stress Scale 21 (DASS-21)

The DASS-21 is a brief version of the DASS-42 (Lovibond & Lovibond, 1995), a widely used self-report measure of psychological distress. The DASS-21 consists of 21 items measured on a four-point Likert-type Scale ranging from 0 (*never*) to 3 (*almost always*). This scale includes three subscales: depression (e.g., "I felt life was meaningless", "I felt I wasn't worth much"), anxiety (e.g.,"I experienced breathing difficulty", "I felt close to panic") and stress (e.g., "I found it hard to wind down", "I found myself agitated"). The sums of the seven items within each subscale provide a score for that particular subscale, while the sum of the scores for all items gives the total score for the DASS-21. Higher scores indicate higher levels of distress. The instructions provided asked participants to respond to the items based on how much the statement applied to them over the past week. The DASS-21 has been found to have good reliability for the total score (α = .85) and its depression (α = .85),

anxiety (α = .81), and stress (α = .88) subscales (Osman et al., 2012). In the current study, the DASS-21 demonstrated good internal consistency for the total score (α = .94, ω = .94) and its depression (α = .91, ω = .91), anxiety (α = .81, ω = .82) and stress (α = .84, ω = .84) subscales.

International Positive and Negative Affect Scale Short Form (I-PANAS-SF)

The International Positive and Negative Affect Scale Short Form (I-PANAS-SF; Thompson, 2007) is a short version derived from the Positive and Negative Affect Scale (PANAS; Watson et al., 1988) and was designed to be an internationally useable measure of positive and negative affect. The development of the I-PANAS-SF involved a series of qualitative and quantitative studies with participants from 38 different countries (Thompson, 2007). The I-PANAS-SF contains two 5-item subscales that measure positive affect (e.g., attentive, determined) and negative affect (e.g., ashamed, nervous). The instructions given for this measure were "Thinking about yourself and how you normally feel, to what extent do you generally feel:" Each item is scored on a five-point Likert-type scale ranging from 1 (*never*) to 5 (*always*). Total scores for positive and negative affect are calculated by summing the respective item scores. Higher scores indicate higher levels of positive or negative affect. Previously, the I-PANAS-SF has been found to have acceptable reliability for both the positive (α =.82) and negative (α =.74) affect subscales (Thompson, 2007). In the current study, the I-PANAS-SF demonstrated acceptable internal consistency reliability for the positive affect subscale (α = .70, ω = .70.) and good reliability for the negative (α =.81, ω =.81) affect subscale.

Experiences in Close Relationships-Short Form (ECR-SF)

The Experiences in Close Relationships-Short Form (ECR-SF; Wei et al., 2007) is a 12-item short form of the ECR (Brennan et al., 1998). The ECR-SF has two subscales, which contain six items each and measure attachment-related anxiety and avoidance in close

relationships. Examples of items measuring attachment-related anxiety include “I worry that romantic partners won’t care as much about me as I care about them” and “I need a lot of reassurance that I am loved by my partner”. Examples of items measuring avoidance in close relationships include “I try to avoid getting too close to my partner” and “I am nervous when partners get to close to me”. The instructions suggest respondents think about how they feel in romantic relationships in general when responding to the items. Items are scored using a seven-point Likert-type scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*) and the total score for each subscale is calculated by summing the scores of all items after reverse coding the four reverse-worded items. Higher scores on the anxiety subscale reflect fear of abandonment and rejection, while higher scores on the avoidance subscale indicate greater discomfort with closeness and dependence. Previously, acceptable reliability had been found for both the anxiety (α =.78) and avoidance subscales (α =.84; Wei et al., 2007). In the current study, the ECR-SF demonstrated acceptable internal reliability for anxiety (α =.77, ω = .78) and avoidance (α =.80, ω = .80) subscales.

Hurt, Insult, Threaten and Scream (HITS) Screening Tool

Current and previous intimate partner violence was assessed using the screening tool: Hurt, Insult, Threaten and Scream (HITS: Sherin et al., 1998). The HITS is a 4-item self-report measure with items that evaluate the frequency of psychological abuse and physical violence from any past or current intimate partner. Respondents are recorded on a five-point Likert-type scale ranging from 1 (*never*) to 5 (*frequently*). Examples of items in this scale include “How often does your partner physically hurt you” and “How often does your partner insult you or talk down to you”. Total scores are calculated by summing the scores from each item, with higher scores indicating greater frequency of intimate partner violence. The HITS has previously been found to have good internal consistency (α =.80 Sherin et al., 1998) and

good concurrent validity for both men (Shakil et al., 2005) and women (Chen et al., 2005). In the current study, the HITS demonstrated good internal consistency (α =.87, ω = .88).

The Adverse Childhood Experience Questionnaire (ACE-Q)

The Adverse Childhood Experience Questionnaire (ACE-Q; Felitti et al., 1998) was used to assess adverse childhood experiences. This 10-item self-report questionnaire evaluates experiences of various types of abuse, neglect, trauma and family dysfunction that occurred during the first 18 years of a person's life. Examples of items in this questionnaire include "Was a household member depressed or mentally ill or did a household member attempt suicide?" and "Did a household member go to prison?". Respondents can either select "yes" or "no" for each item to indicate whether or not they have experienced that particular adverse childhood experience. The total score is a sum of the number of adverse experiences a person responds "yes" to, with a higher score indicating a greater exposure to adverse childhood experiences. The ACE-Q has been found to have acceptable reliability (α =.73; Craig et al., 2023). In the current sample, the ACE-Q demonstrated good internal reliability (α =.78, ω = .78).

Data Analysis

Descriptive Statistics

All statistical analyses were conducted using the IBM Statistical Package for the Social Sciences (SPSS), version 28.0. Descriptive statistics were computed for each of the measures, including means, frequencies, variance and standard deviation. Distributions of the data were checked to assess normality and other assumptions of inferential statistics. In cases where the data were found to deviate from normality as indicated by skewness and kurtosis values outside the acceptable range of -1 to +1 (Muthen & Kaplan, 1985), transformations were used. Following transformation, the distributions were checked again to assess normality.

Examining the Construct Validity of the NPSS: Exploratory Factor Analysis (EFA)

Bartlett's Test of Sphericity was used to check whether there were correlations between items of the NPSS. A significant result for this test ($p < .05$), would indicate that the correlation matrix is not random and that there are significant relationships in the data, making it appropriate for factor analyis (Fabrigar et al., 1999). The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was also conducted. This is a measure of shared variance and is required to be above .5 to demonstrate sample adequacy and indicate suitability of the data for factor analysis (Kaiser, 1974).

Based on the nature of the NPSS, we expected the factors to correlate with each other and, therefore, used an oblique (direct oblimin) rotation according to the recommendations by Izquierdo et al. (2014). Due to the assumptions of normality being violated for the Compassion subscale in particular, we used the Principal Axis Factor (PAF) method to extract factors according to recommendations from Costello and Osborne (2005). PAF does not assume multivariate normality, making it a more robust approach to data that is non-normally distributed (Costello & Osborne, 2005; Field, 2017). The EFA approach is also considered suitable for the purpose of this study because the NPSS has not yet been extensively evaluated and therefore the goal of this study was to explore the underlying dimensions of the construct of psychological safety rather than confirming a model that had been previously proposed. In addition, PAF is also focussed on the common variance shared among items as well as unique variance, which is useful for identifying latent constructs, such as those in the NPSS.

When deciding how many factors to retain, various authors recommend a combination of different criteria and a theoretical understanding of the construct (Costello & Osborne, 2005; Watkins, 2018). In this study, three main approaches were used to determine how many factors to retain in the model: (1) According to recommendations by Kaiser

(1960), factors with an eigenvalue above 1 were considered for retention; (2) The scree plot (a graph of eigenvalues) was visually examined for the point at which the curve flattens out (point of inflection). The number of factors above this point provides guidance on the number of factors to be retained; and (3) A parallel analysis was also conducted to determine if the eigenvalues of the proposed factors exceeded the 95th percentile of the randomly generated data eigenvalues.

Several criteria were used to determine the factors' adequacy based on recommendations by Streiner et al. (2014) and Field (2017). Firstly, a factor loading of at least 0.40 was required based on the sample size in this study, with no cross-loadings greater than 0.30 on other factors. Secondly, the factor should demonstrate internal consistency of at least 0.70. Thirdly, a factor should be regarded as reliable if it has four or more loadings of 0.60 or greater. Finally, the factors are required to be theoretically meaningful. Overall, a combination of statistical methods and evaluation of theoretical consistency were used to determine the factor structure of the NPSS.

Construct Validity: Correlations

The mean of all NPSS items within each factor reflects the subscale score. Correlations between the NPSS subscale scores and measures of other related constructs (e.g., body awareness, depression, anxiety, stress, experiences in close relationships, adverse childhood experiences, etc.) were calculated to assess the construct validity of the NPSS. The scores on all of the measures except for the Compassion subscale of the NPSS and the HITS screening tool were normally distributed. Based on guidlines by Field (2017), we transformed these non-normal scores by reflecting the scores and using a log transformation. Following this transformation, the Compassion subscale scores were normally distributed, but the HITS scores remained skewed. Therefore, Pearson correlations were used for all correlations except those involving the HITS scores, where the non-parametric Spearman correlations were used

instead. The following guidelines by Cohen (1988) were used to interpret the strength of *r* values : weak = 0.10 - 0.29; moderate = 0.30 – 0.49; strong ≥ 0.50.

Examining Internal Reliability: Internal Consistency and Item-total Correlations

The internal consistency of the NPSS and its subscales were evaluated using Cronbach's alpha (α), McDonald's omega (ω). Item-total correlations were also calculated to reflect the contribution of each item to the overall score (i.e., how well the item discriminated between respondents who scored high and low on the measure overall).

Post Hoc Analysis: Examining Gender Differences between Factors

Mean scores were calculated for the three resulting NPSS factors — Compassion (CP), Social Engagement (SE) and Bodily Sensations (BS). These mean scores were compared using independent samples *t*-tests to test for differences between males and females.

Analysis of Participant Definitions of Safety

As part of the survey, participants provided a global rating of safety (GRS) where they subjectively rated how safe they felt on average (on a scale of 1-10) and defined how they understood the concept of feeling safe. I read through the definitions submitted and proposed six preliminary categories based on common themes that arose to code the participant defintions. These theme categories were refined through discussion with my supervisor before being tested using a subset of 50 responses, where the two of us attempted to code the 50 participant defintions using the theme categories proposed. The theme categories were finalised as follows: (a) Interpersonal (feeling secure in social relationships and interactions, including feelings of trust, respect and support); (b) Internal experience (a description of internal state of calm, including physiological responses and emotions); (c) Physical/environmental (freedom from physical harm or threat, feeling secure in the physical environment and access to basic needs, such as food and shelter); (d) Self-expression **(**feeling

comfortable being and expressing themselves and not feeling like the need to pretend to be something they are not).

Of the 422 participants that provided a response for GRS, 410 provided a definition for feeling safe. I coded all the participants' definitions based on the finalised theme categories and my supervisor also coded 20% of definitions. Good inter-rater reliability was found, with Cohen's Kappa coefficient ranging between 0.80 to 1.00.

Chapter 3: Results

Exploratory Factor Analysis (EFA)

An exploratory factor analysis (EFA) was conducted using principal axis factoring (PAF) with a direct oblimin rotation on the 29 items of the NPSS. First, the suitability of the data for factor analysis was assessed. Bartlett's test of Sphericity reached statistical significance, indicating good factorability (χ^2 =6945; df = 406; p = <.001) of the correlation matrix, while the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was .93, exceeding the recommended value of .5 (Kaiser, 1974). This demonstrated that the sample was sufficient and suitable for factor analysis.

