



Design for play for cognitive load management in young adults

by

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Dedication

This thesis is dedicated to my parents whose love, guidance and unwavering support have shaped who I am today. They have always encouraged me to pursue opportunities and rise to challenges, building me up with strength, resilience and confidence. Their support and encouragement have made everything possible. Thank you for seeing who I could be before I did.

Abstract

Contemporary society is epitomised by constant digital connectivity, informational exposure and sensory bombardment. However, play has multiple benefits that can influence personal, relational and societal wellbeing. This design research project explores how play-based design can support cognitive load management among young adults who live in Cape Town and manage multiple roles and responsibilities. The study adopts a practice-led exploratory qualitative approach. The design research employs two co-design workshops, interviews, inductive thematic analysis and deductive analysis. The findings reveal that cognitive overload is both a systemic and embodied experience. This design research reframes play as a restorative tool that supports cognitive balance. The study introduces five design principles for play-based interventions and demonstrates how co-design methods can be adopted when designing for play-based interventions that support cognitive load management. This research contributes to theory, design and methodology by positioning play as a strategy for cognitive restoration in the context of contemporary adult life.

Keywords: play based design, cognitive load management, co-design, practice-led research, young adults

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Clarification of terms

Cognitive overload – “the situation in which the demands placed on a person by mental work (the cognitive load) are greater than the person’s mental abilities can cope with” (American Psychological Association, 2018).

Play – “a pleasurable activity motivated by artefacts, environments, experiences, other players and other interactions facilitated by these actors” (Heljakka, 2020).

Play deprivation – “the unmet need for play” (Chinyakata et al., 2022:192).

CHAPTER ONE: INTRODUCTION

Chapter one begins with the background of the research problem. Next, it presents the research problem, followed by the research question and sub-questions. The chapter then presents the objectives, delineation and the significance of the design research. Chapter one ends with an outline of this design research report.

1.1 BACKGROUND OF THE RESEARCH PROBLEM

In the modern world, sensory cues and an influx of information overpower our senses and ability to cope. Cognitive load is based in theories of human architecture and asserts that a human's working memory has limited capacity (Bannert, 2002:139). Cognitive load has been described as the:

“Psychological condition, wherein individuals are overwhelmed by an excessive influx of information, leading to a scarcity of psychological resources for problem-solving or task completion, thereby burdening the cognitive system” (Yu et al., 2024:13388).

Cognitive load can increase because of sensory stimuli (Tirrell et al., 2026:1) and an influx of information (Yu et al., 2024:13388). The phenomenon of information overload occurs when an individual's capacity to process data exceeds a threshold, leading to overwhelming attempts to process additional information or make accurate decisions due to an excess of data (Kashada et al., 2020:53).

“Our brains did not evolve to function in a society like ours. We are flooded with endless news to read, notifications to click on, posts to ‘like’, activities to sign the kids up for, medical conditions to ‘ask the doctor about’ and goods to buy. Technology has brought the entire world to the palm of our hands, while our support systems are spread out farther and wider than ever. The volume and pace of information to be processed can overwhelm our cognitive resources. This perfect storm of brain-unfriendly circumstances-depleted internal resources and cognitive overload from excessive external demands is the reason many of us find ourselves constantly ‘glitching’. We find musty clothes in the dryer, the overdue work report in or ‘drafts’ folder and our car keys in the fridge” (Menchola, 2024:3).

The implications of information overload are diverse, including diminished concentration, hastiness, irritability, entering trance-like states, compromised task quality, increased stress levels, diminished productivity, impaired decision-making abilities, an inability to disconnect and mental and psychological issues (Kashada et al., 2020:53). Information overload has been amplified because of the increased amount of information available due to mobile technology (Kashada et al., 2020:54).

Although sensory experiences incorporate physical sensations, individuals possess limited capability to perceive and process sensory inputs. Consequently, sensory overload arises when individuals struggle to effectively process sensory cues (Doucé & Adams, 2020:2), especially within environments overflowing with stimuli, resulting in difficulties with the perceptual and cognitive demands imposed by their surroundings (Kim et al., 2021:1). The effects of sensory overload include confusion, frustration and withdrawal (Doucé & Adams, 2020:2).

Young adulthood is being associated with increased cognitive demands. Research shows that Generation Z young adults, in comparison to previous generations, experience increased anxiety and are exposed to more environmental stressors (Nekic, 2023:1020). A study showed that young adults aged eighteen to thirty-four have reported higher stress levels than older adults with the average stress levels being a 6 out of 10 in opposition to the latter's 3.4 out of 10 (Medaris, 2023). The study reported that out of these young adults (Medaris, 2023):

- 67% reported that stress negatively affects their ability to concentrate
- 58% reported experiencing stress that feels completely overwhelming
- 50% reported experiencing emotional numbness from prolonged stress

Young people represent 60% of the national population in South Africa (KetaMind, n.d.). Studies show that distress can be attributed to factors such as poverty, unemployment, exposure to violence and limited access to mental health resources (KetaMind, n.d.). Between a third and a half of South African youth, aged fifteen to thirty-four, are determined to be not in employment, education or training (NEET) (Mhlaba et al., 2025:1). Young South Africans experience increased vulnerability to poor mental and physical health, reduced physical activity and increased substance use (Mhlaba et al., 2025:1). Accusatively, these statistics suggest that young adults are vulnerable to psychological and cognitive strain.

Play is a topic that has been extensively researched, and literature has explored its positive impact on trauma, rehabilitation and physiological, behavioural, social and emotional issues (Whitton, 2022:10). Tonkin & Whitaker (2021:1-2) discuss that play and playfulness increase the human experience by improving mental health and overall wellbeing and the importance of playfulness and humour as a coping tool in times of heightened stress and emotional distress. Whitton (2022:5) echoes that statement by stating that play and playfulness have physical, mental and social benefits. Play influences how individuals relate to themselves and others in the world (Powell, 2023:24).

1.2 STATEMENT OF THE RESEARCH PROBLEM

The increasing importance of cognitive load management in the contemporary society is evident as more individuals are seeking support for stress and mental fatigue. Cognitive overload often leads to heightened levels of stress and diminished focus, impacting their wellbeing. There is a growing awareness of these challenges, however, there remains a lack of play-based design interventions that address cognitive load management. This design research project explores how play-based design can support cognitive load management among young adults (aged eighteen to thirty-five), who are managing multiple roles and responsibilities while living in Cape Town, South Africa.

1.3 RESEARCH QUESTIONS

Main research question

How can design for play be utilised to support cognitive load management for young adults living in Cape Town who are managing multiple roles and responsibilities?

Sub-question one

What factors contribute to cognitive overload in young adults living in Cape Town who manage multiple roles and responsibilities?

Sub-question two

What types of play-based interventions could help support young adults living in Cape Town, who manage multiple roles and responsibilities, with cognitive load management?

Sub-question three

How can co-design inform the development of a play-based design intervention that addresses the cognitive load management needs of young adults living in Cape Town who manage multiple roles and responsibilities?

1.4 OBJECTIVES OF THE RESEARCH

The objectives of the design research project provide a guide to achieving the overarching aim of the study. The aim of the design research is to explore how play-based design can support cognitive load management in young adults in Cape Town who manage multiple roles and responsibilities. Table 1 discusses the research objectives in relation to the research questions.

Table 1: Research objectives linked to research questions

Source: Created by author

Research question	Objective
How can design for play be utilised to support cognitive load management for young adults living in Cape Town who are managing multiple roles and responsibilities?	To explore how play-based design can support young adults, living in Cape Town, who manage multiple roles and responsibilities. To make a contribution to practical knowledge within design for cognitive load management and co-design.
What factors contribute to cognitive overload in young adults living in Cape Town who manage multiple roles and responsibilities?	To explore the lived experiences and challenges of cognitive overload in young adults living in Cape Town through participatory engagement.
What types of play-based interventions could help support young adults living in Cape Town, who manage multiple roles and responsibilities, with cognitive load management?	To investigate the relationship between play and cognitive overload in young adults. To explore how play can be incorporated into future practical design interventions that support cognitive load management.
How can co-design inform the development of a play-based design intervention that addresses the cognitive load management needs of young adults living in Cape Town who manage multiple roles and responsibilities?	To facilitate the prototyping of play-based design interventions that address the identified needs and contexts of young adults, living in Cape Town, who manage multiple roles and responsibilities. To make a contribution to methodological knowledge within co-design practice.

Click or tap here to enter text.

1.5 DELINEATION OF THE RESEARCH

This design research project focuses on young adults, age eighteen to thirty-five, living in Cape Town and managing multiple roles and responsibilities. This study is situated within a practice-led and co-

creation context. It employs qualitative design methods through two co-design workshops with participants and two key informant interviews. The focus of the study is to explore play-based design to support cognitive load management in young adults, living in Cape Town, with multiple roles and responsibilities.

The design research did not aim to provide generalisable statistical findings or clinical evaluations of mental health outcomes. The design research project explores contextual design insights, artefacts and principles that can inform future play-based design interventions. The scope of the design research is limited to young adults within a specific geographic context. It reflects an exploratory design inquiry rather than large-scale intervention.

1.6 SIGNIFICANCE OF THE RESEARCH

The design research project highlights an important issue emerging from the rapidly changing contemporary world. Digital technology has contributed to an increase in information availability. Constant exposure to information and sensory stimuli has a growing impact on cognitive overload. Existing literature recognises the benefits of adult play; however, a notable research gap remains in the domain of play-based design for young adults who experience cognitive overload, particularly within the localised context of Cape Town, South Africa.

In contemporary Cape Town, young adults who experience cognitive overload have the potential to benefit from play-based design intervention. Play-based design interventions that support cognitive load management offers practical real-world applications. The research identifies design-principles for play-based intervention that can inform future play-based design interventions.

1.7 DESIGN RESEARCH REPORT OUTLINE

This design research report is structured into eight chapters. Each chapter contributes to developing an understanding of how play-based design can support cognitive load management among young adults in Cape Town, South Africa.

Chapter one introduces the research topic by outlining the background and problem statement of this design study. It establishes the research questions and objectives and discusses the significance and delineation of the research.

Chapter two explores existing literature on play. It defines cognitive load with reference to young adulthood and South Africa, play in the context of this design study, explores play in adulthood and investigates that impact of play on well-being. This chapter synthesises key design principles for play-based intervention from the literature and presents the conceptual framework that underpins this study.

Chapter three outlines the qualitative, practice-led, co-creation design research approach that is adopted in this study. It discusses the position of the researcher and the methodological framework. The chapter presents sampling and recruitment strategies, design methods, data collection and data analysis techniques. Ethical considerations are also detailed in this chapter.

Chapter four and five presents and analyses the design process and outcomes that emerged from the co-design workshops and key informant interviews. It outlines the inductive and deductive analysis' that was used to interpret the data.

Chapter six analyses the findings presented in chapter four using the Three Horizons Framework. The findings are presented in the three horizons within the three identified domain domains in which some young adults experience cognitive overload.

Chapter seven interprets and discusses the findings in relation to the study's aim with each section corresponding to one of the research questions. It links the findings to theory and design practice, demonstrating how play can serve as a restorative and relational design strategy.

Chapter eight summarises the design research project and findings. It highlights the theoretical, methodological and practical contributions that emerged from this study. In addition, this chapter provides recommendations for policy, further design research and future design development.

1.8 CONCLUSION

Chapter one introduced the foundation of this design research project. The chapter began with an exploration of the research background, a definition of the research problem, established the research questions and discussed the research objectives. This chapter then discussed the delineation of the research followed by the significance of the research. Chapter one ends with an outline of the design research report. Chapter two will review existing literature based in play and extract design principles for play-based intervention.

CHAPTER TWO: LITERATURE REVIEW

Chapter two investigates how play-based design can support cognitive load management in young adults who manage multiple roles and responsibilities. First, the literature review explores cognitive load in young adulthood through existing literature. It then defines the concept of play, with specific reference to the core characteristics and motivations, the psychological and communal mindset and contexts, forms and modalities. Next, it examines play beyond childhood, addressing the barriers to engaging in play in adulthood. The discussion extends to the benefits of play with reference to four case studies. One case study explores play deprivation and three illustrate play-based design as a resource to support cognitive balance. The literature review then synthesises and extracts key design principles for play-based interventions, outlining guidelines for structuring playful experiences. The final section of the literature review discusses the conceptual framework of the research - that combines play theory with the double diamond framework and Three Horizons Model.

2.1 UNDERSTANDING COGNITIVE LOAD IN YOUNG ADULTHOOD

Information is experienced through multiple senses simultaneously which work together to generate a clear understanding of what is happening around an individual (Tirrell et al. 2026:1). The senses work together to combine information, which is vital for perception, decision-making and helps people function effectively in complex and changing environments (Tirrell et al., 2026:1). Bannert (2002:139) refers to Cognitive Load Theory which is based on how the human brain processes information, and it assumes that working memory has a limited capacity. Tirrell et al. (2026:2) discusses the concept of cognitive-perceptual load which refers to the mental effort that is needed to process information and successfully complete tasks and suggests that task performance can be hindered when a task requires more mental resources than a person has available. Cognitive overload occurs when individuals have limited mental capacity to think clearly and complete tasks effectively due to overwhelm caused by an excess of information (Yu et al., 2024:13388). Complex tasks require more sensory processing and mental control which leaves fewer resources left for other parts of the task as it uses more attention and working memory (Tirrell et al., 2026:2). Everyday activities require individuals to focus on multiple external stimuli simultaneously which places higher demands on mental processes such as attention and working memory (Tirrell et al., 2026:2).

