TOWARDS THE DEVELOPMENT OF AN INTEGRATIVE MEASURE OF AUTONOMOUS CEPHALOCAUDAL PARESTHESIA

Submitted by

Natalie M Roberts (BA Psychology)

This thesis is submitted in partial fulfilment of the requirements for the degree of Master of Research (Psychology) at Macquarie University.

Department of Psychology

Faculty of Human Sciences

Date of Submission
October 2015

Statement of Candidate

I certify that the work in this thesis entitled “Towards the Development of an Integrative Measure of Autonomous Cephalocaudal Paresthesia” has not previously been submitted for a degree nor has it been submitted as part of requirements for a degree to any other university or institution other than Macquarie University.

I also certify that the thesis is an original piece of research and it has been written by me. Any help and assistance that I have received in my research work and the preparation of the thesis itself have been appropriately acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

The research presented in this thesis was approved by Macquarie University Ethics Review Committee, reference number: 5201500323 on 17th April, 2015.

Natalie Roberts (42453801)

08/10/15

Abstract

While significant progress has been made, altered states of consciousness (ASCs) still represent a major frontier in psychological research. The present project aimed to develop a reliable and valid measure of a proposed alteration of consciousness, Autonomous Cephalocaudal Paresthesia (ACP), also known as Autonomous Sensory Meridian Response (ASMR). The phenomenon has been described as an intensely pleasurable and euphoric tingling sensation that begins at the back of the head and travels down the central nervous system in response to specific, individualised audio-visual triggers and real world stimuli. A mixed-methods approach was adopted, utilising a sample of existing online data (N = 303) for qualitative analysis and then deriving a scale (ACPS-31) through content analysis. The secondary, quantitative study refined the ACPS-31 through factor analysis (N = 451), producing a cohesive scale with five subscales: Movement, Sensation, Affect, Relaxation and Cognition. The final total score 21-item ACP scale (ACPS-21) evidenced good reliability with adequate internal consistency (Cronbach's $\alpha = .82$) and demonstrated a divergent pattern of correlations to frisson, flow, absorption or alexithymia. Future work could focus on further refinement of the ACPS-21, as well experimentally assessing the relationship between ACP, arousal and personality factors.

Acknowledgments

They say that nothing in life happens in a vacuum. While this may more commonly be seen as an acknowledgement of the consequences of our actions, with respect to this thesis, I have been fortunate enough to have been surrounded by individuals whose unrelenting support and selflessness has been invaluable in assuring the completion of such an endeavour.

I would firstly like to thank my supervisor Dr Simon Boag. I feel incredibly fortunate to have been able to work alongside Simon in completing this project. Thank you for your unceasing friendliness, patience, knowledge and open-mindedness. I would also like to thank Dr Naomi Sweller for her statistics guidance and assurance. Finally, I would like to extend gratitude to the late Associate Professor Doris McIlwain. I feel eternally privileged to have been able to extensively discuss this project with Doris. Her passion and theoretical insights were both invaluable and incomparable.

Thank you to my family and friends. It goes without saying that your support has been monumental. Special thanks to my uni family in Nick Everett and Robyn Ordman, it sounds cheesy but I truly don't believe I could have done this without you two. Your friendships have been invaluable and for that I am forever grateful. Finally, thank you also to my boyfriend Thomas Garman. Despite having no interest in learning the intricacies of factor analysis, you made sure I never felt alone in what can be an isolating venture.

Table of Contents

List of Tables

Chapter 1: Introduction

Altered states of consciousness (ASCs) refer to qualitative shifts in an individual's overall pattern of mental functioning (Tart, 1972). From accounts of religious possession, daydreaming, trance states and shamanic rituals, to transformational peak experiences and sensory induced paresthetic sensations, alterations of consciousness have been well documented as integral aspects of human life throughout history and across cultures since the earliest recorded times (Polito, Langdon & Brown, 2010; James, 1902; Maslow, 1964) Posited as intrinsically valuable, culturally mediated "tools" (Tart, 1976, p.64), anthropological records suggest that over 90% of human societies engage with altered states as part of their everyday culture (Polito et al., 2010; Bourguignon, 1973). Despite the ubiquitous nature of such experiences, altered states have been subject to widespread pathology, scrutiny and apprehension (Maslow, 1964; Cardeña, 2014).

While significant progress has been made towards understanding specific alterations of consciousness, ASCs still represent a major frontier in psychological research, with much still unknown about the organisation of such phenomena, and the limitations or parameters of human experience (Tart, 1974; Móró, 2010). In acknowledging this lacuna, the present project proposes the existence of a new and under researched alteration of consciousness that has garnered significant online interest, Autonomous Sensory Meridian Response (ASMR). ASMR has been described as an intensely pleasurable and euphoric tingling sensation that typically begins at the back of the head and travels down the central nervous system in response to specific, individualised audio-visual triggers and real world stimuli, resulting in feelings of comfort, relaxation and euphoria (Andersen, 2014; Colizoli, Murre & Rouw, 2013). It has been proposed that ASMR results in profound alterations in cognitive functioning, affect and sensory perception, distinct from other sensory-induced peak experiences including frisson, as well as absorption and flow states. Largely unrecognised and unaccounted for by existing constructs, ASMR appears to share many of the characteristics of other altered states, particularly meditation, relaxation and trance states. However,

the phenomenon also demonstrates features unique from other ASCs, arguably existing as a distinct alteration of consciousness with a significant, specific sensory component (Andersen, 2014).

Currently, significant online interest in describing, discussing and inducing ASMR has seen the emergence of large and diverse online communities, suggesting that ASMR may exist as a real, common experience across individuals. Currently, the ASMR dedicated community on popular forum website Reddit, *ASMR: Sounds That Feel Good*, has attracted over 100 000 active members since its inception in 2011. Also referred to as attention-induced euphoria (AIE), some individuals who report such experiences claim to regularly encounter the sensation incidentally, while many also consciously seek it out through online 'trigger videos', frequently hosted on YouTube (Andersen, 2014). Common triggers identified, and recreated through such stimuli include binaural stimulation, simulated close personal attention, whispering, crisp sounds, slow movements, smiling, and observation of others completing masterful tasks (Ahuja, 2013; Barratt & Davis, 2015).

Given that ASMR most commonly refers to Age Specific Mortality Rate, and to increase the specificity and accuracy of the descriptive terminology, it is proposed in the current study that ASMR should instead be named Autonomous Cephalocaudal Paresthesia. The word 'autonomous', in line with the term 'ASMR' coined by Jennifer Allen in 2010, describes the individualistic nature of trigger stimuli and the ability, for some, to facilitate or create the sensation at will. While, 'paresthesia' denotes the unexplained, tingly, physical sensation. Lastly, in specifying 'cephalocaudal' in the terminology, referring to the path of sensation from brain to body, a further discrimination between ACP and other paresthesias will be established. Throughout the rest of this thesis, ACP will be used in favour of ASMR.

As yet, ACP has not been substantively investigated. One reason for this is that there has been little attempt to define the concept or assess the parameters of the experience and whether such conceptions stand up to empirical investigation. As a result, the aim of this thesis is to develop a

self-report measure of ACP experiences and to examine ASMR/ACP as an alteration of consciousness distinct from other, similar phenomena.

Altered States of Consciousness (ASCs)

According to Ludwig (1966), altered states of consciousness, or ASCs, refer to "any mental state, induced by various physiological, psychological or pharmacological manoeuvres or agents, which can be recognised subjectively by the individual himself as representing a sufficient deviation in subjective experience or psychological functioning from…alert, waking consciousness" (p. 225). Tart (1974) argued that while ordinary waking consciousness exists as a baseline from which to make comparisons about experiential deviations, altered states do not reflect pathological or inferior variations of the waking state. Rather, ordinary waking consciousness exists as a construction on a continuum of consciousness where individual perception and experience, compounded with cultural influence, construct accounts of reality (Tart, 1974; Rawlinson, 1979). As discrete states, ASCs exist as complicated systems with various dynamic stabilisation processes, allowing for the maintenance and propagation of adaptive states (Tart, 1974). As articulated by William James in his highly influential work, *The Varieties of Religious Experience* (1902), exploration of altered states allow for the perception of reality through multiple channels. He stated:

> Our normal waking consciousness, rational consciousness as we call it, is but one special type of consciousness, whilst all about it, parted from it by the filmiest of screens, there lie potential forms of consciousness entirely different. We may go through life without suspecting their existence; but apply the requisite stimulus, and at a touch they are there in all their completeness, definite types of mentality which probably somewhere have their field of application and adaptation. No account of the universe in its totality can be final which leaves these other forms of consciousness quite disregarded. How to regard them is the question,—for they are so discontinuous with ordinary consciousness. Yet they may

> determine attitudes though they fail to give a map. At any rate, they forbid a premature closing of our accounts with reality. (p. 378-379).

In attempting to distill the commonalities among a wide spectrum of ASCs, common features have emerged across manifestations (Ludwig, 1966). Through examining the effects on consciousness produced through hypnosis, psychedelic drugs and other methods of altered state induction, Ludwig (1966) advocated for the existence of ten common denominators across the majority of ASCs, positing altered states as diverse, yet related phenomena. These key characteristics include: Alterations in thinking (e.g. disturbances in concentration, attention, primary process thought), disturbed time sense (e.g. feelings of timelessness, time slowing or stopping), loss of control (e.g. fear of loss of control and sense of reality), change in emotional expression (e.g. primitive emotional expression, detachment, ecstasy, profound depression), body image change (e.g. detachment from body, dissolution of boundaries between the self, universe, environment and others), perceptual distortions (e.g. hallucinations, visual imagery, illusions, synesthesias), change in meaning or significance (e.g. attribution of significance to ordinarily mundane objects, illumination, insight), a sense of the ineffable (e.g. inability to communicate experience, amnesias), feelings of rejuvenation (e.g. feelings of hope, renaissance, rebirth), and hypersuggestibility (e.g. compulsive obedience). While the outward manifestations of these characteristics differ across ASC presentation, Ludwig's (1966) distillation of key features remain consistent with appraisals of altered states as existing on a continuum (Móró, 2010).

Alterations of Consciousness (AoCs)

Existing as a broader phenomenological grouping, alterations of consciousness (AoCs) refer to less clearly defined shifts in psychological functioning, compared to the discrete states of ASCs (Barušs, 2003; Barušs, 2012; Móró, 2010; Tart, 1974; Vaitl et al., 2005). Examples of alterations of consciousness include, but are not limited to: Daydreaming, sleep, near death experiences, rhythm-induced trance, meditation, and pharmacologically induced deviations from ordinary functioning

(Móró, 2010; Vaitl et al., 2005). While some contention exists concerning whether such states are best conceptualised as either altered states or alterations, in the present study, given the limited empirical assessment of the phenomenon, ACP appears to be closer to an alteration of consciousness since ACP experiences are frequently cited as being brief, dynamic and reactive (Barratt & Davis, 2015). As a result, ACP will be preliminarily conceptualised as an alteration of consciousness as opposed to a stable, self-propagating ASC (Tart, 1974). Following qualitative and quantitative assessment, this categorisation will be evaluated.

In proposing the categorisation of alterations via method of induction, Vaitl et al. (2005) conceptualised alterations of consciousness as belonging to five categories: Spontaneously occurring (drowsiness, daydreaming, sleep and dreaming), physically and physiologically induced (starvation and diet, sexual activity and orgasm), pharmacologically induced (LSD, MDMA, marijuana), psychologically induced (trance, meditation, hypnosis), and disease induced (coma, psychotic disorders). Of particular interest in the present study are alterations produced through psychological intervention, particularly sensory induced deviations from ordinary, waking consciousness.

Transcendence, Chills and Tingles

Recently, the exploration of ASCs and other anomalous experiences has seen a shift towards investigating more specific, unusual sensory experiences and transient adaptive states, particularly those implicated in moments of peak performance, euphoria, and powerful emotional identifications with external stimuli (Schafer, Fachner & Smukalla, 2013; Harrison & Loui, 2014). Most notably, the experience of transcendence, or the achievement of a state distinct and superior to ordinary existence (Barušs, 2003). While the experience of a specific, paresthetic sensation appears to be the defining characteristic cited in separating ACP from other, similar phenomena (Barratt & Davis, 2015), there also appears to be a significant transcendental element to ACP experiences, comparable to absorption, peak experiences and flow states (Barratt & Davis, 2015). As a result, ACP has been

compared to meditation and described as soporific, transformational, and beneficial in managing the symptoms of anxiety, depression, and insomnia (Andersen, 2014). Described also as a "trance-like state" (Jones, 2014, p.8), associations between ACP and 'frisson', or musically-induced chills, have been suggested. However, there are currently no studies exploring the relationship between ACP and frisson, dissociation proneness and other altered states. Further, little empirical research is currently available to guide ACP scale development. As a result, in developing a measure of ACP, from the perspective of alterations of consciousness, peak experiences, sensory induced paresthesias and wider accounts of altered states will be examined to inform scale development, particularly in guiding discussions of construct validity. There will be a specific focus on the theoretical similarities of ACP to peak experiences, and the differentiation of ACP from frisson, flow states and absorption.

Peak Experiences. 'Peak experiences' were first formally described by Maslow (1964). Akin to meditation, trance and relaxation, transcendent peak experiences can be triggered through sufficient focus, direct attention and profound, visceral identifications with non-physical, sensory stimuli (McCrae, 2007). For example, transformational experiences associated with an engagement with art, music and nature (Hallaq, 1962; McInman & Grove, 1991). Posited as states of exceptional human functioning, transcendent experiences, such as flow states, peak experiences and mystical experiences are characterised by the achievement of a highly adaptive, idealised state of consciousness (Barušs, 2003). These states are associated with affective, cognitive and practical benefit, including a loss of fear or hesitation, greater compassion and love, and an increased propensity towards effortless, decisive functioning (Barušs, 2003). Peak experiences represent the ultimate in affective, sensory or cognitive experience, and the epitome of transcending feeling across all historical, theological and philosophical bounds (Allen et al., 1964). According to Allen et al. (1964), in peak experiences, the individual perceives the self and other as unified, in an all-encompassing, pervasive mindset, while remaining cognisant in a non-judgemental, non-comparing

manner. Further, peak experiences are characterised by changes in cognition and concepts of self-identity during self-validating, self-sufficient, intrinsically valuable, life affirming experiences that are, at times, considered sacred (Barušs, 2003). According to Thorne (1963), these states are best described as a systematic experiencing of recognised high points in life, at once, enriching, exciting and fulfilling.

While there exists general agreement on the core characteristics that define Maslow's (1964) peak experiences, contention exists over the exact role of self awareness and the appropriateness of the categorisation of specific phenomena under the broad 'peak experiences' umbrella. For example, peak experiences have also been described as the by-product of a loss of self awareness and temporary fusion with objects, people and environments not 'of the self', resulting in complete absorption with the attentional source (Barušs, 2003). From this perspective, peak experiences appear to be share many elements characteristic of dissociative phenomena, namely absorption. Overall, some conceptualisations of peak phenomena appear to have a stronger, primary focus on higher awareness of self and the position of the self within an environment, while others disregard the importance of the self in the service of connection with external stimuli. The definitional and categorical ambiguity surrounding peak experiences and ASCs as a whole suggests the importance of careful disambiguation of ACP related phenomena prior to the development of assessment tools.

However, as there exists a significant degree of overlap in the descriptions of these transcendental experiences, and no clear organisation of these experiences within a hierarchy, peak experiences, flow states and paresthetic 'chills' may fall within the same category of stimulus-induced and attentionally mediated transformative states. Akin to Vaitl et al.'s (2005) grouping of psychologically induced ASCs, these phenomena will be examined in determining the similarities between ACP and other peak experiences, as well as the tentative categorisation of ACP as characteristic of a sensory induced, peak phenomena.

Categorising Peak Experiences. In attempting to organise the variety of experiences cited as exciting, affirming and transformational, Thorne (1963) devised a six category classification system, incorporating sensory, affective and cognitive elements of actualised development and experience. Firstly, sensual peak experiences were categorised as being either pleasurable sensations, or sexual experiences. The second category of experience involve emotional phenomena, including love, states of euphoria and highs in humour (Allen, Haupt, & Jones, 1964). Cognitive experiences were divided into two categories: development of mind and life path. Cognitive events involving the development of the mind accounted for transformational peaks in understanding and self-discovery, or invention and creativity, whereas cognitive phenomena centred on life path accounted for growth experiences and self-determination (Allen et al., 1964). Finally, the fifth and sixth categories of peak experiences incorporated incidences of self-actualisation, and climax experiences, including transcendent identifications with nature, spiritual phenomena and orgastic experiences (Allen et al., 1964). Across peak experiences and related states, namely frisson and flow states, these dimensions will be discussed with respect to ACP induction and classification.

Frisson. Frisson describes the incidence of moments of profound musical resonance, resulting in a marked shift in emotionality in the listener and an accompanying physical, bodily response (Harrison & Loui, 2014). Similar to Maslow's peak experiences (1964), transcendental musical experiences are distinctive, poignant, physical or quasi-physical sensations, manifested in physical markers of affect, including tears, chills and goosebumps (Harrison & Loui, 2014). Akin to the utilisation of musical triggers critical to the induction of trance states (Harrison & Loui, 2014), specific alterations in the construction of music, including loudness, tempo, melody, key changes and chord progressions have been demonstrated to be key predictors in eliciting frisson responses (Sloboda, 1991).

In a study by Sloboda (1991), it was found that descending chord progressions, and the inclusion of unexpected or unusual harmonies, melodies and harmonic sequences were associated with increased reports of frisson responses. In another study by Grewe, Katzur, Kopiez & Altenmuller (2010), assessment of frisson responses in participants were established by asking participants to listen to a selected piece of music, and indicate when they were experiencing the sensation in real time. Consistent with the findings of Sloboda (1991), it was found that frisson was significantly more likely to occur during peaks of loudness, modulation, and in pieces where the vocals carry the melody. Finally, as far as establishing the mechanisms underlying frisson, there is evidence to suggest an effect of expectancies, emotional contagion, and the release of endogenous opioids, implicated in reward, in the incidence of frisson, and autonomic nervous system (ANS) arousal in the excitatory physical chill or thrill sensation experienced (Juslin, 2013; Goldstein, 1980; Le Merrer, Becker, Befort & Kieffer, 2009).

Relation Between Frisson and ACP. While descriptions of ACP experiences align with aspects of other established ASCs and paresthetic phenomena, ACP appears to be distinct in the comprehensiveness of its cognitive, affective and sensory components, as well as the specificity of its sensational locality and direction of movement through the body. Currently, there exists significant contention over the distinction between musical chills and ACP tingles, particularly in the controversial endorsement of musical stimuli in inducing ACP, a trigger seemingly exclusive to eliciting frisson (Harrison & Loui, 2014). Interestingly, in an experiment by Grewe et al. (2010), 17 of the total 36 participants reported a ‘chills’ experience through the recall of emotion events, independent of external stimulation. Significant variation in arousal, valence and heart rate was observed across cases. Accounts of mindful induction of paresthetic sensations in ACP have been documented online, with users stating that reflection on previous ACP experiences can induce the phenomenon, in the absence of external triggers. However, while consistent with the findings of Grewe et al. (2010), this mindful method of induction has yet to be experimentally assessed.

Further, it is yet to be established whether frisson operates in a particular body locality or if it is characterised by a certain pathway of movement through the central nervous system (CNS). Frisson, as described in the literature, is not domain specific and this generalness impedes the comparison between locality and movement of sensation arguably necessary to differentiate ACP from frisson. Namely, there exists disagreement about the involvement of the spine in frisson sensations, as the phenomenon appears to exist primarily in the peripheral nervous system (PNS), compared to the often cited scalp to spine, cephalocaudal direction of movement in descriptions of ACP (Barratt & Davis, 2015). Without a clear distinction between the sensation, arousal, and direction of movement seen in ACP and frisson experiences, ACP may appear to exist as a form of frisson induced by non-musical stimuli. Given the excitatory and thrilling response frequently cited as fundamental to the experience of frisson or musical-induced chills (Grewe et al., 2010), ACP appears to be a distinctly relaxing, meditative phenomenon, suggesting that both sensations exist as separate constructs. Thus, it is imperative that the divergent relationship between ACP and frisson is examined.

Synaesthesia and Misophonia. Arguably, both frisson and ACP involve cross-modal sensory stimulation, also known as synaesthesia (Colizoli et al., 2013). In some individuals, this phenomenon involves the experiencing of tastes, smells and colours in response to stimulation of an unrelated sensory domain (Colizoli et al., 2013). For example, seeing colours in response to music or other specific sounds. While it is not yet known how synaesthesia specifically relates to ACP experiences, Barratt and Davis (2015) assessed the relative prevalence of synaesthetic experiences within an online ACP/ASMR interest group sample. It was found that a higher proportion of synaesthetic experiences were found within the ACP/ASMR sample (5.9%) compared to the general population (4.4%), however this difference was not significant. Similarly, in a case study conducted by Colizoli et al. (2013), a participant, known as SC, demonstrated unidirectional synaesthesia, as well as ACP/ASMR experiences upon hearing soft, crackling sounds. It is possible, therefore, that

ACP exists as a form of synaesthesia, or that individuals who report synaesthetic sensations may have a higher propensity towards experiencing ACP. However, this relationship needs to be more clearly delineated in future work.