Four factors had eigenvalues greater than 1 and the inflection point on the scree plot appeared to be at the fourth eigenvalue, suggesting the possibility of a four-factor solution. This was further supported by the findings of the parallel analysis, which suggested retaining four factors because the first four eigenvalues exceeded the 95th percentile of the randomly generated data eigenvalues. However, upon further evaluation, some cross-loadings were observed between factors and there was a lack of clear distinction between some factors. A three-factor solution resulted in a more straightforward factor structure with more interpretable dimensions. Overall, the three factor solution also seemed to demonstrate better theoretical consistency and parsimony.

While the four-factor solution explained slightly more variance than the three-factor solution, the difference was a minimal 4.62%. The three-factor solution still accounted for a substantial 56.5% of the variance in the data, with the first, second and third factors explaining 35.18%, 13.68% and 7.60% of the variance respectively. In addition, Field (2017) supported the suggestion of Guadagnoli & Velicer (1988) to consider a factor reliable if it has four or more loadings 0.6 or greater. The first three factors would be considered reliable according to this recommendation but the 4th proposed factor would not because it only had two items. In the three factor solution, the items within each factor appeared to conceptually fit, all items had primary loadings over .40 and there were no items that substantially cross-loaded (above .32) on multiple factors according to guidelines proposed by Costello and Osborne (2005). Overall, the advantages of a three-factor structure for the NPSS appeared to outweigh the marginal statistical advantage associated with a four-factor solution. Therefore a three-factor solution was considered the most appropriate. The factor structure with corresponding factor loadings are presented in Table 2.

Table 2

Results from a Factor Analysis of the Neuroception of Psychological Safety Scale (NPSS)

NPSS Item	Factor loading		
	1	2	3
Factor 1 (Social Engagement)			
10. I felt heard by others	.76		
3. I felt accepted by others	.74		
1. I felt valued	.72		
4. I felt understood	.72		
6. I felt respected	.72		
9. I felt comforted by others	.71		
12. I felt cared for	.70		
13. I felt wanted	.68		
11. I felt like people would try their best to help me	.66		
2. I felt comfortable expressing myself	.64		
5. I felt like others got me	.64		
8. There was someone that I could trust	.50		
7. There was someone who made me feel safe	.49		
14. I didn't feel judged by others	.43		
Factor 2 (Body Sensations)			
27. My breathing was steady		.87	
23. Breathing felt effortless		.81	
25. My body felt relaxed		.81	
26. My stomach felt settled		.71	
29. My face felt relaxed		.70	
22. My heart rate felt steady		.68	
24. My voice felt normal		.62	
28. I felt able to stay still		.61	
Factor 3 (Compassion)			
16. I felt able to comfort another person if needed			.79
17. I felt compassion for others			.78
21. I felt caring			.75
18. I wanted to help others relax			.66
19. I felt like I could comfort a loved one			.66
20. I felt so connected to others I wanted to help them			.64
15. I felt able to empathise with other people			.56

Note. $N = 423$. The extraction method was principal axis factoring using an oblique (direct oblimin) rotation. All factor loadings below .30 have not been displayed.

The three factors found in this study corresponded with the three factors found by Morton et al. (2022a) and the three theoretical concepts of safety according to the PVT: Social Engagement (Factor 1; 14 items), Bodily Sensations (Factor 2; 8 items) and Compassion (Factor 3; 7 items). The correlations between the three factors ranged from 0.21 to .49, supporting the use of an oblique rotation (direct oblimin) and suggesting that the factors represent related but distinct constructs. Internal consistency was examined using Cronbach's alpha and McDonald's omega for the NPSS total score ($\alpha = .93$, $\omega = .93$), and the Social Engagement ($\alpha = .92$, $\omega = .92$), Body Sensations ($\alpha = .90$, $\omega = .90$), and Compassion ($\alpha = .88$, $\omega = .87$) subscales. The corrected item-total correlations across the three factors ranged from .417- .806, indicating that the items in each subscale are likely measuring a similar underlying construct. A measure is considered reliable with a Cronbach's alpha score greater than 0.6 and a corrected item-total correlation greater than 0.3 (Hajjar, 2018).

Descriptive Statistics

The descriptive statistics for the NPSS total score and its subscales are shown in Table 3. The Compassion (CP) subscale, in particular, deviated from normality as indicated by the skewness and kurtosis values outside the acceptable range of -1 to +1 (Muthen & Kaplan, 1985). The skewness value for the CP scores, which was outside of the acceptable range suggested that most participants had high CP scores. For the items in the CP subscale, over 30% of the participants selected the highest score of 5 (Strongly Agree). The relatively kurtotic distribution of CP scores suggested that the scores were more concentrated around the mean than would be in a normal distribution. However, following log transformation, the compassion scores were normally distributed. Therefore, these transformed scores could be used to conduct Pearson correlations to evaluate construct validity.

Table 3

Descriptive Statistics for the NPSS Total and Subscales

	Mean	Median	SD	Skewness	Kurtosis
NPSS Total	3.64	4	0.55	-0.47	0.43
Social Engagement (SE)	3.66	4	0.66	-0.75	0.90
Compassion (CP)	4.11	4	0.62	-1.23	3.44
Body Sensations (BS)	3.21	3	0.82	-0.03	-0.67

Correlations with Theoretically Related Constructs (Convergent Validity)

To evaluate the construct validity of the NPSS, this study examined correlations of the NPSS total score and subscales scores with theoretically related constructs, which are are presented in Table 4. As hypothesised, the NPSS total score, and its Social Engagement (SE) and Body Sensations (BS) subscales had significant correlations in the directions hypothesised with all the constructs examined in this study. Most of the correlations between both the SE and BS subscales and theoretically related constructs were in the moderate to strong range using Cohen's (1988) guidelines for interpreting strength of correlation.

Table 4

Correlations between the NPSS Scores (Total and Subscales) and the Theoretically Related Constructs

	Social Engagement (SE)	Body Sensations (BS)	Compassion (CP)	Total NPSS
Body Awareness (BPQ-VSF)	-0.13**	-0.28**	-0.02	-0.18**
Autonomic Reactivity (BPQ20-ANS)	-0.32**	-0.48**	-0.07	-0.40**
Depression (DASS-21)	-0.60**	-0.56**	-0.19**	-0.60**
Anxiety (DASS-21)	-0.40**	-0.60**	-0.07	-0.50**
Stress (DASS-21)	-0.41**	-0.62**	-0.08	-0.52**
Positive Affect (I-PANAS-SF)	0.24**	0.22**	0.27**	0.30**
Negative Affect (I-PANAS-SF)	-0.50**	-0.56**	-0.17**	-0.57**
Avoidance (ECR-SF)	-0.31**	-0.19**	-0.21**	-0.33**
Anxiety (ECR-SF)	-0.32**	-0.35**	-0.10	-0.36**
Childhood Adversity (ACEQ)	-0.27**	-0.27**	-0.06	-0.30**
Intimate Partner Violence (HITS)	-0.30**	-0.20**	-0.11*	-0.28**
Global Rating of Safety (GRS)	0.52**	0.49**	0.19**	0.55**

Note. All correlations reported are Pearson correlation coefficients except for the correlations involving HITS, which are Spearman correlations due to the non-normal distribution of this data that could not successfully be transformed. All Pearson correlations involving CP subscale scores were conducted using the transformed CP scores. The overall pattern of correlations using the untransformed CP scores was similar and is presented in Appendix B.
*$p < .05$. **$p < .01$.

The CP subscale correlated with the constructs examined in the directions hypothesised. However, the correlations were weak and half of them were not statistically significant. CP had weak negative correlations with depression, stress, negative affect, avoidance in close relationships, and intimate partner violence, while the correlations with

body awareness, autonomic reactivity, anxiety, attachment-related anxiety and childhood adversity were not significant.

All three NPSS subscales were positively correlated with the GRS, where participants rated how safe they felt on average on a scale of 1-10. The BS and SE subscales had moderate and strong positive correlations with the GRS respectively, while the CP subscale had a weak positive correlation.

Gender Differences in NPSS Subscale Scores

Males (M = 3.91, SD = 0.60) scored significantly lower than females (M = 4.17, SD = 0.61) on the CP subscale, $t(410) = 3.32$, $p = <.001$. Females (M = 3.16, SD = 0.81) scored significantly lower than males (M = 3.47, SD = 0.79) on the BS subscale, $t(410) = 3.04$, $p = .003$. Males (M = 3.56 SD = 0.74) and females (M = 3.68, SD = 0.64) did not differ significantly on the SE subscale, $t(410) = 1.28$, $p = .202$.

Participant Definitions of Safety

The frequencies and percentages of the themes included in the participant definitions of safety are reported in Table 5. More than half the participants' definitions of safety included the Physical/environmental theme. These responses ranged from "Feeling physically safe from harm" and "Feeling safe in a home environment" to "Not get killed". Slightly less than half the definitions provided included the Internal experience theme (e.g., "To feel at a state of peace and relaxed" and "How calm I feel during the week or how much I think I wasn't feeling anxious"), while 43.2% of the definitions included the Interpersonal theme (e.g., "Feeling loved, comforted and understood by others" and "I can trust the people around me"). The Self-expression theme was included in 11.5% of the definitions provided (e.g., "I can express myself freely", "Being able to express myself, thoughts and feelings with a group of people" and "I am able to express myself without fear of punishment or condemnation from others").

Table 5

Frequency and Percentages of Themes Included in Participant Definitions of Safety

Theme	Frequency	Percentage (%)
Interpersonal	200	48.8
Internal experience	179	43.7
Physical/environmental	218	53.2
Self-expression	47	11.5

Note. The percentages reported represent the number of definitions that contain the listed theme as a proportion of the total number of definitions.

The number of themes in participants' definitions of safety is presented in Table 6, where more than half the participants' defintions of safety included two or more of the theme categories used to code the definitions. Of the 159 participants who provided definitions that included two themes, 38.8% (61) of these definitions were coded as Interpersonal and Physical/environmental, 33.33% of these definitions were coded as Internal experience and Physical/environmental, 15.72% were coded as Interpersonal and Internal experience, while the other combinations of themes were below 10%. Of the 47 participants who provided definitions that included three themes, more than half (55.3%) of their defintions were coded to include the Internal experience and Physical/environmental themes.

Table 6

Number of Themes Included in Participant Definitions of Safety

Number of Themes	Frequency	Percentage (%)
0	25	6.1
1	177	43.2
2	159	38.8
3	47	11.5
4	2	0.5

Chapter 4: Discussion

The findings of this study provide evidence for the reliability and validity of the Neuroception of Psychological Safety Scale (NPSS). The three-factor structure found in this study was consistent with that proposed by Morton et al. (2022a), providing evidence of factorial validity. In addition, the NPSS total and its three subscales demonstrated good internal consistency reliability. Psychological safety, as measured by the NPSS, was associated with various theoretically related constructs in the directions hypothesised, providing evidence of construct (convergent) validity.

The three factors found in this study were consistent with the polyvagal theory (PVT; Porges, 1995) understanding of psychological safety and the factor structure proposed by Morton et al. (2022a). The first factor, labelled the Social Engagement (SE) subscale by Morton et al. (2022a), aligns with properties of the Social Engagement System (SES) proposed by Porges (2011). This subscale includes items that describe social environments that are evaluated as safe and facilitate social engagement (i.e. feeling accepted and understood by others). The second factor, the Body Sensations (BS) subacale, captures physiological sensations that reflect the body being in a calm and relaxed state, which according to Porges (2009) is an important component of a person's subconscious evaluation of safety. This subscale includes items that reflect physiological sensations that a person might be aware of such as the steadiness of their heart rate and breathing, and how settled their stomach feels. According to Porges (2011), the SES is associated with these physiological sensations via the vagus nerve, which connects the brain to many organs including the heart, lungs and digestive system. The third factor, the Compassion (CP) subscale, captures interpersonal behaviours and attitudes that are enabled by a state of feeling safe, and includes items related to feeling caring and empathetic to others.