Nekic (2023:1019) discusses emerging adulthood and defines it as individuals between the ages of eighteen and twenty-nine. Emerging adulthood is characterized by identity exploration, instability and the navigation of concurrent life transitions (Nekic, 2023:1019). Engels et al. (2021:2) asserts that young adults often balance interconnected social roles such as employment, education, relationships and family responsibilities. It has been argued that disruptions to one role or responsibility can influence others and result in increased levels of cognitive strain (Engels et al., 2021:2). Nekic (2023:1021) discusses intolerance for uncertainty which has been identified as a cognitive mechanism that contributes to increased levels of stress. This generates a heightened risk to the impairment of problem solving, decision-making and emotional exhaustion due to persistent worry, rumination and anticipatory anxiety (Nekic, 2023:1021).

It can be argued that these cognitive processes are especially relevant within the transitional life phases of a young adult. This intensified stress and anxiety can be contributed to uncertainty regarding future outcomes. Research conducted across sub-Saharan Africa reported that among young people (Mumbauer et al., 2024:384):

- 27% experience depression
- 30% experience anxiety
- 41% experience emotional or behavioural difficulties

The literature highlights the vulnerability of young adults and reinforces the importance of exploring strategies that support cognitive load management within this demographic.

2.2 THE ESSENCE OF PLAY

For this study, the discussion around play focuses on analogue play, excluding video gaming and other forms of digital play. Analogue play presents similar advantages to digital play while reducing potential risks that have been attributed to excessive screen time. Brailovskaia et al. (2022:1) highlight the prevalence of Internet Gaming Disorder during the pandemic and demonstrated the positive effects of reducing gaming time on mental health. While video games can provide stress relief and connectivity for some individuals, they may also worsen feelings of loneliness and anxiety, particularly when gaming becomes a form of escapism (Pallavicini et al., 2022). Therefore, focusing on analogue play instead of video gaming is in line with the objective of enhancing cognitive load management in young adults who experience cognitive overload.

2.2.1 Core Characteristics and Motivations

Academic literature has presented multiple definitions for the concept of play. Tonkin & Whitaker (2021:2) have stated that play has no defined outcome however the process of engaging in play is intrinsically motivated, pleasure-seeking and open-ended. Whitton (2022:2) has discussed play as a knowledge sharing tool and can be used to engage and motivate people. Play is absent of temporal and spatial constraints and encourages spontaneity, active involvement and intrinsic motivation (Hartt et al., 2023:1). Caillois (2001:6) states that play should be voluntary and enjoyable. Brown (2019) argues that manifests as a purposeless, voluntary, improvised and engaging activity that is characterised by temporal detachment, reduced self-awareness and inherent attraction.

2.2.2 Psychological and Communal Mindset

From a psychological perspective, play has been described as a playful mindset that is receptive to new experiences and learning through trial and error (Kang, 2020:573). Play has been argued to influence behavioural patterns and attitudes (Whitton, 2022:5-10). On a neurological level, play is argued to have relevance across age groups in embracing novelty (Kang, 2020:573). Play has been linked to the pre-frontal cortex which is responsible for cognitive organisation Kang (2020:573). Whitton (2022:4) argues that play is a communal experience that encourages joy, contentment and belonging.

2.2.3 Context, Form and Modalities

Play encourages participation in physical fitness, relaxation and entertainment as a recreational activity (Chinyakata et al., 2022:190). Literature argues that play holds value in the process rather than the outcome (Heljakka, 2020). Heljakka (2020) states that play is supported by artefacts, environments, experiences, players and interactions. The National Institute for Play (n.d.) defines three types of play:

- Free play – play that is intrinsically motivated and internally satisfying. It is characterised by self-selection, self-direction and imaginative involvement.
- Mixed-age play – play that encourages engagement across ages and diverse learning experiences.

- Adult-directed play – play that is led by adults and are often organised for children. It is characterised by a lack of intrinsic motivation and choice.

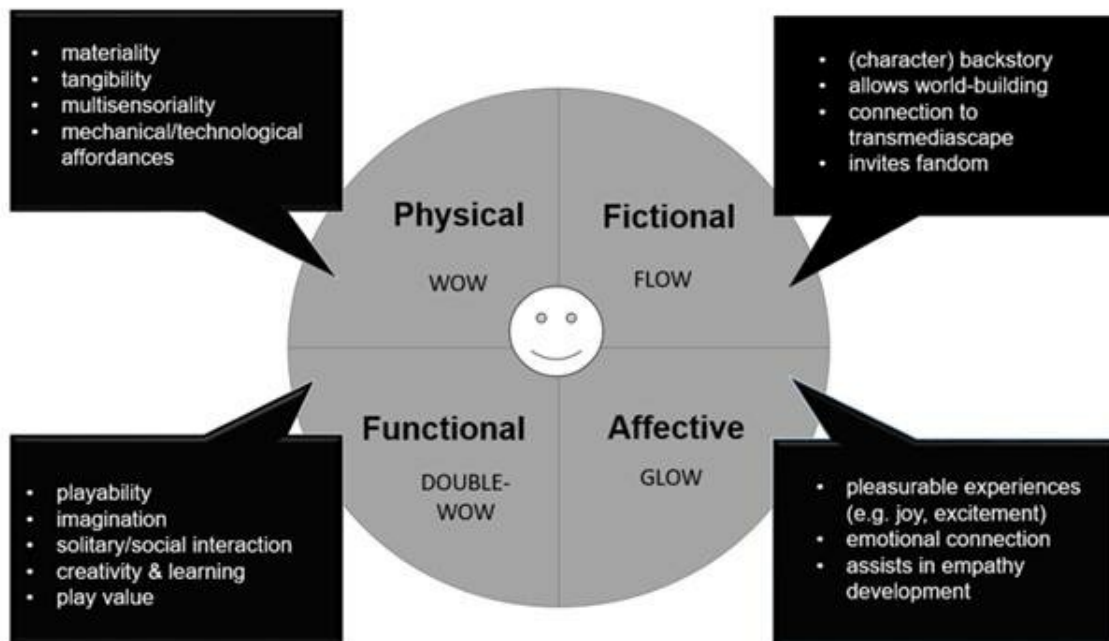


Figure 1: Dimensions of toy experience

Source: (Heljakka, 2020)

Literature argues that play is universal but acknowledges variations of engagement deriving from geographical locations, tools, systems and environments (Heljakka, 2020). Kang (2020:573) identifies two types of play: divergent and convergent. Divergent play is unbounded and encourages experimentation while convergent play is structured and can restrain innovation and creativity (Kang, 2020:573). Brown (2019) associates play with healthy human development and notes that it can manifest in solitary and social activities. Play assumes multiple forms encompassing social interactions, narrative weaving, physical movement, object manipulation, and imaginative exploration (Kang, 2020:574). Kang (2020:574) identifies eight play personas, including: the storyteller, artist/creator, collector, competitor, director, explorer, joker, and mover. Play artefacts and toys span physical, fictional, functional, and affective categories (Heljakka, 2020).

In this study, play is framed as a restorative practice. It is characterised by voluntary participation and is intrinsically motivated and open-ended. Playful experiences should allow individuals to temporarily detach from internal and external pressures and generate enjoyment from the process

rather than the outcome. The focus of play in the context of this design research is on analogue play and excludes digital play and video gaming.

2.3 PLAY BEYOND CHILDHOOD

Academic discourse predominantly centres on the concept of child play. The exploration of play in adulthood has only recently gained recognition. Childhood play receives positive attention for its influence on developing skills such as teamwork, creativity, problem-solving, communication and reasoning (Nance, 2022:164). The value that is associated with play diminishes as individuals move into adulthood (Powell, 2023:3). Instead, priority is given to education, work, familial responsibilities, and daily routines (Whitton, 2022:3).

Brown (2019) argues that adult play is undervalued. Research indicates that there is a societal perception that play is unproductive and adults are conditioned to disengage from it (Chinyakata et al., 2022:192). Adults who engage in play might be viewed as lacking seriousness and is often dismissed as an immature pursuit unless it aligns with economically productive and socially approved parameters (Powell, 2023:4). Adult play is limited to individuals with resources, time, energy, confidence and social networks (Whitton, 2022:3).

Academic literature shows unanimity in advocating for a universal acceptance of play across all age groups. Play has been noted as a fundamental human right that is essential for human existence at any life stage (Chinyakata et al., 2022:190). Adult play is a tool that supports creative thinking, imagination, problem-solving, stress relief and emotional wellbeing (Chinyakata et al., 2022:191). Nance (2022:165) argues that adult play is an unstructured and creative outlet that allows individuals to navigate stress, boredom, coping skills and social interaction.

2.4 THE POWER OF PLAY

Research highlights the benefits of adult play which has been linked to the development of cognitive skills (Whitton, 2022:5). Furthermore, play can be adopted to maintain cognitive, physical and social balance (Heljakka, 2020). Brown (2019) identifies play as an essential tool for building resilience and stress management. It is a universal activity that has been linked to navigating challenges and basic survival behaviours (Brown, 2019). It is argued that *homo ludens*, the playing human being, has

survived emotionally challenging events such as war through the adoption of playful and creative attitudes (Heljakka, 2020). Leading play expert, Stuart Brown (2019) observes:

“The evidence from play science demonstrates, also, that we all, children and adults, have untapped play-based resources that are there for us to access, which exist in us despite the many ongoing difficult circumstances. These play reservoirs and which have been provided for us by nature have persisted through past difficult and varied historic situations (famines, diseases, natural disasters, political upheavals, wars, etc.). By embracing them, they keep us upbeat, positive and resilient. When examining the lives of non-players, comparing them to play-fulfilled individuals, research has been able to show how play itself contributes to getting along better with ourselves, (play as a good anti-depressant) and certainly provides the tools to better get along non-violently, cooperatively and innovatively with each other”.

Chinyakata et al. (2022:191) associates play with stress relief, stimulation and cooperation. It has been noted that play benefits attention, cognitive reasoning, compassion, empathy and self-expression (Hartt et al., 2023:26). Whitton (2022:165) communicates that insufficient engagement with play correlates with the adoption of unhealthy coping mechanisms such as substance use, isolation, denial and avoidance. Furthermore, play has interpersonal and extra personal benefits such as improved community relationships and increase social connections (Hartt et al., 2023:2). Literature identifies four domains that encapsulate the therapeutic powers of play: communication facilitation, emotional balance and stress management, reinforcement of social relationships and growth of personal strengths (Heljakka, 2020).

2.4.1 Case Studies

The literature explores four case studies. One discusses the concept of play deprivation and three illustrate how play can be adopted to benefit individuals.

a) Play Deprivation

Play deprivation refers to the absence of adequate play (Chinyakata et al., 2022:192). A study conducted in the United States highlights a decreasing engagement with play within contemporary society. This decline has been associated with increased levels of depression, suicide, anxiety, helplessness and narcissism (Chinyakata et al., 2022:191).

The first case study, a South African research project conducted in the rural regions of the Western Cape, Northern Cape and Free State, explores the causes and impacts of play deprivation. The findings of the research indicate that play deprivation is the product of limited recreational facilities, parental influences, unsafe environments, illness, demanding adult schedules and financial constraints (Chinyakata et al., 2022:195-203). Chinyakata et al. (2022:204) highlight key insights that emerged from the study:

The barriers that reduce playful interaction can be dismantled by adopting play as a tool for well-being and giving individuals permission to engage in play. The play experienced can be protected and enriched through collaboration among families, communities and stakeholders, resulting in intrapersonal, interpersonal and extra personal benefits. The significance of adult play needs to be recognised by mainstreaming play and countering the misconception that play lacks value.

b) Academic Libraries

The second case study investigates how academic libraries situated in higher education institutions adopt play as a supportive tool for students. Environments, such as higher education institutions, are often associated with heightened levels of stress. Brown (2019) describes the complex relationship between stress and play. He explains that stress inhibits play due to fear, however, play can increase resilience and adaptive reaction amidst challenges (Brown, 2019). The case study suggests that mindfulness and meditation can be encouraged through playful mediums such as colouring materials, gaming consoles, Lego and crafting supplies into high stress environments (Nance, 2022:172). In this case study, the integration of play activities into an educational setting destigmatised the concept of taking a break and promoted cognitive equilibrium (Nance, 2022:172).

c) Teddy Bear Challenge

The third case study was conducted in Finland and explored the effects of toy play in the demanding circumstances of the Covid-19 pandemic. It examined play strategies and the positive personal and communal outcomes of play (Heljakka, 2020). This case study analysed the "teddy bear challenge" (refer to figure 2). The "teddy bear challenge" involved individuals who displayed teddy bears in windows during the Covid-19 pandemic which prompted a scavenger hunt for people of all ages. The challenge initially intended to entertain children but resulted in a sense of togetherness among adults during an isolating period (Heljakka, 2020). The study highlighted the capacity of cross-generational and communal play as a coping tool during uncertainty and isolation (Heljakka, 2020).



Figure 2: Teddy bear challenge

Source: (Heljakka, 2020)

d) Play As You Go Walk

Literature notes that people are engaging in play more frequently, however, the time and space available for play is diminishing (Powell, 2023:1-2). The perception that play lacks value is contributing to play deprivation, highlighting a growing mental health crisis, increased privatisation of public spaces and the commercialisation of play (Powell, 2023:1-2).