As a related synaesthetic experience, misophonia, a condition associated with decreased sound tolerance, is estimated to affect between 1-6% of the general population (Wu, Lewin, Murphy & Storch, 2014). Individuals with misophonia report negative emotions and extreme sensitivity to particular sounds, often resulting in anger, avoidance and anxiety (Wu et al., 2014). Unlike hyperacusis, a reduced tolerance for all sounds, individuals with misophonia find specific, known sounds unpleasant and annoying (Møller, 2011). As discussed by Barratt and Davis (2015), misophonia and ACP share a number of common features, particularly the incitement of pleasure or displeasure through specific stimuli, potentially influenced by learned associations. A common synaesthetic pattern of responding to stimuli has been hypothesised as a key factor across both conditions (Colizoli, Murre & Rouw, 2013; Barratt & Davis, 2015). However, a careful disambiguation of the role of synaesthesia in both misophonia and ACP, as well as the relationship between ACP and misophonia has yet to be determined.

Flow States. Flow states are characteristic of masterful, effortless and decisive functioning, triggered in situations when the individual's skill matches the difficulty of the goal-oriented context (Barušs, 2003). More specifically, Csikszentmihalyi (1993) identified nine dimensions characteristic of flow states: challenge-skill balance, action-awareness merging, unambiguous feedback, sense of control, clear goals, automatic experience, loss of self-consciousness and time transformation (Jackson et al., 2008). In differentiating peak experiences from flow states, or peak performance states, Jackson and Marsh (1996) note that incidences of peak performance reflect optimal functioning toward a goal or standard of accomplishment, whereas peak experiences are posited as an intrinsically rewarding, distinct psychological states (Jackson, 2001). The eight components of flow involve the engagement with a challenge matched to one's skill level, a complete attentional

absorption in the activity, clear, operational goals and feedback on the progression towards these goals (Barušs, 2003). Further, flow is also associated with, and an attenuation of, usual concerns, a sense of control, loss of self awareness, an identification with one's environment or fellow participants, and freedom from conscious, ordered time perception and processing (Barušs, 2003). In this way, while flow states are similarly characterised by distortions in time perceptions, environmental separation, and a spontaneous flow of action, flow states are inherently anchored to activity (Barušs, 2003).

Relation Between Flow States and ACP. ACP appears to share some common elements with those characteristic of flow states, namely absorption in either an activity of interest, or in relating to people during a shared experience (Harrison & Loui, 2014). In a study by Barratt and Davis (2015), ASMR/ACP was assessed from the perspective of passive experiences of flow states, utilising a modified version of the Flow State Scale (FSS-2; Jackson & Marsh, 1996). The study also focused on the demographics, viewing habits and specific triggers of individuals who report ACP experiences and actively seek out online trigger videos, as well as subjective accounts of pain and mood management following the consumption of ASMR/ACP media. Significant improvements in mood during and immediately following ASMR/ACP stimulus exposure were reported by the majority of the sample (80%), with a similar significant effect found for ASMR/ACP induction and a reduction in chronic pain symptomatology. Further, the findings suggested evidence for a significant association between accounts of flow state experiences when watching ASMR/ACP videos, and reported number of identified ACP triggers, suggesting that ACP triggers function in a similar fashion to the environmental and interpersonal factors associated with flow state induction. If flow states are produced when the situational demands placed upon an individual match the personal competency of the individual to meet said demands, perhaps the action of watching ASMR/ACP videos, as framed by the flow state questionnaire, induces flow in individuals who feel more competent in successfully triggering their own ACP experiences. Within the ACP/

ASMR community, individuals frequently re-watch the same video or stimulus until the sought effects are no longer felt (Andersen, 2014). Incidence of flow-like experiences may then reflect a level of familiarity and appraisal of their chosen stimulus from repeated exposure.

Trance, Meditation and Relaxation

In discussing the similarities of a proposed ACP construct to existing conceptualisations of alterations of consciousness more broadly, the relationship between established psychologically induced alterations and presentations of ACP will be examined. These similarities will be useful in informing scale construction, disambiguating accounts of changes in arousal and affect, and interpreting appraisals of ACP as an AoC.

Trance. According to Barušs (2003; 2012), "trance" refers to the presence of apparent awareness and self-determination in the absence of adequate subjective awareness and actual self-determination. Across trancelike states, an increase in arousal levels, widened awareness span, absence of self awareness and a reduced threshold for sensory input has been observed (Vaitl et al., 2005). During trancelike states, an individual will typically experience a selectively focused, narrowing of awareness of the immediate environment, as well as stereotyped behaviours appraised as being outside of one's control (Vaitl et al., 2005; American Psychiatric Association, 1994). In the case of religious healing ceremonies, accounts of hyperkinetic emotional contagion and musically induced "psytrance"experiences, trance states have been posited as involving the relinquishment of autonomy and individual will to an external power, life source or energy (St John, 2011; Ludwig, 1966). As a broad descriptor, significant variation in the degrees and conceptualisations of awareness and self-determination exist across states of trance (Barušs, 2003). As a result, a number of alterations of consciousness exist within the category of trance states, reflecting a cluster of qualitatively similar, yet experientially distinct phenomena.

The relation between ACP and trance. ACP experiences appear to differ from trance experiences involving increased arousal and focus on external stimulation, since ACP has been

described as both relaxing and “trancelike” (Barratt & Davis, 2015, p. 6). As seen in the work of Barratt and Davis (2015), 98% of participants who described experiencing ACP, and reported regular engagement with ASMR/ACP stimuli, mentioned relaxation as a primary motivator in seeking out ACP sensations. Further, of this sample, 82% utilised ASMR/ACP media for the purpose of sleep, while 70% endorsed stress-reduction motives. While not definitive, the strong assertion that ACP induction has practical benefit in promoting relaxation diverges from the classification of ACP as belonging to a broader category of trance states. However, as markers of physiological arousal in ACP experiences have thus far not been assessed, this distinction requires further exploration.

Absorption. Dissociation refers to a process of separation from oneself or the environment, resulting in symptoms of derealisation and depersonalisation (Wise, Mann & Sheridan, 2000). As a dissociative phenomenon, absorption has been defined as a disposition for experiencing periods of ‘total’ attention that completely engage one’s representational resources (Tellegen & Atkinson, 1974). Further, temporary alterations of self have been associated with absorption when the focus of attention, or attentional object, is someone else (Tellegen & Atkinson, 1974). For example, Tellegen and Atkinson (1974) reported passive, sympathetic kinaesthetic engagement as a product of absorption between an individual and another, comparable to the establishment of a roleplaying interaction.

The relation between ACP and absorption. ACP stimuli possibly produces trancelike effects through the simulation of a roleplaying relationship that engages latent absorption tendencies in viewers, producing a temporary alteration of self. Frequently induced through focused engagement with immersive stimuli, online ACP videos simulating personal attention frequently utilise roleplaying techniques in order to establish and sustain a personal connection between the viewer and subject (Ahuja, 2013). Similarly, Ludwig (1966) acknowledged the power of simulated roleplaying in the production of ASCs, suggesting that ACP videos may interact with latent

absorption or dissociative tendencies, utilising roleplaying as a means of establishing a pleasurable, kinaesthetically engaged ASC.

Further, in a study by Mason, Tyson, Jones and Potts (2005), associations between dissociation, dissociative absorption and scores on the Tellegen and Atkinson (1974) alexithymia construct were observed, suggesting that individuals reporting higher absorption propensity also demonstrate higher levels of alexithymia symptomatology. Individuals with high levels of alexithymia experience difficulty discerning and identifying emotions within themselves, expressing emotion and introspection (Mason et al., 2005). Further, alexithymia has also been associated with an inability to disambiguate sensations within the self (Tellegen & Atkinson, 1974). Due to this cluster of common phenomena, and the associations between absorption and the experience of unusual physical symptomatology, the relationship between absorption, alexithymia and ACP will be addressed in the present study.

Meditation. Meditative states encompass a broad range of practices, philosophies and experiences (Shapiro, 1983; Dittrich, 2003). For example, while some practices involve sitting in silence with a focus on the internal repetition of specific words and syllables, as in yogic mantra meditation, other forms involve active body movement (Vaitl et al., 2005). As there exists a great deal of variation across meditative techniques, meditation has been found to be both arousing and relaxing (Vaitl et al., 2005). Further, meditation can produce a state with either a widened or narrowed awareness span and an increased or decreased threshold for sensory input (Vaitl et al., 2005). Similarly, self awareness may be present or absent (Vaitl et al., 2005). However, some common features are seen across meditative states. Firstly, meditation involves an intentional alteration of experience through the redirection of attentional resources towards a mantra, rhythm or other internal or external object, including guided meditation stimuli (Dittrich, 2003). In deliberately and consistently directing attention towards a stimuli of interest and away from external noise and intrusive information, a relaxed, mindful mental state is achieved (Dittrich, 2003).

Consistent with the deliberate redirection of attention characteristic of meditative states, online ACP videos frequently feature role playing and close personal attention, directing focus to simulated touch sensations (Andersen, 2014). Interpersonal interaction structured around the careful direction of attention towards objects and their edges, textures and sounds could be equivalent to guided focus on external objects. Similarly, role playing stimuli involving the direction of attention towards specific body parts (e.g. makeup role playing, doctor visits, cranial nerve exams), resemble guided meditation practice, where the viewer is instructed to engage with and reflect on the specific, simulated intimacy (Andersen, 2014).

Relaxation. Described as a "relaxing shivering sensation" (Andersen, 2014, p. 1), ACP experiences appear to have a distinct relaxation element implicated in reducing stress, anxiety and promoting sleep (Barratt & Davis, 2015). According to Smith, Amutio, Anderson and Aria (1996), three elements underlie all forms of relaxation: Focusing (consistently maintaining concentration on simple stimuli); passivity (the ability to avoid analytical thought); receptivity (tolerating and accepting paradoxical and unusual experiences; Vaitl et al., 2005). Relaxation exists as a common feature across multiple ASCs including meditative states and mindfulness based progressive muscle relaxation (Vaitl et al., 2005). According to Vaitl et al. (2005), relaxation states are associated with reduced arousal, including suppression of heart rate and breathing, a narrowed span of awareness and reduced threshold for sensory input. Distinct from trance and some meditative states, an awareness of self remains throughout the experience (Vaitl et al., 2005).

Relaxation and ACP experiences appear to be inextricably linked (Andersen, 2014; Barratt & Davis, 2015). In focusing on ACP stimuli, the viewer is guided through an immersive narrative (e.g. role playing, close personal attention), associated with stress and anxiety reduction (Ahuja, 2013; Barratt & Davis, 2015). Elements of involuntary behaviour and loss of agency have not featured prominently in discussions of ACP experiences, consistent with the maintenance of self awareness through states of relaxation. However, the paresthetic sensation component of ACP

suggests a consistent or heightened sensitivity to sensory stimulation, inconsistent with dimensions of sensory suppression across relaxation states (Vaitl et al., 2005)

Aims of the Present Investigation

Perhaps the most fundamental barrier to research in this area is the lack of a reliable and valid measure for assessing ACP/ASMR experiences, and the associations between ACP/ASMR, personality correlates and similar sensory-induced psychophysiological phenomena. The modified ASMR Flow State Scale (Barratt & Davis, 2015; Jackson & Marsh, 1996) pertains particularly to the passive experience of watching online videos from the perspective of flow states, as opposed to the experience of ACP itself, which can also be induced without audio-visual stimulation. As a result, the fundamental aim of the present investigation was to create a reliable and valid self-report measure of Autonomous Cephalocaudal Paresthesia (ACP). This aim was addressed via a dual-aspect, mixed-methods study, firstly conducting a content analysis of existing online and archival data to first conceptualise what ACP involves and then develop a scale for assessing ACP experiences. Following this, the reliability and validity of the measure was examined through a construct validity approach (within-network), determining the internal characteristics of the measure (descriptive statistics and model fit), as well as the relationship between the ACP scale, similar ASCs, personality factors and transcendental physiological phenomena (between-network), including frisson, alexithymia, flow and absorption.

Chapter 2: Study 1: Development of a Measure of ACP

Method

Archival Data Collection

Accounts of ACP (ASMR) experiences were located through examination of online news articles, blogs and forums discussing ASMR, as well as user comments found within the discussion sections of these webpages. Between December 2014 and January 2015, 39 pages were downloaded into the qualitative analysis program Atlas.ti (Archive for Technology, the Lifeworld, and Everyday Language) for analysis, with 24 (61.5%) sourced from the popular sub Reddit forum *ASMR: Sounds That Feel Good*. Criterion sampling was undertaken to filter the sample of comments used in analysis (Rudestam & Newton, 2007). Inclusionary criteria specified that the comments explicitly described the experiential qualities of ASMR/ACP (e.g. “intense, tingling sensations just flow from my head”), as opposed to theoretical discussions or accounts independent of specific phenomenological descriptors (e.g. “I first experienced this at age 8”). All key phrases and quotations utilised in analysis were de-identified to maintain commenter anonymity.

The approach to content analysis in the present study was consistent with the method employed by Garcia-Romeu (2012). Consistent with grounded theory, an open sampling approach was adopted in selecting cases, with no existing theory imposed on analysis (Rudestam & Newton, 2007). In the present study, this involved systematically selecting every comment that was an experiential description. Comments that detailed age of onset, specific triggers or broader theories alongside specific descriptions were acknowledged, but were not used to inform scale development in the present study. Prior to analysis, expectations of sample size were not determined, and instead the data were analysed until no new categories were generated, suggesting that theoretical saturation was reached. As a guide, Creswell (1998) advocated for a minimum of 20 to 30 cases as acceptable for grounded theory research. With a total of 303 cases, the present study exceeded these requirements.

Data Analysis

Through the qualitative analysis program Atlas.ti, content analysis was conducted, utilising a conventional content analysis approach. Schematic networks and codebooks were generated throughout collection, with data interpreted based on a rolling increase of new categories and sub categories (Corbin & Strauss, 1990). In the present study, all cases of ACP experiences were initially assessed to gain a broad understanding of the phenomenon, before isolating and highlighting words and phrases that indicated new concepts (Hsieh & Shannon, 2005). With continued analysis, larger and more abstract categories emerged that accounted for more specific key phrases and ideas, forming conceptual nodes that organised codes into meaningful clusters (Hsieh & Shannon, 2005). A hierarchical structure was established within the coding framework through the generation of network diagrams that linked key terms and abstract categories. Further, conceptual links were generated between categories connected to separate nodes, creating a large, web matrix of conceptual associations. See Appendix A. Theoretical assumptions of independence were not imposed on the data, allowing the researcher to examine the pattern of relationships schematically, linking seemingly disparate codes within the larger network based on the presence of connections within the raw data (Strauss & Corbin, 1990).

In order to assess the intra-rater reliability (or coder stability) of the researcher in the present study, a subset of cases were coded twice, once at the beginning of analysis and again following saturation. Cases were presented in a new document without existing comments or highlighting for the second analysis. In reviewing the pattern of coding choices in the initial and repeat assessments, the researcher demonstrated sufficient consistency in code selection (.93; Neuendorf, 2002). In addition to intra-rater reliability issues, inter-rater reliability was assessed to examine the possibility of the researcher's subjective biases impacting upon the coding. To address this, detailed coding instructions were provided to an independent coder alongside a sample of 30 case descriptions of ACP (10%). In assessing the consensus of coding decisions between raters, an initial similarity of

80% was achieved, a proportion deemed acceptable in previous work (Neuendorf, 2002). Upon discussion, discrepancies between the attribution of coding categories between raters were attributed to slight misinterpretations of the theoretical underpinnings of particular labels used. After some revision, a complete consensus on coding decisions was established.

Results

Characteristics of Autonomous Cephalocaudal Paresthesia (ACP)

In assessing 303 experiential descriptions of ACP/ASMR, a large and diverse range of codes, categories and themes emerged. A total of 174 categories were utilised 1140 times throughout the coding process, where frequency of code use ranged from 1 to 108. Through the development of broad categories, three large thematic nodes emerged: Cognition, Affect and Sensation. Significant overlap between categories and codes within nodes was observed, producing large, schematic outputs. See Appendix A. See Table 1 for the five most prominent codes within each theme.

Table 1.
Frequency of Prominent Codes Within Major Themes

Theme	Codes	Frequency	Total Theme (*f*)
Affect	Pleasurable	51	
	Appraisal	43	
	Positive	32	
	Strange	13	
	Euphoric	10	
		Total = 149	228 (20.0%)
Cognition	Comparison	50	
	Relaxation	38	
	Trance-like	27	
	Recreational Drug High	22	
	Mental State	21	
		Total = 158	282 (24.7%)
Sensation	Location	92	
	Tingle	73	
	Head	59	
	Intensity	38	
	Movement	29	
		Total = 291	630 (55.3%)
			Total = 1140

Note. $N = 303$. Total Theme reflects the total frequency of all codes within each theme. The percentage refers to the proportion of total frequencies ($n = 1140$) accounted for by each theme.

Theme 1: Affect

Accounting for 20% (*n* = 228) of coding frequency, the first broad theme established within the data was labeled "Affect". In the present study, affect refers to the emotional component of ACP experiences, including elements of pleasure, discomfort and euphoria. The most prominent codes and categories established as affective markers of experience were reports of pleasure (*n* = 51), appraisals of emotions related to ACP (e.g. pure, innocent; *n* = 43), accounts of ACP as a positive occurrence (*n* = 32) and descriptions of ACP as strange (*n* = 13), and euphoric (*n* = 10).

Pleasurable. Accounts of ACP were most frequently (*n* = 51) coded as pleasurable. One comment described the experience as "a wonderful, warm, blissful, uplifting feeling…like there's a pocket of warm, soothing helium in my stomach and it's lifting me up out of my chair when I feel it" (C171). Another case posited ACP as "a tingle in your brain, a kind of pleasurable headache that can creep down your spine. It's a shortcut to a blissed-out meditative state" (C241). A further commenter asserted that their experience with ACP was "one of the most intensely pleasurable feelings I've ever encountered" (C165). Conversely, ACP was also prominently described as unpleasant within the sample (*n* = 10). One case stated "my ASMR can feel unpleasant, and it sometimes starts in my arms…sometimes you need to "put your mind into it" to make it feel pleasant" (C291). Accounts of negative ACP experiences were also associated with appraisals of ACP experiences as uncomfortable (*n* = 2) and unnerving (*n* = 3). However, a significant coding overlap was observed between recollections of ACP as both pleasant and unpleasant. For example, one case described their experience watching ASMR videos as "crazy weird... felt good and little uncomfortable at the same time" (C11).

Positive. Appraisals of ACP as a positive occurrence were prominent across cases (*n* = 32). For example, one commenter described ACP as a "positive feeling" (C62) while another stated that ACP exists as a "relaxing, soothing, innocent, blissful feeling. It's one of the best feelings in the world" (C172). A further commenter stated:

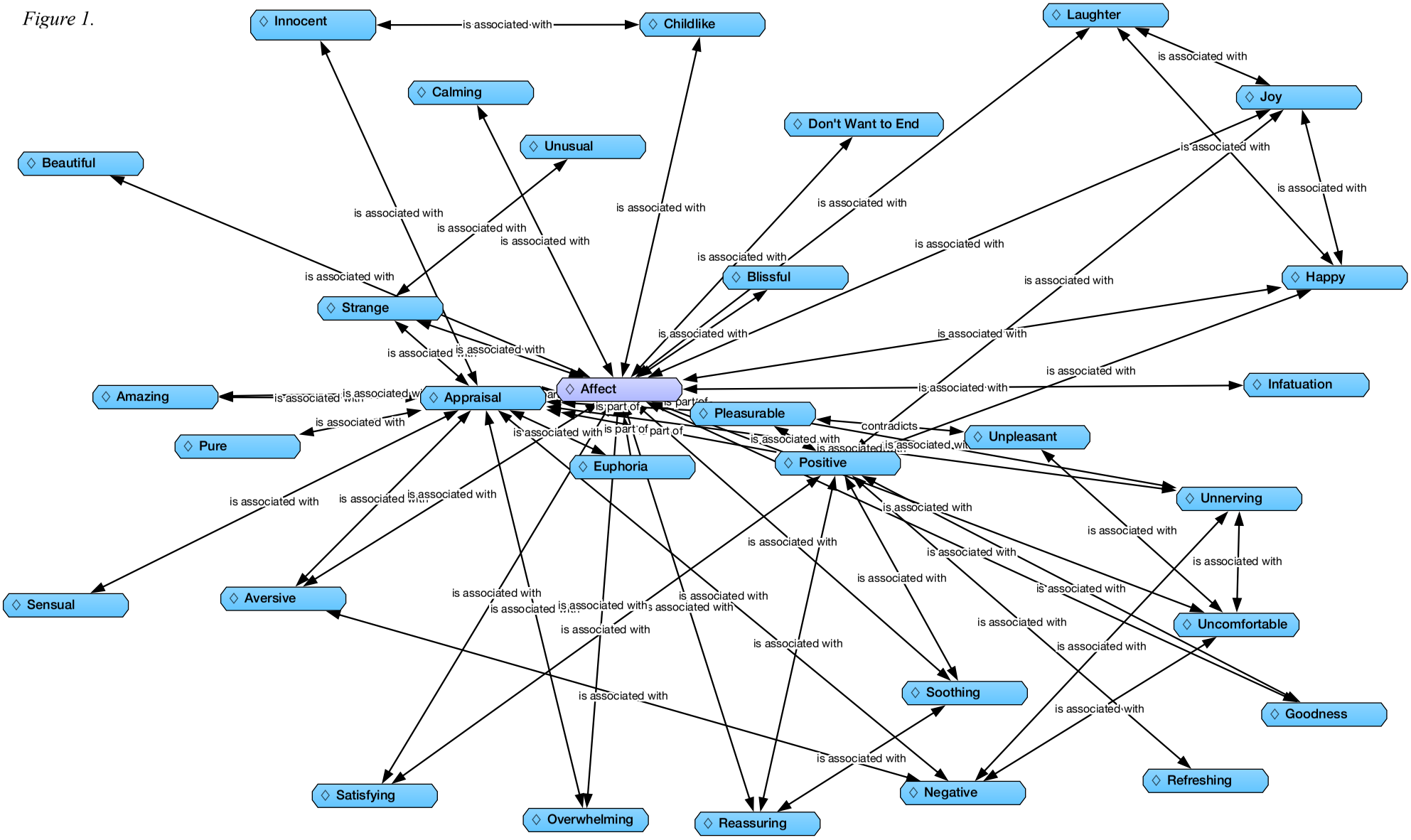
> "I get a feeling of goodness. It́s as if everything everywhere was perfectly correct and right. When it begins it comes into the back part of me head and begins increasing causing sensations of pure bliss radiating down my neck…This is a sensation which only lasts 10 or 15 seconds but it is very powerful and usually so overwhelming that it brings tears to my eyes and I have to sit down" (C238).