In addition, we found the NPSS to have good internal consistency and corrected item-total correlations for the NPSS total score and its three subscales, which contributed to evidence of good internal reliability. These findings suggest that the items in the NPSS work well together to measure three related facets of psychological safety. Overall, our findings of a three factor structure and good internal consisitency align with findings of Morton et al. (2022a) even though a slightly different instruction prompt was used, suggesting that the NPSS has stable psychometric characteristics even across different samples and instructions.

Correlations between NPSS Subscales

In the current study, we found a moderate positive correlation between the SE and BS subscales, a strong positive correlation between the SE and CP subscales, and a weak positive correlation between the BS and CP subscales. Although different strengths, the pattern of these findings was in the same direction as the original Morton et al. (2022a) study, where all subscales had strong significant positive correlations with each other, with BS and CP having the smallest correlation coefficient value. These findings of correlations between factors are also consistent with the PVT. Based on the PVT, a moderate positive correlation between BS and SE is expected because these distinct components of safety are proposed to be closely related. The PVT suggests that when safety is detected (via neuroception), the ventral vagal complex, which supports our body's regulatory functions, is activated (Porges, 2011). The activation of the ventral vagal complex results in physiological sensations associated with calm and restoration as well as regulation of the muscles involved in hearing and facial expression, supporting a person's ability to socially connect and co-regulate (Porges, 2022). Essentially, when a person subconsciously evaluates an environment to be safe, they are proposed to experience a physiological state of calm (captured by items on the BS subscale), which facilitates social behaviour (captured by items in the SE subscale). Therefore, someone who scores highly on the BS subscale would also be expected to have a high score on the SE

subscale, as supported by our finding of a moderate positive correlation between these subscales.

The strong positive correlation between the SE and CP subscales was expected because these subscales involve reciprocal interpersonal processes required for maintaining social relationships. SE seems to capture the receptive components of feeling safe in relationships (i.e., how understood and accepted a person feels). In contrast, CP seems to capture outward interpersonal behaviours and attitudes that are enabled by a state of feeling safe (i.e. wanting to care and comfort others). Therefore, it is likely that someone who feels accepted and understood by others (high SE score), is more likely to want to care for others and would score highly on the CP subscale and vice versa (i.e., someone who cares for others might also be more likely to feel accepted and understood), explaining the strong correlation between SE and CP found in this study.

The positive correlation between the CP and BS subscales, while in the direction consistent with the PVT, is weak. This could be due to an indirect relationship between CP and BS, where these two subscales may be related through their mutual connection with the SE subscale. The relationship between the BS and CP subscales could be affected by the SE subscale (i.e., the relationship between a person's physiological response to feeling safe [BS] and how much care they show others [CP] may be influenced by how understood and accepted they feel by others [SE]). However, it is also important to acknowledge that the distribution of the CP subscale scores is negatively skewed and leptokurtic. This distribution, which suggests a ceiling effect, could impact the ability of the CP subscale to differentiate between participants with higher levels of CP. In addition, the compressed variability at the upper end of the range of CP scores means that our analyses might not capture the full range of how compassion relates to other variables. Therefore, correlation analyses involving the CP subscale in this study could result in findings of smaller correlation coefficients than are

present in the population and Type II errors where the analyses fail to detect relationships that are present. These higher CP subscale scores in this study could be due the specific characteristics of this sample, who were mostly female undergraduate psychology students. Sample characteristics that may contribute to high compassion scores are further discussed in the limitations section.

Gender Differences

Our findings suggest that there are gender differences for the CP and BS subscales, but not the SE subscale. Females scored significantly higher than males on the CP subscale and males scored significantly higher than females on the BS subscale. These findings differed from Morton et al (2022a), who found that males scored lower on the BS subscale and no other gender differences.

Although Morton et al. (2022a) did not find any significant differences between genders for the CP subscale, our finding that females scored higher than males on the CP subscale is consistent with previous research where females reported significantly higher compassion for others than males (Lopez et al., 2018; McDonald & Kanske, 2023; Neff & Pommier, 2013). The reason for differences in levels of compassion between genders was investigated by Sprecher et al. (2007) who found that women expected compassionate acts to result in positive mood to a greater degree than men. They suggested that this may have been due to differences in social role experiences based on the social role theory of helping (Eagly & Crowly, 1986) where females are encouraged to be nurturing and caring while males are encouraged to perform heroic actions.

In terms of our findings that males scored significantly higher than females on the BS subscale, it is possible that females scored lower on the BS subscale in the current study because females have been found to have a greater sensitivity to detecting autonomic arousal than males (Cabrera et al., 2018; Poli et al., 2021b). The BS subscale measures the internal

sensations of the body in a state of calm (the opposite of autonomic arousal). So, it is possible that females are less likely to feel their body in a state of calm because they are more likely to detect even small amounts of autonomic arousal, which could potentially explain the lower BS scores in females.

Although some previous research supports our findings of gender differences for the CP and BS subscales, it is important to acknowledge that there were significantly fewer males in this study, and most participants were undergraduate psychology students. Therefore, it is unclear whether the gender differences for subscale scores found in the current study reflect true differences in the population or are due to the characteristics of this sample, and this should be investigated further.

Convergent Validity — Correlations with Theoretically Related Constructs

The NPSS total score and the SE and BS subscales were correlated (in the directions expected) with all the constructs theoretically associated with psychological safety. These correlations ranged from weak to strong, with the majority being in the moderate to strong range. The theoretically related constructs examined in this study included body awareness, autonomic reactivity, depression, anxiety, stress, positive affect, negative affect, avoidance in close relationships, attachment anxiety, childhood adversity and experience of intimate partner violence. There were particularly strong negative correlations between the BS subscale and both anxiety and stress (measured by the DASS-21), which was expected given the physiological symptoms associated with both anxiety and stress (Daviu et al., 2019; Patriquin & Mathew, 2017). The negative correlation between the SE subscale and depression was also strong. This finding is consistent with the understanding that depression is associated with negative distortions in perceptions of how others might see oneself and withdrawal from social relationships (Bennet, 2011; Carr & McNulty, 2016). Someone who is experiencing higher levels of depressive symptoms is likely to think that others do not like

them due to their negative distortions, making them more likely to withdraw socially and, as a result, receive fewer positive social cues. Therefore, people with higher levels of depression would be less likely to evaluate the environment as safe for social engagement, which would correspond to lower scores on the SE subscale, as supported by our finding of a strong negative correlation between SE and depression.

The pattern of correlations between the CP subscale and all the theoretically related constructs was also generally as expected. However, the correlations were weak (depression, positive affect, negative affect, avoidance in close relationships, and intimate partner violence) or non-significant. While it is important, once again, to acknowledge the impact of the CP scores' non-normal distribution and the effect this may have on correlations (see limitations section), it is also possible that the underlying factor of CP captures a different aspect to the SE and BS subscales. Both the SE and BS subscales have items that capture more inward-focused components of psychological safety that are associated with receiving cues of safety. On the other hand, Compassion, which can be viewed as a higher-order cognitive process (Novak et al., 2022), results in outward-focused positive interpersonal behaviours and attitudes, which the PVT (Porges, 1995) proposes to occur when a person has evaluated an environment as safe. Therefore, it is possible that the theoretically related constructs investigated in this study were more closely associated with the reception of safety cues rather than the outward interpersonal behaviours and attitudes facilitated by feelings of safety as captured by the CP subscale.

All three NPSS subscales had weak positive correlations with positive affect (PA). While these correlations were in the direction hypothesised, all three had a small magnitude, which may have been due to the physiological responses associated with the specific type of positive affect measured in this study. According to the undoing hypothesis (Fredrickson & Levenson, 1998), positive emotions are proposed to play a role in down-regulating

physiological arousal brought on by stress, which would be expected to be closely associated with feelings of safety based on the PVT. However, other models that focus on motivational tendencies of positive emotions (Gable & Harmon-Jones, 2010; Harmon-Jones et al., 2013) propose two main types of positive affect, which are associated with differences in ANS reactivity: (1) High approach PA (e.g., excitement or enthusiasm), which are characterised by increased motivation to pursue goals and have been associated with increase in sympathetic arousal (Kreibig et al., 2010; Shiota et al., 2017); and (2) Low-approach PA (e.g., awe or contentment), which are characterised by a focus on maintaining the current positive state and have been associated with the withdrawal of sympathetic arousal (Kreibig, 2010). All of the positive affect items included in the I-PANAS-SF would be considered high approach PA according to Harmon-Jones et al. (2013). Therefore, it is possible that the correlations between the NPSS scores and PA were weaker than expected due to the sympathetic arousal associated with the types of PA we measured, which, according to the PVT, is related to feeling unsafe. When studying PA and the PVT construct of psychological safety, it is important to be aware of the different autonomic effects of distinct types of positive affect because of the important role that physiological state is proposed to play in the experience of safety.

There were weak negative correlations between the SE and BS subscales of the NPSS and adverse childhood experiences, as well as a non-significant negative correlation between CP and adverse childhood experiences. Based on the evidence of how adverse childhood experiences can affect feelings of safety (Cruz et al., 2022; Finch et al., 2024), stronger correlations would be expected. However, the ACE-Q, used to measure adverse childhood experiences in this study, does not consider protective factors following the exposure to adverse childhood experiences. The protective factors model (Zimmerman, 2014) suggests that positive environmental, social and individual characteristics can promote resilience and

modify the relationship between adverse childhood experiences and their long-term negative outcomes. Therefore, when interpreting the weak negative correlations between psychological safety and adverse childhood experiences in the current study, it is important to be aware that protective factors were not considered, though likely to affect the strength of the relationship.

Overall, the NPSS scores were associated with scores on measures of theoretically related constructs in the directions expected, which provides evidence of construct (convergent) validity. However, the PVT concept of psychological safety that the NPSS proposes to measure lacks an explicit definition (See Introduction for full discussion). This lack of a clear definition poses a challenge in measuring construct validity because the definition of a construct guides the selection of comparison measures and predictions about relationships with theoretically related constructs. Therefore, it is important to consider the lack of an explicit definition for psychological safety when interpreting the correlations between the NPSS and theoretically related constructs as supporting (convergent) construct validity.

Exploring Definitions and Ratings of Safety

The participants' global rating of safety (GRS) had a strong positive correlation with the NPSS total, moderate and strong positive correlations with the BS and SE subscales, respectively, and a weak positive correlation with CP. Although the NPSS is a measure of psychological safety, the word "safe" is only mentioned once in item 7 of the NPSS ("There was someone who made me feel safe"), with most other items being focused on body sensations and thoughts and feelings about interpersonal relationships. So, it was interesting that even with minimal mention of "safe" and "safety" in the NPSS, participant ratings of how safe they felt were positively associated with NPSS subscale scores, particularly the SE

and BS subscales. These findings suggest that participants' understanding of safety was likely similar to the PVT conceptualisation of safety proposed to be measured by the NPSS.

Our exploratory findings that people seemed to define safety according to four main themes (Self-expression, Interpersonal, Internal experience and Physical/environmental) suggested that people have quite varied understandings of what "feeling safe" means. Participant definitions of "feeling safe" ranged from "Not get killed" to "Having a feeling of security that you have someone who makes you feel wanted and accepts you the way you are" and "Feeling comfortable and relaxed in the environment that I'm in". These varying definitions of feeling safe reflected the challenge encountered with finding a clear consistent definition of safety in past research (Armstrong et al., 2021; Larsson et al., 2023;Wouters-Soomers et al., 2022). More importantly, the variation in participant definitions highlight a potential issue with research discussing the importance of "feeling safe" and its proposed impact on various areas of wellbeing (Valente & Crescenzi-Lanna, 2022; Wouters-Soomers et al., 2022). The fact that the term "feeling safe" is used, often without being clearly defined (Armstrong et al., 2021; Clark & Beck, 2010; Morton et al., 2022a), suggests that there is an assumption that feeling safe carries a consistent meaning that is well-known to many. However, based on the subjective definitions by participants in this study, it is clear that this construct is understood differently by different people, which could raise questions about what "feeling safe" means when used in the context of research and in clinical practice.