The final case study explores play within conflicting contextual realities. The research introduces the “play as you go walk” (see figure 3), a play intervention for adults that investigates how public spaces can be transformed through playful interaction. The study explores how experiential design and co-design can adopt play to people’s relationships, existence and behaviour in the world (Powell, 2023:1-2).



Figure 3: Play as you go event

Source: (Powell, 2023:7-15)

The case study highlighted the deeper value of play and the positive experiences associated with it (Powell, 2023:17-22). The research showed that adults require permission to engage with playful activity and that play is impacted by self-consciousness and psychological factors (Powell, 2023:22-23). Powell (2023:24) advocates for increased playful resources in urban design and urges designers to view play as tool to challenge societal, spatial and political structures that support poor mental health (Powell, 2023:24).

2.5 DESIGN PRINCIPLES FOR PLAY-BASED INTERVENTIONS

Design principles for play-based interventions are guidelines derived from the literature that inform how playful experiences can be structured. The principles ensure that play is designed to meaningful and effective in supporting cognitive balance. The author's synthesis of the literature reveals six key design principles (Refer to Table 2).

Table 2: Design principles for play-based intervention extracted from literature

Source: created by author

Principle	Goal/key characteristic	Supporting literature
Voluntariness and intrinsic motivation	Freely chosen and internally rewarding to encourage authentic and sustained participation.	(Brown, 2019); (Caillois, 2001:6); (Heljakka, 2020); (Tonkin & Whitaker, 2021:2).
Social interaction and co-creation	Encourage co-creation, interaction, social engagement and empathy to ensure authentic and sustained participation.	(Heljakka, 2020); (Powell, 2023:24); (Whitton, 2022:4-5).
Balance of structure and freedom	Provide guidance (convergent) but encourage exploration, experimentation and improvisation (divergent).	(Brown, 2019); (Kang, 2020:573-574).
Material and environmental design	Invite participation and curiosity through objects, environments and contextual cues.	(Heljakka, 2020); (Nance, 2022:172); (Powell, 2023:22-24).
Accessibility and barrier reduction	Actively remove barriers (stigmas, time, lack of permission) ensuring feasibility to all participants.	(Chinyakata et al., 2022:190-192); (Powell, 2023:22-23); (Whitton, 2022:3).
Emotional regulation and resilience	Generate restorative and safe opportunities to engage in play that are conducive to managing stress and emotional balance.	(Brown, 2019); (Chinyakata et al., 2022:191); (Heljakka, 2020).

The first group of principles reflect the motivational elements of play-based design, such as voluntary engagement and intrinsic motivation, and the contextual manifestations of play through objects and environments. The second group of principles address the social and structural impact of play. This incorporates the balance of structure and freedom, social interaction and co-creation, accessibility and barrier reduction and support emotional regulation and resilience.

2.6 CONCEPTUAL FRAMEWORK OF THE STUDY

The conceptual framework of this design research project integrates Play Theory, the Double Diamond Model and the Three Horizons Framework. Play theory provides a lens to understand how play contributes to personal, relational and societal wellbeing and shapes the content and direction of the design inquiry. The Double Diamond Model (Elmansy, 2021) creates structural rigor by dividing the research process into two phases: the problem space (discover and define) and the solution space (develop and deliver). This systematically guides the study from understanding lived experiences of cognitive overload among young adults in Cape Town, to co-designing potential play-based design interventions that support cognitive overload. The Three Horizons Framework (International Training Centre, n.d.), in this study, has been adopted as both a qualitative and

analytical lens and supports reflection on present challenges, exploration of transitional opportunities and envisioning a future of improved cognitive load management through the adoption of play-based design in adulthood. Collectively, these frameworks connect theory, empirical exploration and creative practice. This ensures that the design research maintains coherence between its conceptual grounding and its design outcomes.

2.7 CONCLUSION

Chapter two explored the concept of play and provided a definition of play in the context of this design research project. The literature review explored the concept of cognitive load in the context of young adulthood. It then discussed play in adulthood and explored the benefits of play with reference to four case studies. It revealed a gap in understanding how play can be intentionally designed to support cognitive load management in young adults. Next, six design principles for play-based intervention were extracted from the synthesised literature. The chapter ends with a discussion of Play Theory, the Double Diamond Model and the Three Horizons Framework as the conceptual framework that is employed in this design research project. Chapter three will provide a detailed account of the research design and methodology of the design research project.

CHAPTER THREE: RESEARCH DESIGN AND METHODOLOGY

Chapter three is an explanation of the researcher's choice of methodology. The chapter begins with an outline of the research approach, detailing practice-led design research and the position of the researcher. Next, it discusses the research design and methodological framework of the design research project with reference to design thinking, the double diamond model and co-creation. The chapter then outlines the sampling and recruitment of participants and key informants, data collection procedures, design research activities structured according to the double diamond framework and data analysis. Chapter three ends with a discussion of the ethical considerations and practices employed in this design research project.

3.1 RESEARCH APPROACH

This study is situated within an exploratory qualitative, practice-led design research paradigm. It foregrounds creative practice as both a method of inquiry and a mode of knowledge generation (Mäkelä, 2007:157). It adopts a human-centred (Interaction Design Foundation, n.d.) and co-creative (Co-create, n.d.:8) approach, drawing on design thinking as a methodological framework for exploring how play can support cognitive load management among young adults in Cape Town.

3.1.1 Practice-Led Design Research

“‘Designer-practitioner-researcher’ can be the title or description of an individual, their work role, or their understanding of the integration of these various aspects of their professional work. Like a molecule chain, this title can be read left-to-right or right-to-left, but at the centre of ‘designer’ and ‘researcher’ is, in effect, practice” (Vaughan, 2017:3).

Practice-led design research emphasises learning through doing and creating, with a focus on understanding the unique knowledge embedded in practitioners and their processes (Mäkelä, 2007:158). It acknowledges the importance of practitioners' expertise and encompass both tacit and explicit knowledge (Mäkelä, 2007:158). This approach requires active engagement in design work, by reflecting on their practices and examining the materials and methods they employ, for the generation of valuable insights (Mäkelä, 2007:158). Practice-led research encourages the exploration

of questions that emerge during the creative process (Mäkelä, 2007:160). It notes that artefacts hold knowledge and reinforces the notion that what is created is equally important as the knowledge that it embodies (Mäkelä, 2007:160). The researchers understanding their role within the broader research community and the significance of learning research practices effectively regardless of the field of study (Hawkins & Wilson, 2017:83). There has been a shift towards participatory and practice-oriented design research due to a growing recognition of the need to understand and integrate practitioners' perspectives into research (Mäkelä, 2007:158).

Practice-led design research aligns closely with design thinking and co-creation. The three approaches support learning through doing, iterative experimentation and collaborative engagement. Design thinking generates insight through iterative activities, such as understanding users, questioning assumptions, reframing problems, prototyping, testing and reflecting (Dam & Siang, n.d.). It mirrors the practice-led focus of knowledge generation through making. Active participant involvement in shaping decisions and processes forms the foundation of co-creation (Co-create, n.d.:8). Knowledge is acquired through mutual learning, diverse perspectives and collaboration (Co-create, n.d.:8). This design research project combines practice-led research, design thinking and co-creation to support a participatory and practice-oriented methodology. These approaches were applied iterative co-design workshops which explored lived experiences of cognitive overload and concept generation. The design intervention was directly informed by collaborative knowledge, reflection and insight creation.

3.1.2 Position of The Researcher

My role in the design research project was as a designer and a researcher. I combined my knowledge and skills as a designer with my responsibility as a researcher. My background in industrial design informed the design research methodology and selection of tools, with service design and design for sustainability being particularly influential in guiding my research approach.

My personal experience with cognitive overload allowed me to understand and empathise with the needs and lived experiences of the targeted demographic. However, all design decisions were grounded in insights generated through participant knowledge, professional expertise and reflection. I maintained awareness of my influence on participants through continuous internal reflection while I participated in the creative process. My dual role in the design research process aligns with the practice-led approach where practice acts as a method of inquiry and a mode of

knowledge generation (Vaughan, 2017:3). Table 3 provides a summary of the research process by communicating the sequence of activities that supported knowledge generation and design outcomes.

Table 3: Sequence and purpose of research activities

Source: created by author

Phase	Activity	Purpose
Step 1	Literature review	Informed workshop design.
Step 2	Co-design workshop one	Identified challenges and opportunities.
Step 3	Key informant interviews	Triangulated and validated insights and transitioned to a solution space.
Step 4	Co-design workshop two	Generated concepts in response to the generated insights.
Step 5	Synthesis	Generated design principles for play-based intervention based on outcomes of the design process.

3.2 RESEARCH DESIGN & METHODOLOGICAL FRAMEWORK

A practice-led and human-centred approach that was structured around the double diamond model was employed in the design research project. The study explored how play might support cognitive load management among young adults in Cape Town. This engaged design thinking and co-creation methods to ensure that the research process was iterative and collaborative.

The methodological framework builds on the conceptual framework. Play theory was employed as an interpretive lens within the double diamond process to explore and identify design principles for play-based interventions. The study does not apply play theory principles directly. Instead, it was used to guide the exploration of the participants' experiences to enable the identification of challenges, opportunities and insights relating to employing play as a cognitive load management tool. The Three Horizons Framework further informed the approach by providing a structure to reflect on current practices, envision transitional possibilities and generate future-focused design interventions. The combination of these conceptual tools shaped the study's practice-led, participatory and iterative methodology to ensure that knowledge was generated through creative practice and reflective analysis.

The research design was designed to collaborate with a specific group of participants to identify an area requiring design intervention and to conceptualise that intervention. The central question it addressed was: How can design for play be utilised to support cognitive load management for young

adults living in Cape Town who are managing multiple roles and responsibilities? The research employed co-design and design thinking methods with the Double Diamond emphasis on the double diamond model. Two co-design workshops and two interviews were conducted within this framework (refer to figure 4). This ensured the generation of empathy and insights into the lived experiences of young adults living in Cape Town. The research activities were structured sequentially (refer to figure 5 and figure 6).