Consistent with the differing appraisals of ACP as both pleasant and unpleasant, a small subset of cases described ACP as a negative experience (n = 2).

Strange. Akin to the divide over the positivity and pleasantness of ACP, 13 cases described ACP as strange, differentially linked to both the pleasurable and unpleasant coding categories. For example, one commenter posited ACP as strange and unpleasant, feeling a "strange sensation on the right side of my back which is as if someone is tickling me there, and It's actually a tiny bit unpleasant" (C286). Conversely, commenter 263 described the experience as both strange and pleasant, "I find myself staring off into space while I feel my head filling with warmth. Sometimes, I shiver. It's a whole weird thing that I don't understand, but I love it."

Euphoric. A significant portion of cases recalled feeling euphoric during ACP experiences (n = 10). Commenter 23 asserted that ACP felt like "tingles down my neck" and a "euphoric head feeling". Similarly, another case posited ACP as "a trance-like state of euphoria" (C157). Finally, another commenter discussed the differential reaction to ASMR trigger videos between individuals with a propensity towards experiencing ACP from those who do not. "Regular people feel a calming sensation, we feel it like explosions in our head, it literally feels like explosions in our head, it literally feels like a euphoria" (C149). For a schematic depiction of associations within the "Affect" node, see Figure 1.

Figure 1.


Innocent
is associated with
Childlike
Laughter
is associated with
Joy
Calming
Don't Want to End
Unusual
Beautiful
is associated with
is associated with
is associated with
is associated with
is associated with
is associated with
is associated with
is associated with
is associated with
is associated with
is associated with
Blissful
Happy
Strange
is associated with
is associated with
is associated with
is associated with
is associated with
Affect
Infatuation
Amazing
is associated with
Appraisal
is part of
is part of
Pleasurable
contradicts
Unpleasant
Pure
is associated with
is associated with
is part of
part of
is associated with
is associated with
Euphoria
Positive
Unnerving
is associated with
is associated with
is associated with
is associated with
is associated with
is associated with
is associated with
is associated with
Sensual
Aversive
is associated with
is associated with
is associated with
is associated with
is associated with
is associated with
is associated with
is associated with
is associated with
Uncomfortable
is associated with
is associated with
is associated with
is associated with
Soothing
Goodness
is associated with
is associated with
is associated with
Satisfying
Overwhelming
Reassuring
Negative
Refreshing

Theme 2: Cognition

The second theme to emerge from the data was labeled "Cognition" and accounted for 282 (24.7%) code selections. In the present study, cognition refers to the mental aspects of ACP experiences, specifically those related to thinking, attention and perception. The most prominent categories found within discussions of the mental facets of ACP experiences were relaxation (*n* = 38), descriptions of ACP as a trance-like state (*n* = 27), allusions to narcotic and psychedelic experiences (*n* = 22), shifts in mental states (*n* = 21) and comparisons to other phenomena (*n* = 50).

Comparison. A significant proportion of cases described ACP as being similar to a wide range of conventional and unusual practices and experiences (*n* = 50). Comparisons between ACP and meditation featured prominently in the data set (*n* = 10). One commenter described ACP as "deeply meditating" (C259), while another posited the phenomenon as "a sort of meditative state, where your whole body is buzzing for a prolonged period of time" (C174). Another descriptor seen across cases were comparisons to orgastic experiences (*n* = 11). For example, one commenter described ACP as a "widespread tingly orgasmic feeling" (C107), while another used the term "brain orgasm" (C125). Commenter 248 recalled the following:

> "Since I was a kid, I've been able to trigger a tingling sensation in my body that I can best describe as a sort of orgasmic tingling/numbness. It basically renders my body paralyzed for 3-5 seconds until I release or my legs start shaking. It's 100% voluntary, and feels great but gets pretty intense if I hold for more than a couple seconds."

Conversely, a similarly significant proportion of commenters (*n* = 9) noted a distinction between the sensuality of ACP and sexual experiences, describing the phenomenon as distinctly non-sexual. For example, one commenter insisted the pleasurable experiences "are not orgasms. In fact, to confuse ASMR with something even remotely sexual ruins the entire experience" (C175). Commenter 157 similarly stated that ACP is "nothing like sex, at least for most of us who actually experience ASMR. For me, it is a trance-like state of euphoria. All the feeling is in the back of my head,

nowhere else". Across cases, ACP was frequently described as "sensual but not sexual" (C131) and "a relaxing experience rather than an arousing one" (C144).

Recreational Drug High. Clustered under the broader term "comparison", the most prominent comparative descriptors cited were illicit drug effects, or recreational drug experiences (*n* = 22). Commonly mentioned drugs included MDMA (*n* = 3), Ecstasy (*n* = 3), LSD (*n* = 2), opiates (*n* = 2) and DMT (*n* = 3). One commenter compared ACP to a "head rush from MDMA" (C302), while another stated that ACP experiences mirror those of ecstasy, where the substance "makes everything on Earth produce this effect" (C16). Similarly, the experience of ACP was associated with the consumption of opiates, with one commenter stating that ACP stimulates what they "imagine heroin must feel like" (C166). These codes were also associated with direct mention of accessing altered states (*n* = 4) through ACP induction. For example, Commenter 260 posited ACP as akin to "taking an opiate. No mental discipline required - just turn on the trigger and wait for the wave of altered consciousness to wash over you". Non-specific drug comparisons also featured prominently within the category (*n* = 9). Commenters described ACP induction through online videos as "incredibly satisfying, the video equivalent of a really nice, mellow kind of drug that leaves no aftertaste" (C240), and a way of reaching a "much higher place than you would ever imagine" (C150).

Relaxation. The second most prominent concept that emerged within the cognitive node were descriptions of ACP as relaxing (*n* = 38). Commenters frequently recalled ACP experiences as "incredibly relaxing" (C181), producing an "intense feeling of relaxation" (C187). One commenter stated that their ACP experiences were "much more intense and relaxing than words can describe" (C213), while another described the phenomenon as a "slow crawl of relaxation" (C297). Closely related to appraisals of ACP as soporific (*n* = 9), multiple cases within the category detailed intentional ACP induction for the purpose of sleep (*n* = 4). For example:

> "Since You Tube came online, I'd search for videos that gave me this pleasant feeling. For me it's more of an overall feeling of relaxation. It helps me fall asleep, it helps me quiet my mind if my thoughts are racing, it even helps me focus all my thoughts on something if I need to." (C292)

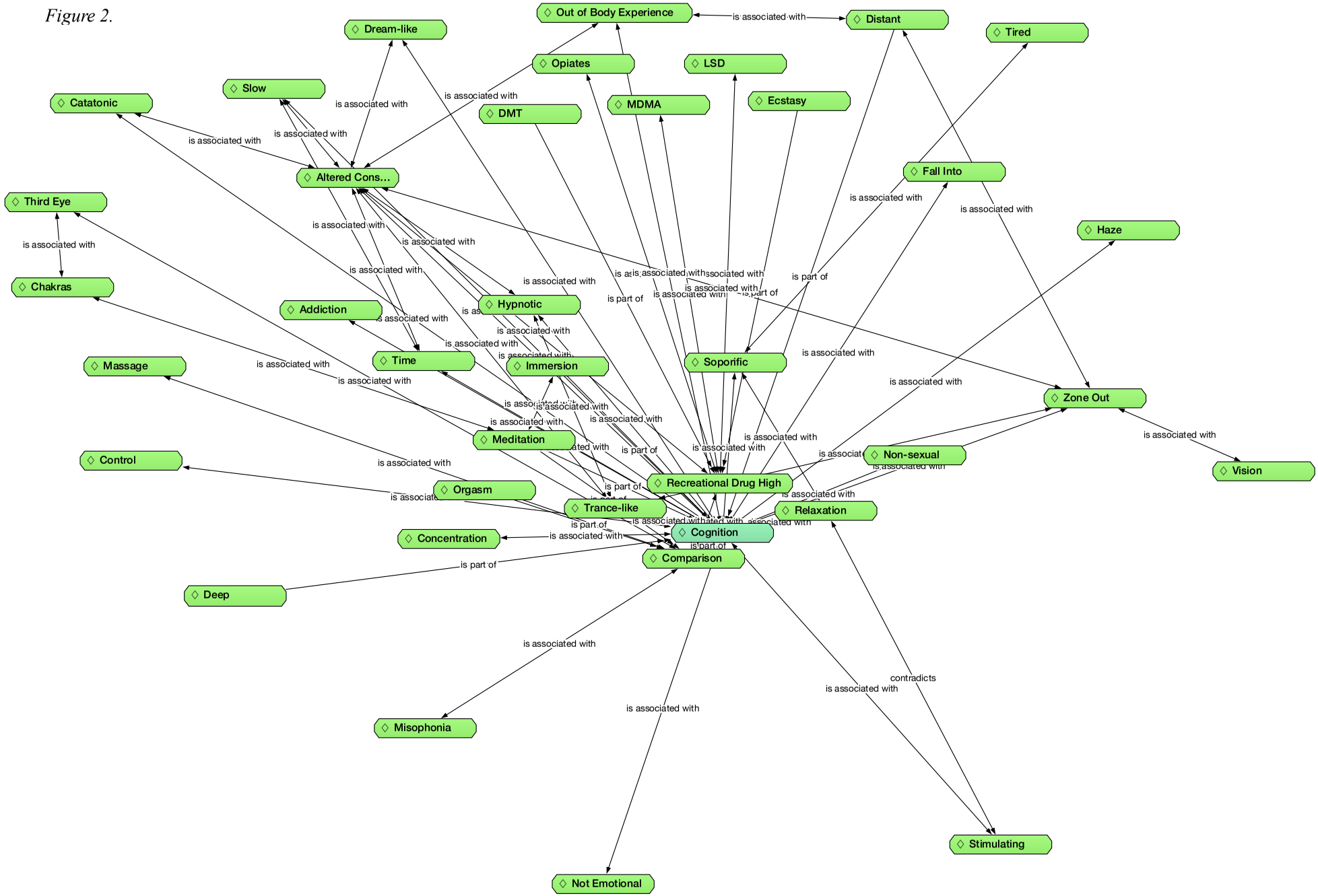
A significant portion of cases (*n* = 7) linked the relaxation effects of ACP with trance-like states.

Trance-like. Associations between descriptions of ACP as a trance-like state and other prominent codes were noted across categories and nodes. Overall, 27 cases described ACP as akin to a trance-like state, a category associated with immersion (*n* = 9), hypnotic states (*n* = 6), altered states of consciousness (*n* = 4) and 'zoning out' (*n* = 3). Some commenters recalled time distortions while experiencing ACP (*n* = 6), and of these cases, 3 comments mentioned "going into a trance" (C266). Of the 6 cases that mentioned time distortions, all comments were associated with a slowing of time. For example, commenter 261 stated that while in an ACP 'state' they can "completely zone out and not realise 20 minutes just went by". Similarly, another commenter stated:

> "ASMR may include shivers or tingling, but it is much more than that. It is tough to explain the sensation, but it feels like everything slows down, watching someone move their arm gently or smack their gum can send waves down your spine. It feels like a trance. A calm, measured voice can induce an ASMR trance" (C279).

Similarly, while commenter 254 mentioned perceiving their environment as "slowed down", commenter 255 recalled entering "a mild catatonic state. My eyelids became heavy. My breathing slowed. Everything slowed". For a schematic outline of codes within the Cognition node, see Figure 2.

Figure 2.


Out of Body Experience
Distant
Dream-like
Tired
Opiates
LSD
Slow
Catatonic
DMT
MDMA
Ecstasy
Fall Into
Altered Cons...
Third Eye
Haze
Chakras
Addiction
Hypnotic
Soporific
Time
Immersion
Massage
Zone Out
Meditation
Control
Non-sexual
Vision
Orgasm
Recreational Drug High
Trance-like
Relaxation
Concentration
Cognition
Comparison
Deep
Misophonia
Stimulating
Not Emotional
is associated with
is part of
contradicts

Theme 3: Sensation.

Accounting for 630 code selections (55.3%), the majority of experiential descriptions of ACP detailed a distinct sensation component. Significant variation across cases was observed for sensation descriptors, particularly within the categories addressing the location (*n* = 92) and movement of ACP through the body (*n* = 29). The most commonly cited categories through analysis were location, movement, descriptions of tingling sensations (*n* = 73), discussions of locality related to the head (*n* = 59), and differential intensity of the sensation (*n* = 38).

Sensation. Specific descriptions of the sensational component of ACP experiences varied widely across cases. In total, 7 comments posited ACP as electric, involving a spread of energy (*n* = 8) and producing a sensation akin to static (*n* = 1) or fuzz (*n* = 5). For example, one case stated “Its like, fuzz. Electric fuzz. Comes from the back of my head, to the sides past my ears and then to my shoulders. And my eyes get heavy and I feel the best type of dizziness” (C250). Similarly, Commenter 257 compared ACP to the “build up on an old TV screen, inside my brain”. A further 11 cases cited a buzzing sensation. For example:

> “All of a sudden, a tingling would start in the top of my head, and then a sensation that I can only describe as the equivalent of the sound " wahhhhhhhh" would start enveloping my entire body, this most pleasurable feeling rushing through my body. I would try to focus and make it stay. I didn't want it to end” (C7).

A similar cluster of concepts emerged around descriptions of ACP as an explosion (*n* = 2) and an eruption (*n* = 2). For example, commenter 244 described the experience as “a little explosion” followed by “sparkles and little stars going down my back”. Commenter 3 likened ACP to both an electrical sensation and an eruption, describing the experience as a “caressing physical sensory eruption spontaneously traveling like a current of electricity from my head, making its way down my spine, and fading away into the other areas of my body”.

Location. Specific accounts of localised ACP experiences were prominent within the data, accounting for 92 code selections. Sites of ACP sensations demonstrated significant variability across cases. 31 cases described experiencing ACP primarily within the central nervous system (CNS), including the brain (*n* = 14) and spine (*n* = 17). A further 74 accounts cited ACP sensations within the head (*n* = 59), including the ears (*n* = 3), chin (*n* =1), face (*n* = 1), scalp (*n* = 9) and skull (*n* = 1). Four cases mentioned effects within the digestive system, specifically the stomach (*n* = 3) and throat (*n* = 1). Regions encapsulated by the broader peripheral nervous system (PNS) were also strongly endorsed (*n* = 43), comprising the arms (*n* = 7), back (*n* = 4), chest (*n* = 3), feet (*n* = 1), legs (*n* = 5) and neck (*n* = 14). The heart (*n* = 1) and entire body (*n* = 8) were also noted as sites of ACP sensations.

Head. Within the "head" category, discrepancy existed over the specific location of ACP experiences, with 9 cases attributing the sensation to activity on the scalp, and 4 comments positing ACP as occurring inside the head. For example, one commenter stated that they feel ACP "in my scalp" (C300), while another described the sensation as "scalp tingles" (C142). Conversely, some cases placed the origin of sensation "in the head" (C55). For example:

> "It kind of feels like an army of ants who march from inside my head into my hair, crawl down my spine and then jump off my skin; throughout this journey they bite me, but it does not hurt. Rather, it feels as if they are injecting small bursts of relaxing pleasure into my body" (C4).

However, some commenters placed the sensation both "in the head and scalp" (C163). Similarly, commenter 187 described ACP "as a tingling sensation in the head and scalp area that may extend down the neck and limbs".

Tingles. Prominent across cases (*n* = 73) were appraisals of ACP as a "tingling sensation" (C275). For example, one commenter recalled experiencing a buzzing sensation throughout his or her body, resulting in "wave after wave of tingles" (C174). Another case

described ACP as being “caught up in the moment” where “intense tingling sensations just flow from my head” (C5). Further, a separate case commented that “it is more or less tingles or soft sparks in the brain, often accompanied with a trance-like feeling” (C154). Conversely, some cases described an absence of tingling in ACP. For example, commenter 264 stated:

> “Tingles are rare for me, and have never occurred by watching a video. I only get them with personal interaction, such as a haircut/shampoo. I also felt they were more prevalent when I was younger, such as listening to a teacher or tutor with a relaxing, hypnotic voice. I do enjoy the "trance" feeling though.”

Akin to tingling, less frequently endorsed, yet conceptually related descriptions of ACP included shivers (n = 6), shudders (n = 1), vibrations (n = 1), chills (n = 1), butterflies (n = 1) and thrills (n = 1).

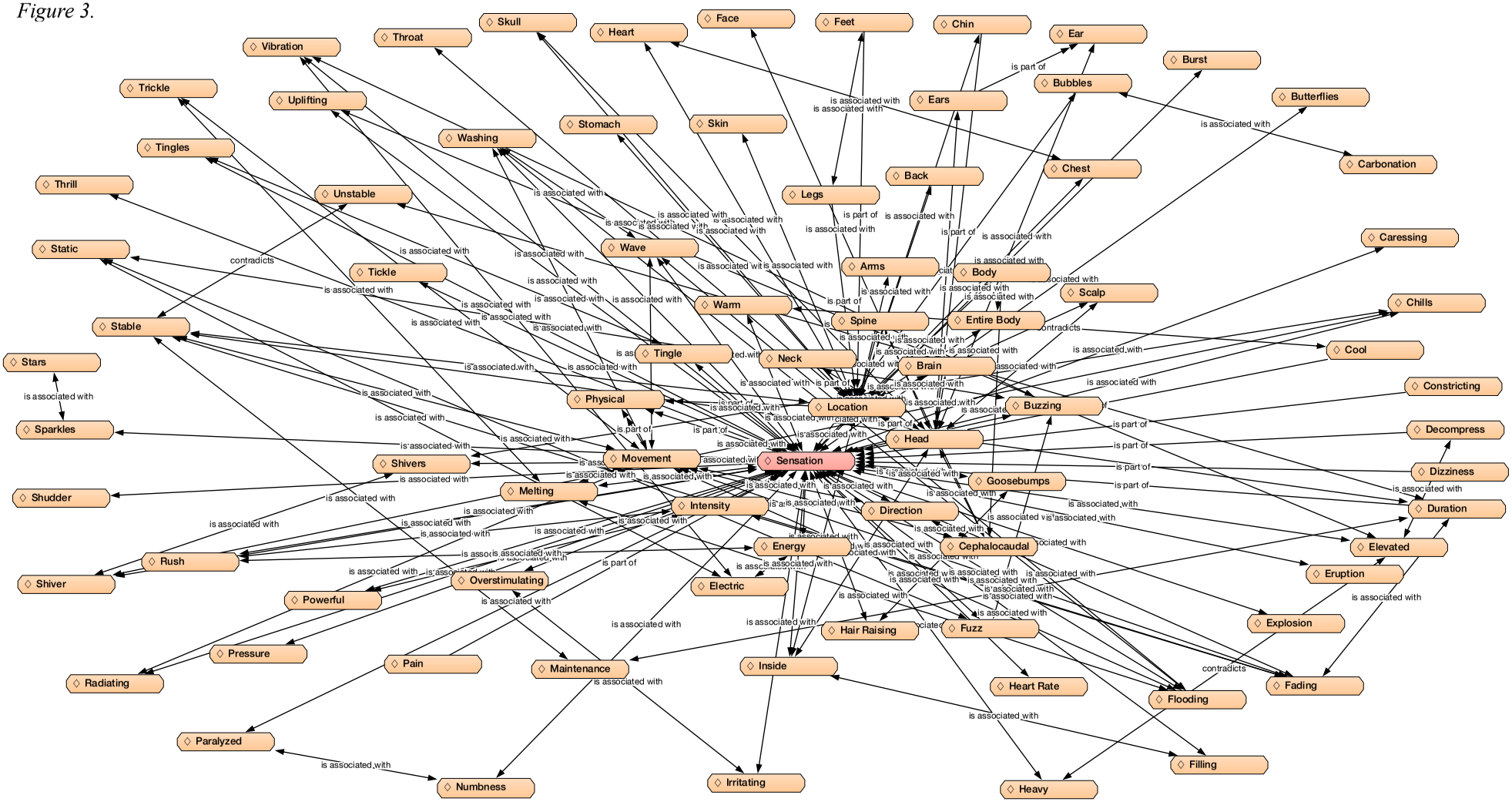
Movement. Discussions of the movement of ACP sensations through the body were found in 29 cases. The movement category was linked to direction (n = 21), or the path of sensation, as well as the nature of propagation through the body. For example, of the 21 cases describing a specific direction of sensation, 18 comments mentioned a cephalocaudal spread of ACP. Commenter 302 recalled ACP as “a warm fuzz that starts at the back of my head and sometimes travels down my spine, but is generally more head-centric”. Similarly, ACP was described as “tingles down my neck” (C220) and as “a tingling sensation in the head and scalp area that may extend down the neck and limbs” (C187). For example, commenter 210 recalled experiencing “a tingle right up the back of the neck, followed by a full body shiver driven tingle down the spine.” However, some cases reported sensations beginning in locations other than the head. For example, commenter 287 stated that the path of sensation begins “from somewhere around my left shoulder down to my left back/ side”. Similarly, the remaining non-cephalocaudal cases (n = 3) indicated a non-specific path of ACP sensation, recalling tingles “up and down (the) spine” (C219). Another commenter stated the sensation “starts just behind my heart and creeps up my spine into my brainstem” (C299).