Nearly half the participants in this study included the Interpersonal theme in their defintion of feeling safe, which was interesting considering the important role that social engagement plays within the PVT understanding of psychological safety. Over half the participants included the Physical/environmental theme in their definition, while 43.7% included an Internal experience theme. Both the Internal experience and Physical/environmental themes seem related to the BS subscale whereby

Physical/environmental captures the presence of safety and danger cues in the environment, while Internal experience captures the internal state of calm, which results from the process of evaluating the safety or danger cues (neuroception).

More than 10% of all participant safety definitions also included the specific theme of freedom of expressing oneself (Self-expression), which aligned with the definition of team psychological safety by Edmonson (1999). Edmonson (1999) defined team psychological safety as the belief that one would not be humiliated for expressing themselves in terms of ideas, questions or concerns within a team environment. This Self-expression theme also appeared to fit with some items on the SE subscale of the NPSS (e.g “I didn’t feel judged by others” and “I felt comfortable expressing myself”). Overall, the participants’ definitions for safety had themes that aligned with the PVT conceptualisation of psychological safety where physiological state is proposed to act as an intervening variable between safety (or danger) cues in the environment and interpersonal accessibility. These findings could explain the moderate to strong positive relationships between the participants’ subjective rating of safety (GRS) and the SE and BS subscales scores.

Interestingly, none of the themes identified in the participant definitions reflected the CP subscale and there did not appear to be any definitions that described outward interpersonal behavior such as that captured in the CP subscale items (e.g., I felt able to empathise with other people” and “I wanted to help others relax”). Based on participants’ defintions of safety, they did not seem to think of outward compassion as being related to safety, which could potentially explain the weak positive correlation between the GRS and CP subscale scores.

In addition to varying defitions of feeling safe, many participants tended to give complex defintions, where more than half of the participant safety definitions included two or more of the categories identified. For example, “Being able to reach out to someone when I

feel overwhelmed or troubled and being able to relax" was categorised as Interpersonal and Internal experience, while "Safety meant to have a good safe home with all my basic needs met and to not worry about any harm from anyone around me" was categorised as Physical/environmental and Interpersonal. The frequency of complex definitions supports the idea that participants are aware of a multifaceted concept of safety, similar to the PVT construct of psychological safety proposed to be measured by the NPSS. It is important, however, to acknowledge that the participants in this study were psychology undergraduate students who may have a more nuanced understanding of safety and therefore may have provided more complex definitions than could be expected from the general population.

Practical and Theoretical Implications

Our findings provide support for the internal consistency reliability and construct (convergent and factorial) validity of the NPSS, which has practical and theoretical implications for the measurement of psychological safety from a PVT perspective. Our contribution to the psychometric validation of the NPSS provides empirical support for the relationship between the social, physiological and psychological components of psychological safety as proposed by PVT and strengthens the theoretical foundation of polyvagal-informed therapy. In addition, having an understanding of the psychometric properties of the NPSS enables future researchers to utilise this tool as a valid measure of individual psychological safety and contribute to the development of an empirical evidence base for this theoretical construct and its association with other constructs related to psychological wellbeing.

Our findings support the potential use of the NPSS in clinical practice as a tool to track progress and measure treatment outcomes of polyvagal-informed interventions. This is important in building an evidence base for the effectiveness of this treatment approach and also for further development of polyvagal-informed interventions, which could lead to

improved treatment outcomes for people with various psychological difficulties. The confirmation of a three-factor structure of the NPSS is helpful for clinical practice because it allows therapists to more precisely identify particular areas of psychological safety that a client may be struggling with, and inform treatment planning by enabling treatment to be tailored to the client's specific needs. For example, findings of this study included relatively strong correlations between anxiety and the BS subscale, and depression with the SE subscale, suggesting that polyvagal-informed therapy for treating depression could focus on the social engagement components of psychological safety, while anxiety treatment could be focused on the body sensations component. Overall, our findings contribute to a foundation for future research on psychological safety from a PVT perspective and support the use of the NPSS in clinical practice for treatment planning and measuring treatment progress.

The exploratory anaylsis of themes in participant definitions of safety provided valuable information about the complexity and variablity of people's understanding of the construct of safety. This information highlights the importance of clearly explaining the concept of safety if it is used in a clinical setting (e.g., polyvagal-informed therapy) or in future research and suggests an avenue for future research to develop a clear definition of psychological safety.

Limitations and Future Research

This study has several limitations. First, although the overall sample size was adequate for the analyses conducted, it was not diverse or large enough to allow for detailed examination of subgroups such as gender, age and ethnicity, and some sample characteristics may limit the generalisability of our findings. The majority of participants in this study were below the age of 25 and female. Previous research found differences in compassion levels (Stietz et al., 2021) and body awareness (Cabrera et al., 2018) between younger and older people, and differences in compassion levels between males and females (McDonald &

Kanske, 2023; Neff & Pommier, 2013). These previous findings suggest that the conclusions drawn from this study might not be applicable to older people and to males. The majority of participants in this study were also undergraduate psychology students who may have different attitudes and more interest in psychological safety than people in the general population, further limiting the generalisability of these findings.

Although roughly representative of the ethnicities in the New Zealand (NZ) population, the majority of this sample were NZ European, who are part of a culture in which independence is promoted. People from more collectivistic cultures where interdependence is more highly valued might have a different understanding and experience of safety in interpersonal relationships, potentially leading to different responses to the NPSS items in the SE and CP subscales. Some evidence of this can be seen in research findings of differences in the conceptualisation and expression of compassion across people of different cultures/ethnicities (Chang et al., 2021; Kariyawasam et al., 2022; Singh et al., 2018). Therefore the findings of this study may not be generalisable to people of different ethnicities.

Overall, an important area of future research would be to replicate this study with a larger, more balanced (i.e more equal numbers of males and females and younger and older participants), general population sample. This would result in more generalisable findings, enable the development of norms for people of different genders, ages and cultures, and allow for examinations of differences acoress people from different demographic groups. This would improve the validity and utility of the NPSS across diverse populations and increase our understanding of the underlying constructs measured by the NPSS. In research applications, this would allow more accurate research comparisons, and in clinical applications, it would help clinicians identify genuine deviations from “normal” within specific demographic groups and enhance clinical utility of the NPSS.

Another limitation of this study is the non-normal distribution (negative skew and a high kurtosis) of the CP subscale scores, which may have affected correlational analyses involving the CP subscale scores. Having a sample of mostly female psychology students seems the most likely explanation for most people scoring high on the CP subscale, where there was concentration of scores on the upper end of the distribution. Females have been found to have significantly higher self-reported compassion for others than males (Lopez et al., 2018; McDonald & Kanske, 2023; Neff & Pommier, 2013), and undergraduate psychology students also likely to have higher levels of compassion since the majority of them are working towards a career in the field of psychology, which requires showing empathy and compassion to others (Brill & Nahmani, 2017; Harton & Lyons, 2003). Therefore, it is possible that the ceiling effect found for the CP subscale scores in the current study is due to having a sample of mostly female psychology students and the psychometric properties of the NPSS should be further investigated with a diverse sample from the general population.

Although the distribution of CP scores is one possible explanation for the consistent finding of weak correlations between the CP subscale and theoretically related constructs, it may still be useful to further research compassion as a concept to better understand how it is related to the overarching construct of psychological safety and the SE and BE subscales. Future research might include gathering qualitative data to provide some insight into how people using the NPSS might interpret the items in the CP subscale of the NPSS. Further, it may be useful to investigate whether there are any cultural differences in the experience and expression of compassion as measured by the NPSS that might affect responses to the items in the CP subscale. In addition, research that investigates how the CP subscale of the NPSS relates to other measures of compassion, such as the Compassion Scale (Pommier et al.,

2020) and the Compassionate Love Scale (Sprecher & Fehr, 2005), could provide further information about its validity.

Additionally, it could be useful for future research to investigate whether the NPSS is a trait or state measure of psychological safety, which would include an evaluation of test-retest reliability that has yet to be investigated. A trait measure would reflect a person's stable, characteristic way of thinking, feeling and behaving, which is likely to be similar across a variety of contexts (Lance et al., 2021). On the other hand, a state measure would reflect variation in a person's ways of thinking, feeling and behaving based on a particular context or a particular time (Lance et al., 2021). Overall, this line of future research would provide more information about the stability or malleability of the construct of psychological safety as measured by the NPSS, which would help researchers and clinicians make informed decisions about which NPSS instructions to use and how best to interpret NPSS scores.

Future research could also use the NPSS to empirically investigate the relationship between past experience of trauma and its effect on psychological safety, along with the potential role of protective factors in moderating this relationship. This type of research would be an important contribution to the research-base supporting the use of polyvagal-informed interventions with people who have experienced trauma. Based on our findings supporting the reliability and construct validity of the NPSS, future research could also use the NPSS to evaluate outcomes of polyvagal-informed therapy approaches, such as treatment for clients who have experienced trauma (Dana, 2018), building therapeutic alliances (Geller, 2018), interventions for attachment trauma (Wagner, 2015) and contemplative practices that are associated with vagus nerve stimulation as interventions for OCD and PTSD (Poli et al., 2021a).

Conclusion

Overall, this study contributed to the psychometric evaluation of the NPSS by providing evidence for its reliability and validity with a New Zealand sample. The three-factor structure found for the NPSS was consistent with the PVT conceptualisation of psychological safety and findings of the original Morton et al. (2022a) study, providing evidence of factorial validity with a sample from a different country. The NPSS total score and its three subscales were also found to have good internal consistency reliability, while correlations with theoretically related constructs in the directions hypothesised provided evidence of construct (convergent) validity. Overall, our main findings contribute to a foundation for future research on psychological safety from a PVT perspective and support the use of the NPSS for measuring psychological safety in clinical practice for treatment planning and measuring treatment progress.

References

Alavi, K. (2021). The role of social safeness and self-compassion in mental health problems: A model based on Gilbert theory of emotion regulation systems. *Journal of Practice in Clinical Psychology, 9*(3), 237-246. https://doi. org/10.32598/jpcp.9.3.768.1

Alvares, G. A., Quintana, D. S., Kemp, A. H., Van Zwieten, A., Balleine, B. W., Hickie, I. B., Guastella, A. J., & Fontenelle, L. (2013). Reduced heart rate variability in social anxiety disorder: Associations with gender and symptom severity. *PloS One, 8*(7), Article e70468. https://doi.org/10.1371/journal.pone.0070468

Armstrong, B. F., Nitschke, J. P., Bilash, U., & Zuroff, D. C. (2021). An affect in its own right: Investigating the relationship of social safeness with positive and negative affect. *Personality and Individual Differences, 168,* Article 109670. https://doi.org/10.1016/j.paid.2019.109670

Babic, T., & Browning, K. N. (2014). The role of vagal neurocircuits in the regulation of nausea and vomiting. *European Journal of Pharmacology*, *722*, 38–47. https://doi.org/10.1016/j.ejphar.2013.08.047

Barlow, D., Durand, V., & Hofmann, S. (2016). *Abnormal psychology* (8th ed.). Wadsworth ISE.