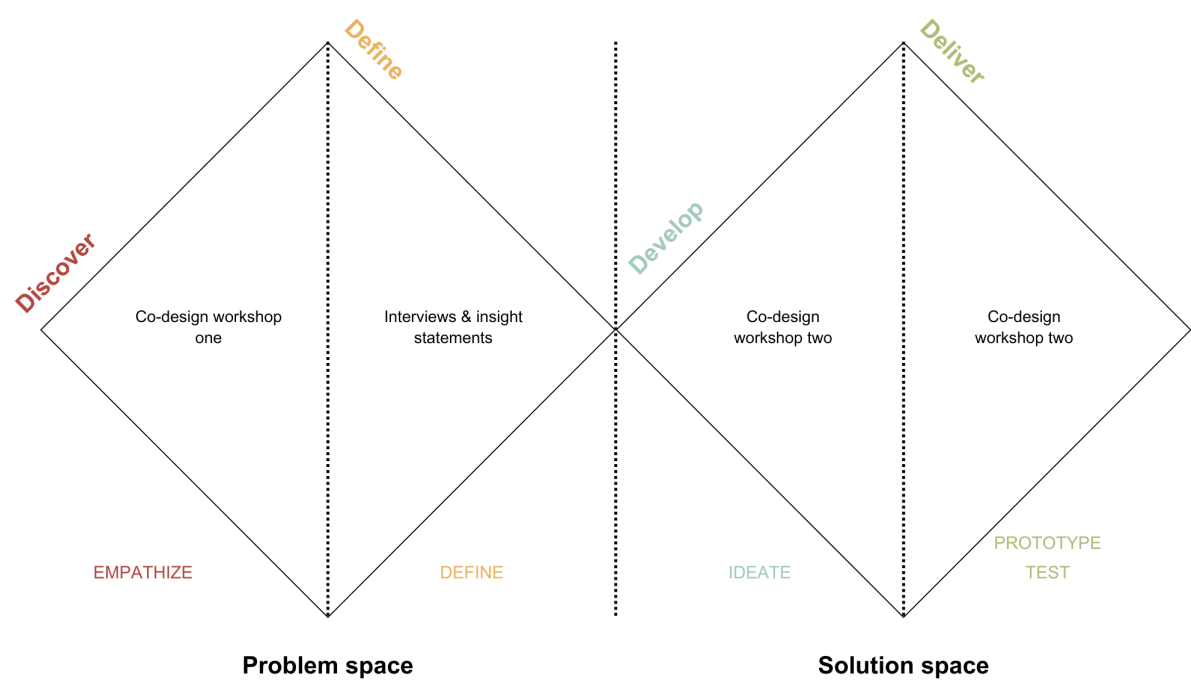


Figure 4: research activities within the double diamond model

Source: created by author

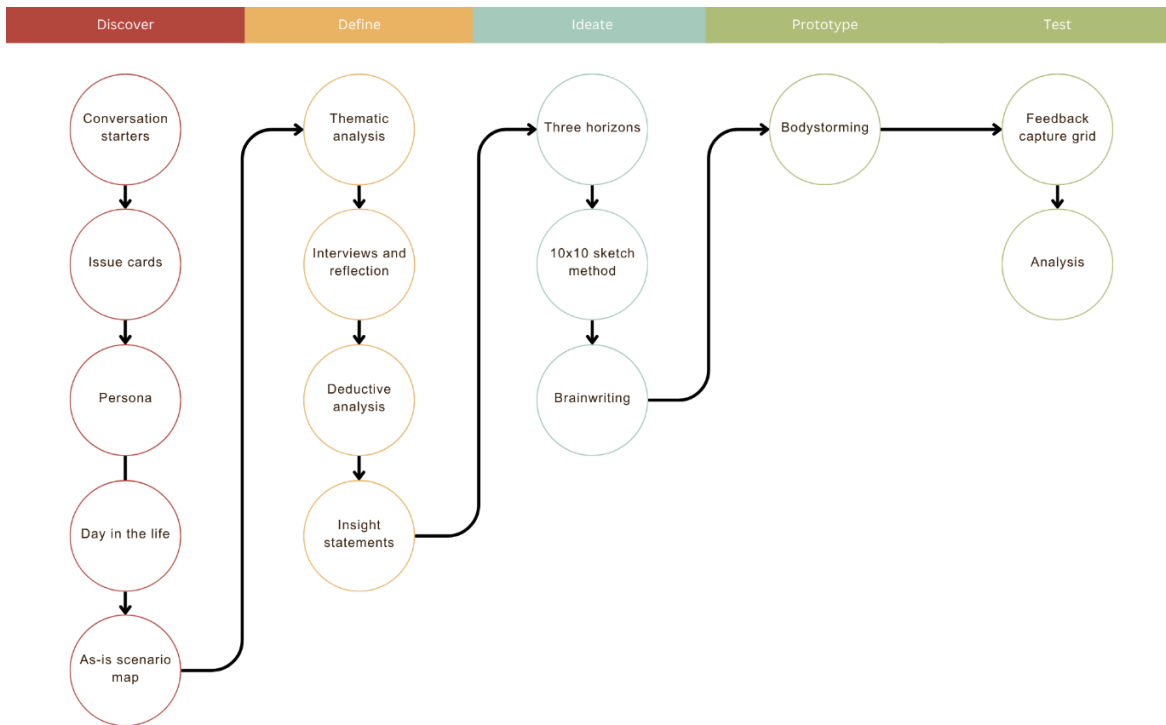


Figure 5: sequential flow of research activities

Source: created by author

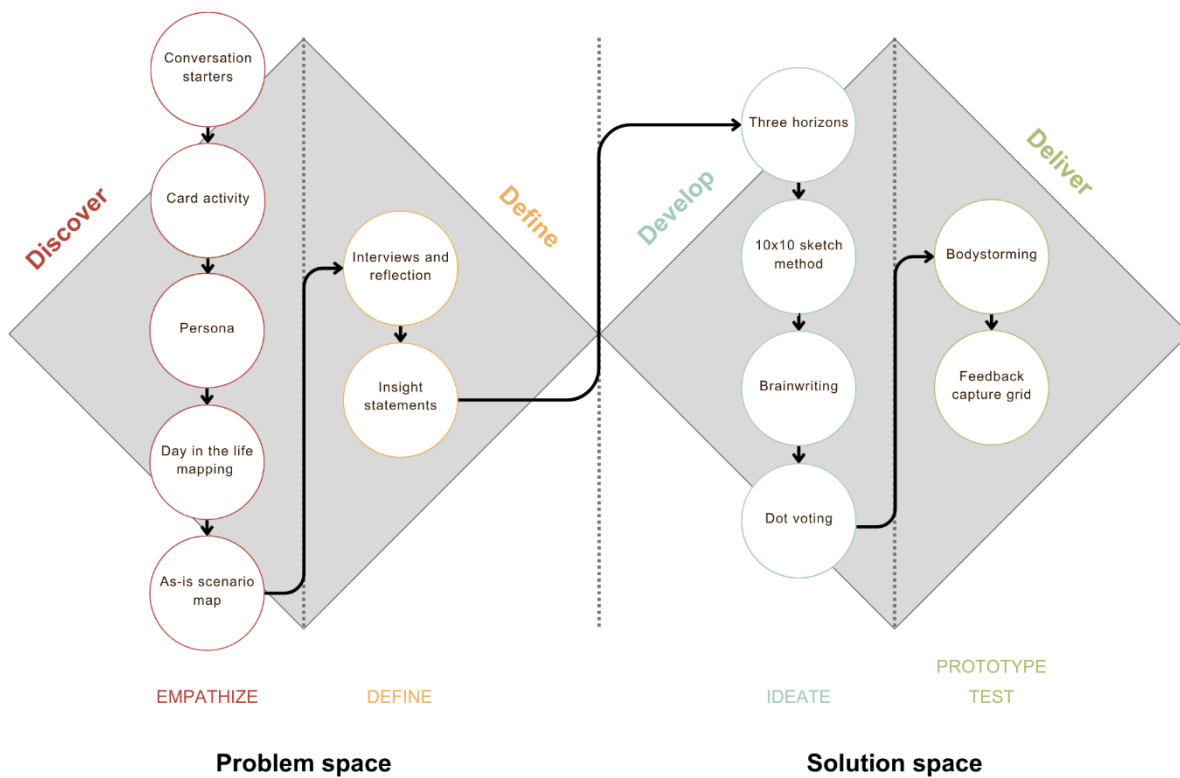


Figure 6: sequential flow of research activities within the double diamond model

Source: created by author

3.2.1 Design Thinking and the Double Diamond

Design thinking formed a methodological foundation for this design research project. It guided how participants engaged in problem exploration and idea generation within the co-design workshops. Design thinking is a transformative approach that deals with complex problems and reshapes the development of products, services, processes and strategies (IDEO Design Thinking, n.d.). Design thinking was used to reframe problems, user-centricity and diverse collaboration through a framework that highlights the potential of human innovation (Liedtka, 2018). Designers recognise that optimal interventions emerge from the direct engagement with the perspectives and needs of the people they serve through the guidance of human-centred principles (IDEO Design Thinking, n.d.). In this design research project, design thinking provided a framework for structuring the co-design workshops, ensuring empathy-driven exploration in the problem (discover and define) and iterative experimentation in the solution space (develop and deliver). Design thinking was adopted as the practical process through which play theory and the double diamond model were enacted within the conceptual framework of this study.

a) The double diamond model

The Double Diamond is a design thinking framework with two diamond shapes (refer to figure 7). The first diamond represents the stages of discovering and defining a problem, involving research and narrowing down the issue. The second diamond signifies developing and delivering solutions, including brainstorming, prototyping, testing, and finalizing a solution. The framework emphasises both divergent thinking (exploring options) and convergent thinking (making decisions) in a cyclical process. The double diamond model provided the overall structure for the design research process. It guided how the study transitioned from identifying and defining the problem and context of the problem to developing and testing a play-based design intervention that responded to the contextualised issues.

The double diamond model and the Three Horizons framework aligned with the conceptual framework within this design research project. The double diamond model provided a process structure through which play theory could be explored and the Three Horizons framework was used for future-focused reflection. Furthermore, the four stages of the double diamond model directly correspond to the empirical phases of this study.

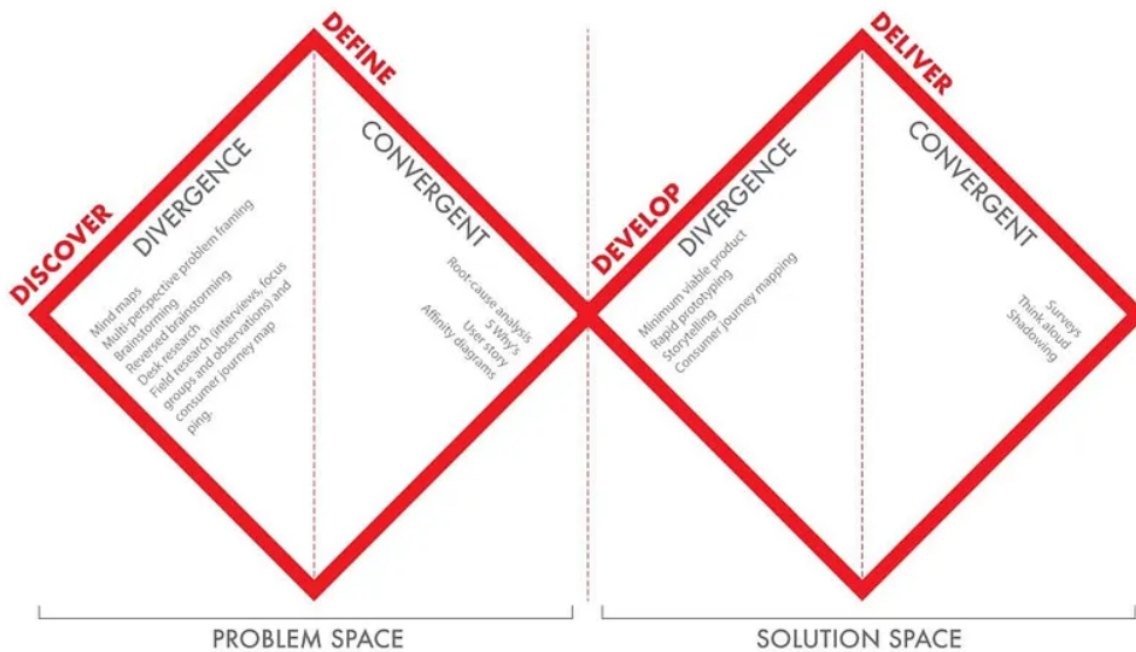


Figure 7: The double diamond design thinking process

Source: (Elmansy, 2021)

Some critics argue that design thinking oversimplifies professional design methods and risks producing superficial outcomes (Hernández-Ramírez, 2018:48). Conversely, Lake et al. (2021:339) highlights that the design thinking approach generates empathy, critical observation and creative collaboration. It is adaptable and iterative which made it appropriate for this practice-led, co-design design research project.

The double diamond model was applied in this design research project to structure the research process. The first co-design workshop was situated in the problem space and focused on the discover phase (refer to figure 4). The key-informant interviews and insight statements were also situated in the problem space but aligned with the define phase (refer to figure 4). The second co-design workshop was situated in the solution space and covered the develop and deliver phases (refer to figure 4). This sequence ensured that the play-based design intervention emerged directly from the insights gained during the earlier stages of exploration.

3.2.2 Co-Design and Co-Creation

This design research project adopted a co-creative and co-design approach which built on the design thinking framework. The inclusion of this approach ensured that insights and play-based

design interventions emerged collaboratively with participants as opposed to being imposed by the researcher.

This design research project employed design thinking in conjunction with co-creation. Co-creation encompasses co-design, participatory design and open design, involving all stakeholders in the design process (Co-create, n.d.:5). It fosters collaboration, considers users as experts of their own experience, prioritises mutual learning, connects users and creative professionals and extends beyond data collection, encouraging active user participation (Co-create, n.d.:5). Co-creation can be structured in various ways; however, it typically involves four key steps: engage, understand, ideate and validate (Co-create, n.d.:10) (refer to figure 8).



Figure 8: The four steps of co-creation

Source: (Co-create, n.d.:10)

This design research project adopted co-design as a collaborative approach that actively engaged young adults in the design process to gain insights that emerged from lived experiences and better address the needs and expectations of this demographic (Interaction Design Foundation, n.d.). Past knowledge indicates that participation in the design process should be limited to design professionals however tools have emerged to support the inclusion of participants and stakeholders into the process (Sanders & Stappers, n.d.:29). The adoption of co-design tools encouraged non-designers to participate in the design process and supported the mindset that the end-users are the experts of their future lives (Sanders & Stappers, n.d.:29-30). Participants were guided to identify opportunities, consider the current reality, recall previous experiences, reflect underlying values and translate that insight into a desirable future state (Sanders & Stappers, n.d.:29).

3.2.3 Sampling and Participants

The design research project involved one participant group across two co-design workshops and two key informants for the interviews. The participants and key informants were selected through nonprobability sampling methods, which entailed the selection of individuals based on specific, non-random criteria (McCombes, 2019). The participant group included young adults between the ages of eighteen and thirty-five who were geographically located in Cape Town, South Africa (refer to table

21). Participants were identified by their need to manage multiple roles and responsibilities such as studying, working, family or other responsibilities.

The first co-design workshop consisted of eight participants, five of which returned to make up the participant group for the second co-design workshop. The number of participants involved in the workshops was decided to ensure that there were enough participants to generate valuable insights but not too many that the environment became overwhelming and voices got lost. The small group size enabled in-depth discussion and meaningful engagement with each participant.

The group of key informants (refer to table 22), comprised of one psychiatrist and one life coach, formed a bridge between the first and second co-design workshops. The two key informants engaged in interviews and reflection. They were selected for their specialised expertise and provided detailed input to validate the problem space and inform the solution space. This was sufficient given the focus on depth of insight rather than quantity.

3.3 DATA COLLECTION PROCEDURES

The data collection in this design research project adopted a practice-led and co-creation approach (refer to table 4). It involved participant-generated artefacts, workshop photographs, researcher notes and interview recordings and transcripts. This was designed to capture the lived experiences of the participants and expert reflections to inform the development of the design outcomes. The study adopted multiple data sources to ensure a depth of exploration and understanding and to validate and triangulate findings. Table 5 links the research activity to the research questions.