A commonly endorsed code within the movement category incorporated descriptions of ACP as a melting sensation (*n* = 13). For example, commenter 247 described the sensation as a "brain-ear melting feeling" and as "honey dripping on your brain". Similarly, commenter 297 stated:

> "I kind of feel like I'm melting in a weird way, and I am washed over by a strange, almost maternal comfort that I've never felt independent of the melty feeling. I hear ASMR described as tingles…but what I would describe it as is my brain feels like it melts, and then trickles down my spine."

For a detailed, schematic depiction of codes within the Sensation node, see Figure 3.

Figure 3.


Sensation
Location
Movement
Intensity
Energy
Direction
Physical
Head
Neck
Brain
Spine
Entire Body
Arms
Body
Back
Legs
Chest
Face
Skull
Heart
Feet
Chin
Ear
Ears
Throat
Vibration
Trickle
Uplifting
Tingles
Thrill
Static
Stable
Stars
Sparkles
Shudder
Shivers
Shiver
Rush
Powerful
Radiating
Pressure
Paralyzed
Numbness
Pain
Maintenance
Overstimulating
Melting
Electric
Inside
Irritating
Hair Raising
Fuzz
Heart Rate
Flooding
Heavy
Filling
Fading
Explosion
Eruption
Elevated
Duration
Dizziness
Decompress
Constricting
Buzzing
Goosebumps
Cephalocaudal
Tickle
Tingle
Warm
Wave
Unstable
Stomach
Skin
Washing
Scalp
Chills
Cool
Caressing
Bubbles
Burst
Butterflies
Carbonation
contradicts
is associated with
is part of

Item Generation and Scale Development

Utilising the 174 coding categories generated through content analysis, with frequencies ranging from 1 to 108, schematic code networks were re-organised hierarchically to aid in item generation. The most frequently cited codes were positioned closest to the key node and less commonly endorsed concepts were incrementally spaced further away from the centre, based on numeric frequency. Figures 1, 2, and 3 were generated through hierarchical mapping. Through this method, prominent categories and clusters of concepts were readily interpretable, assisting in the generation of items most representative of the dataset.

Items were constructed based on hierarchical prevalence, producing a total of 31 items, with 11 items accorded to categories within the 'Cognitive' node, 9 items for 'Affect' and 11 based on 'Sensation' descriptors. Consistent with the approach outlined by Loevinger (1957), themes accounting for greater proportions of coding frequency were accorded more items. Items reflecting less frequently endorsed codes were included judiciously. In writing items for the ACPS, clarity and conciseness of language was favoured over in-depth and lengthy descriptions. Jargon and terms related to specific theories were also avoided for ease of participant interpretation. Reverse scored items were generated through examining the antonyms of frequently cited categories and codes. For example, "I feel relaxed" was reversed to become "I feel tense". Five reversed items were included to highlight acquiescent response styles. Items and scale instructions were developed to be accessible to participants who had previously experienced ACP. For example, "When I experience ASMR…". See Chapter 5 for the final ACPS items.

Chapter 3: Study 2: Quantitative Analysis & Scale Refinement

Method

Recruitment

Participants were recruited via an online Study Flyer (see Appendix B) posted on the sub Reddit forum *ASMR: Sounds That Feel Good* in May, 2015. The flyer promoted participation in a research study designed to increase understanding of the nature of ASMR/ACP experiences, and how the phenomenon differs from other, similar sensations and psychological constructs. The advertisement estimated that the questionnaire would require approximately 15 minutes to complete. Volunteers were instructed to follow an online link to the questionnaire hosted through MQ Qualtrics (https://mqedu.qualtrics.com). When opened, participants were presented with an online copy of the Informed Consent Form (see Appendix C), a demographics questionnaire (DQ; see Appendix D), the Autonomous Cephalocaudal Paresthesia Scale (ACPS), a short version of the Tellegen and Atkinson (1974) Absorption Scale, Barratt and Davis' (2015) modified version of the Flow State Scale (Jackson & Marsh, 1996), Silvia and Nusbaum's (2011) modified Aesthetic Experiences Scale and the Toronto Alexithymia Scale (TAS; Taylor, Ryan & Bagby, 1986), in that order.

Participants

Participants for this study were English-speaking adults over the age of 18, who identified with experiencing ASMR/ACP. Employing a convenience sample, the study allowed for randomness among participants concerning other demographic variables, such as gender and level of education, provided the above criteria were met. A total of 701 volunteers were recruited. Among this sample, 453 participants (64.6%) completed the Autonomous Cephalocaudal Paresthesia Scale (ACPS). In total, 396 participants completed the entire questionnaire (56.5%), with a mean age of 24.12 years.

Instruments

Demographics questionnaire. Participants who met study criteria completed a short 4-item anonymous demographics questionnaire (see Appendix D), assessing age, gender, geographic location and highest level of education. These data provided a general overview of the background of consenting participants and insight into what ways the results of the study may be appropriately generalised.

Autonomous Cephalocaudal Paresthesia Scale (ACPS-31). The created ACPS-31 includes 11 items for ACPS1 (cognition), 9 items for ACPS2 (affect) and 11 items for ACPS3 (sensation) subscales, with a total of 31 Likert-scaled items scored from 1, *completely untrue for me* to 5, *completely true for me*, and producing a range of total scores from 31 to 155. In response to the question "when I experience ASMR?' items include "I experience time distortions", "I feel euphoric" and "the sensation feels "tingly"". Higher scores on the ACPS-31 indicated greater ACP propensity, consistent with the conceptualisation of the construct outlined in Study 1.

Short Tellegen Absorption Scale. Tellegen and Atkinson's (1974) short Absorption scale is a 6-item measure developed to assess periods of "total" attention (p.268), a state associated with hypnotic susceptibility. It was sourced from Tellegen and Atkinson's (1974) 34-item Tellegen Absorption Scale (TAS), as part of a 71-item exploratory questionnaire, incorporating items from Lee-Teng's (1965) Hypnotic Characteristics Inventory, and covering dimensions of absorption, dissociation, trust, impulsiveness and relaxation. The short TAS is a two-dimensional measure that asks participants to indicate how accurate each item is in describing their conscious experience. Responses were recorded dichotomously from 0, *false*, to 1, *true*. Items were grouped under two subscales, *Reality Absorption* and *Fantasy Absorption*. One example item from the Reality Absorption subscale asks participants to indicate their agreement with the statement: "the sound of a voice can be so fascinating to me that I can just go on listening to it" (Tellegen & Atkinson, 1974). Scores are calculated from the sum of responses to all items, producing a possible range of scores

from 0 to 6. Higher scores on the TAS indicate increased susceptibility to experiencing periods of "total" attention (p.268).

Modified Short Flow State Scale. The 36-item Flow State Scale (FSS-2; Jackson & Marsh, 1996; Jackson & Eklund, 2002) is a self-report measure assessing the state or situational experience of flow, following specific flow events (Jackson, Martin & Eklund, 2008). Based on the nine dimensions of flow described by Csikszentmihalyi (1993), the FSS-2 includes four items under nine subscales: challenge-skill balance, action-awareness merging, unambiguous feedback, sense of control, clear goals, automatic experience, loss of self-consciousness and time transformation (Jackson et al., 2008). In assessing flow state propensity among active Australians, the FSS-2 demonstrated good concurrent validity with the FSS (r = .73, Jackson et al., 2008). In empirical studies, the instrument has demonstrated acceptable reliability and good internal consistency, with subscale alphas ranging between .78 and .92 (Jackson & Eklund, 2002; Jackson et al., 2008). Shortened versions of the FSS-2, including the 9-item short FSS-2 have also evidenced good reliability with alphas ranging between .77 and .78 (Jackson et al., 2008).

In assessing the passive experience of ASMR/ACP as a flow state, Barratt and Davis (2015) utilised a modified version of the FSS-2, specifically focused on ASMR/ACP induction through engagement with online trigger videos. Participants are asked to indicate their level of agreement with the items based on their recollection of ASMR, or "tingles" experiences. Following factor analysis, the reduced 8-item scale was accounted for by one factor (Barratt & Davis, 2015), and comprises only items from the FSS-2 related to the passive experience of flow, including "time seems to stop", "I feel totally in control" and "things seem to happen automatically". Responses are scored on a 5-point Likert scale from 1, *not my experience at all*, to 5, *completely represents my experience,* with total scores calculated as a sum of item scores, ranging between 8 and 40. Higher scores on the modified FSS-2 indicate greater sensitivity to experiencing flow states through engagement with ASMR videos.

Modified Aesthetic Experiences Scale (AES). Silvia and Nusbaum's (2011) Aesthetic Experiences Scale is a 10-item self-report measure designed to assess experiences of aesthetic chills states in response to the arts. Items were developed based on previous work into aesthetic chills and similar states, including acoustical, tactile and visually induced paresthesias (Grewe, Kopiez & Altenm¨ller, 2007; Sloboda, 1991; Konecni, 2005). The AES is comprised of descriptive statements, such as "feel like crying", "feel chills down your spine" and "feel detached from your surroundings". Participants are asked to reflect on the artistic or creative medium they most frequently engage with and how often they experience each sensation or alteration while interacting with their nominated art form. Responses are rated on a 7-point Likert scale, from 1, *never or rarely*, to 7, *nearly always.* Total scores are calculated as the sum of item scores, ranging between 7 and 70. Higher scores on the AES suggest more frequent aesthetic chills experiences. The AES recorded a Cronbach's alpha of .87 in prior work (Silvia & Nusbaum, 2011).

In order to specifically assess the relationship between personality traits and frequency of frisson responses, Nusbaum and Silvia (2011) utilised a modified version of the AES, identifying 3 items as a frisson specific subscale. Contextualising the phenomenon within music listening experiences, participants are asked how often they "feel chills down (their) spine", "get goosebumps" and "feel like (their) hair is standing on end" while listening to music. Responses are rated on a 7-point Likert scale, from 1, *never or rarely*, to 7, *nearly always.* Total scores are calculated as the sum of item scores, ranging between 3 and 21. Higher scores on the reduced AES suggest more frequent frisson experiences. The modified AES evidenced good internal consistency in previous work, recording a Cronbach's alpha of .85 (Nusbaum & Silvia, 2011).

In the present study, a modified version of the AES was utilised, grounding the original 10-item scale within music-specific experiences. This will allow for examination of the relationship between ASMR/ACP and musical aesthetic experiences, as well as the specific association between ASMR/ACP and the frisson subscale.

Toronto Alexithymia Scale (TAS-20). The Toronto Alexithymia Scale (TAS-20; Taylor, Ryan & Bagby, 1986) is a 20-item self-report measure of alexithymia, developed to assess levels of trait alexithymia and to improve upon previously developed alexithymia scales that failed to demonstrate adequate reliability or validity (e.g., MMPI Alexithymia Scale; Schalling Sifneos Personality Scale).

The TAS-20 has three subscales, with 7 items assessing an individual's difficulty identifying feelings (DIS), 5 items for difficulty describing feelings (DDS) and 8 items accorded to assessing externally-orientated thinking (EOT). Items are scored on a Likert-scale from 1, *strongly disagree* to 5, *strongly agree*, with total scores calculated from the sum of item scores, producing a possible range from 20 to 100. Higher scores on the TAS-20 indicate greater levels of alexithymia. Participants are asked to indicate the accuracy of each item presented, including "it is difficult for me to reveal my innermost feelings, even to close friends", "I have physical sensations that even doctors don't understand" and "I am often puzzled by sensations in my body". Five items are reverse scored to highlight acquiescent response style. In assessing alexithymia in a college student sample, the TAS-20 demonstrated good discriminant validity with psychiatric samples (Bagby, Parker & Taylor, 1994). The TAS-20 has evidenced good internal consistency in previous studies, recording a Cronbach's alpha between .81 and .87 (Bagby, Parker & Taylor, 1994; Cleland, Magura, Foote, Rosenblum & Kosanke, 2005). Following factor analysis, the resultant TAS-20 pattern of loadings fell into three factors consistent with theoretical conceptions of the alexithymia construct (Bagby, Parker & Taylor, 1994).

Procedure

This study was approved by and conducted in accordance with the guidelines of the Macquarie University Human Research Ethics Committee (see Appendix E). No identified or anticipated risks or potential for discomfort were associated with completion of the questionnaire.

Prior to posting, permission to host the questionnaire on the sub Reddit forum *ASMR: Sounds That Feel Good* was sought from moderators, in accordance with ethics guidelines. Upon presentation of the information and consent form, participants were reminded that completion of the survey was confidential and entirely voluntary. All participants received the same instructions to complete the questionnaire accurately and honestly. The questionnaire employed a forced choice format, ensuring that access to the questionnaire was conditional on participant consent. Further, a minimum age of 18 was selected as a requirement for progression through the questionnaire. Participants were informed that the data were only accessible by the chief investigator and co-investigator and that a summary of results would be made available upon request following the completion of the project in November.

Chapter 4: Study 2: Quantitative Analysis & Scale Refinement

Results

The quantitative section of this thesis outlined the reliability and validity of the created ACPS-31 measure. Further, an exploratory factor analysis of the ACPS-31 was conducted to examine the underlying factors within the measure and allow for preliminary refinement. Additionally, the relationships between the refined ACPS and measures of absorption, flow, aesthetic experiences, frisson, alexithymia and demographic variables were assessed. In this section, an overview of the quantitative data analyses and procedures will be presented, including demographic data, reliability analyses of the ACPS and existing constructs, exploratory factor analysis and interpretation, as well as significant correlations between the ACPS and related demographic variables and existing measures.

Quantitative Data Analysis

Once rates of responding had reduced to less than one completion per week, the online questionnaire was closed. Quantitative data were downloaded from MQ Qualtrics (https://mqedu.qualtrics.com) and analysed using the Statistical Package for the Social Sciences (SPSS), version 21.0. Consistent with the approach outlined by Groves, Dillman, Eltinge and Little (2002), the co-investigator removed cases with incomplete data for the first survey. Following this, total scores were computed for all measures and subscales. Reliability analyses for the ACPS-31, TAS, TAS-20, AES and FSS-2 were conducted to assess the recorded internal consistency of published measures against those observed in the present study.

The individual items of the ACPS-31 were examined to ensure sufficient variability within items before performing an exploratory factor analysis (EFA) on the measure. Exploratory factor analysis was utilised to determine the underlying factors of the ACPS-31, and was chosen over other methods due to the lack of empirical investigation into the nature and dimensions of ACP to inform theoretical groupings. The pattern of intercorrelations demonstrated through quantitative

analysis were then analysed to determine the relationship between the latent factors and the qualitatively theorised subscales from Study 1. Through factor analysis, 10 items were removed and the resultant five factors were progressively extracted, consistent with theoretical groupings, as outlined in Study 1. Reliability analyses of the new ACPS-21 and subscales were conducted to assess levels of internal consistency following item reduction and subscale construction.

Pearson's *r* correlations were conducted to assess the relationships between the ACPS-21, subscales and the TAS, TAS-20, AES, FSS-2 and relevant subscales, to assess convergent and divergent validity of ACP and related constructs. Finally, the relationships between relevant demographic variables and the ACPS-21 were assessed to determine the existence of significant effects of gender and age on ACP scores.

Data Screening and Cleaning

Missing Data. While 701 volunteers consented to participate, 67 individuals (9.56%) failed to indicate that they were over the age of 18. As a result, these 67 cases were removed as they contained a substantive amount of missing data (98.9% of questionnaire incomplete). Due to questionnaire construction, the ACPS-31 measure received 453 completed responses, while 394 participants completed the total battery of instruments. As a result, reliability analyses and factor analyses were conducted on the sample that completed the ACPS-31, to utilise the maximum number of completed cases.

Outliers. Following Hoalgin and Iglewicz's (1987) outlier labelling rule, cases were considered exceptional if they exceeded the parameters of 78 and 154 on the ACPS-31. This was calculated by establishing the difference between the upper and lower quartiles and multiplying this number (14), by the constant *g,* and adding this value (31) to the upper and lower quartile values. For this study, the more conservative standard of *g* was adopted (2.2; Iglewicz & Banerjee, 2001).

This resulted in the removal of two cases from the dataset, consistent with appraisals of outlier values from SPSS generated box plots.

Normality. In assessing normality, the Shapiro-Wilk test was used to establish the significance of data deviation from a model normal curve. See Appendix F for normality distribution. The resultant statistic (p <.001) suggests that the ACPS-31 significantly differs from a normal distribution. Upon closer examination of the skewness and kurtosis statistics, once divided by the standard error (SE) of each respectively, the resulting value for skewness was -4.50, and 0.89 for kurtosis. In line with the guidelines outlined by Field (2005), the calculated skewness statistic exceeded the value limit of 3.29 (p <.001), suggesting a non-normal distribution. However, while not ideal, Fabrigar, Wegener, MacCallum and Strahan (1999) argue that factor analysis is robust against distributional assumptions provided the appropriate model and extraction procedures are selected.

Descriptive Statistics.

Participant Demographics. Of the 634 volunteers who provided demographic information, 451 participants (71.45%) completed the ACPS-31, comprising 320 males (70.6%) and 122 females (26.9%), ranging from 18 to 60 years (M = 24.64, *SD* = 6.51). Similar to the total sample, participants came from 34 different countries, predominantly the United States, with 243 volunteers (53.6%). A large proportion of participants (11.0%) came from Canada (n = 50), a further 7.3% from the United Kingdom (n = 33) and 5.1% from Australia (n = 23). See Appendix G for full details.

Following completion of the ACPS-31, FSS-2, AES, TAS and TAS-20, a total of 394 participants comprised the final sample (56.49%), including 278 males (70.2%) and 109 females (27.5%), with ages ranging from 18 to 60 years (M = 24.82, *SD* = 6.54). Participants resided in 33 different countries, with 11.1% from Canada (n = 44), 7.6% from the United Kingdom (n = 30) and

5.3% from Australia (n = 21). The majority of participants (52.8%) were from the United States (n = 209). Further demographic information is provided in Appendix H.

Scale Means and Frequencies.

The means, standard deviations and ranges of scores on the ACPS-31, TAS-20, TAS, AES and FSS-2 can be seen in Table 2.

Table 2
Means, Range and Standard Deviation of Measures

Instrument and subscale	Mean	Range	*SD*
ACPS-31	115.12 (31)	81 - 143	11.63
TAS-20	50.28 (20)	23 - 84	11.15
Subscale 1 (DIF)	17.00 (7)	7 - 35	6.19
Subscale 2 (DDF)	14.88 (5)	5 - 25	4.76
Subscale 3 (EOT)	18.40 (8)	8 - 40	4.40
TAS	4.87 (6)	0 - 6	0.77
AES	37.35 (10)	7 - 70	9.65
Subscale 1 (FR)	10.91 (3)	3 - 21	3.67
FSS-2	32.52 (8)	8 - 40	6.67

Note. N = 394, except ACPS-31, where N = 451. TAS-20 = Toronto Alexithymia Scale; DIF = Difficulty Identifying Feelings; DDF = Difficulty Describing Feelings; EOT = Externally Oriented Thinking; TAS = Tellegen and Atkinson (1974) Absorption Scale; AES = Aesthetic Experiences Scale; FR = Frisson; FSS-2 = Flow State Scale. Numbers in parentheses indicate the number of items within the scale.

Reliability Analyses

In assessing the internal consistency of the ACPS-31 and other measures utilised in the present study, Cronbach's alpha reliability coefficients were calculated for all scales and subscales. Adopting the guidelines of George and Mallery (2003), where values greater than .7 are acceptable, the ACPS-31 (.75) and the Difficulty Describing Feelings (DDF) Alexithymia subscale (.79) demonstrated acceptable reliability. Further, recording alphas exceeding .8, the Aesthetic

Experiences Scale (AES; .87), the Frisson subscale (.87), Alexithymia scale (TAS-20; .81) and the Difficulty Identifying Feelings (DIF; .83) subscale, meet criteria for good internal consistency (George & Mallery, 2003; Santos, 1999). However, not all scales utilised in the present study demonstrated sufficient reliability. The modified Flow State Scale (FSS-2) produced an alpha of . 61, which is regarded as questionable by the George and Mallery (2003) model. Further, the TAS-20 subscale Externally Oriented Thinking (EOT) and Tellegen and Atkinson (1974) short Absorption scale both recorded alphas of .57, which are considered poor. While the reported literature alpha of the EOT ranges between .64 and .66, the findings nevertheless need to be interpreted with caution. The remaining scales, however, recorded alphas consistent with, or greater than those previously reported in other studies, see Table 3.

Table 3

Study and Literature Reliability (Cronbach's Alpha) of Measures

Instrument and subscale	Study α (items)	Literature α
ACPS-31	0.75 (31)	
TAS-20	0.81 (20)	0.80 - 0.83
Subscale 1 (DIF)	0.83 (7)	0.78 - 0.81
Subscale 2 (DDF)	0.79 (5)	0.75
Subscale 3 (EOT)	0.57 (8)	0.64 - 0.66
TAS	0.57 (6)	
AES	0.87 (10)	0.87
Subscale 1 (Frisson)	0.87 (3)	0.85
FSS-2	0.61 (8)	.77 - .78*

Note. N = 394, except ACPS-31, where N = 451. TAS-20 = Toronto Alexithymia Scale; DIF = Difficulty Identifying Feelings; DDF = Difficulty Describing Feelings; EOT = Externally Oriented Thinking; TAS = Tellegen and Atkinson (1974) Absorption Scale; AES = Aesthetic Experiences Scale; FR = Frisson; FSS-2 = Flow State Scale. *Reliability statistics were not provided for the modified 8-item FSS-2, so published alphas for the original 9-item FSS-2 were included as a guide.