Beauchaine, T. P., Gatzke-Kopp, L., & Mead, H. K. (2007). Polyvagal theory and developmental psychopathology: Emotion dysregulation and conduct problems from preschool to adolescence. *Biological Psychology*, *74*(2), 174–184. https://doi.org/10.1016/j.biopsycho.2005.08.008

Belay, A. S., Guangul, M. M., Asmare, W. N., & Mesafint, G. (2021). Prevalence and associated factors of psychological distress among nurses in public hospitals, southwest, Ethiopia: A cross-sectional study. *Ethiopian Journal of Health Sciences*, *31*(6), 1247–1256. https://doi.org/10.4314/ejhs.v31i6.21

Bennett, P. (2011). *Abnormal and clinical psychology: An introductory textbook* (3rd ed.). McGraw Hill.

Blanning, S. (2024). Treating emotional neglect: Polyvagal and trauma-informed compassion focused therapy. *Counselling Psychology Quarterly*, *10,* 1–19. https://doi.org/10.1080/09515070.2024.2413093

Boateng, G. O., Neilands, T. B., Frongillo, E. A., Melgar-Quiñonez, H. R., & Young, S. L. (2018). Best practices for developing and validating scales for health, social, and behavioral research: A primer. *Frontiers in Public Health, 6,* Article 149. https://doi.org/10.3389/fpubh.2018.00149

Bowlby, J. (1969). *Attachment and loss: Volume 1 attachment* (2nd ed.). Basic Books.

Breit, S., Kupferberg, A., Rogler, G., & Hasler, G. (2018). Vagus nerve as modulator of the brain-gut axis in psychiatric and inflammatory disorders. *Frontiers in Psychiatry*, *9*, Article 44. https://doi.org/10.3389/fpsyt.2018.00044

Brennan, K. A., Clark, C. L., & Shaver, P. R. (1998). Self-report measurement of adult attachment: An integrative overview. In J. A. Simpson & W. S. Rholes (Eds.), *Attachment theory and close relationships* (pp. 46–76). The Guilford Press.

Brill, M., & Nahmani, N. (2017). The presence of compassion in therapy. *Clinical Social Work Journal*, *45*(1), 10–21. https://doi.org/10.1007/s10615-016-0582-5

Browning, K. N., Verheijden, S., & Boeckxstaens, G. E. (2017). The vagus nerve in appetite regulation, mood, and intestinal inflammation. *Gastroenterology*, *152*(4), 730–744. https://doi.org/10.1053/j.gastro.2016.10.046

Cabrera, A., Kolacz, J., Pailhez, G., Bulbena-Cabre, A., Bulbena, A., & Porges, S. W. (2018). Assessing body awareness and autonomic reactivity: Factor structure and psychometric properties of the Body Perception Questionnaire-Short Form (BPQ-

SF). *International Journal of Methods in Psychiatric Research*, *27*(2), Article e1596. https://doi.org/10.1002/mpr.1596

Carr, A., & McNulty, M. (2016). Depression. In A. Carr & M. McNulty (Eds.), *The handbook of adult clinical psychology: An evidence-based practice approach* (2nd ed., pp. 265-316). Routledge.

Chang, J. H., Detrick, S. M., Maas, Z., Çoşkun, H., Klos, C., Zeifert, H., Parmer, E., & Sule, J. (2021). Cross-cultural comparison of compassion: An in-depth analysis of cultural differences in compassion using the Compassion of Others' Lives (COOL) Scale. *The Humanistic Psychologist, 49*(3), 459–478. https://doi.org/10.1037/hum0000167

Chen, P. H., Rovi, S., Vega, M., Jacobs, A., & Johnson, M. S. (2005). Screening for domestic violence in a predominantly Hispanic clinical setting. *Family Practice*, *22*(6), 617–623. https://doi.org/10.1093/fampra/cmi075

Clark, D. A., & Beck, A. T. (2010). Cognitive theory and therapy of anxiety and depression: Convergence with neurobiological findings. *Trends in Cognitive Sciences*, *14*(9), 418–424. https://doi.org/10.1016/j.tics.2010.06.007

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Routledge. https://doi.org/10.4324/9780203771587

Cosley, B. J., McCoy, S. K., Saslow, L. R., & Epel, E. S. (2010). Is compassion for others stress buffering? Consequences of compassion and social support for physiological reactivity to stress. *Journal of Experimental Social Psychology*, *46*(5), 816–823. https://doi.org/10.1016/j.jesp.2010.04.008

Costello, A. B., & Osborne, J. W. (2005). Best practices in exploratory factor analysis: Four recommendations for getting the most from your analysis. *Practical Assessment, Research & Evaluation*, *10*(7), Article 7. https://doi.org/10.7275/jyj1-4868

Craig, F., Servidio, R., Calomino, M. L., Candreva, F., Nardi, L., Palermo, A., Polito, A., Spina, M. F., Tenuta, F., & Costabile, A. (2023). Adverse childhood experiences and mental health among students seeking psychological counseling services. *International Journal of Environmental Research and Public Health*, *20*(10), Article 5906. https://doi.org/10.3390/ijerph20105906

Craske, M. G., Rauch, S. L., Ursano, R., Prenoveau, J., Pine, D. S., & Zinbarg, R. E. (2009). What is an anxiety disorder? *Depression and Anxiety*, *26*(12), 1066–1085. https://doi.org/10.1002/da.20633

Cruz, D., Lichten, M., Berg, K., & George, P. (2022). Developmental trauma: Conceptual framework, associated risks and comorbidities, and evaluation and treatment. *Frontiers in Psychiatry*, *13*, Article 800687. https://doi.org/10.3389/fpsyt.2022.800687

Dana, D. (2018). *The polyvagal theory in therapy.* W. W. Norton & Company.

Dana, D. (2020). *Polyvagal exercises for safety and connection: 50 client-centred practices.* W. W. Norton & Company.

Daviu, N., Bruchas, M. R., Moghaddam, B., Sandi, C., & Beyeler, A. (2019). Neurobiological links between stress and anxiety. *Neurobiology of Stress*, *11*, Article 100191. https://doi.org/10.1016/j.ynstr.2019.100191

Duarte, J., & Pinto-Gouveia, J. (2017). Positive affect and parasympathetic activity: Evidence for a quadratic relationship between feeling safe and content and heart rate variability. *Psychiatry Research*, *257*, 284–289. https://doi.org/10.1016/j.psychres.2017.07.077

Duros, P., & Crowley, D. (2014). The body comes to therapy too. *Clinical Social Work Journal*, *42*(3), 237–246. https://doi.org/10.1007/s10615-014-0486-1

Eagly, A. H., & Crowley, M. (1986). Gender and helping behavior: A meta-analytic review of the social psychological literature. *Psychological Bulletin*, *100*(3), 283–308. https://doi.org/10.1037/0033-2909.100.3.283

Edmondson, A. (1999). Psychological safety and learning behavior in work teams. *Administrative Science Quarterly*, *44*(2), 350–383. https://doi.org/10.2307/2666999

Edmondson, A., & Lei, Z. (2014). Psychological safety: The history, renaissance, and future of an interpersonal construct. *Annual Review of Organizational Psychology and Organizational Behavior*, *1*(1), 23–43. https://doi.org/10.1146/annurev-orgpsych-031413-091305

Everaert, J., Podina, I. R., & Koster, E. H. W. (2017). A comprehensive meta-analysis of interpretation biases in depression. *Clinical Psychology Review*, *58*, 33–48. https://doi.org/10.1016/j.cpr.2017.09.005

Fabrigar, L. R., Wegener, D. T., MacCallum, R. C., & Strahan, E. J. (1999). Evaluating the use of exploratory factor analysis in psychological research. *Psychological Methods*, *4*(3), 272–299. https://doi.org/10.1037/1082-989X.4.3.272

Felitti, V. J., Anda, R. F., Nordenberg, D., Williamson, D. F., Spitz, A. M., Edwards, V., Koss, M. P., & Marks, J. S. (1998). Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults: The Adverse Childhood Experiences (ACE) study. *American Journal of Preventive Medicine*, *14*(4), 245–258. https://doi.org/10.1016/S0749-3797(98)00017-8

Field, A. (2017). *Discovering statistics using IBM SPSS statistics* (5th ed.). SAGE Publications Ltd.

Finch, K., Lawrence, D., Williams, M. O., Thompson, A. R., & Hartwright, C. (2024). Relationships between adverse childhood experiences, attachment, resilience, psychological distress and trauma among forensic mental health populations. *The*

Journal of Forensic Psychiatry & Psychology, *35*(5), 660–684. https://doi.org/10.1080/14789949.2024.2365149

Fleury, J., Sedikides, C., Wildschut, T., Coon, D. W., & Komnenich, P. (2022). Feeling safe and nostalgia in healthy aging. *Frontiers in Psychology*, *13*, 843051–843051. https://doi.org/10.3389/fpsyg.2022.843051

Frazier, M. L., Fainshmidt, S., Klinger, R. L., Pezeshkan, A., & Vracheva, V. (2017). Psychological safety: A meta-analytic review and extension. *Personnel Psychology*, *70*(1), 113–165. https://doi.org/10.1111/peps.12183

Fredrickson, B. L. (2001). The role of positive emotions in positive psychology: The broaden-and-build theory of positive emotions. *American Psychologist, 56*(3), 218–226. https://doi.org/10.1037/0003-066X.56.3.218

Fredrickson, B. L., & Levenson, R. W. (1998). Positive emotions speed recovery from the cardiovascular sequelae of negative emotions. *Cognition and Emotion*, *12*(2), 191–220. https://doi.org/10.1080/026999398379718

Freeman, D., Bradley, J., Waite, F., Sheaves, B., DeWeever, N., Bourke, E., McInerney, J., Evans, N., Černis, E., Lister, R., Garety, P., & Dunn, G. (2016). Targeting recovery in persistent persecutory delusions: A proof of principle study of a new translational psychological treatment (the Feeling Safe Programme). *Behavioural and Cognitive Psychotherapy*, *44*(5), 539–552. https://doi.org/10.1017/S1352465816000060

Frøkjaer, J. B., Bergmann, S., Brock, C., Madzak, A., Farmer, A. D., Ellrich, J., & Drewes, A. M. (2016). Modulation of vagal tone enhances gastroduodenal motility and reduces somatic pain sensitivity. *Neurogastroenterology and Motility*, *28*(4), 592–598. https://doi.org/10.1111/nmo.12760

Gable, P., & Harmon-Jones, E. (2010). The motivational dimensional model of affect: Implications for breadth of attention, memory, and cognitive

categorisation. *Cognition and Emotion*, *24*(2), 322-337. https://doi.org/10.1080/02699930903378305

Geller, S. M. (2018). Therapeutic presence and polyvagal theory: Principles and practices for cultivating effective therapeutic relationships. In S. W. Porges & D. Dana (Eds.), *Clinical applications of the polyvagal theory: The emergence of polyvagal-informed therapies* (pp. 106–126). W. W. Norton & Company.

Geller, S. M., & Porges, S. W. (2014). Therapeutic presence: Neurophysiological mechanisms mediating feeling safe in therapeutic relationships. *Journal of Psychotherapy Integration*, *24*(3), 178–192. https://doi.org/10.1037/a0037511

Gilbert, P. (2009). Introducing compassion-focused therapy. *Advances in Psychiatric Treatment*, *15*(3), 199–208. https://doi.org/10.1192/apt.bp.107.005264

Gilbert, P., McEwan, K., Mitra, R., Franks, L., Richter, A., & Rockliff, H. (2008). Feeling safe and content: A specific affect regulation system? Relationship to depression, anxiety, stress, and self-criticism. *The Journal of Positive Psychology*, *3*(3), 182–191. https://doi.org/10.1080/17439760801999461

Godoy, L. D., Rossignoli, M. T., Delfino-Pereira, P., Garcia-Cairasco, N., & de Lima Umeoka, E. H. (2018). A comprehensive overview on stress neurobiology: Basic concepts and clinical implications. *Frontiers in Behavioral Neuroscience, 12*, Article 127. https://www.frontiersin.org/articles/10.3389/fnbeh.2018.00127

Guadagnoli, E., & Velicer, W. F. (1988). Relation of sample size to the stability of component patterns. *Psychological Bulletin, 103*(2), 265–275. https://doi.org/10.1037/0033-2909.103.2.265

Hajjar, S. T. (2018). Statistical analysis: Internal consistency reliability and construct validity. *International Journal of Quantitative and Qualitative Research Methods*, *6*(1), 27-38.