Table 4: Data collection procedures

Source: author created table

Data source	Contributors	Purpose	Methods/activities	Type of data
Co-design workshop one	Participants: eight young adults (aged eighteen to thirty-five) in Cape Town who manage multiple roles and responsibilities.	To explore the participants lived experiences with cognitive overload and identify a context in which a play-based design intervention could benefit them.	Co-design workshop activities including card activity, persona, day in the life mapping and as-is scenario mapping.	Participant-generated artefacts (cards and maps) and photographs.

Interviews	Key informant one: psychiatrist working with young adults in Cape Town. Key informant two: life coach working with young adults in Cape Town.	To validate, triangulate and extend findings from workshop one and gain expert perspectives on play for cognitive load management to move into the solution space.	Semi-structured interviews conducted in person.	Audio recordings and verbatim transcripts.
Co-design workshop two	Participants: five young adults (aged eighteen to thirty-five) in Cape Town who manage multiple roles and responsibilities.	To translate insights from prior phases into potential play-based design interventions and extract design principles for play-based intervention.	Co-design workshop activities including the three horizons, 10x10 sketch method, brainwriting, bodystorming and feedback capture grid.	Participant-generated artefacts (sticky notes, cards, mapping, written notes, sketches), photographs, researcher notes from group discussions.

Table 5: Research activities linked to research questions and research objectives

Source: created by author

Research question	Objective	Research activity
How can design for play be utilised to support cognitive load management for young adults living in Cape Town who are managing multiple roles and responsibilities?	To explore how play-based design can support young adults, living in Cape Town, who manage multiple roles and responsibilities. To make a contribution to theoretical, methodological and practical knowledge within design for cognitive load management and co-design.	Co-design workshop one Key informant interviews Co-design workshop two
What factors contribute to cognitive overload in young adults living in Cape Town who manage multiple roles and responsibilities?	To explore the lived experiences and challenges of cognitive overload in young adults living in Cape Town through participatory engagement.	Co-design workshop one Key informant interviews
What types of play-based interventions could help support young adults living in Cape Town, who manage multiple roles and responsibilities, with cognitive load management?	To investigate the relationship between play and cognitive overload in young adults. To explore how play can be incorporated into future practical design interventions that support cognitive load management.	Key informant interviews Co-design workshop two
How can co-design inform the development of a play-based design intervention that addresses the cognitive load management needs of young adults living in Cape	To facilitate the prototyping of play-based design interventions that address the identified needs and contexts of young adults, living in Cape Town, who manage multiple roles and responsibilities.	Co-design workshop one Co-design workshop two

Town who manage multiple roles and responsibilities?	To make a contribution to methodological knowledge within co-design practice.	
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3.3.1 Discover Phase: Co-Design Workshop One

The first co-design workshop was situated in the problem space within the discover phase of the double diamond. It identified and contextualised challenges that young adults living in Cape Town face in relation to cognitive overload.

The workshop encouraged eight participants to uncover and share their experiences with cognitive overload. The facilitation approach followed co-creation principles to encourage mutual learning and ensuring that all participants contributed equally to the design conversation (HUD Exchange, 2021:10). The activities and tools were selected and structured to generate engagement and stimulate discussion around the lived experiences of the participants. The workshop began with an introduction (HUD Exchange, 2021:11) and ice-breaker activity (IDEO Design Kit, n.d.)

to promote transparency, establish a shared understanding of the research goals and objectives, encourage inclusivity, stimulate discussions and alleviate formality. The proceeding activities were generative and included the generation of issue cards (IDEO Design Kit, n.d.), persona creation (This Is Service Design Doing, n.d.), day-in-the-life mapping (Creately, n.d.) and as-is scenario mapping (IBM, n.d.).

The card activity was used to uncover the participants lived-experiences, and the persona, day-in-the-life mapping and as-is-scenario mapping were employed to contextualise the identified challenges. Table 23 provides a detailed workshop outline that includes the activity structure, description, objectives, and materials.

3.3.2 Define Phase: Key-Informant Interviews & Insight Statements

The interviews and insight statements were situated in the problem space within the define phase. This phase of the design research project built on the findings generated during the first co-design workshop. It aimed to triangulate and validate the first data set and refine it into clearer problem statements, opportunity areas and design directions. Furthermore, the concept of play was explored in this phase which created a foundation for the solution space.

a) Key-Informant Interviews

The human-centred design research involved creating empathy with the targeted demographic based on their own words (IDEO Design Kit, n.d.). It was essential to triangulate and validate this data through key informant interviews. These semi-structured interviews provided a framework for discussion and allowed for the exploration of overlooked topics (refer to table 26 and table 27). All the artefacts that emerged from the first co-design workshop were thematically analysed and presented to the key informants for discussion. This collaboration enabled the key informants to provide additional perspectives that either reinforced or challenged the data. The aim was to strengthen the argument and unearth new insights and suggestions that were previously overlooked. Furthermore, the key informants generated new play-based insights that guided the second co-design workshop.

The key informant interviews were each around ninety minutes to allow for in depth exploration of the participants perspectives and discussion around play to form a foundation for the proceeding workshop. The long interviews ensured that the key informants have enough opportunity to share nuanced insights, discuss complex topics and provide detailed input to inform the design research process. The design research relied on small participant and informant group to provide rich quality insights rather than a high quantity of data.

b) Insight statements

The key insights that emerged from the first co-design workshop and the key informant interviews were synthesised into insight statements to define the core themes that guided the design research activities that were situated in the solution space. The insight statements concisely expressed the significant realisations and pivotal revelations that emerged from the problem space (IDEO Design Kit, n.d.). Furthermore, the insight statements formed Horizon One of the Three Horizons framework.

3.3.3 Develop–Deliver Phases: Co-Design Workshop Two

The second co-design workshop was situated in the solution space with the first part in the develop phase and the second part in the deliver phase. The workshop involved a facilitator and five returning participants from workshop one. The objective of the second co-design workshop was to ideate, iterate and generate play-based design interventions that responded to the insight statements.

The workshop began with an introduction to the objectives and goals of workshop two and a reflection on the preceding research activities and insights (HUD Exchange, 2021:11). The first generative activity in this workshop was the Three Horizons Framework where the insight statements formed horizon one (the current state) and the participants envisioned horizon two (the desired future state) (International Training Centre, n.d.:3-4). Horizon two (transitional space) became the bridge between horizon one and horizon three. Conceptualisation, prototyping and reflective activities were adopted as tools to guide the creation of the second horizon. These activities included the 10x10 sketch method (This Is Service Design Doing, n.d.), brainwriting (Interaction Design Foundation, n.d.), dot voting (Gibbons, 2019), bodystorming (Curedale 2019:495) and a feedback capture grid (IBM, n.d.). Tables 24 and 25 provide a detailed outline of the workshop two and includes the activity structure, description, objectives and materials.

3.4 DATA ANALYSIS

The design research process generated various forms of qualitative data. This data emerged from workshop one, key informant interviews and workshop two. The workshop data included participant-generated cards that were both textual and visual, mappings and diagrams, sticky notes, written notes, sketches and photographs. The key informant interviews produced verbatim interview transcripts that were transcribed from audio recordings of the conversations. This data was analysed to identify explicit and implicit patterns and insights grounded in participants lived experiences.

Three data analysis processes were undertaken in the design research project. It started with an inductive thematic analysis of co-design workshop one data in Miro (Miro, n.d.), then used that framework to deductively analyse the key informant interviews in Taguette (Taguette, n.d.) and later applied the same framework to analyse co-design workshop two in Miro (Miro, n.d.). The themes generated during the inductive thematic analysis of co-design workshop one was used as a basis to form a preliminary codebook for the key informant interview analysis (refer to figure 73). This codebook was adapted as the analysis evolved and later cross-referenced with the workshop one themes to add an extra layer of depth (refer to table 10). This produced data that was triangulated and validated as a foundation for insight statements.

3.4.1 Co-Design Workshop One Analysis

A thematic analysis was conducted in Miro (Miro, n.d.) to inductively analyse the data that was generated in the first co-design workshop. A thematic analysis is a qualitative research technique

that, within this design research project, adopted a six-step process: data familiarisation, coding, theme generation, theme review, defining and naming themes and writing up findings (Caulfield, 2023). The thematic analysis began with data familiarisation. The data set was read repeatedly while taking notes and identifying initial patterns (Delve, 2023). Next, the data was labelled with codes that captured key concepts and patterns (Delve, 2023). Subsequently, related codes were grouped into relevant clusters (Caulfield, 2023). From there, the clusters were reviewed and compared against the original data set to ensure an accurate representation of the data (Caulfield, 2023). Lastly, each theme was named and defined before being written up into insight statements (Caulfield, 2023).

3.4.2 Key Informant Interview Analysis

The transcriptions of the key informant interviews were done using Turboscribe (Turboscribe, n.d.) and analysed using a deductive analysis in Taguette (Taguette, n.d.). The deductive analysis used a codebook derived from the emergent themes from workshop one (Kohler, n.d.). The analysis began with data familiarisation by reading the interview transcripts. Next, relevant insights were highlighted and coded into a predetermined set of themes (refer to table 28). The interview data was then compared against the co-design workshop one themes and synthesised to create insight statements.

3.4.3 Co-Design Workshop Two Analysis

The data that emerged from the second co-design workshop was analysed using an inductive analysis on Miro. The objective of the analysis was to uncover both the extrinsic and intrinsic motivations amongst the participants when designing play-based interventions. This stage of analysis involved data familiarisation, grouping, clustering, naming themes and highlighting emergent patterns.

3.5 ETHICS

The ethical considerations in the design research project upheld integrity, human rights and trust between research and society. The ethical practices were applied to both the participant group and the two key informants. It prioritised informed consent, safeguarding privacy, minimising risks,

ensuring fairness and maintaining research integrity (Bhandari, 2021). This studies ethical practices included voluntary participation, anonymity, confidentiality, potential for harm and the ethical communication of research findings (refer to table 6).

Ethical clearance for this design research was obtained from the Cape Peninsula University of Technology (CPUT) prior to data collection activities. The design research was reviewed by the Faculty of Informatics and Design Research Ethics Committee (FID-REC) and referred to the Health and Wellness Science Research Ethics Committee (HWS-REC) (refer to figure 62). Ethics approval was obtained from HWS-REC (refer to figure 63) and the design research complied with the ethical guidelines that govern research involving human participants.

Table 6: Ethical considerations in the design research process

Source: author created table

Ethics consideration	Description
Voluntary participation	The participants and key informants freely engaged with the design research activities. They were not coerced into participating and had the right to withdraw from the study without justification or negative consequences (Bhandari, 2021). The research aims; activities and associated risks and benefits were communicated with the individuals before the design research commenced.
Informed consent	The participants and key informants received and introduction letter and consent form. This detailed the studies purpose, potential risks, benefits, duration and institutional approval (Bhandari, 2021) (refer to figure 60 and figure 61). Participants and key informants were required to read and sign the consent form before participating in the design research project. Furthermore, continuous consent checkpoints were embedded in the design research process to ensure continued consent (refer to figure 65).
Anonymity	The participants and key informants were protected by ensuring that their identities cannot be linked back to the data (Bhandari, 2021). The participant's anonymity was maintained by generating fictitious codes and images of them were cropped or blurred beyond recognition.
Potential for harm	The potential for harm was examined with focus on psychological, social, physical, and legal risks to participants and key informants and engaged with proactive steps to anticipate and minimise negative consequences (Bhandari, 2021). The identified risks were openly communicated to the participants and key informants in the introduction letter and consent form and the facilitators in the workshop were qualified and trained to deal with any ethical issues appropriately (refer to figure 64). Furthermore, the facilitator has experience with cognitive overload and understood the needs and boundaries of the participant group and was able to protect their wellbeing and comfort. The researcher assed the demographics of the participants before the first co-design workshop to ensure familiarity with social and cultural etiquette to conduct the workshop respectfully. If any participant became visibly uncomfortable during the workshops,

	they would have been promptly escorted to a private area to ensure their well-being.
Ethical results communication	The research findings have been communicated with the participants and key-informants to ensure that it is accurately represented to ensure honesty, reliability, transparency and credibility (Bhandari, 2021).
FID ethics	The research ethics for this study was governed by the ethical guidelines established by the FID-REC at CPUT. An ethics approval form was completed as part of the research proposal submitted to the faculty research committee. Ethics approval was reviewed and subsequently referred to the HWS-REC by the FID-REC (refer to figure 62).
HWS ethics	The research ethics for this study was governed by the ethical guidelines established by the HWS-REC at CPUT. An ethics approval form was completed as part of the research proposal submitted to the faculty research committee. An ethics approval certificate was obtained before the design research process commenced (refer to figure 63)

3.6 CONCLUSION

Chapter three introduced the methodology employed in the design research project. The chapter began with an outline of the research approach and discussed practice-led design research and the position of the researcher. Next, it presented the research design and methodological framework adopted in the design research project with reference to design thinking, the double diamond model and co-creation. The chapter outlined the sampling and recruitment of participants and key informants, data collection procedures, design research activities and data analysis. Chapter three ended with a discussion of the ethical considerations and practices employed in this design research project. Chapter four and five will provide a detailed account of the findings that emerged from the design research activities presented in this chapter.

CHAPTER FOUR: DESIGN PROCESS - PROBLEM SPACE

Chapter four is an exploration of the outcomes that emerged from the design process. Structured around the double diamond, this chapter is situated in the problem space of the double diamond (discover and define). Discover begins with an overview of the tools and sequences that were adopted in a co-design workshop. Next, it illustrates the thematic analysis of the workshop data. Finally, it presents the findings of the co-design workshop. Define begins with an overview of the interview method and insight statements employed in the design research project. Next, it presents the deductive analysis of the interview data. Lastly, it presents the findings and insight statements that emerged from the problem space.