Exploratory Factor Analysis

The factor analytic model. Factor analysis seeks to identify underlying patterns within a set of interrelated variables (Suhr, 2006). Exploratory factor analysis (EFA) is a multi-step process that assesses latent groupings within measures, independent of any preconceived or imposed theoretical structure (Child, 1990). These latent associations, or factors, emerge as groupings of items with similar patterns of responding. One requirement of EFA is a sufficiently large sample. According to Suhr (2006), a minimum of 100 cases are required for EFA, including at least five observations for every item. In this study, 451 participants successfully completed the ACPS-31, which exceeds the theoretical minimum of 155 cases required for analysis.

Factor Extraction. Factor extraction aims to account for the maximum amount of variance within a set of items in the least amount of factors (Suhr, 2006). The first factor attempts to explain the maximum amount of common variance, progressively reducing with each successive factor. The initial extraction criteria utilised in the present study involved the examination of eigenvalues in line with the Kaiser-Guttman rule, and the generation and analysis of a scree plot. Following this, The Kaiser criterion advocates for the inclusion of factors with corresponding eigenvalues greater than one (Costello & Osborne, 2005).

While this method is commonly regarded as acceptable in the literature on factor analysis, the Kaiser criterion is problematic, as the procedure often overestimates the true number of factors (Costello & Osborne, 2005; Basto & Pereira, 2012). As a result, a progressive factor extraction was undertaken, where factors were progressively reduced through considered examination of cross loadings and communalities. In the current analysis, principal axis factoring (PAF) identified eight factors with corresponding eigenvalues greater than one, as depicted in Table 4. Cumulatively, the eight factors accounted for 56.6% of variance in scores, with factor 1 explaining the most covariance, at 18.3%, and successive factors accounting for progressively smaller proportions of total variance. As demonstrated in Figure 1., the “elbow” of the scree plot suggests the extraction of

six factors as ideal. This estimation was used as a guide throughout the progressive factor extraction.

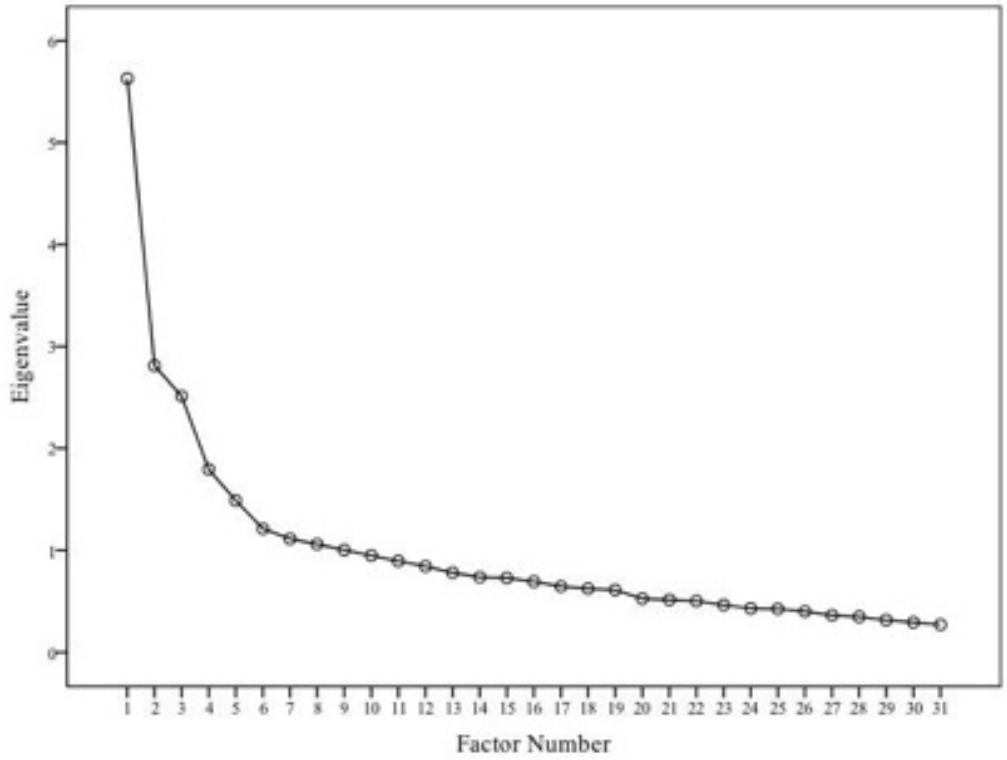


Figure 1. Scree plot suggesting 6 factors for extraction. *Note.* N = 451.

Table 4

ACPS-21 Factors with Eigenvalues Greater Than One

	Eigenvalues		
Factor	Total	% of Variance	Cumulative %
1	5.68	18.31	18.31
2	2.75	8.86	27.16
3	2.54	8.20	35.36
4	1.78	5.75	41.11
5	1.45	4.67	45.77
6	1.20	3.85	49.63
7	1.13	3.63	53.25
8	1.04	3.36	56.61

Note. N = 451.

Method of Extraction and Factor Rotation. The method of extraction employed in Study 2 was PAF with a direct oblimin rotation. According to Fabrigar et al. (1999), PAF does not suffer unduly from distributional assumptions of normality, compared to other extraction methods. In employing factor rotation, eigenvalues are shifted in order to achieve a simplified factor structure (Brown, 2009). An oblique rotation method was employed due to the assumption that the emergent ACPS-31 factors would be correlated, as opposed to the assumption of orthogonality of factors implicit in orthogonal rotation methods (Brown, 2009). Direct oblimin rotation allows for the establishment of correlations between meaningful factors of the ACPS-31, consistent with the exploratory aims of Study 2 (Costello & Osborne, 2005).

Factor Interpretation. A factor matrix was produced after 13 iterations, and following this, factor loading significance was explored. Factor loadings were considered in line with criteria outlined by Worthington and Whittaker (2006). Factor loadings that failed to reach a minimum of .3 were removed progressively as they were deemed to be weakly associated with a common theoretical grouping. Factors with only two loadings were evaluated and removed if the two-item factor contained only one positively and one negatively loaded item. Items that loaded onto more than one factor were also removed. The item reduction process involved the total removal of 10 items, producing a final 21-item ACP scale which will be referred to throughout the remainder of the analyses and discussion as the ACPS-21. The 21 items loaded strongly onto five theoretically meaningful factors, the final pattern matrix loadings and factors are presented in Tables 5 and 6.

Table 5

Final Item Matrix of the ACPS-21

ACPS-21 Item	ACPS-21 Factors				
	(1)	(2)	(3)	(4)	(5)
Q29	.739				
Q23	.557				
Q28	.461				
Q24	.457				
Q27	.450				
Q21		.621			
Q25		.513			
Q22		.466			
Q30		.366			
Q17			-.759		
Q12			-.671		
Q16			-.642		
Q11			-.580		
Q13			-.419		
Q14				.749	
Q9				.691	
Q10					.775
Q2					.728
Q8					.562
Q4					.522
Q3					.433
% of Variance	20.53	9.63	6.91	4.79	2.39
Cumulative % of Variance	20.53	30.16	37.07	41.86	44.25

Note. N = 451. 5 factors extracted, 13 iterations required.

Table 6

Final Items and Subscales of the Five-Factor ACPS-21

Factor	Item	Question
M	Q29	The sensation feels like a “wave of energy”.
	Q23	The sensation spreads like wave.
	Q28	The sensation feels warm.
	Q24	It feels as though there is a build-up followed by a release.
	Q27	The sensation begins in my head and travels downwards through the rest of my body.
S	Q21	I experience an unusual sensation in my head and body.
	Q25	The sensation feels “tingly”.
	Q22	I feel a strange sensation inside my skull.
	Q30	It feels like goosebumps on the back of my head.
A	Q17	The experience is blissful.
	Q12	I feel euphoric.
	Q16	I find the sensation intensely pleasurable.
	Q11	It feels like a natural “high”.
	Q13	It feels like a positive occurrence.
R	Q14	I find the experience calming.
	Q9	I feel sleepy and relaxed.
C	Q10	It feels like an altered state of consciousness.
	Q2	It feels like a different state of mind.
	Q8	It feels as though I have slipped into a hypnotic, trance-like state.
	Q4	I experience time distortions.
	Q3	The phenomenon is similar to meditation.

Note: M = Movement; S = Sensation; A = Affect; R = Relaxation; C = Cognition.

Determining Factor Labels. Following interpretation, factor labels were determined by looking at the conceptual and thematic groupings within factors. Factor 1, labelled ‘Movement’, comprised items related to the spread of sensation throughout the body. In Study 1, Movement was

established as a category within the larger Sensation node. As a result, the Movement and Sensation factors describe a similar facet of ACP. However, while item Q28 (“The sensation feels warm”), remains consistent with the broader Sensation descriptor, the item does not immediately link to the concept of movement. This has been rationalised by interpreting the perception of sensed warmth as involving movement or spread of energy, consistent with item Q29 “The sensation feels like a “wave of energy””. Factor 2, ‘Sensation’ captured descriptors of location and physical sensation (e.g. “The sensation feels “tingly””), congruent with thematic nodes and groupings outlined in Study 1. Factor 3 described items related to ‘Affect’ or emotional experience and appraisal (e.g. “The experience is blissful”). Items loaded onto Factor 4, ‘Relaxation’, represented a distinct physical and emotional shift in arousal and appraisal (e.g. “I find the experience calming”). The final factor, Factor 5 or ‘Cognition’, contained items related to cognitive shifts in perception and awareness, particularly items related to altered states of consciousness and deviations from general functioning, independent of emotional or physical input (e.g. “It feels like an altered state of consciousness”).

Reliability Analysis of the ACPS-21 and Factors.

In assessing the reliability of the ACPS-21 and the five identified factors, Movement, Sensation, Affect, Relaxation and Cognition, Cronbach’s alpha reliability coefficients were calculated for the total score scale and subscales. As above, utilising the George and Mallery (2003) guidelines of acceptability, where values greater than .7 are sufficient. While the total score ACPS-21 measure and Movement, Affect and Cognition subscales meet requirements for internal consistency, the Relaxation and Sensation subscales produced alphas of .69 and .63 respectively, which are considered questionable by the George and Mallery (2003) criteria. As a result, these findings need to be interpreted with caution. See Table 7.

Table 7

Reliability (Cronbach's Alpha) of the ACPS-21 and Subscale Measures

Instrument and subscale	Study α (items)
ACPS-21	0.82 (21)
Subscale 1 (M)	0.71 (5)
Subscale 2 (S)	0.63 (4)
Subscale 3 (A)	0.77 (5)
Subscale 4 (R)	0.69 (2)
Subscale 5 (C)	0.76 (5)

Note. N = 451. M = Movement; S = Sensation; A = Affect; R = Relaxation; C = Cognition.

Scale Means and Frequencies of the ACPS-21 and Factors.

Of the 451 participants who completed the total ACPS-21, a mean score of 78.23 was obtained (*SD* = 10.74) on the 21-item measure, with scores ranging between 45 and 101 out of a possible range between 11 and 105. See Table 8 for statistics related to the ACPS-21 factors.

Table 8

Means and Standard Deviation of the ACPS-21 and Subscale Scores

Instrument and subscale	Mean	*SD*
ACPS-21	78.23 (21)	10.74
Subscale 1 (M)	16.99 (5)	4.22
Subscale 2 (S)	16.68 (4)	2.95
Subscale 3 (A)	19.83 (5)	3.53
Subscale 4 (R)	9.21 (2)	1.16
Subscale 5 (C)	15.52 (5)	4.31

Note. N = 451. M = Movement; S = Sensation; A = Affect; R = Relaxation; C = Cognition.

Correlation Analysis.

Following reliability analyses, Pearson's correlation coefficients were calculated to determine the relationships between the five factors of the ACPS-21, as well as the associations between the five factors and total scores on the ACPS-21. Further, Pearson correlation coefficients were utilised to assess the construct validity of the total ACPS-21 and subscales against the TAS-20, TAS, AES and FSS-2. Finally, the relationships between demographic factors, including age, gender and level of education and total ACPS-21 scores were examined.

Correlations Between the ACPS-21 and Five Factors. As depicted in Table 9, the relationships between total scores on the ACPS-21 and individual subscales were assessed. All subscales were significant at the .001 level.

Table 9

Correlations between the Five ACPS-21 Subscales and the Total ACPS-21

Measure	ACPS-21
Movement (M)	.754**
Sensation (S)	.595**
Affect (A)	.700**
Relaxation (R)	.360**
Cognition (C)	.675**

Note. N = 451. **$p < .001$ (2-tailed).

Correlations Between the Five ACPS-21 Factors. To assess the correlations among factors of the ACPS-21, Pearson correlation coefficients were calculated (see Table 10). Inter-item correlation coefficients were calculated for items within and across subscales. See Appendices I and J.

Table 10

Correlations Between the Five ACPS-21 Factors

Measure	M	S	A	R	C
Movement (M)		.500**	.322**	.133**	.257**
Sensation (S)			.243**	.087	.086
Affect (A)				.249**	.376**
Relaxation (R)					.232**
Cognition (C)					

Note. N = 451. **$p < .001$ (2-tailed).

Exploration of Demographic Characteristics of the ACPS-21

Chi-square test statistics were performed to assess the relationship between scores on the ACPS-21 and the demographic factors of age and gender. No significant associations were found for the ACPS-21 and demographic variables, despite considerable differences in gender distribution with 70.1% males, 27.7% females and 2.3% identifying as another unspecified gender.

Correlations Between the ACPS-21 and Related Total Score Measures.

In assessing the construct validity of the ACPS-21, the final measure was correlated with the existing TAS-20, TAS, AES and FSS-2 measures. The Pearson's correlation coefficient recorded for the relationship between participant scores on the ACPS-21 and the TAS-20 was non-significant ($r = .07$), suggesting that the ACPS-21 and TAS-20 assess different constructs. Correlations between subscale scores of the TAS-20 are presented in Table 12. The correlation observed between scores on the short TAS measure and the ACPS-21 was weak, yet significant ($r = .28$, $p < .01$). Importantly, the AES and FSS-2 both recorded weak correlations with the ACPS-21, at .33 ($p < .01$) and .44 ($p <$.

01) respectively. The implications of these findings will be discussed further in Chapter 7. See Table 11 for correlations between the ACPS-21 and total score measures.

Pearson correlation coefficients were also generated to assess the relationship between the existing total score measures. The TAS-20 failed to correlate strongly with the TAS (r = .11, p <. 05), AES (r = .14, p <.01) or the FSS-2 (r = .007, p >.05). However, the TAS recorded weak, yet significant correlations with the AES (r = .30, p <.01) and the FSS-2 (r = .20, p < 01). Lastly, while significant, the AES and FSS-2 measures did not correlate strongly (r = .24, p <.01). See Table 11 for details.

Table 11

Correlations Between the ACPS-21 and Total Score Measures

Measure	ACPS-21	TAS-20	TAS	AES	FSS-2
ACPS-21		.066	.281**	.327**	.435**
TAS-20			.112*	.141**	.007
TAS				.295**	.202**
AES					.242**
FSS-2					

Note. N = 394. TAS-20 = Toronto Alexithymia Scale; TAS = Tellegen and Atkinson (1974) Absorption Scale; AES = Aesthetic Experiences Scale; FSS-2 = Flow State Scale.
**p < .01 (2-tailed); *p <.05.

Correlations Between the ACPS-21 Factors and Related Measures.

Pearson correlation coefficients were calculated to assess the relationships between the ACPS-21, the five subscales and relevant subscale scores of existing measures, namely the Difficulty Identifying Feelings, Difficulty Describing Feelings, Externally Oriented Thinking and Frisson subscales. See Table 12 for correlations between the ACPS-21, subscales and total score measures.

Table 12
Correlations Between the SCPS-21, Subscales and Total Score Measures

Measure	SCPS-21	M	S	A	R	C	TAS-20	DIF	DDF	EOT	TAS	AES	AES-FR	FSS-2
SCPS-21	1	.754**	.591**	.697**	.352**	.665**	.066	.197**	.064	-.179**	.281**	.327**	.248**	.435**
M		1	.498**	.321**	.130**	.241**	.026	.112*	.074	-.173**	.243**	.243**	.196**	.283**
S			1	.227**	.082	.072	.017	.027	.023	-.021	.119*	.095	.113*	.109*
A				1	.240**	.377**	-.003	.135**	-.018	-.179**	.158**	.206**	.139**	.255**
R					1	.220**	-.003	.026	-.001	-.042	.126*	.101*	.084	.138**
C						1	.131**	.244**	.084	-.102*	.213**	.311**	.209**	.480**
TAS-20							1	.805**	.846**	.488**	.112*	.141**	.128*	.007
DIF								1	.591**	-.006	.237**	.312**	.220**	.110*
DDF									1	.230**	.087	.120*	.107*	-.035
EOT										1	-.193**	-.211**	-.100*	-.100*
TAS											1	.295**	.179**	.202**
AES												1	.783**	.242**
AES-FR													1	.206**
FSS-2														1

Note. N = 394. SCPS-21 = Spontaneous Cephalocaudal Paresthesia Scale; M = Movement; S = Sensation; A = Affect; R = Relaxation; C = Cognition; TAS-20 = Toronto Alexithymia Scale; DIF = Difficulty Identifying Feelings; DDF = Difficulty Describing Feelings, EOT = Externally Oriented Thinking; TAS = Tellegen and Atkinson (1974) Absorption Scale; AES = Aesthetic Experiences Scale; AES-FR = Frisson Subscale; FSS-2 = Flow State Scale. **$p < .01$ (2-tailed); *$p < .05$.

Summary.

The quantitative results chapter of this thesis assessed the reliability and validity of the created ACPS-31 measure on an online convenience sample. Following an exploratory factor analysis and preliminary refinement, five underlying factors within the measure, Movement, Sensation, Affect, Relaxation and Cognition were identified. The reduced ACPS-21 demonstrated good reliability ($\alpha = .82$). Moderate to good internal constancy was observed for the five subscales of the ACPS-21. Additionally, the relationships between the refined ACPS-21 and measures of absorption, flow, aesthetic experiences, frisson, alexithymia and demographic variables were assessed. The ACPS-21 demonstrated a pattern of divergent relationships to existing measures of related phenomena, producing correlation coefficients within the range of .01 to .44, suggesting some evidence for the construct validity for the ACPS-21. The next chapter will discuss the implications of these findings.

Chapter 5: Discussion

The aim of the present thesis was to develop a reliable and valid measure of autonomous sensory meridian response (ASMR), preliminarily termed Autonomous Cephalocaudal Paresthesia. The created measure, the Autonomous Cephalocaudal Paresthesia Scale (ACPS-21) was developed alongside theoretical and reported accounts of ACP experiences, suggesting the existence of a distinct and under researched phenomenon (Andersen, 2014). Further, as the first designated ACP scale, the measure intended to highlight the common features of the phenomenon as well as establishing a means from which to assess relationships to similar paresthetic sensations and altered states. A mixed-methods approach was undertaken to address these aims.

Study 1. The first study assessed a sample of online archival data describing specific ACP experiences to inform scale development and assess the core features of the experience.. While the nature and practices of the ASMR/ACP community and prominence of common triggers were explored by Andersen (2014) from a sociological perspective, and Barratt and Davis (2015) assessed specific facets of ASMR/ACP accounts through an online questionnaire, a comprehensive grounded theory approach had thus far not been attempted. As a result, a large sample of ACP descriptions were explored with the aim of capturing a diverse range of prominent features previously unaccounted for in previous research.

Through content analysis, significant variation across cases was observed, seen in the establishment of 174 coding categories. Specific points of contention emerged within nodes and categories suggesting that accounts of ACP may differ definitionally as well as experientially. Despite this, a large proportion of cases reported similar shifts in affect, cognition and specific sensations. As a result, coding saturation was reached within 303 cases. Three prominent, interrelated themes emerged throughout content analysis: Affect, Cognition and Sensation.

Affect. Descriptions of the affective component of ACP experiences accounted for 20% of code selections in the sample. ACP was most prominently described as a pleasurable experience linked to meditation and trance-like states. These results are consistent with the assessments of the "undeniably affective" (Andersen, 2014, p. 4) component of ACP experiences and appraisals of pleasure seeking motivations in the consumption of online ACP media (Ahuja, 2013). Further, through assessing the effect of ACP on mood, Barratt and Davis (2015) reported a strong association between positive mood and incidence of ACP, with the strongest effects observed during the experience and within the first three hours following ACP induction. Therefore, the findings in the present study support these aspects of previous research.

Despite this, two conflicting groups were established within the affective node, positing ACP as either a pleasurable and positive experience, or negative and unpleasant. Accounts of ACP as pleasurable were associated with feelings of euphoria, bliss and satisfaction. In comparison, appraisals of ACP as unpleasant were linked to overstimulation and discomfort. Feelings of strangeness were common to both pleasant and unpleasant descriptors, suggesting that familiarity or appraisal of the experience as unusual may function independently of pleasure. Further, this discordance may suggest the existence of two forms of ACP, with a common cognitive or sensation element. Conversely, these differences may instead be indicative of two divergent reactions to the same experience, akin to inebriation from the ingestion of alcohol and substance use more broadly. For example, individual appraisals of intoxication may reflect differences in enjoyment, but not experience. As a result, differential appraisal may shape accounts of ACP as existing across two dimensions, but these differences may only reflect variations in appraisal and pleasure across individuals.