Hamrefors, V., Fedorowski, A., & Ohlsson, B. (2019). Susceptibility to diarrhea is related to hemodynamic markers of sympathetic activation in the general population. *Scandinavian Journal of Gastroenterology*, *54*(12), 1426–1432. https://doi.org/10.1080/00365521.2019.1697742

Harmon-Jones E., Harmon-Jones C., Price T. F. (2013). What is approach motivation? *Emotion Review*, 5, 291–295. https://doi.org/10.1177/1754073913477509

Harrison, L. L., Williams, A. K., Leeper, J., Stern, J. T., & Wang, L. (2000). Factors associated with vagal tone responses in preterm infants. *Western Journal of Nursing Research*, *22*(7), 776–795. https://journals.sagepub.com/doi/epdf/10.1177/01939450022044755

Harton, H. C., & Lyons, P. C. (2003). Gender, empathy, and the choice of the psychology major. *Teaching of Psychology*, *30*(1), 19–24. https://doi.org/10.1207/S15328023TOP3001_03

Heim, C., Mletzko, T., Purselle, D., Musselman, D. L., & Nemeroff, C. B. (2008). The dexamethasone/corticotropin-releasing factor test in men with major depression: Role of childhood trauma. *Biological Psychiatry*, *63*(4), 398–405. https://doi.org/10.1016/j.biopsych.2007.07.002

Izquierdo, I., Olea, J., & Abad, F. J. (2014). Exploratory factor analysis in validation studies: Uses and recommendations. *Psicothema*, *26*(3), 395–400. https://doi.org/10.7334/psicothema2013.349

Kaiser, H. F. (1960). The application of electronic computers to factor analysis. *Educational and Psychological Measurement, 20,* 141–151. https://doi.org/10.1177/001316446002000116

Kaiser, H. F. (1974). An index of factorial simplicity. *Psychometrika*, *39*(1), 31–36. https://doi.org/10.1007/BF02291575

Kariyawasam, L., Ononaiye, M., Irons, C., & Kirby, S. E. (2022). A cross-cultural exploration of compassion, and facilitators and inhibitors of compassion in UK and Sri Lankan people. *Global Mental Health*, *9*, 99–110. https://doi.org/10.1017/gmh.2022.10

Kelly, A. C., Zuroff, D. C., Leybman, M. J., & Gilbert, P. (2012). Social safeness, received social support, and maladjustment: Testing a tripartite model of affect regulation. *Cognitive Therapy and Research*, *36*(6), 815–826. https://doi.org/10.1007/s10608-011-9432-5

Kolacz, J., Holmes, L., Roath, O. K., & Porges, S. W. (2023). *Body Perception Questionnaire (BPQ) manual.* https://www.traumascience.org/body-perception-questionnaire

Kop, W. J., Synowski, S. J., Newell, M. E., Schmidt, L. A., Waldstein, S. R., & Fox, N. A. (2011). Autonomic nervous system reactivity to positive and negative mood induction: The role of acute psychological responses and frontal electrocortical activity. *Biological Psychology*, *86*(3), 230–238. https://doi.org/10.1016/j.biopsycho.2010.12.003

Kovacic, K., Hainsworth, K., Sood, M., Chelimsky, G., Unteutsch, R., Nugent, M., Simpson, P., & Miranda, A. (2017). Neurostimulation for abdominal pain-related functional gastrointestinal disorders in adolescents: a randomised, double-blind, sham-controlled trial. *The lancet. Gastroenterology & Hepatology*, *2*(10), 727–737. https://doi.org/10.1016/S2468-1253(17)30253-4

Krahé, C., Whyte, J., Bridge, L., Loizou, S., & Hirsch, C. R. (2019). Are different forms of repetitive negative thinking associated with interpretation bias in generalized anxiety disorder and depression? *Clinical Psychological Science*, *7*(5), 969–981. https://doi.org/10.1177/2167702619851808

Kraiss, J. T., Kohlhoff, M., & ten Klooster, P. M. (2023). Disentangling between- and within-person associations of psychological distress and mental well-being: An experience sampling study examining the dual continua model of mental health among university students. *Current Psychology, 42*(20), 16789–16800. https://doi.org/10.1007/s12144-022-02942-1

Kreibig S. D. (2010). Autonomic nervous system activity in emotion: A review. *Biological Psychology*, *84*(3), 394–421. https://doi.org/10.1016/j.biopsycho.2010.03.010

Kreibig S. D., Gendolla G. H., Scherer K. R. (2010). Psychophysiological effects of emotional responding to goal attainment. *Biological Psychology,* 84, 474–487. https://doi.org/10.1016/j.biopsycho.2009.11.004.

Krupnik, V. (2020). Trauma or drama: A predictive processing perspective on the continuum of stress. *Frontiers in Psychology*, *11*, 1248–1248. https://doi.org/10.3389/fpsyg.2020.01248

Lance, C. E., Christie, J., & Williamson, G. M. (2021). Do state and trait measures measure states and traits? The case of community-dwelling caregivers of older adults. *Assessment, 28*(3), 829–844. https://doi.org/10.1177/1073191119888582

Larsson, F., Engström, Å., Strömbäck, U., & Gustafsson, S. (2021). Development and psychometric evaluation of the Feeling Safe During Surgery Scale. *Nursing Open*, *8*(5), 2452–2460. https://doi.org/10.1002/nop2.1003

Larsson, F., Strömbäck, U., Rysst Gustafsson, S., & Engström, Å. (2023). Perception of feeling safe perioperatively: A concept analysis. *International Journal of Qualitative Studies on Health and Well-being*, *18*(1), Article 2216018. https://doi.org/10.1080/17482631.2023.2216018

López, A., Sanderman, R., Ranchor, A. V., & Schroevers, M. J. (2018). Compassion for others and self-compassion: Levels, correlates, and relationship with psychological well-being. *Mindfulness, 9*(1), 325–331. https://doi.org/10.1007/s12671-017-0777-z

Lovibond, P. F., & Lovibond, S. H. (1995). The structure of negative emotional states: Comparison of the Depression Anxiety Stress Scales (DASS) with the Beck Depression and Anxiety Inventories. *Behaviour Research and Therapy, 33*(3), 335–343. https://doi.org/10.1016/0005-7967(94)00075-U

Lovink, M. H., Kars, M. C., de Man-van Ginkel, J. M., & Schoonhoven, L. (2015). Patients' experiences of safety during haemodialysis treatment: A qualitative study. *Journal of Advanced Nursing, 71*(10), 2374–2383. https://doi.org/10.1111/jan.12690

Manzotti, A., Panisi, C., Pivotto, M., Vinciguerra, F., Benedet, M., Brazzoli, F., Zanni, S., Comassi, A., Caputo, S., Cerritelli, F., & Chiera, M. (2024). An in-depth analysis of the polyvagal theory in light of current findings in neuroscience and clinical research. *Developmental Psychobiology, 66*(2), Article e22450. https://doi.org/10.1002/dev.22450

McCorry, L. K. (2007). Physiology of the autonomic nervous system. *American Journal of Pharmaceutical Education, 71*(4), Article 78. https://doi.org/10.5688/aj710478

McCraty, R., Atkinson, M., Tiller, W. A., Rein, G., & Watkins, A. D. (1995). The effects of emotions on short-term power spectrum analysis of heart rate variability. *The American Journal of Cardiology, 76*(14), 1089–1093. https://doi.org/10.1016/s0002-9149(99)80309-9

McDonald, B., & Kanske, P. (2023). Gender differences in empathy, compassion, and prosocial donations, but not theory of mind in a naturalistic social task. *Scientific Reports, 13*(1), Article 20748. https://doi.org/10.1038/s41598-023-47747-9

Minartz, P., Aumann, C. M., Vondeberg, C., & Kuske, S. (2024). Feeling safe in the context of digitalization in healthcare: a scoping review. *Systematic Reviews*, *13*(1), Article 62. https://doi.org/10.1186/s13643-024-02465-9

Mollon, D. (2014). Feeling safe during an inpatient hospitalization: A concept analysis. *Journal of Advanced Nursing*, *70*(8), 1727–1737. https://doi.org/10.1111/jan.12348

Montgomery, E. (2013). Feeling safe: A metasynthesis of the maternity care needs of women who were sexually abused in childhood. *Birth*, *40*(2), 88–95. https://doi.org/10.1111/birt.12043

Morton, L., Cogan, N., Kolacz, J., Calderwood, C., Nikolic, M., Bacon, T., Pathe, E., Williams, D., & Porges, S. W. (2022a). A new measure of feeling safe: Developing psychometric properties of the Neuroception of Psychological Safety Scale (NPSS). *Psychological Trauma: Theory, Research, Practice, and Policy*, *16*(4), 701–708. https://doi.org/10.1037/tra0001313

Morton, L., Cogan, N., Kolacz, J., Calderwood, C., Nikolič, M., Bacon, T., Pathe, E., Williams, D., & Porges, S. W. (2022b). *Neuroception of Psychological Safety Scale (NPSS) manual and scoring guide.* University of Strathclyde Humanities and Social Sciences. https://www.traumascience.org/neuroception-of-safety-scale

Mueller, B., Figueroa, A., & Robinson-Papp, J. (2022). Structural and functional connections between the autonomic nervous system, hypothalamic–pituitary–adrenal axis, and the immune system: A context and time dependent stress response network. *Neurological Sciences*, *43*(2), 951–960. https://doi.org/10.1007/s10072-021-05810-1

Mundfrom, D. J., Shaw, D. G., & Ke, T. L. (2005). Minimum sample size recommendations for conducting factor analyses. *International Journal of Testing*, *5*(2), 159–168. https://doi.org/10.1207/s15327574ijt0502_4

Murphy, F., Nasa, A., Cullinane, D., Raajakesary, K., Gazzaz, A., Sooknarine, V., Haines, M., Roman, E., Kelly, L., O'Neill, A., Cannon, M., & Roddy, D. W. (2022). Childhood trauma, the HPA axis and psychiatric illnesses: A targeted literature synthesis. *Frontiers in Psychiatry*, *13*, Article 748372. https://doi.org/10.3389/fpsyt.2022.748372

Murray, C. E., Ross, R., & Cannon, J. (2021). The happy, healthy, safe relationships continuum: Conceptualizing a spectrum of relationship quality to guide community-based healthy relationship promotion programming. *The Family Journal*, *29*(1), 50–59. https://doi.org/10.1177/1066480720960416

Muthén, B., & Kaplan, D. (1985). A comparison of some methodologies for the factor analysis of non-normal Likert variables. *British Journal of Mathematical and Statistical Psychology*, *38*(2), 171–189. https://doi.org/10.1111/j.2044-8317.1985.tb00832.x

Nakata, R., Tanaka, F., Sugawara, N., Kojima, Y., Takeuchi, T., Shiba, M., Higuchi, K., & Fujiwara, Y. (2022). Analysis of autonomic function during natural defecation in patients with irritable bowel syndrome using real-time recording with a wearable device. *PloS one*, *17*(12), Article e0278922. https://doi.org/10.1371/journal.pone.0278922