4.1 PROBLEM SPACE

The first phase of the research focused on the first diamond of the double diamond framework, discover and define, which represents the problem space (refer to figure 9).

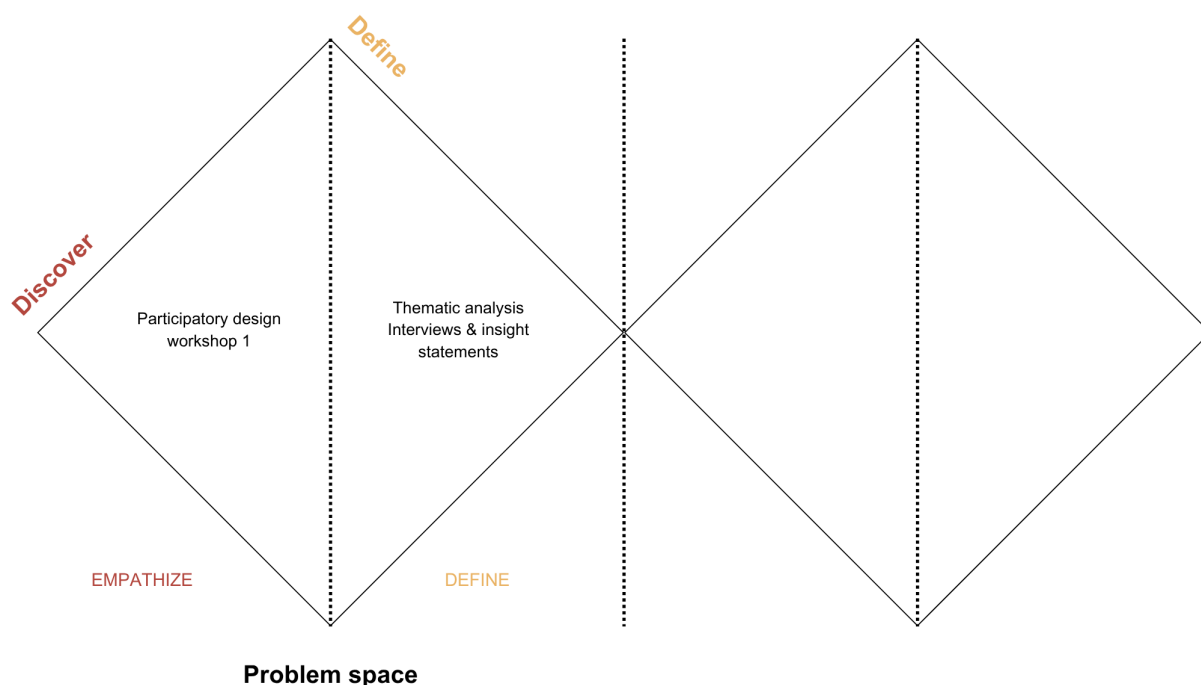


Figure 9: Double diamond problem space

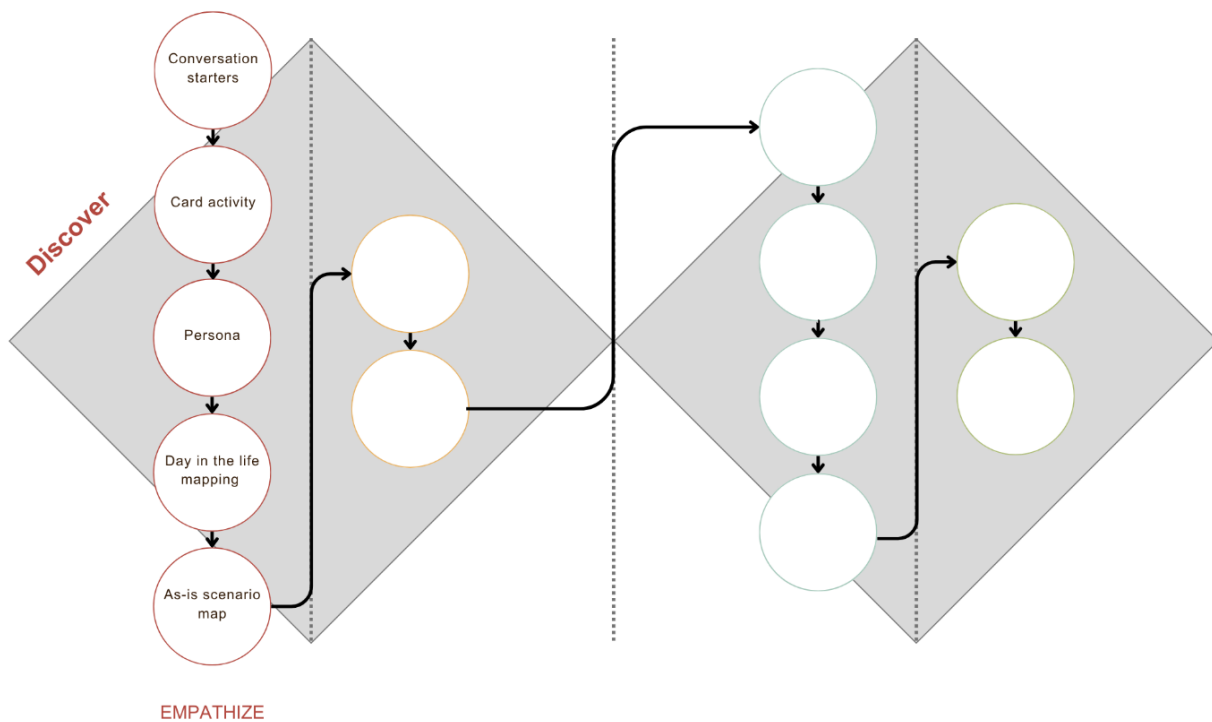
Source: author created diagram

4.1.1 Discover

The first co-design workshop focused on the initial phase of the double diamond framework, discover. The first co-design workshop included eight participants. The primary objective of the discover phase of the design research was to identify a context where the participants would benefit from a play-based design intervention.

a) Co-design tools and sequence

The workshop employed playful and collaborative data collection methods that targeted specific outcomes (refer to figure 10), The activities were structured sequentially.



Problem space

Figure 10: Workshop activities and sequence within the double diamond

Source: author created diagram

Conversation starters

The conversation starter activity was designed for participant orientation. Conversation starters functioned as an icebreaker, encouraging comfort and openness among participants (refer to figure 11).



Figure 11: Photograph detailing the use of the conversation starter cards

Source: photograph by author, 2025

Issue cards

The workshop continued with the issue card activity. Each participant received a blank card template (refer to figure 12). The template consisted of a space to title, visualise and describe the challenges that they experience in their day to day lives.

Name of challenge Quick sketch of challenge Description of the challenge	
--	--

Figure 12: Issue card template

Source: created by author

[illegible]

Source: photograph by author, 2025



Figure 14: Issue card sorting

Source: photograph by author, 2025

The participants voiced surprise at their shared experiences during the categorisation process. They made comments such as “I didn’t think of that, but I experience that too” or “I thought I was alone in feeling that”. This emotional response reinforced a sense of belonging, a theme that recurred throughout the study.

Persona

The participants co-created a persona based on the collective insights that were gathered in the card making activity (refer to figure 15). The persona, Julian Jackson (JJ), represented their collective experiences and personalities. JJ’s biography included personality traits, goals, habits, history, core needs, skills, current situation, unique qualities, and frustrations. The persona was not used as an inductive source of data; however, it was used to validate the insights that emerged in the issue cards.

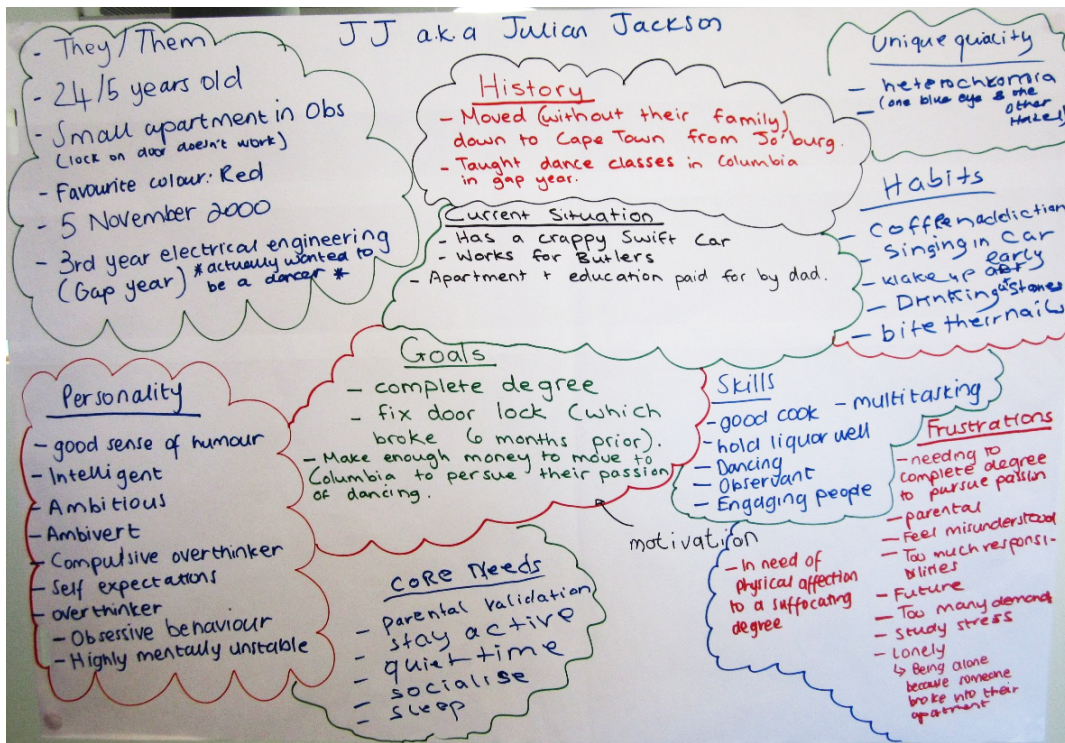


Figure 15: Co-creation of the Persona, Julian Jackson ("JJ")

Source: photograph by author, 2025

Day-in-the-life mapping

Using JJ as a focal point and considering their own experiences, participants mapped out a typical day in persona's life (refer to figure 16). This process served to highlight when and how young adults experience different challenges and to note the high and low points throughout the day.



Figure 16: Day-in-the-Life Mapping of Persona "JJ"

Source: photograph by author, 2025

As-is scenario map

Following the day-in-the-life mapping, participants adopted JJ's experiences as their own when they generated an as-is scenario map (refer to figure 17). This enabled participants to uncover JJ's (and by extension their own) daily emotional and mental journey. This was achieved by breaking the day down into phases of Doing, Thinking, and Feeling.



Figure 17: As-is scenario map

Source: photograph by author, 2025

b) Data analysis

The thematic analysis of the first workshop was done using a visual process on Miro (Miro, n.d.). The analysis of the issue cards was inductive while the persona, day-in-the-life mapping and as-is scenario map validated and triangulated the generated themes. The thematic analysis process allowed for iterative engagement with the material. This included notetaking, mind mapping and reorganising information to generate patterns and themes that emerged from the data.

During the first workshop activity, the issue cards were categorised according to participant generated themes. The first step of the analysis was to restructure the cards based on their individual origin. Each participant was assigned a colour, enabling a clear visual representation of diversity throughout the thematic analysis process (refer to figure 18 and figure 68).



Figure 18: Restructuring issue cards by participant origin and assigned colour

Source: Miro screenshot by author, 2025

Once the issue cards had been restructured, each card was assigned with approximately five codes that encapsulated the essence of the communicated challenge. The codes were then colour-coded according to the participant that they originated from and assigned a number to indicate the card they came from (e.g., participant 3, card 1 = light green 1) (refer to figure 19 and figure 69). The systematic approach enabled efficient organisation and ensured traceability to the original data source.

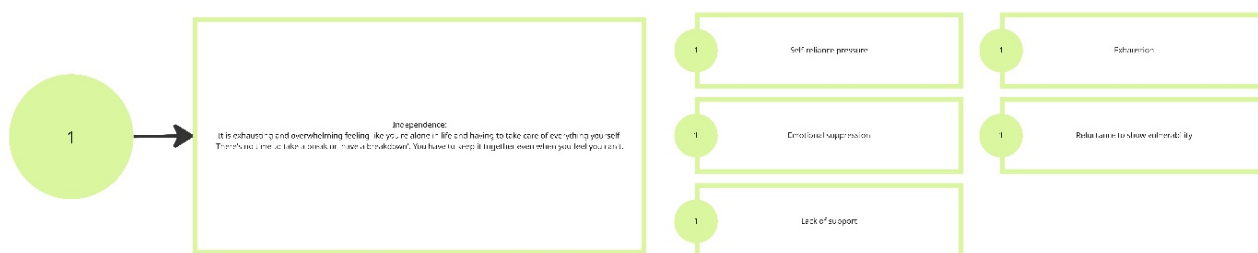


Figure 19: Coding, colour-coding, and numbering for data traceability

Source: Miro screenshot by author, 2025

The codes were grouped into similar clusters thereby revealing patterns in the data. The initial clusters were named and the colour coding allowed for a clear visual assessment of participant diversity in each cluster (refer to figure 20 and figure 70).