Alternatively, accounts of displeasure may reflect the experience of misophonia, or hatred of sound (Jastreboff & Jastreboff, 2002) as opposed to ACP. Consequently, ACP and misophonia may exist on a continuum, where increased sensitivity to audio stimulation results in profound affective

responses. In the present study, this may explain the proportion of respondents reporting negative (*n* = 5) and unpleasant (*n* = 10) experiences, compared to the more common, pleasant (*n* = 51) and positive (*n* = 32) accounts of ACP. Careful disambiguation of this association in future research would be beneficial, alongside assessments of ACP as a synaesthetic experience, and a symptom of stimulus sensitivity more broadly.

Cognition. The second prominent theme established was Cognition (24.7%), accounting for the mental component of ACP experiences, specifically those related to thinking, attention and perception. The most frequently utilised category within the Cognition node reflected comparisons between ACP and other experiences, with a focus on established ASCs and AoCs. Comparisons between ACP experiences and a wide array of recreational drug effects were prominent (*n* = 22), particularly MDMA (*n* = 3), Ecstasy (*n* = 3), LSD (*n* = 2), opiates (*n* = 2) and DMT (*n* = 3). Importantly, a proportion of these codes were directly related to the utilisation of ACP as a means of accessing altered states akin to pharmacologically induced "highs" (*n* = 4). Some commenters described ACP as orgastic, though distinctly non-sexual (*n* = 9). which echoes the findings of Barratt and Davis (2015). Barratt and Davis study found that only 5% of respondents cited sexual motivations in seeking out ACP, while the majority of participants (84%) stated that the concepts were unrelated, consistent with the findings of the present study.

"Intense" relaxation effects were described frequently in the sample, particularly related to sleep and stress reduction. Emerging as the most prominent code within the cognitive node (*n* = 38), relaxation was also strongly associated with both Affect and Sensation nodes, suggesting that an element of relaxation pervades the emotional, physical and mental aspects of ACP. These findings were consistent with those of Barratt and Davis (2015), where the overwhelming majority of participants (98%) cited seeking relaxation as a core motivator behind engagement with ACP media.

Similarly, descriptions of ACP as "trance-like" featured prominently within the dataset (*n* = 27), linked to discussions of immersion, hypnosis and time distortions. This finding was consistent with descriptions of "trance like" effects reported in Barratt and Davis' (2015, p. 6) study, as well as the relative prominence of "trance-like" descriptors present in Study 1. However, as outlined by Barušs (2003; 2012), trance states are characterised by an absence of self-awareness and self-determination, an element of the phenomenon largely unaccounted for by ACP descriptions. Similarly, trance states are associated with an increase in arousal, widened awareness and a reduced threshold for sensory input (Vaitl et al., 2005), an element seemingly incongruous with accounts of relaxation and other prominently cited elements of ACP. This finding will be revisited in the discussion of Study 2.

Sensation. Accounting for over half of code selections (55.3%), the majority of experiential descriptions of ACP detailed a distinct sensation element, suggesting that ACP exists as a diverse phenomenon with a primary sensation component. The majority of cases endorsed descriptions of ACP sensations as "tingly" (*n* = 73), with comparisons to electricity (*n* = 7), fuzz (*n* = 5) and energy (*n* = 8). However, significant variation was observed within this node, particularly among descriptions of sensory location and movement across cases. The majority of cases described ACP as existing within the head (*n* = 59), followed by accounts of specific localisation within the CNS pathway from brain to spine (*n* = 18). Less frequently endorsed locations included areas within the PNS (*n* = 43), such as legs and feet, as well as the circulatory (*n* = 1) and digestive systems (*n* = 4). These findings were consistent with those of Barratt and Davis (2015), where the most cited locational origins of ACP were the back of the head (41%), extending down the spine (50%). This indicates that there exists some consensus on the common elements of ACP, with respect to a frequently cited cluster of sensation and location descriptors. Further, this finding has been established across separate studies and samples, utilising different assessment tools.

Within the sample, disagreement was observed within the broader "head" category, with the majority of cases endorsing scalp activity (n = 9) during ACP experiences, and others describing the sensation as originating from within the head (n = 4). Of the accounts that described the movement or path of ACP sensations, the majority of cases advocated for a cephalocaudal direction of sensation (85.7%), while the remaining cases described ACP as beginning in areas other than the head and travelling either proximodistally or upwards through the CNS. This discordance also mirrored the findings of Barratt and Davis (2015), where the majority of participants reported a consistent cephalocaudal path of sensation. However, significant individual differences in the site of origin and path of movement were observed across cases. This suggests that while a prominent cluster of sensation descriptors are frequently endorsed by the majority of individuals reporting ACP, a notable subset of responses demonstrate inconsistency across these dimensions. This may suggest the existence of two forms or dimensions of ACP or an issue in the recall of past experiences.

Following content analysis, items were developed in accordance with code prominence within the three themes. In an attempt to address inconsistencies in the consensus of descriptors, particularly regarding location and movement of sensation, items were developed that detailed less prominent, yet key differentiating facets of experience. For example, items detailing sexual motivations, proximodistal movement of sensation, as well as the location of sensation on the scalp and within the head. The resultant 31-item self-report scale was assessed in Study 2.

Study 2. The second study assessed the performance of the ACPS-31 measure with respect to internal consistency, factor structure and divergent validity from related constructs. The measure was refined utilising an online convenience sample who completed the ACPS-31 alongside measures of flow (FSS-2; Jackson & Marsh, 1996; Barratt & Davis, 2015), frisson (AES; Silvia & Nussbaum, 2011), absorption (m-TAS; Tellegen & Atkinson, 1974) and alexithymia (TAS-20; Taylor et al., 1986).

Consistent with the grounded theory approach undertaken in Study 1, and given the very limited empirical evidence from which to estimate factor groupings, exploratory factor analysis (EFA) was utilised in assessing the underlying structure of the ACPS-31. Through progressive reduction, 10 items were removed from the scale, producing the ACPS-21. Further, five factors emerged within the measure: Movement, Sensation, Affect, Relaxation and Cognition. As meaningful subscales, the resultant five factors closely resembled the nodes and clusters of codes established in Study 1.

Construct validity of the ACPS-21 was assessed through reliability analyses of the internal consistency of the overall scale and subscales, as well as divergent validity between the ACPS-21 and flow, frisson, alexithymia and absorption. Assessment of the internal consistency of the ACPS-21 suggested the creation of a sufficiently reliable total score measure ($\alpha = .82$) (George & Mallery, 2003). However, two of the five subscales recorded reliability coefficients outside of the acceptable range. The Relaxation ($\alpha = .69$) and Sensation ($\alpha = .63$) subscales produced coefficients deemed borderline or marginally insufficient (George & Mallery, 2003). The inter-item correlations for these subscales were then assessed.

Overall, the internal consistency of the total score measure suggests the existence of a diverse and multifaceted, yet commonly endorsed experience. However, in examining the inter-item correlations for the Sensation subscale, some discrepancy appeared to exist over the location of the sensation, either “inside (the) skull” or on the “back of (the) head”, consistent with the contrasting accounts of location seen in Study 1. Similarly, a stronger relationship was recorded between descriptions of the sensation as “tingly” and as “goosebumps on the back of (the) head”, compared to the association between descriptions of ACP as “tingly” and occurring “inside (the) skull”. It could be argued that this discrepancy may reflect differences in the locational experience of ACP as inside the head or on the surface of the skin. Alternatively, the inconsistency could be a product of associations between “tingly” and “goosebumps”, reflecting a conceptual association, rather than

experiential differences. However, the low internal consistency of the scale as a whole suggests that significant disagreement exists over the exact nature of ACP sensations, particularly with regard to location, potentially suggesting the existence of multiple varieties of ACP. Consequently, these findings highlight the need for further examination and refinement of both the ACP concept and the sensation subscale in future work.

Similarly, the Relaxation subscale produced a moderate correlation between items. However, the overall performance of the subscale did not meet requirements for internal consistency (George & Mallery, 2003). As a distinct grouping of items, consistent with the reports of the adaptive effects of ACP seen in Study 1, the relaxation component of ACP needs to be revisited in future work. Firstly, in order to understand the function of relaxation in ACP experiences, as well as to assess the prominence of relaxation as a common element between ACP and other constructs, including meditation, guided relaxation techniques and trance states.

Following reliability analysis, the divergent validity of the ACPS-21 and flow, frisson, absorption and alexithymia measures was assessed.

ACP and Flow. Consistent with the findings of Barratt and Davis (2015), higher scores on the ACPS-21 were significantly, yet only moderately correlated to scores on the modified FSS-2 (r = .435) indicating some convergence between the measures. However, while previous work established a strong association between the constructs, the relationship was only of weak to moderate strength in the present study (George & Mallery, 2003). At face value, this suggests that across studies, some discordance exists between conceptualisations of ACP. However, a likely explanation of this finding is the differences in assessment tools and methods used in both studies. For example, Barratt and Davis (2015) operationalised ASMR/ACP propensity as being the sum of common triggers reported by participants, as opposed to the incidence of a variety of ACP elements, including cognitive, affective and sensation components. This means that while a greater number of identified triggers may be strongly associated with incidence of flow while watching ACP stimuli,

the operationalisation of ACP propensity as the sum of triggers fails to account for the experiential nature of the phenomenon.

Upon examining the correlations between subscales of the ACPS-21 and flow, the strongest association was found between scores on flow and the cognitive subscale of the ACPS-21 (r = .480), suggesting that the similarities between the constructs largely reflect a common cognitive element. Further, the weakest association was found between Sensation and flow (r = .109), supporting the assertion that ACP exists as a unique phenomenon, with a prominent sensation component unaccounted for by flow states.

ACP and Frisson. ACP and frisson demonstrated a divergent relationship in the present study, with significant, yet weak relationships found between scores on the ACPS-21 and the Aesthetic Experiences Scale (r = .327), as well as the ACPS-21 and AES frisson subscale (r = .248). For both measures, the Movement and Cognitive subscales recorded the strongest associations to scores on the AES and AES-FR. Through examining the inter-item correlations of the Movement subscale, the strongest association for both the AES (r = .243) and AES-FR (r = .196) existed for descriptions of ACP as a "wave of energy", while conceptualisations of ACP as a "build-up followed by a release" and a sensation that "begins in my head and travels downwards through the rest of my body" were the least strongly related.

These findings suggest, importantly, that while ACP and frisson appear to exist as dynamic sensations that travel through the body in similar ways, the cephalocaudal element strongly endorsed by accounts of ACP differs from the path of movement characteristic of frisson. This provides prima facie evidence for ACP as a phenomenon distinct from frisson. Furthermore, the Sensation and Relaxation elements were the least strongly related to both measures, suggesting that the sensation and arousal components of frisson and aesthetic experiences largely differ from those seen in ACP. Importantly, these associations support subjective accounts of the distinct, physical localities these sensations appear to originate, and their respective, opposing directions of

movement through the nervous system. These findings further support the existence of ACP as an independent phenomenon, notably distinct from frisson.

ACP and Alexithymia. The TAS-20 did not demonstrate a significant relationship to scores on the ACPS-21 (r = .066), consistent with appraisals of ACP as an independent phenomenon. The total score alexithymia scale only correlated significantly with the Cognition subscale (r = .131), again suggesting a unique physical element captured by the ACPS-21 unrelated to existing measures. The Difficulty Identifying Feelings (DIF) subscale (r = .197) and Difficulty Describing Feelings (DDF; r = .064) subscales did not correlate strongly with scores on the ACPS-21 or subscales, suggesting that individuals reporting ACP do not demonstrate higher levels of alexithymia symptomatology, and that ACP and alexithymia exist as divergent constructs. The Externally Oriented Thinking (EOT) subscale followed a similar pattern of correlations to the DIF, however there was a negative association between scores on the EOT to the ACPS-21 (r = -.197), Movement (r = -.173), Affect (r = -.179) and Cognition (r = .131). Further, a significant, yet weak association was found between absorption and alexithymia (r = .112), inconsistent with the findings of Mason et al. (2005). These findings must be interpreted with caution, however, as the EOT subscale failed to demonstrate adequate reliability in the present study.

ACP and Absorption. ACP and absorption were significantly, yet weakly related (r = .281), suggesting that ACP and absorption exist as related, yet divergent constructs. The strongest associations within the data were found between the Movement (r = .243) and Cognition (r = .158) subscales. Consistent with hypothesised associations between ACP and dissociative experiences, the correlation between Cognition and absorption (r = .213) converges with the theory that immersion in ACP stimuli engages latent absorption tendencies, particularly in the case of roleplaying. However, the relationship between Movement and absorption (r = .243) appears inconsistent with dissociative phenomena, as Movement items relate specifically to the path of sensation through the body. This may be attributed to the use of a reduced version of the Tellegen and Atkinson

Absorption Scale (TAS; 1974). While economical given the substantial length of the total questionnaire, a longer absorption scale with consistently adequate reliability would allow for a more detailed exploration of the relationship between absorption and ACP. However, while further research utilising a more extensive absorption measure would allow for more decisive conclusions, the preliminary results gathered nevertheless suggest that absorption and ACP exist as related, yet distinct constructs.

Summary of Findings. In summary, this thesis has developed a preliminary measure of autonomous cephalocaudal paresthesia that can be utilised as a reliable and valid total score measure in identifying ACP propensity in people who report such experiences. As a diverse and elusive phenomenon, contention exists across cases on the exact parameters and core features of ACP, at times suggesting the existence of multiple forms of ACP, or confusion between ACP and misophonia. Despite this, a significant degree of overlap has been observed across descriptions of ACP, as well as scores on the final ACPS-21, suggesting that the majority of individuals reporting ACP demonstrate a degree of consensus on the key features and applications of the phenomenon, mirroring a normal distribution among a specialised sample. These similarities also converge with appraisals and analyses of ACP experiences within the literature (Barratt & Davis, 2015; Ahuja, 2013; Andersen, 2014). The measure, however, requires further refinement and assessment to improve upon the comprehensiveness of the five subscales and to examine the test-retest reliability and performance of the scale on more diverse samples. It would also appear that ACP differs from frisson, absorption, alexithymia and flow states, and that the ACPS-21 performs in a manner that assesses these differences.

Limitations

Firstly, as discussed earlier, the created ACPS-21 needs to undergo further refinement and assessment, with a particular focus on the creation of a more substantial relaxation subscale. While

relaxation specific items were included upon coding presence in the schematic output of content analysis, the resultant items did not demonstrate sufficient internal consistency as a subscale. In future work, the inclusion of more items related to relaxation specific experiences and a potential rewording of relaxation items from the ACPS-31 may overcome this issue. Alternatively, a larger pool of items could be generated under each major theme, incorporating a greater proportion of codes and categories, including less prominent codes within the relaxation category.

A further limitation may lie in the use of self-report to assess ACP experiences in both studies. While necessary at this stage of scale development, self-report has been associated with biased responding in line with perceived social desirability, demand characteristics and memory deficits in recall (Donaldson & Grant-Vallone, 2002). In particular, relying on participant recollection in Study 2 may have resulted in inaccurate or limited accounts of ACP experiences, particularly with respect to cognitive effects. This is hypothesised due to the abstract elements described within the Cognition subscale, such as, for example, perception of time distortions.

Another issue in the present study arose through the use of archival data. As the data was de-identified and derived from a convenience sample, demographic statistics for Study 1 were not available. This may have issues for the generalisability of the findings of the present research. Further, Study 2 employed convenience sampling through the use of online ASMR interest groups. Demographic data suggests that the majority of participants were male, under the age of 25 and based in English speaking, Western countries (most prominently the United States). Issues of sampling arise in attempting to generalise the findings of research to wider populations (Jensen, 2011). However, in the present study, no significant effect of gender or level of education on ACPS-21 scores was found, suggesting that these factors do not impede the representativeness of the findings.

However, issues of validity arise when attempting to generalise findings from within a special interest group to a wider population (Jensen, 2011). The utilisation of a primary online

community sample in the development of the ACPS-31, where 61.5% of coding material was sourced from Reddit pages, may impede generalisability when the resultant scale was assessed on a similar interest group sample. However, given the limited information about rates of prevalence within the general population, and issues of assessment that may arise in testing a niche scale on a naive sample, it was determined that a specialised sample was appropriate for preliminary scale construction and assessment.

A further issue that arises from using archival data in the creation of the ACPS-21 is the lack of demographic information available to the researcher. As a result, screening for co-morbid symptoms of anxiety and drug use could not be controlled for in Study 1, nor were they addressed in the screening of participants for Study 2. This may be of concern given the possible effects of drug use in informing or heightening ACP experiences, including anti-anxiety medication and recreational substance use. Future work should screen for these experiences prior to assessment in order to better understand the role of anxiety and drug use in ACP experiences, as well as the proportion of respondents reporting both ACP and anxiety symptomatology. This is of particular note given the anxiety reduction motivations cited among seekers of ACP sensations (Andersen, 2014), and the unclear involvement of dissociative symptomatology in ACP experiences.

Finally, future research could benefit from the use of a more comprehensive and longer absorption scale. Due to the large battery of items in the present study, the complete 32-item Tellegen and Atkinson (1974) absorption scale was not used, limiting the conclusions able to be drawn from the data, as the reliability statistics of the reduced measure have not been published. In future work, a longer questionnaire incorporating the full TAS measure would be beneficial for the assessment of absorption in ACP.

Implications and Future Research

The present study focused on the development a self-report measure that appears to reliably measure ACP, a multifaceted paresthetic phenomenon, since no comprehensive measure of ACP experiences was available prior to this study. The ACP-21 demonstrates a divergent pattern of relationships to commonly associated phenomena, including frisson, flow, absorption and alexithymia, as well as an acceptable degree of internal consistency as a total score measure. It is of note, however, that the predictive validity of the ACPS-21 has yet to be assessed, a necessary step in disambiguating the underlying affective, cognitive and sensation components of ACP, as well as increasing the specificity of the physical and experiential markers of the phenomenon. In its current form, the ACPS-21 serves as a list of common features of ACP and offers preliminary insights into the distinctiveness of ACP from related phenomena. Further, in utilising the ACPS-21 in self-report screening in experimental work, the scale may be useful in differentiating levels of arousal between ACP and frisson and the effect of induction method on ACP presentation.

Exploration of the Psychometric Properties of the ACPS-21. As stated previously, future work should focus on further refinement of the ACPS-21 with a particular expansion of the Relaxation subscale. This is of particular importance given the real world applications of ACP frequently cite relaxation as a core motivator behind ACP induction (Barratt & Davis, 2015; Ahuja, 2013; Andersen, 2014). Further, relaxation could be further developed to differentiate ACP from other ASCs and AoCs with respect to reports of arousal, a key differentiator across altered states (Vaitl et al., 2005). Similarly, some items in the Sensation subscale could also be revisited to disambiguate the origin of associations between the items. For example, the items stating that the ACP "experience is strange" and feeling a "strange sensation inside my skull" may have been highly correlated due to similar word choice across items, as opposed to the recognition of the distinct location elements.

Secondly, the ACPS-21 could be tested on a more diverse sample of participants, including those outside of ASMR/ACP interest groups. In order to do this, the ACPS-21 would need to be reframed to contextualise experiences based on incidence or common triggers, to accommodate participants naive to conceptions of ACP as a construct. The distribution of total scores on the measure could be compared to the close to normal distribution seen in the present study to assess differential ACP profiles across specialised and non-specialised samples.

Personality Factors. The role of personality in ACP propensity could also be explored in future work. In line with findings suggesting a potential relation between misophonia and unpleasant ACP experiences, the association between ACP and synaesthesia could be explored. Further, consistent with the association between misophonia and a reduced tolerance for audio stimulation (Møller, 2011), the relationship between ACP propensity, introversion and misophonia could be explored. For example, in accordance with Eysenck's biological account of personality, where higher scores on trait Introversion reflect higher levels of basal cortical arousal, it is proposed that greater Introversion, and lower levels of Extraversion may be associated with increased ACP propensity (Gray, 1970). Further, it would be of value to assess the associations between trait Neuroticism and ACP experiences, as higher scores on measures of neuroticism were associated with increased propensity towards negative affect in a study by Larsen and Ketelaar (1989). This dimension may help to further disambiguate the relationship between accounts of positive and negative affect in ACP induction.