Neff, K. D., & Pommier, E. (2013). The relationship between self-compassion and other-focused concern among college undergraduates, community adults, and practicing meditators. *Self and Identity*, *12*(2), 160-176. https://doi.org/10.1080/15298868.2011.649546

Newman, A., Donohue, R., & Eva, N. (2017). Psychological safety: A systematic review of the literature. *Human Resource Management Review*, *27*(3), 521-535. https://doi.org/10.1016/j.hrmr.2017.01.001

Normansell, K. M., & Wisco, B. E. (2017). Negative interpretation bias as a mechanism of the relationship between rejection sensitivity and depressive symptoms. *Cognition and Emotion*, *31*(5), 950–962. https://doi.org/10.1080/02699931.2016.1185395

Novak, L., Malinakova, K., Mikoska, P., van Dijk, J. P., & Tavel, P. (2022). Neural correlates of compassion: An integrative systematic review. *International Journal of Psychophysiology*, *172*, 46–59. https://doi.org/10.1016/j.ijpsycho.2021.12.004

Patriquin, M. A., & Mathew, S. J. (2017). The neurobiological mechanisms of generalized anxiety disorder and chronic stress. *Chronic Stress*, *1*, Article 17703993. https://doi.org/10.1177/2470547017703993

Peng, H., Long, Y., Li, J., Guo, Y., Wu, H., Yang, Y., Ding, Y., He, J., & Ning, Y. (2014). Hypothalamic-pituitary-adrenal axis functioning and dysfunctional attitude in depressed patients with and without childhood neglect. *BMC Psychiatry*, *14*(1), 45. https://doi.org/10.1186/1471-244X-14-45

Podolan, M., & Gelo, O. C. G. (2023). The functions of safety in psychotherapy: An integrative theoretical perspective across therapeutic schools. *Clinical Neuropsychiatry*, *20*(3), 193–204. https://doi.org/10.36131/cnfioritieditore20230304

Poli, A., & Miccoli, M. (2024). Validation of the Italian version of the Neuroception of Psychological Safety Scale (NPSS). *Heliyon*, *10*(6), Article e27625. https://doi.org/10.1016/j.heliyon.2024.e27625

Poli, A., Gemignani, A., Soldani, F., & Miccoli, M. (2021a). A systematic review of a polyvagal perspective on embodied contemplative practices as promoters of cardiorespiratory coupling and traumatic stress recovery for PTSD and OCD: Research methodologies and state of the art. *International Journal of Environmental Research and Public Health*, *18*(22), Article 11778. https://doi.org/10.3390/ijerph182211778

Poli, A., Maremmani, A. G. I., Chiorri, C., Mazzoni, G. P., Orrù, G., Kolacz, J., Porges, S. W., Conversano, C., Gemignani, A., & Miccoli, M. (2021b). Item reduction, psychometric and biometric properties of the Italian version of the Body Perception Questionnaire-Short Form (BPQ-SF): The BPQ-22. *International Journal of Environmental Research and Public Health*, *18*(7), Article 3835. https://doi.org/10.3390/ijerph18073835

Pommier, E., Neff, K. D., & Tóth-Király, I. (2020). The development and validation of the Compassion Scale. *Assessment*, *27*(1), 21-39. https://doi.org/10.1177/1073191119874108

Porges, S. W. (1993). *Body Perception Questionnaire*. Laboratory of Developmental Assessment, University of Maryland. https://onlinelibrary.wiley.com/doi/pdf/10.1002/9781118638279.app5

Porges, S. W. (1995). Orienting in a defensive world: Mammalian modifications of our evolutionary heritage. A polyvagal theory. *Psychophysiology*, *32*(4), 301–318. https://doi.org/10.1111/j.1469-8986.1995.tb01213.x

Porges, S. W. (2007). The polyvagal perspective. *Biological Psychology*, *74*(2), 116–143. https://doi.org/10.1016/j.biopsycho.2006.06.009

Porges, S. W. (2011). *The polyvagal theory: Neurophysiological foundations of emotions, attachment, communication, and self-regulation*. W W Norton & Co.

Porges, S. W. (2018). Polyvagal theory: A primer. In S. W. Porges & D. Dana (Eds.), *Clinical applications of the polyvagal theory: The emergence of polyvagal-informed therapies* (pp. 61–83). W. W. Norton & Company.

Porges, S. W. (2021). *Polyvagal safety: Attachment, communication, self-regulation*. W. W. Norton & Company.

Porges S. W. (2022). Polyvagal Theory: A Science of Safety. *Frontiers in Integrative Neuroscience, 16,* Article 871227. https://doi.org/10.3389/fnint.2022.871227

Porges, S. W., & Dana, D. (Eds.). (2018). *Clinical applications of the polyvagal theory: The emergence of polyvagal-informed therapies.* W. W. Norton & Company.

Porges, S. W., Doussard-Roosevelt, J. A., Portales, A. L., & Greenspan, S. I. (1996). Infant regulation of the vagal "brake" predicts child behavior problems: A psychobiological model of social behavior. *Developmental Psychobiology, 29*(8), 697–712. https://doi.org/10.1002/(SICI)1098-2302(199612)29:8<697::AID-DEV5>3.0.CO;2-O

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist, 55*(1), 68–78. https://doi.org/10.1037/0003-066X.55.1.68

Sanders, M. R., & Hall, S. L. (2018). Trauma-informed care in the newborn intensive care unit: Promoting safety, security and connectedness. *Journal of Perinatology*, *38*(1), 3–10. https://doi.org/10.1038/jp.2017.124

Shakil, A., Donald, S., Sinacore, J. M., & Krepcho, M. (2005). Validation of the HITS domestic violence screening tool with males. *Family Medicine*, *37*(3), 193–198.

Sherin, K. M., Sinacore, J. M., Li, X. Q., Zitter, R. E., & Shakil, A. (1998). HITS: A short domestic violence screening tool for use in a family practice setting. *Family Medicine*, *30*(7), 508–512.

Shiota, M. N., Campos, B., Oveis, C., Hertenstein, M. J., Simon-Thomas, E., & Keltner, D. (2017). Beyond happiness: Building a science of discrete positive emotions. *The American Psychologist, 72*(7), 617–643. https://doi.org/10.1037/a0040456

Singh, P., King-Shier, K., Sinclair, S., & van Bogaert, P. (2018). The colours and contours of compassion: A systematic review of the perspectives of compassion among ethnically

diverse patients and healthcare providers. *PloS One*, *13*(5), Article e0197261. https://doi.org/10.1371/journal.pone.0197261

Sjöberg, L. (2007). Emotions and risk perception. *Risk Management*, *9*(4), 223–237. https://doi.org/10.1057/palgrave.rm.8250038

Smith, K. E., & Pollak, S. D. (2020). Early life stress and development: Potential mechanisms for adverse outcomes. *Journal of Neurodevelopmental Disorders*, *12*(1), Article 34. https://doi.org/10.1186/s11689-020-09337-y

Sobkow, A., Traczyk, J., & Zaleskiewicz, T. (2016). The affective bases of risk perception: Negative feelings and stress mediate the relationship between mental imagery and risk perception. *Frontiers in Psychology*, *7*, Article 932. https://doi.org/10.3389/fpsyg.2016.00932

Sprecher, S., & Fehr, B. (2005). Compassionate love for close others and humanity. *Journal of Social and Personal Relationships*, *22*(5), 629–651. https://doi.org/10.1177/0265407505056439

Sprecher, S., Fehr, B., & Zimmerman, C. (2007). Expectation for mood enhancement as a result of helping: The effects of gender and compassionate love. *Sex Roles*, *56*(7–8), 543–549. https://doi.org/10.1007/s11199-007-9192-6

Stietz, J., Pollerhoff, L., Kurtz, M., Li, S. C., Reiter, A. M. F., & Kanske, P. (2021). The ageing of the social mind: Replicating the preservation of socio-affective and the decline of socio-cognitive processes in old age. *Royal Society Open Science*, *8*(8), Article 210641. https://doi.org/10.1098/rsos.210641

Streiner, D. L., Norman, G. R., & Cairney, J. (2014). *Health measurement scales: A practical guide to their development and use* (5th ed.). Oxford University Press.

Sullivan, C. M., Goodman, L. A., Virden, T., Strom, J., & Ramirez, R. (2018). Evaluation of the effects of receiving trauma-informed practices on domestic violence shelter

residents. *American Journal of Orthopsychiatry, 88*(5), 563–570. https://doi.org/10.1037/ort0000286

Sweeney, A., Filson, B., Kennedy, A., Collinson, L., & Gillard, S. (2018). A paradigm shift: Relationships in trauma-informed mental health services. *BJPsych Advances, 24*(5), 319–333. https://doi.org/10.1192/bja.2018.29

Thompson, E. R. (2007). Development and validation of an internationally reliable short-form of the Positive and Negative Affect Schedule (PANAS). *Journal of Cross-Cultural Psychology, 38*(2), 227–242. https://doi.org/10.1177/0022022106297301

Tortora, G. J. (2019). *Principles of anatomy and physiology* (2nd Asia-Pacific ed.). John Wiley & Sons.

Valente, R., & Crescenzi-Lanna, L. (2022). Feeling unsafe as a source of psychological distress in early adolescence. *Social Science & Medicine, 293*, Article 114643. https://doi.org/10.1016/j.socscimed.2021.114643

Veale, D., Miles, S., Naismith, I. J., & Gilbert, P. (2016). Development of a compassion focused and contextual behavioural environment and validation of the Therapeutic Environment Scales (TESS). *BJPsych Bulletin*, *40*, 12-19. https://doi.org/10.1192/pb.bp.114.048736

Viertiö, S., Kiviruusu, O., Piirtola, M., Kaprio, J., Korhonen, T., Marttunen, M., & Suvisaari, J. (2021). Factors contributing to psychological distress in the working population, with a special reference to gender difference. *BMC Public Health, 21*(1), Article 611. https://doi.org/10.1186/s12889-021-10560-y

Vrtička, P., & Vuilleumier, P. (2012). Neuroscience of human social interactions and adult attachment style. *Frontiers in Human Neuroscience*, *6*, Article 212. https://doi.org/10.3389/fnhum.2012.00212

Wager, T. D., Waugh, C. E., Lindquist, M., Noll, D. C., Fredrickson, B. L., & Taylor, S. F. (2009). Brain mediators of cardiovascular responses to social threat, Part I: Reciprocal dorsal and ventral sub-regions of the medial prefrontal cortex and heart-rate reactivity. *Neuroimage, 47*(3), 821–835. https://doi.org/10.1016/j.neuroimage.2009.05.043

Wagner, D. (2015). Polyvagal theory and peek-a-boo: How the therapeutic pas de deux heals attachment trauma. *Body, Movement and Dance in Psychotherapy, 10*(4), 256–265. https://doi.org/10.1080/17432979.2015.1069762

Wei, M., Russell, D. W., Mallinckrodt, B., & Vogel, D. L. (2007). The Experiences in Close Relationship Scale (ECR)-short form: Reliability, validity, and factor structure. *Journal of Personality Assessment, 88*(2), 187–204. https://doi.org/10.1080/00223890701268041

Williamson, J. B., Porges, E. C., Lamb, D. G., & Porges, S. W. (2015). Maladaptive autonomic regulation in PTSD accelerates physiological aging. *Frontiers in Psychology*, *5*, Article 1571. https://doi.org/10.3389/fpsyg.2014.01571

Wouters-Soomers, L., Van Ruysseveldt, J., Bos, A. E. R., & Jacobs, N. (2022). An individual perspective on psychological safety: The role of basic need satisfaction and self-compassion. *Frontiers in Psychology*, *13*, Article 920908. https://doi.org/10.3389/fpsyg.2022.920908

Yaribeygi, H., Panahi, Y., Sahraei, H., Johnston, T. P., & Sahebkar, A. (2017). The impact of stress on body function: A review. *Experimental and Clinical Sciences, 16*, 1057–1072. https://doi.org/10.17179/excli2017-480

Yu, P. J., Tsao, L. I., & Liu, C. Y. (2022). Development of the Self-Perceived Safety of Orthopedic Post-Surgery Inpatients (SPSOPSI) Scale. *Healthcare*, *10*(12), Article 2343. https://doi.org/10.3390/healthcare10122343

Zhang, X., Ge, T. tong, Yin, G., Cui, R., Zhao, G., & Yang, W. (2018). Stress-induced functional alterations in amygdala: Implications for neuropsychiatric diseases. *Frontiers in Neuroscience*, *12*, Article 367. https://doi.org/10.3389/fnins.2018.00367

Zimmerman M. A. (2013). Resiliency theory: A strengths-based approach to research and practice for adolescent health. *Health Education & Behavior*, *40*(4), 381–383. https://doi.org/10.1177/1090198113493782

Appendix A

Items from the Online Survey

All items from the online survey are listed below in the order presented to participants. The names of the scales and instructions provided are also listed.