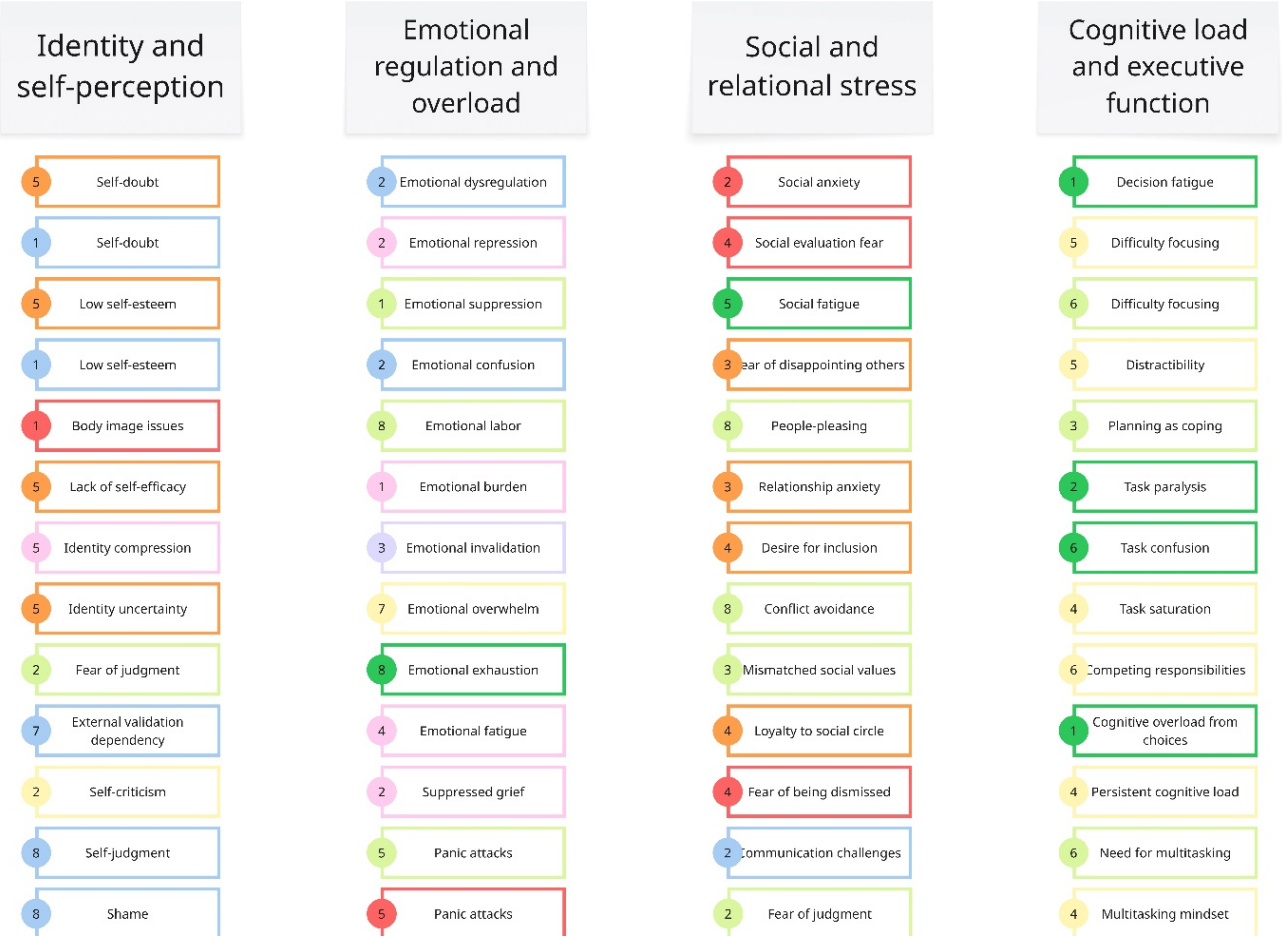


Figure 20: Clustering of codes to reveal thematic patterns and participant diversity

Source: Miro screenshot by author, 2025

The analysis revealed that the identified challenges were experienced on an intrapersonal (internal), interpersonal (relational) or extra personal (societal/environmental) level. Each cluster was then mapped out accordingly, with the codes organised within the three domains (refer to figure 21 and figure 71).

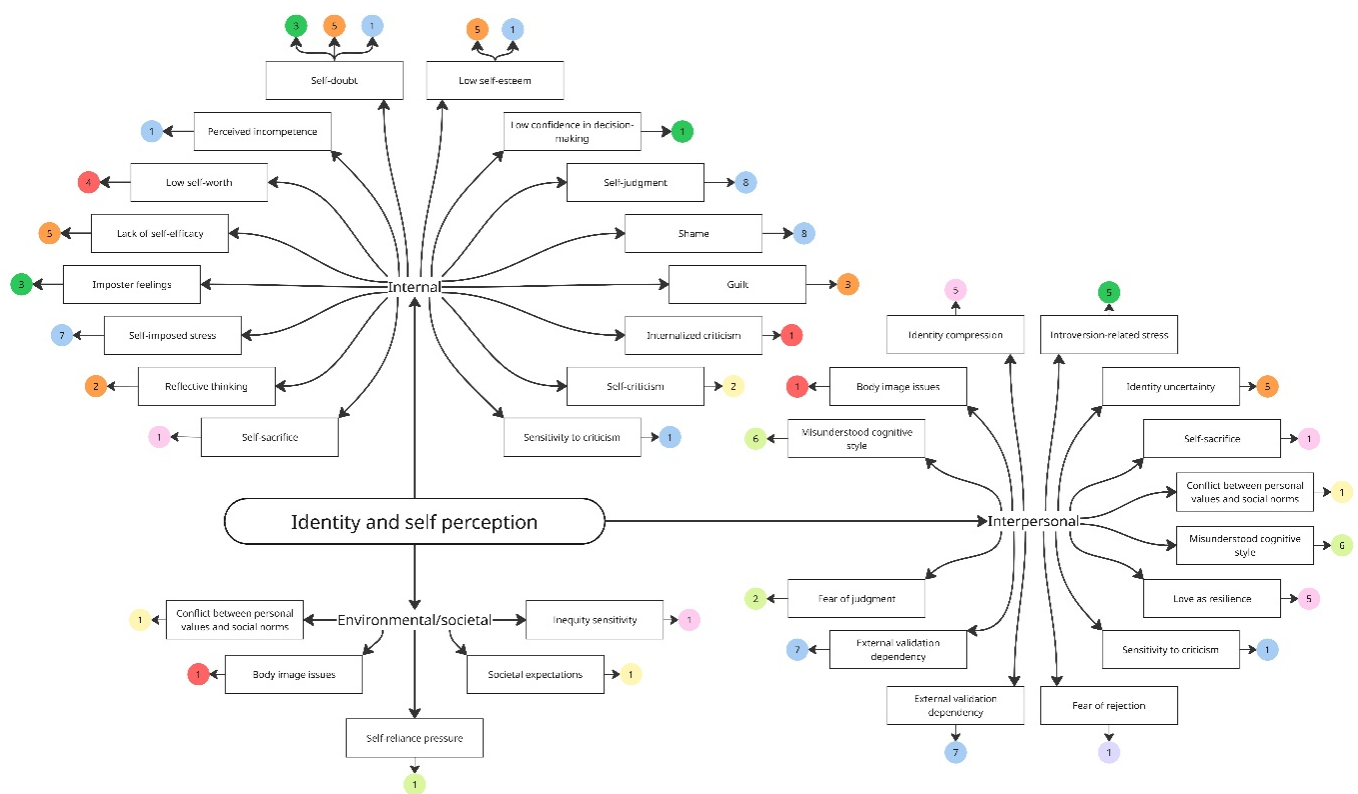


Figure 21: Organising clustered codes within the three domains

Source: Miro screenshot by author, 2025

A second cycle of analysis re-engaged with the themes by reconnecting participant quotes to codes and visualising them within each thematic cluster (refer to figure 22 and figure 72). This refinement produced 29 subthemes, which were colour-coded to indicate diversity across participants and to determine the prevalence of each challenge.

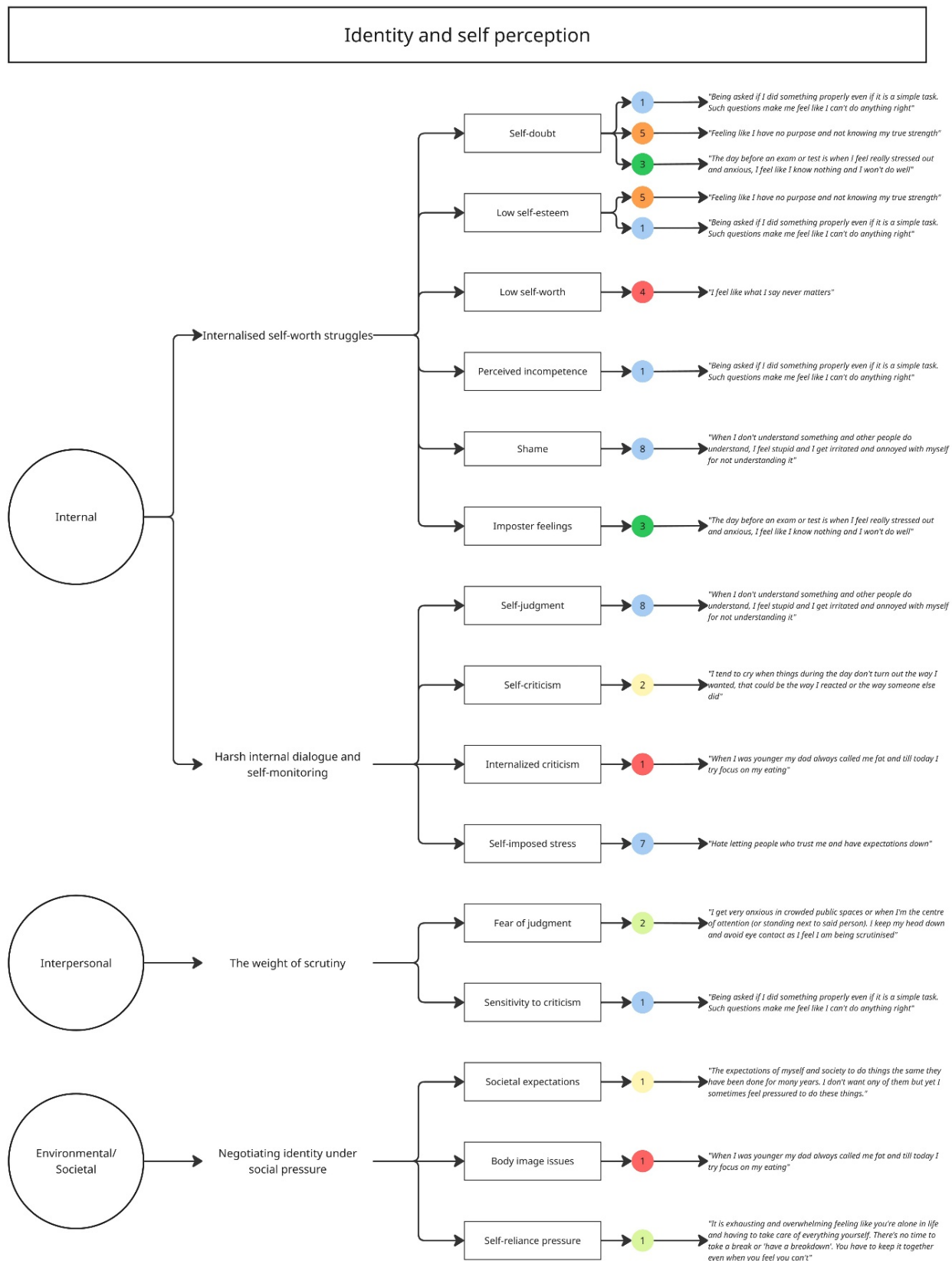


Figure 22: Second cycle of analysis, reconnecting quotes to codes for thematic refinement

Source: Miro screenshot by author, 2025

The eight most prevalent themes (experienced by five or more participants) were used to define a context in which young adults could benefit from a play-based design intervention (refer to figure 73). These themes were grouped into three overarching categories aligned with intrapersonal, interpersonal and extra personal domains (refer to figure 23 and figure 74).

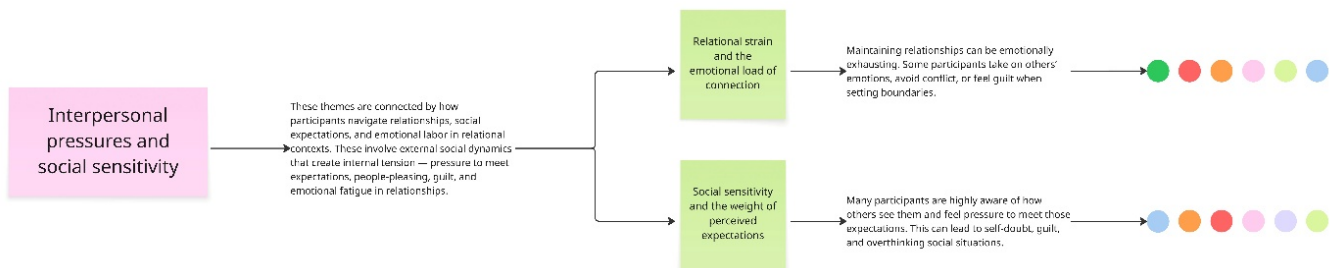


Figure 23: Final thematic grouping (8 key themes) aligned with intrapersonal, interpersonal, and extra personal domains

Source: Miro screenshot by author, 2025

Analysis of the persona (refer to figure 24 and figure 75), day-in-the-life mapping (refer to figure 25 and figure 76), and as-is scenario map (refer to figure 26 and figure 77) was deductive. These activities did not generate new themes but served to confirm and contextualise the issues identified in the issue cards, clarifying when and how participants encountered these challenges throughout their daily routines.