Similarly, given that emotional connection with musical stimuli predicts greater frisson response, a potential influence of emotion, particularly empathy, is implicated in the experience of chills (Grewe et al., 2010). Future work could assess whether the meaning of words seen in ACP stimulus videos has an effect on empathic experiences, independent of tone. This could be examined through the creation of nonsense language trigger stimuli, holding tone constant, and assessing reports of ACP. Within online communities, inaudible whisper videos currently exist for

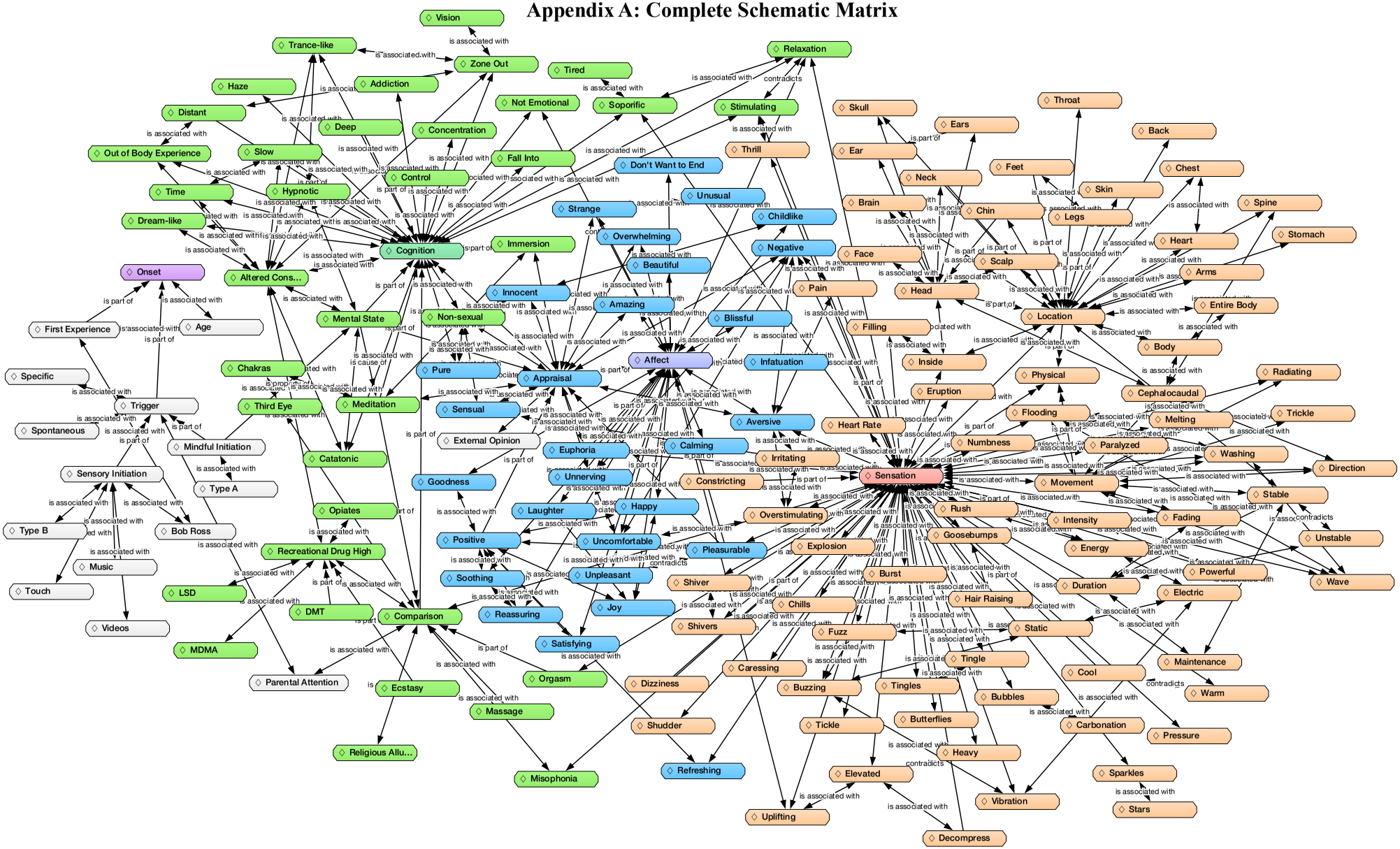
the purpose of ACP incitement, where whispering and associated simulated intimacy appears to be the most prominent trigger, as opposed to a specific communication of ideas (Andersen, 2014). Finally, in line with the transformative nature of peak experience phenomena, future work could directly assess the perceived meaningfulness and significance of ACP experiences among participants. This may also help to further disambiguate the role of intimacy, verbal communication and appraisal in ACP experiences.

Arousal. Finally, in order to examine the criterion validity of the ACPS-21, experimental assessment of the effect of ACP induction on indicators of arousal could be assessed. For example, heart rate and skin conductance measures could be utilised to determine the shifts in arousal across ACP experiences when compared to baseline. Further, these findings could be compared against the recorded incidences of arousal seen to be characteristic of other ASCs and AoCs, including frisson, trace states, meditation and relaxation (Vaitl et al., 2005).

Conclusions

In conclusion, the aim of this thesis was to develop a reliable and valid measure of ASMR, or Autonomous Cephalocaudal Paresthesia (ACP). The results of this project appear to indicate that ACP is a distinct experience, with sensory, affective and cognitive components, distinct from other established phenomena, including frisson, flow states and absorption. Within this thesis a workable scale has been developed to assess ACP as an independent phenomenon, meeting requirements for sufficient internal consistency and divergent validity as a total score measure. Overall, these findings provide support for the assessment of ACP as a unique alteration of consciousness, with potential adaptive benefits and a core set of features previously unaccounted for by identified altered states.

Appendix A: Complete Schematic Matrix



Appendix B: Online Study Flyer

Do You Experience ASMR?

We want to know about it! If you are interested in helping us explain and understand this fascinating phenomena, please consider completing the short (15 minute) survey linked below.

As a long-time ASMR experiencer, I'm currently working on my Masters thesis in psychology, devoted to understanding and legitimising this experience within the academic world. In short, we are trying to specify the exact nature of ASMR experiences and aim to differentiate this phenomena from other similar, unusual sensations.

Thanks so much for your time! Who knows, it might give you tingles?

Survey Link - https://mqedu.qualtrics.com/SE/?SID=SV_dj56Ef0kCSGxvDf

Appendix C: Information and Consent Form

Department of Psychology
Faculty of Human Sciences
MACQUARIE UNIVERSITY NSW 2109

Phone: +61 (0))2 9850 9898
Fax: +61 (0)2 9850 9911
Email: natalie.roberts@students.mq.edu.au

Chief Investigator's / Supervisor's Name & Title: Dr. Simon Boag

Participant Information and Consent Form

Name of Project: Towards the Development of an Integrative Measure of Spontaneous Cephalocaudal Paresthesia

You are invited to participate in a study of Spontaneous Cephalocaudal Paresthesia (SCP), also known as Autonomous Sensory Meridian Response (ASMR). The purpose of the study is to increase present understanding of SCP/ASMR through the development of an SCP/ASMR scale that effectively differentiates these experiences from other, similar phenomena.

The study is being conducted by Dr. Simon Boag (Department of Psychology, 02 9850 8024, simon.boag@mq.edu.au) and Natalie Roberts (Master of Research - Psychology, natalie.roberts@students.mq.edu.au), to meet the requirements of the Master of Research in Psychology, under the supervision of Dr. Simon Boag (02 9850 8024, simon.boag@mq.edu.au) of the Department of Psychology.

If you decide to participate, you will be asked to complete a short (20 minute) self-report survey examining ASMR experiences and other similar constructs. Limited demographic information will be collected, maintaining participant anonymity. There are no identified or anticipated risks or potential for discomfort associated with participation in this study.

Any information or personal details gathered in the course of the study are confidential, except as required by law. No individual will be identified in any publication of the results. Only Dr. Simon Boag and Natalie Roberts will have access to the data obtained. A summary of the results of the data can be made available to you on request. If interested, please email Natalie Roberts (natalie.roberts@students.mq.edu.au) for information following the completion of the project in November.

Participation in this study is entirely voluntary.

Appendix D: Demographics Questionnaire (DQ)

DEMOGRAPHIC QUESTIONNAIRE

1. What is your age (in years)?

   _____

2. What is the highest level of education you have completed?

- High School or equivalent
- Bachelor's Degree
- Master's Degree
- Doctoral Degree
- Other (please specify) _____

3. Which gender do you identify with?

- Male
- Female
- Other (please specify) _____

4. Which country do you currently live in?

   _____

Appendix E: Ethics

Dear Dr Boag,

Re: 'Towards the Development of an Integrative Measure of Spontaneous Cephalocaudal Paresthesia' (Ref: 5201500323)

The above application was reviewed by The Faculty of Human Sciences Human Research Ethics Sub-Committee. The Faculty Ethics Sub-Committee wishes to thank you for your well-written application. Approval has been granted, effective 17th April 2015. This email constitutes ethical approval only.

This research meets the requirements of the National Statement on Ethical Conduct in Human Research (2007). The National Statement is available at the following web site:

http://www.nhmrc.gov.au/_files_nhmrc/publications/attachments/e72.pdf.

The following personnel are authorised to conduct this research:

Dr Simon Boag
Miss Natalie Michelle Roberts

NB. STUDENTS: IT IS YOUR RESPONSIBILITY TO KEEP A COPY OF THIS APPROVAL EMAIL TO SUBMIT WITH YOUR THESIS.

Please note the following standard requirements of approval:

1. The approval of this project is conditional upon your continuing compliance with the National Statement on Ethical Conduct in Human Research (2007).

2. Approval will be for a period of five (5) years subject to the provision of annual reports.

Progress Report 1 Due: 17th April 2016
Progress Report 2 Due: 17th April 2017
Progress Report 3 Due: 17th April 2018
Progress Report 4 Due: 17th April 2019
Final Report Due: 17th April 2020

NB. If you complete the work earlier than you had planned you must submit a Final Report as soon as the work is completed. If the project has been discontinued or not commenced for any reason, you are also required to submit a Final Report for the project.

Progress Reports and Final Reports are available at the following website:

http://www.research.mq.edu.au/current_research_staff/human_research_ethics/application_resources

3. If the project has run for more than five (5) years you cannot renew approval for the project. You will need to complete and submit a Final Report and submit a new application for the project. (The five year limit on renewal of approvals allows the Committee to fully re-review research in an environment where legislation, guidelines and requirements are continually changing, for example, new child protection and privacy laws).

4. All amendments to the project must be reviewed and approved by the Committee before implementation.

Please complete and submit a Request for Amendment Form available at the following website:

http://www.research.mq.edu.au/current_research_staff/human_research_ethics/managing_approved_research_projects

5. Please notify the Committee immediately in the event of any adverse effects on participants or of any unforeseen events that affect the continued ethical acceptability of the project.

6. At all times you are responsible for the ethical conduct of your research in accordance with the guidelines established by the University. This information is available at the following websites:

http://www.mq.edu.au/policy/
http://www.research.mq.edu.au/for/researchers/how_to_obtain_ethics_approval/human_research_ethics/policy

If you will be applying for or have applied for internal or external funding for the above project it is your responsibility to provide the Macquarie University's Research Grants Management Assistant with a copy of this email as soon as possible. Internal and External funding agencies will not be informed that you have approval for your project and funds will not be released until the Research Grants Management Assistant has received a copy of this email.

If you need to provide a hard copy letter of approval to an external organisation as evidence that you have approval, please do not hesitate to contact the FHS Ethics at the address below.

Please retain a copy of this email as this is your official notification of ethics approval.

Yours sincerely,

Dr Anthony Miller
Chair
Faculty of Human Sciences
Human Research Ethics Sub-Committee

FHS Ethics

Faculty of Human Sciences | Level 3, C5C Building
Macquarie University, NSW 2109, Australia

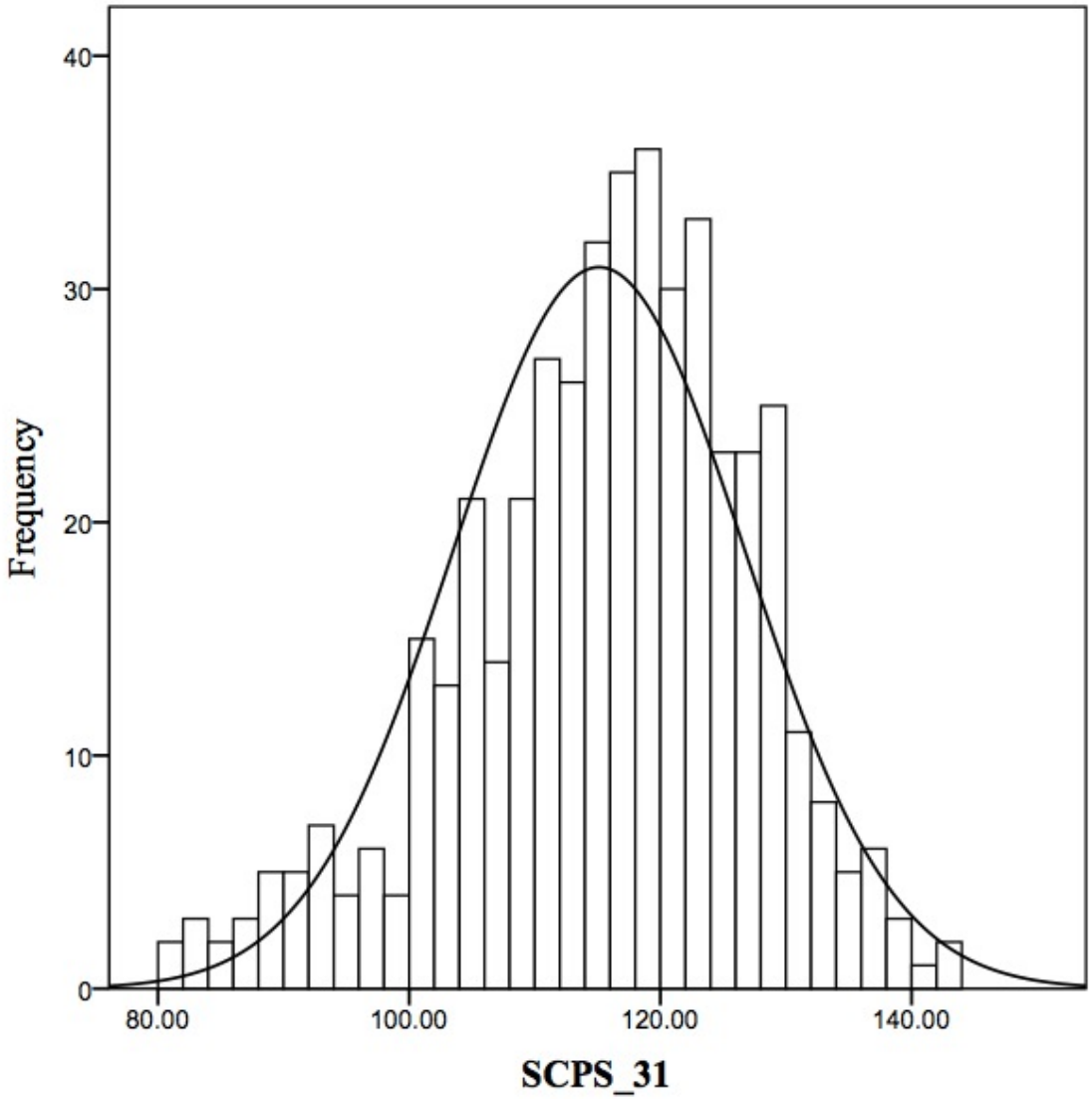
T: +61 2 9850 4197 | **http://www.research.mq.edu.au/**

CRICOS Provider Number 00002J. Think before you print.
Please consider the environment before printing this email.

This message is intended for the addressee named and may contain confidential information. If you are not the intended recipient, please delete it and notify the sender. Views expressed in this message are those of the individual sender, and are not necessarily the views of Macquarie University.

Appendix F: Normality Distribution

Normality Distribution of the SCPS-31



Note: N = 451. M = 115.12, *SD* = 11.63.

Appendix G: Demographic Statistics (N = 451)

Age

Age Distribution of Participants (N = 451)

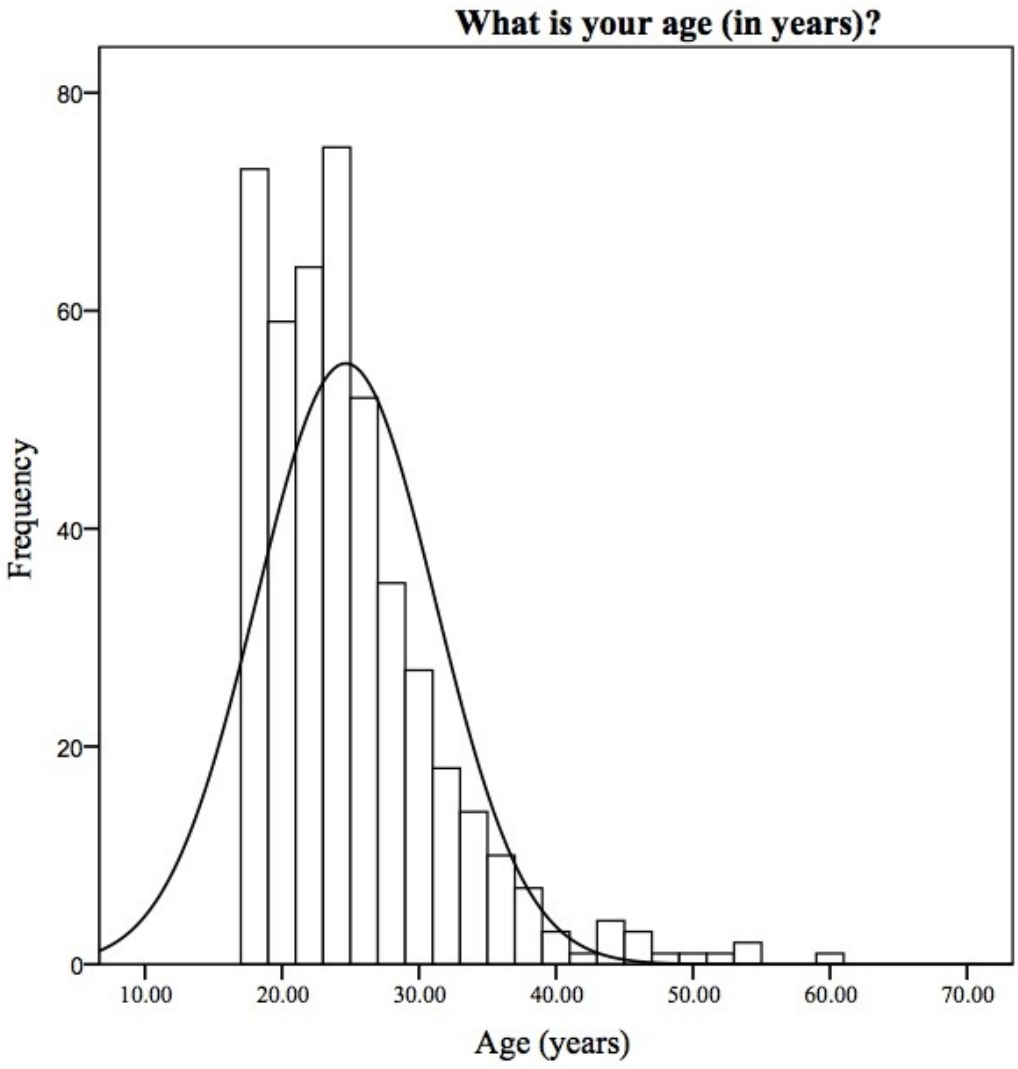


Table 13

Distribution of Participants by Level of Education (N = 451)

Level of Education	*f*	Percentage (%)	Cumulative %
High School or Equivalent	234	51.9	51.9
Trade Certificate	4	.9	52.8
Associate's Degree	11	2.4	55.2
Bachelor's Degree	159	35.3	90.5
Master's Degree	32	7.1	97.6
Doctoral Degree	9	2.0	99.6
Other	2	.4	100.0

f = frequency

Table 14

Distribution of Participants by Country (N = 451)

Country	*f*	Percentage (%)	Cumulative %
Argentina	1	.2	.2
Australia	22	4.9	5.1
Austria	1	.2	5.3
Belgium	5	1.1	6.4
Canada	50	11.1	17.5
China	3	.7	18.2
Czech Republic	1	.2	18.4
Denmark	4	.9	19.3
England	14	3.1	22.4
Finland	4	.9	23.3
France	5	1.1	24.4
Germany	7	1.6	25.9
Greece	1	.2	26.2
Ireland	3	.7	26.9
Israel	1	.2	27.2
Italy	1	.2	27.4
Japan	1	.2	27.6
Latvia	2	.4	28.0
Mexico	1	.2	28.3
New Zealand	9	2.0	30.3
Norway	5	1.1	31.4
Pakistan	1	.2	31.6
Poland	2	.4	32.0
Romania	1	.2	32.2
Saudi Arabia	1	.2	32.4
Scotland	1	.2	32.6
Singapore	1	.2	32.8
Sweden	9	2.0	34.8
The Netherlands	12	2.7	37.5
Turkey	2	.4	37.9
United Kingdom	33	7.3	45.2
United States of America	242	53.7	98.9
Venezuela	1	.2	99.1
Other	4	.9	100.0

f = frequency

Appendix H: Demographic Statistics (N = 394)

Age

Age Distribution of Participants (N = 394)