Neuroception of Psychological Safety Scale (NPSS)

Please rate how well the following statements describe your feelings over the past week using the following options: Strongly Disagree (1), Disagree (2), Neither Agree or Disagree (3), Agree (4), Strongly Agree (5)

1. I felt valued
2. I felt comfortable expressing myself
3. I felt accepted by others
4. I felt understood
5. I felt like others got me
6. I felt respected
7. There was someone who made me feel safe
8. There was someone I could trust
9. I felt comforted by others
10. I felt heard by others
11. I felt like people would try their best to help me
12. I felt cared for
13. I felt wanted

14. I didn’t feel judged by others
15. I felt able to empathize with others
16. I felt able to comfort another person if needed
17. I felt compassion for others
18. I wanted to help others relax
19. I felt like I could comfort a loved one
20. I felt so connected to others I wanted to help them
21. I felt caring
22. My heart rate felt steady
23. Breathing felt effortless
24. My voice felt normal
25. My body felt relaxed
26. My stomach felt settled
27. My breathing was steady
28. I felt able to stay still
29. My face felt relaxed

Safety Questions

Global Rating of Safety

How safe do you feel in general? Rate yourself from 0-10

Extremely unsafe Extremely Safe

0 1 2 3 4 5 6 7 8 9 10

Definition of Safety

In answering the previous question, how did you define or think about what it means to feel safe?

_____

Body Perception Questionnaire — Body Awareness Very Short Form (BPQ-VSF)

Please rate your awareness of each of the characteristics described below. Select the answer that most accurately describes you.

Response options: Never (1), Occasionally (2),Sometimes (3) Usually, (4), Always (5)

I am aware of...

1. My mouth being dry
2. How fast I am breathing
3. A swelling of my body or parts of my body
4. Muscle tension in my arms and legs
5. A bloated feeling because of water retention
6. Goose bumps
7. Stomach and gut pains

8. Stomach distension or bloatedness
9. Tremor in my lips
10. The hair on the back of my neck “standing up”
11. The urge to swallow
12. How hard my heart is beating

Body Perception Questionnaire Autonomic Reactivity Short Form (BPQ20-ANS)

The autonomic nervous system controls your cardiovascular, respiratory, digestive, and temperature regulation systems. It is also involved in the experience and expression of emotions. The autonomic nervous system functions differently among people. This scale has been developed to measure how your autonomic nervous system reacts. Please rate yourself on each of the statements below using the following response options:

Never (1), Occasionally (2), Sometimes (3), Usually (4), Always (5)

1. I have difficulty coordinating breathing and eating
2. When I am eating, I have difficulty talking
3. My heart often beats irregularly
4. When I eat, food feels dry and sticks to my mouth and throat
5. I feel shortness of breath
6. I have difficulty coordinating breathing with talking
7. When I eat, I have difficulty coordinating swallowing, chewing, and/or sucking with breathing
8. I have a persistent cough that interferes with my talking and eating
9. I gag from the saliva in my mouth

10. I have chest pains
11. I gag when I eat
12. When I talk, I often feel I should cough or swallow the saliva in my mouth
13. When I breathe, I feel like I cannot get enough oxygen
14. I have difficulty controlling my eyes
15. I feel like vomiting
16. I have a 'sour' stomach
17. I am constipated
18. I have indigestion
19. After eating I have digestive problems
20. I have diarrhea

Depression, Anxiety and Stress Scale — 21 (DASS-21)

For the following items, please read each statement and select a choice which indicates how much the statement applied to you over the past week. There are no right or wrong answers. Do not spend too much time on any statement

Response options: Never (0), Sometimes (1), Often (2), Almost Always (3)

1. I found it hard to wind down
2. I was aware of dryness in my mouth
3. I couldn't seem to experience any positive feeling at all
4. I experienced breathing difficulty (e.g., excessively rapid breathing, breathlessness in the absence of physical exertion)

5. I found it difficult to work up the initiative to do things
6. I tended to overreact to situations
7. I experienced trembling (e.g., in the hands)
8. I felt that I was using a lot of nervous energy
9. I was worried about situations in which I might panic and make a fool of myself
10. I felt that I had nothing to look forward to
11. I found myself getting agitated
12. I found it difficult to relax
13. I felt down-hearted and blue
14. I was intolerant of anything that kept me from getting on with what I was doing
15. I felt I was close to panic
16. I was unable to become enthusiastic about anything
17. I felt I wasn't worth much as a person
18. I felt that I was rather touchy
19. I was aware of the action of my heart in the absence of physical exertion (e.g., sense of heart rate increase, heart missing a beat)
20. I felt scared without any good reason
21. I felt that life was meaningless

The International Positive and Negative Affect Schedule Short Form (I-PANAS-SF)

Thinking about yourself and how you normally feel, to what extent do you generally feel:

	1- Never	(2)	(3)	(4)	5 - Always
Upset	○	○	○	○	○
Hostile	○	○	○	○	○
Alert	○	○	○	○	○
Ashamed	○	○	○	○	○
Inspired	○	○	○	○	○
Nervous	○	○	○	○	○
Determined	○	○	○	○	○
Attentive	○	○	○	○	○
Afraid	○	○	○	○	○
Active	○	○	○	○	○

Relationship status

Are you currently in a romantic relationship?

Yes (1)

No (2)

Have you ever been in a romantic relationship?

Yes (1)

No (2)

Experiences in Close Relationships Scale Short Form (ECR-S)

The following statements concern how you feel in romantic relationships. Please respond to each statement by indicating how much you agree or disagree.

Response options: Strongly Disagree (1), Disagree (2), Slightly Disagree (3), Neutral (4) Slightly Agree (5), Agree (6), Strongly Agree (7)

1. It helps to turn to my romantic partner in times of need
2. I need a lot of reassurance that I am loved by my partner
3. I want to get close to my partner, but I keep pulling back
4. I find that my partner doesn't want to get as close to me as I would like
5. I turn to my partner for many things, including comfort and reassurance
6. My desire to be very close sometimes scares people away
7. I try to avoid getting too close to my partner
8. I don't worry about being abandoned
9. I usually discuss my problems and concerns with my partner
10. I get frustrated if my romantic partner is not available when I need them
11. I am nervous when my partner gets too close to me
12. I worry that a romantic partner won't care about me as much as I care about them

HITS Screening Tool

Please respond to the items using the following response options:

Never (1), Rarely (2), Sometimes (3) Fairly Often (4), Frequently (5)

1. How often does/did your partner physically hurt you?

2. How often does/did your partner insult you or talk down to you?

3. How often does/did your partner threaten you with harm?

4. How often does/did your partner scream or curse at you?

Adverse Childhood Experiences Questionnaire (ACE-Q)

While you were growing up, during your first 18 years of life:

1. Did a parent or other adult in the household often...

   Swear at you, insult you, put you down, or humiliate you?

   or

   Act in a way that made you afraid that you might be physically hurt?

   Yes (1)

   No (2)

2. Did a parent or other adult in the household often...

   Push, grab, slap or throw something at you?

   or

   Ever hit you so hard that you had marks or were injured?

   Yes (1)

   No (2)

3. Did an adult or a person at least 5 years older than you ever...

   Touch or fondle you or have you touch their body in a sexual way?

   or

   Try to have oral, anal, or vaginal sex with you?

Yes (1)

No (2)

4. Did you often feel that...

   No one in your family loved you or thought you were important or special?

   or

   Your family didn't look out for each other, feel close to each other, or support each other?

   Yes (1)

   No (2)

5. Did you often feel that...

   You didn't have enough to ear, had to wear dirty clothes, and had no one to protect you

   or

   Your parents were too drunk or high to take care of you or take you to the doctor if you needed it?

   Yes (1)

   No (2)

6. Were your parents ever separated or divorced?

   Yes (1)

   No (2)

7. Was your mother or stepmother:

Often pushed, grabbed, slapped, or had something thrown at her?

or

Sometimes or often kicked, bitten, hit with a fist, or hit with something hard?

or

Ever repeatedly hit over at least a few minutes or threatened with a gun or a knife?

Yes (1)

No (2)

8. Did you live with anyone who was a problem drinker or alcoholic or used street drugs?

   Yes (1)

   No (2)

9. Was a household member depressed or mentally ill or did a household member attempt suicide?

   Yes (1)

   No (2)

10. Did a household member go to prison?

    Yes (1)

    No (2)

Demographic Questions

Age: Please write in your age

Gender: How do you identify your gender?

Male (1)

Female (2)

Non-binary (3)

Prefer not to say (4)

Prefer to self-describe (5) Please describe below:

Ethnicity: Which ethnicity/ethnicities do you identify with?

Māori (1)

NZ European/Pakeha (2)

Pasifika people (3). Please specify:

Asian (4). Please specify:

European (5). Please specify:

Middle Eastern (6)

Latin American/Hispanic (7)

African (8)

Other (9). Please specify:

Occupation: Please indicate your work/study status:

Student (1)

Full-time work (2)

Part-time work (3)

What country do you currently live in?

New Zealand (1)

Australia (2)

United States of America (3)

United Kingdom (4)

Other (5). Please specify:

What is something/an activity that you do that brings you enjoyment/positive feelings? Please describe in a few words:

Help Resources

Help is available if you feel you need it. Here are some helpful resources:

- Lifeline Aotearoa (https://www.lifeline.org.nz/): 0800 543 354, or you can text them for free on 4357
- Suicide crisis helpline (https://1737.org.nz/): 0508 828 865, you can free call or free text 1737
- Māori Women's Welfare League (https://www.mwwl.org.nz): Te Ropu Wāhine Māori Toko I te Ora (Māori Women's Welfare League Inc) drives healthy outcomes for wāhine, whānau and tamariki

Appendix B

Untransformed Compassion Subscale Score Correlations

Table B1

Correlations between the Compassion subscale of the NPSS and Theoretically Related Constructs using the Untransformed Compassion Subscale Scores

Theoretically Related Construct	Compassion
Body Awareness (BPQ-VSF)	0.03
Autonomic Reactivity (BPQ20-ANS)	-0.08
Depression (DASS-21)	-0.23**
Anxiety (DASS-21)	-0.08
Stress (DASS-21)	-0.10*
Positive Affect (PANAS-SF)	0.25**
Negative Affect (PANAS-SF)	-0.20**
Avoidance (ECR-12)	-0.27**
Anxiety (ECR-12)	-0.11
Childhood Adversity (ACEQ)	-0.12
Intimate Partner Violence (HITS)	-0.11*
Self-Report Safety	0.18**

Note. The overall pattern of correlations using the transformed Compassion scores was similar to the unstransformed scores presented above

*$p < .05$. **$p < .01$.