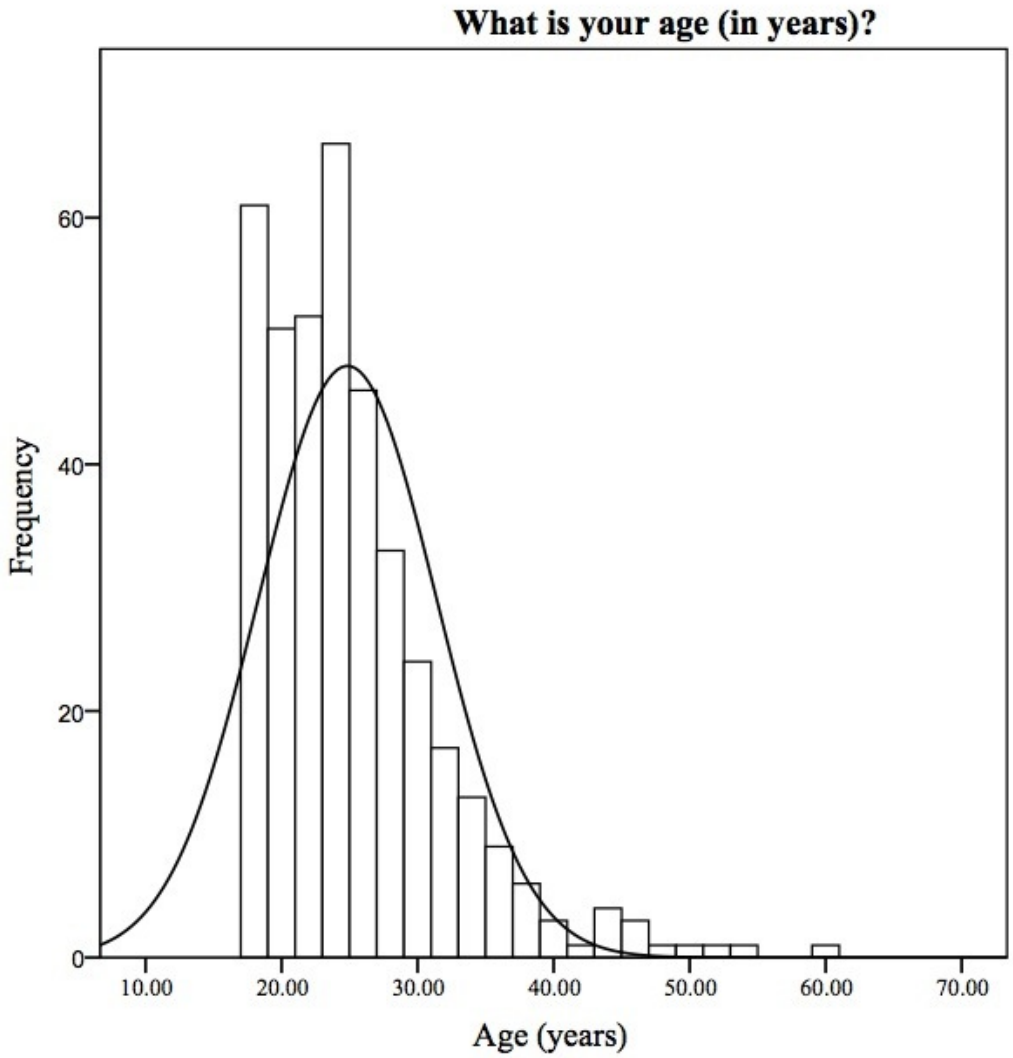


Table 15

Distribution of Participants by Level of Education (N = 394)

Level of Education	*f*	Percentage (%)	Cumulative %
High School or Equivalent	197	50.0	50.0
Trade Certificate	4	1.0	51.0
Associate's Degree	9	2.3	53.3
Bachelor's Degree	143	36.3	89.6
Master's Degree	30	7.6	97.2
Doctoral Degree	9	2.3	99.5
Other	2	.5	100.0

f = frequency

Table 16

Distribution of Participants by Country (N = 394)

Country	*f*	Percentage (%)	Cumulative %
Australia	20	5.1	5.1
Austria	1	.3	5.3
Belgium	2	.5	5.8
Canada	44	11.2	17.0
China	3	.8	17.8
Czech Republic	1	.3	18.0
Denmark	3	.8	18.8
England	13	3.3	22.1
Finland	4	1.0	23.1
France	5	1.3	24.4
Germany	6	1.5	25.9
Greece	1	.3	26.1
Ireland	2	.5	26.6
Israel	1	.3	26.9
Italy	1	.3	27.2
Japan	1	.3	27.4
Latvia	2	.5	27.9
Mexico	1	.3	28.2
New Zealand	9	2.3	30.5
Norway	5	1.3	31.7
Pakistan	1	.3	32.0
Poland	2	.5	32.5
Romania	1	.3	32.8
Saudi Arabia	1	.3	33.1
Scotland	1	.3	33.4
Singapore	1	.3	33.7
Sweden	9	2.3	34.0
The Netherlands	10	2.5	36.3
Turkey	1	.3	38.9
United Kingdom	30	7.6	46.4
United States of America	208	52.8	99.9
Venezuela	1	.3	99.2
Other	3	.8	100.0

f = frequency

Appendix I: Inter-Item Correlations for the Five SCPS-21 Subscales

Table 17

Inter-item Correlations for the Movement Subscale

Item	Q29	Q23	Q28	Q24	Q27
Q29		.511**	.395**	.357**	.381**
Q23			.214**	.386**	.460**
Q28				.258**	.233**
Q24					.240**
Q27					

Note. N = 451. **p < .01 (2-tailed); *p <.05.

Table 18

Inter-item Correlations for the Sensation Subscale

Item	Q21	Q25	Q22	Q30
Q21		.399**	.387**	.271**
Q25			.224**	.581**
Q22				.222**
Q30				

Note. N = 451. **p < .01 (2-tailed); *p <.05.

Table 19

Inter-item Correlations for the Affect Subscale

Item	Q17	Q12	Q16	Q11	Q13
Q17		.529**	.637**	.477**	.424**
Q12			.449**	.653**	.296**
Q16				.348**	.426**
Q11					.211**
Q13					

Note. N = 451. **p < .01 (2-tailed); *p <.05.

Table 20

Inter-item Correlations for the Relaxation Subscale

Item	Q14	Q9
Q14		.601**
Q9		

Note. N = 451. **p < .01 (2-tailed); *p <.05.

Table 21

Inter-item Correlations for the Cognition Subscale

Item	Q10	Q2	Q8	Q4	Q3
Q10		.590**	.546**	.392**	.339**
Q2			.471**	.384**	.372**
Q8				.300**	.294**
Q4					.301**
Q3					

Note. N = 451. **p < .01 (2-tailed); *p <.05.

Appendix J: Inter-Item Correlations Across Subscales

Inter-Item Correlations for All SCPS-21 Items

Item	29	23	28	24	27	21	25	22	30	17	12	16	11	13	14	9	10	2	8	4	3
Q29		.501**	.386**	.352**	.370**	.245**	.244**	.195**	.277**	.246**	.278**	.170**	.284**	.102*	.045	.038	.243**	.182**	.209**	.127**	.177**
Q23			.200 **	.382**	.449**	.355**	.454**	.261**	.349**	.220**	.205**	.167**	.180**	.147**	.141**	.137**	.091	.105*	.147**	.038	.051
Q28				.253**	.222**	.070	.098*	.209**	.117*	.215**	.165**	.194**	.186**	.039	.096*	.126**	.180**	.202**	.184**	.175**	.101*
Q24					.235**	.204**	.227**	.238**	.243**	.084	.070	.093*	.143**	-.050	.000	.039	.100*	.139**	.111*	.049	.034
Q27						.237**	.304**	.206**	.311**	.213**	.196**	.125**	.176**	.101*	.108*	.098*	.088	.104*	.163**	.083	.058
Q21							.308**	.383**	.242**	.200**	.196**	.238**	.152**	.167**	.018	-.010	.115*	.069	.074	-.016	-.013
Q25								.209**	.509**	.139**	.118*	.230**	.074	.131**	.123**	.115*	-.066	-.037	-.001	-.031	-.014
Q22									.214**	.039	.145**	.099*	.142**	.098*	.041	.057	.180**	.190**	.186**	.063	.065
Q30										.112*	.072	.175**	.061	.061	.033	.068	-.008	-.061	.057	-.028	-.024
Q17											.520**	.597**	.465**	.364**	.319**	.211**	.231**	.178**	.255**	.013	.133**
Q12												.430**	.635**	.269**	.166**	.107*	.358**	.320**	.318**	.116*	.179**
Q16													.332**	.376**	.263**	.192**	.144**	.134**	.194**	-.021	.028
Q11														.184**	.092	.064	.486**	.370**	.343**	.189**	.162**
Q13															.361**	.146**	.030	.091	.127**	-.055	.077
Q14																.567**	.041	.117*	.144**	.015	.132**
Q9																	.161**	.181**	.254**	.146**	.195**
Q10																		.592**	.526**	.380**	.322**
Q2																			.461**	.368**	.366**
Q8																				.290**	.267**
Q4																					.305**

Note. N = 451. **$p < .01$ (2-tailed); *$p < .05$.

References

Ahuja, N. K. (2013). It feels good to be measured: Clinical role-play, Walker Percy, and the tingles. *Perspectives in Biology and Medicine, 56, 3*, 442-451.

Allen, R. M., Haupt, T. D., & Jones, R. W. (1964). Analysis of peak experiences reported by college students. *Journal of Clinical Psychology,* 207-213.

Andersen, J. (2014). Now you've got the shiveries: Affect, intimacy, and the ASMR whisper community. *Television & New Media, 1*, 1-18.

Bagby, R. M., Parker, J. D., & Taylor, G. J. (1994). The twenty-item Toronto Alexithymia Scale—I. Item selection and cross-validation of the factor structure. *Journal of Psychosomatic Research*, *38, 1*, 23-32.

Bagby, R. M., Taylor, G. J., & Ryan, D. (1986). Toronto Alexithymia Scale: Relationship with personality and psychopathology measures. *Psychotherapy and Psychosomatics*, *45,* 4, 207-215.

Barratt, E. L. & Davis, N. J. (2015). Autonomous sensory meridian response (ASMR): A flow-like mental state. *PeerJ, 3:e851*, 1-17.

Barušs, I. (2003). *Alterations in Consciousness: An Empirical Analysis for Social Scientists*, Washington, DC: American Psychological Association.

Barušs, I. (2012). What We Can Learn about Consciousness from Altered States of Consciousness. *Journal of Consciousness Exploration & Research*, *3,* 7, 805-819.

Basto, M., & Pereira, J. M. (2012). An SPSS R-Menu for ordinal factor analysis. *Journal of Statistical Software*, *46, 4*, 1-29.

Bourguignon, E. (1973). Religion, altered states of consciousness, and social change. The Ohio State University Press.

Brown, J. D. (2009). Choosing the right type of rotation in PCA and EFA. *JALT Testing and Evaluation SIG Newsletter, 13, 3*, 20-25.

Cardeña, E. (2014). A call for an open, informed study of all aspects of consciousness. *Frontiers in Human Neuroscience*, *8,* 1-4.

Child, D. (1990). *The essentials of factor analysis*. Cassell Educational.

Christopher, J. C., Manaster, G. J., Campbell, R. L., & Weinfeld, M. B. (2002). Peak experiences, social interest, and moral reasoning: An exploratory study. *The Journal of Individual Psychology, 58*, 35-51.

Cleland, C., Magura, S., Foote, J., Rosenblum, A., & Kosanke, N. (2005). Psychometric properties of the Toronto Alexithymia Scale (TAS-20) for substance users. *Journal of Psychosomatic Research*, *58, 3,* 299-306.

Colizoli, O., Murre, J. M. J., & Rouw, R. (2013). A taste for words and sounds: a case of lexical-gustatory and sound-gustatory synesthesia. *Frontiers in Psychology, 4*, 1-16.

Strauss, A. L., & Corbin, J. M. (1990). *Basics of qualitative research* (Vol. 15). Newbury Park, CA: Sage.

Costello, A., & Osborne, J. (2005). Best practices in exploratory factor analysis: Four.

Creswell, J. W., & Miller, D. L. (2000). Determining validity in qualitative inquiry. *Theory Into Practice*, *39,* 3, 124-130.

Csikszentmihalyi, M. (1993). *The evolving self.* New York: Harper & Row.

Dittrich, A. (2003). Functional neuroanatomy of altered states of consciousness: The transient hypofrontality hypothesis. *Consciousness and Cognition, 12*, 231-256.

Donaldson, S. I., & Grant-Vallone, E. J. (2002). Understanding self-report bias in organizational behavior research. *Journal of Business and Psychology*, *17,* 2, 245-260.

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.

Field, A. (2005). Discovering statistics with SPSS. London: Sage.

Freeman, W. J. (1998. A neurobiological role of music in social bonding. *Brain, Music and Dance, 1,* 411-424.

Garcia-Romeu, A. P. (2012). Self-transcendence: Measurement and experience (Unpublished doctoral dissertation). Institute of Transpersonal Psychology, Palo Alto, California.

George, D., & Mallery, P. (2003). Frequencies. SPSS for Windows step by step: A simple guide and reference, 11, 20-52.

Goldstein, A. (1980). Thrills in response to music and other stimuli. *Physiological Psychology. 8*, 126-129.

Gray, J. A. (1970). The psychophysiological basis of introversion-extraversion. *Behaviour Research and Therapy*, *8,* 3, 249-266.

Grewe, O., Nagel, F., Kopiez, R., & Altenmuller, E. (2007). Listening to music as a recreative process - Physiological, psychological, and psychoacoustical correlates of chills and strong emotions. *Music Perception, 24*, 297-314.

Grewe, O., Katzur, B., Kopiez, R., & Altenmuller, E. (2010). Chills in different sensory domains: Frisson elicited by acoustical, visual, tactile and gustatory stimuli. *Psychology of Music, 39*, 220-239.

Dillman, D. A., Eltinge, J. L., Groves, R. M., & Little, R. J. (2002). Survey nonresponse in design, data collection, and analysis. *Survey nonresponse*, 3-26.

Hallaq, J. H. (1977). Scaling and factor analyzing peak experiences. *Journal of Clinical Psychology, 33*, 77-82.

Harrison, L, & Loui, P. (2014). Thrills, chills, frisson, and skin orgasms: toward an integrative model of transcendent psychophysiological experiences in music. *Frontiers in Psychology, 5*, 1-6.

Hoaglin, D. C., and Iglewicz, B. (1987), Fine tuning some resistant rules for outlier labeling, *Journal of American Statistical Association, 82*, 1147-1149.

Hsieh, H. F., & Shannon, S. E. (2005). Three approaches to qualitative content analysis. *Qualitative health research*, *15,* 9, 1277-1288.

Iglewicz, B., & Banerjee, S. (2001, August). A simple univariate outlier identification procedure. In *Proceedings of the annual meeting of the american statistical association*.

Irwin, H. J. (1999). Pathological and nonpathological dissociation: The relevance of childhood trauma. *The Journal of Psychology: Interdisciplinary and Applied, 133*, 157-164.

Jackson, S. A. & Marsh, H. W. (1996). Development and validation of a scale to measure optimal experience: The flow state scale. *Journal of Sport and Exercise Psychology, 18*, 17-35.

Jackson, S. A., Thomas, P. R., Marsh, H. W., & Smethurst, C. J. (2001). Relationship between flow, self-concept, psychological skills, and performance. *Journal of Applied Sport Psychology, 13*, 129-153.

Jackson, S. A., & Eklund, R. C. (2002). Assessing flow in physical activity: The Flow State Scale-2 and Dispositional Flow Scale-2. *Journal of Sport & Exercise Psychology*.

Jackson, S. A., Martin, A. J., & Eklund, R. C. (2008). Long and short measures of flow: The construct validity of the FSS-2, DFS-2, and new brief counterparts. *Journal of Sport & Exercise Psychology*, *30,* 5, 561.

James, W. (1890). *The Principles of Psychology.* New York: Holt.

James, W. (1902). *The Varieties of Religious Experience: A Study in Human Nature.* New York: Modern Library.

Jastreboff, M. M., & Jastreboff, P. J. (2002). Decreased sound tolerance and tinnitus retraining therapy (TRT). *The Australian and New Zealand Journal of Audiology, 24*, 2, 74-84.

Jones, S. (2014). A Scientific and Theoretical Study on Frisson and Autonomous Sensory Meridian Response. Retrieved from http://asmr.ciphersink.net/ASMR_And_Frisson.doc.

Jung, C. G., & von Franz, M. L. (1968). *Man and his symbols*. Laurel.

Juslin, P. N. (2013). From everyday emotions to aesthetic emotions: Towards a unified theory of musical emotions. *Physics of Life Reviews*, *10*(3), 235-266.

Kallio, S., & Revonsuo, A. (2003). Hypnotic phenomena and altered states of consciousness: A multilevel framework of description and explanation. *Contemporary Hypnosis*, *20*(3), 111-164.

Kihlstrom (1993). The continuum of consciousness. *Consciousness and Cognition, 2*, 334-354.

Konecni, V. J. (2005). The aesthetic trinity: Awe, being moved, thrills. *Bulletin of Psychology and the Arts*, *5,* 2, 27-44.

Larsen, R. J. & Ketelaar, T. (1989). Extraversion, neuroticism and susceptibility to positive and negative mood induction procedures. *Personality and Individual Differences, 10*, 1221-1228.

Le Merrer, J., Becker, J. A. J., Befort, K., & Kieffer, B. L. (2009). Reward processing by the opioid system in the brain. *Physiological Reviews, 89*, 1379-1412.

Lee-Teng, E. (1965). Trance-susceptibility, induction-susceptibility, and acquiescence as factors in hypnotic performance. *Journal of Abnormal Psychology*, *70,* 5, 383.

Loevinger, J. (1957). Objective tests as instruments of psychological theory: Monograph supplement 9. *Psychological reports*, *3,* 3, 635-694.

Ludwig, A. M. (1966). Altered states of consciousness. *Archives of General Psychiatry, 15*, 225-234.

Maslow, A. H. (1964). *Religions, values, and peak-experiences* (Vol. 35). Columbus: Ohio State University Press.

Maslow, A. (1965). Eupsychian management. *A Journal, Homewood. III*.

Mason, O., Tyson, M., Jones, C., & Potts, C. (2005). Alexithymia: Its prevalence and correlates in a British undergraduate sample. *Psychology and Psychotherapy: Theory, Research and Practice, 78*, 1, 113-125.

McCrae, R. R. (2007). Aesthetic chills as a universal marker of openness to experience. *Motivation and Emotion, 31*, 5-11.

McInman, A. D., & Grove, J. R. (1991). Peak moments in sport: A literature review. *Quest, 43*, 333-351.

Møller, A. R. (2011). Misophonia, phonophobia, and "exploding head" syndrome. In *Textbook of tinnitus*. Springer: New York.

Móró, L. (2010). Hallucinatory altered states of consciousness. *Phenomenology and the Cognitive Sciences*, *9,* 2, 241-252.

Neuendorf, K. A. (2002). The content analysis guidebook. Sage: London.

Nusbaum, E. C., & Silvia, P. J. (2011). Shivers and timbres: Personality and the experience of chills from music. *Social Psychological and Personality Science*, *2*, 2, 199-204.

Panksepp, J. (1995). The emotional sources of" chills" induced by music. *Music Perception*, 171-207.

Polito, V., Langdon, R., & Brown, J. (2010). The experience of altered states of consciousness in shamanic ritual: The role of pre-existing beliefs and affective factors. *Consciousness and Cognition, 19*, 918-925.

Rawlinson, A. (1979). Altered states of consciousness. *Religion, 9*, 92-103.

Rudestam, K. E., & Newton, R. R. (2007). The method chapter: Describing your research plan. *Surviving your dissertation*, 87-115.

Santos, J. R. A. (1999). Cronbach's alpha: A tool for assessing the reliability of scales. *Journal of Extension, 37*, 2, 1-3.

Schäfer, T., Fachner, J., & Smukalla, M. (2013). Changes in the representation of space and time while listening to music. *Frontiers in Psychology*, *4,* 1-15.

Shapiro, D. H. (1983). Meditation as an altered state of consciousness: Contributions of western behavioural science. *The Journal of Transpersonal Psychology, 15,* 1, 61-81.

Shusterman, R. (2005). William James, somatic introspection, and care of the self. *The Philosophical Forum, 4*, 419-440.

Silvia, P. J., & Nusbaum, E. C. (2011). On personality and piloerection: Individual differences in aesthetic chills and other unusual aesthetic experiences. *Psychology of Aesthetics, Creativity, and the Arts*, *5,* 3, 208-214.

Sloboda, J. A. (1991). Music Structure and Emotional Response: Some Empirical Findings. *Psychology of Music*, *991*(9), L120.

Smith, J. C., Amutio, A., Anderson, J. P., & Aria, L. A. (1996). Relaxation: Mapping an uncharted world. *Biofeedback and self-regulation*, *21*(1), 63-90.

St John, G. (2011). Spiritual Technologies and Altering Consciousness in Contemporary Counterculture. *Altering Consciousness: Multidisciplinary Perspectives: Multidisciplinary Perspectives*, *2*, 203-225.

Strauss, A. L., & Corbin, J. M. (1990). *Basics of qualitative research* (Vol. 15). Newbury Park, CA: Sage.

Suhr, D. D. (2006). Exploratory or confirmatory factor analysis? (pp. 1-17). Cary: SAS Institute.

Sussmann, M., & Robertson, D. U. (1986). The validity of validity: An analysis of validation study designs. *Journal of Applied Psychology*, *71,* 3, 461.

Tart, C. T. (1972). Altered states of consciousness.

Tart, C. T. (1976). Scientific foundations for the study of altered states of consciousness.

Tellegen, A., & Atkinson, G. (1974). Openness to absorbing and self-altering experiences ("absorption"), a trait related to hypnotic susceptibility. *Journal of Abnormal Psychology*, *83,* 3, 268.

Thorne, F. C. (1963). The clinical use of peak and nadir experience reports. *Journal of Clinical Psychology, 19*, 248-250.

Vaitl, D., Birbaumer, N., Gruzelier, J., Jamieson, G. A., Kotchoubey, B., Kübler, A., Lehmann, D., Miltner, W. H. R., Ott, U., Putz, P., Sammer, G., Strauch, I., Strehl, U., Wakermann, J., & Weiss, T. (2005). Psychobiology of altered states of consciousness. *Psychological Bulletin*, *131,* 1, 98-127.

Weinberger, J. (2000). William James and the unconscious: Redressing a century-old misunderstanding. *Psychological Science, 11*, 439-445.

Wise, T. N., Mann, L. S., Sheridan, M. J. (2000). Relationship between alexithymia, dissociation and personality in psychiatric outpatients. *Psychotherapy and Psychosomatics, 69,* 3, 123-127.

Worthington, R. L., & Whittaker, T. A. (2006). Scale development research a content analysis and recommendations for best practices. *The Counselling Psychologist*, *34,* 6, 806-838.

Wu, M. S., Lewin, A. B., Murphy, T. K., & Storch, E. A. (2014). Misophonia: incidence, phenomenology, and clinical correlates in an undergraduate student sample. *Journal of clinical psychology*, *70,* 10, 994-1007.