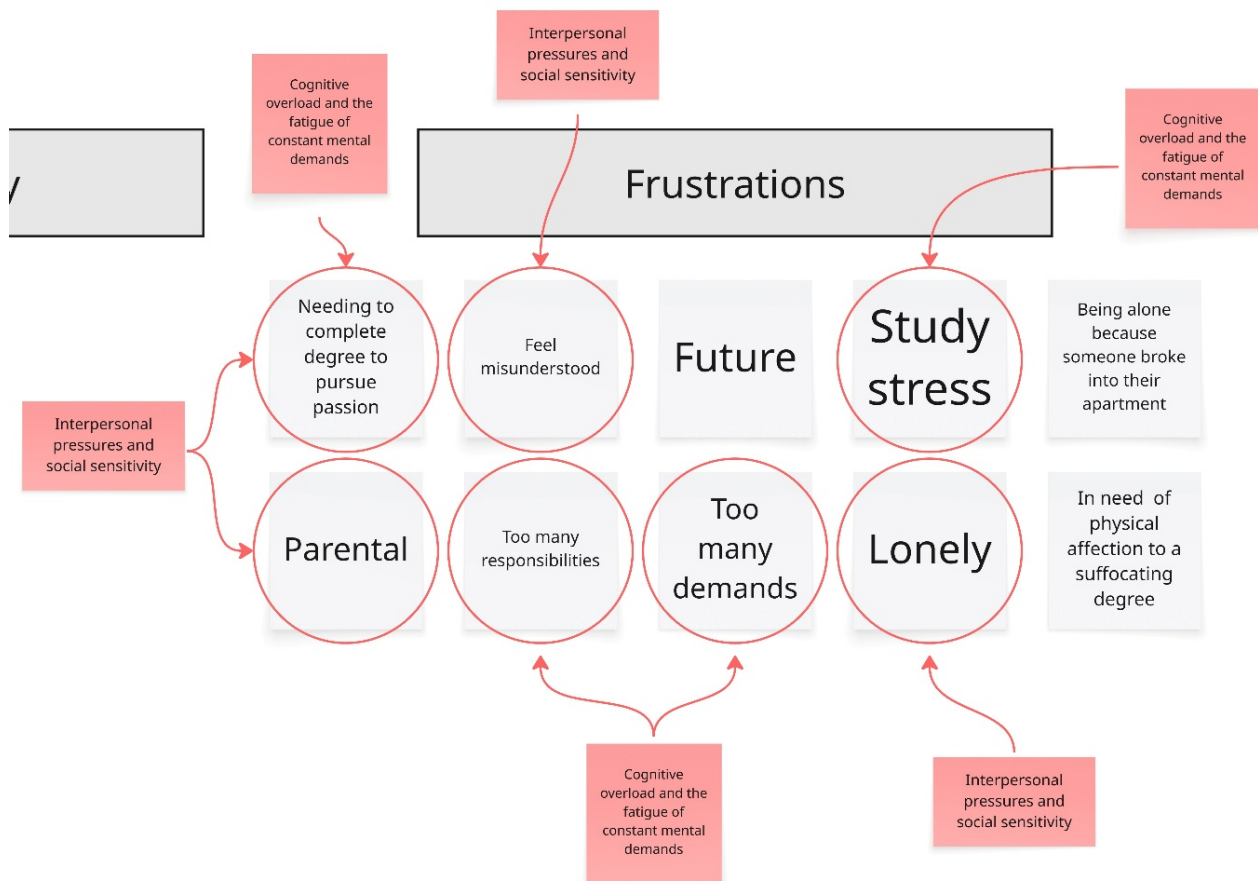


Figure 24: Deductive validation using the persona ("JJ")

Source: Miro screenshot by author, 2025

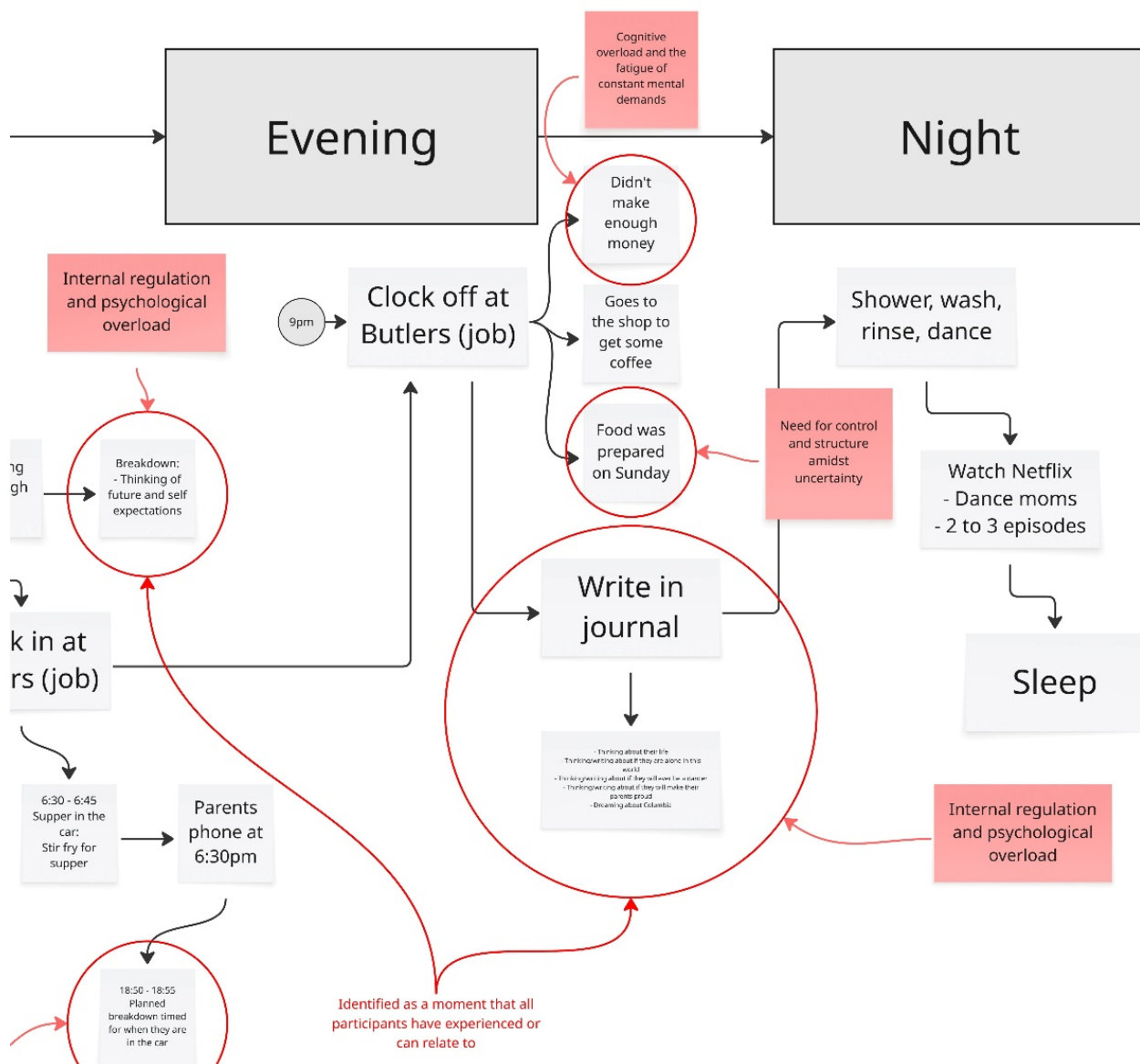


Figure 25: Deductive validation using day-in-the-life

Source: Miro screenshot by author, 2025

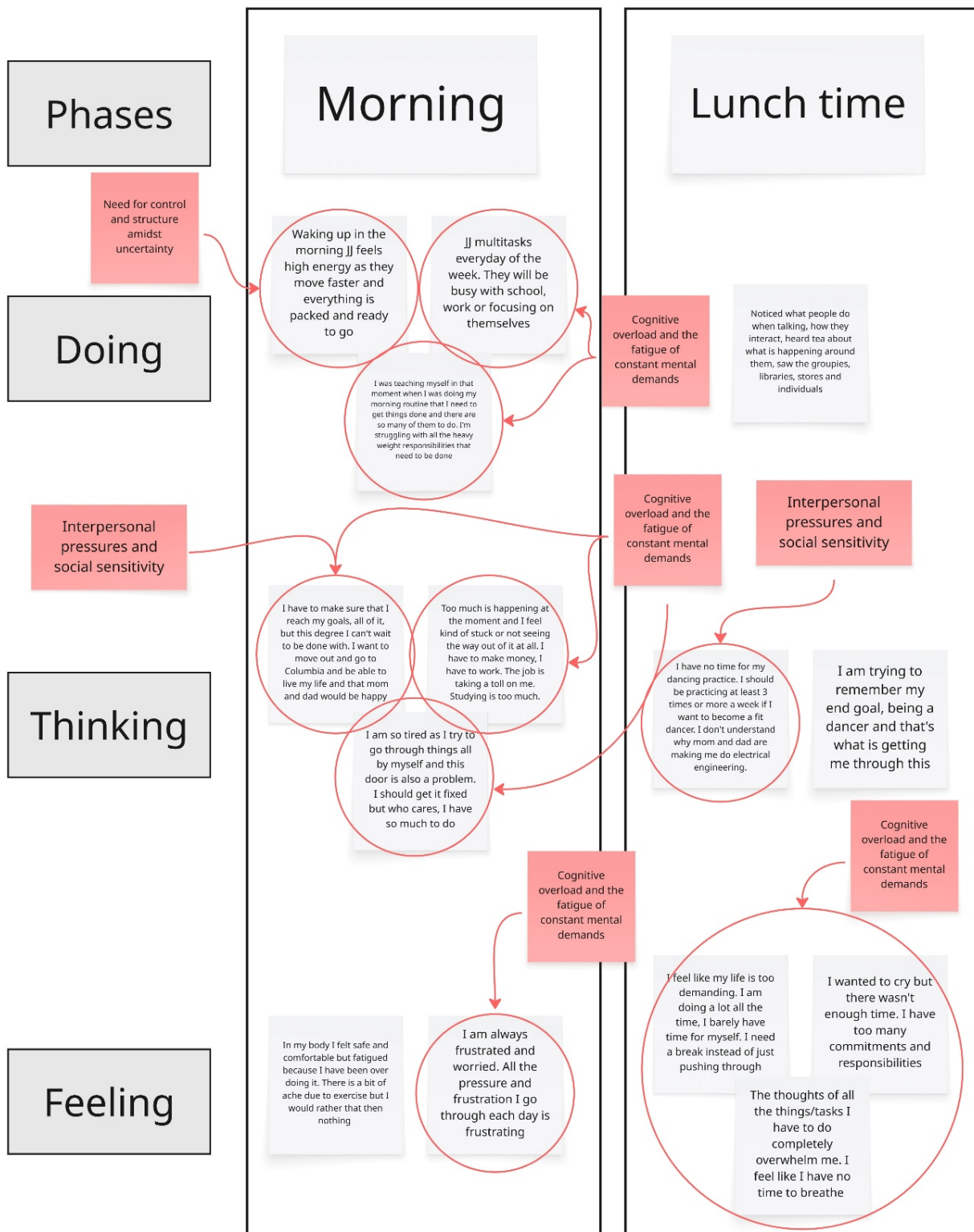


Figure 26: Deductive validation using the As-Is Scenario Map

Source: Miro screenshot by author, 2025

c) Discover findings: themes identified

The analysis of workshop data identified three overarching domains and eight key themes that delineate the challenges young adults face in managing cognitive load (refer to table 7, figure 73 and figure 74). These eight key themes define the problem space, clarifying the underlying factors and contexts related to cognitive overload.

Table 7: Themes identified in workshop one

Source: author created table

Theme	Description
Internal regulation and psychological overload (intrapersonal)	
Anxiety and panic responses to cognitive and environmental overload	Participants experience anxiety or panic when they encounter excess information or physical stimuli, often triggered by large crowds, loud noises or a high mental demand.
Cognitive overload and the fatigue of constant mental demands	Participants struggle to balance multiple roles and responsibilities with their own well-being, often leaving them fatigued.
Restless minds and the strain of scattered attention	Participants struggle to stay present and remain focused, often resulting in jumping between tasks and general restlessness.
Embodied anxiety and the emotional weight of health and trauma	Participants experience emotional and physical distress, often triggered by health challenges or past traumas.
Interpersonal pressures and social sensitivity (interpersonal)	
Relational strain and the emotional load of connection	Participants struggle to enforce boundaries with others, often resulting in suppressed emotion to avoid conflict and guilt.
Social sensitivity and the weight of perceived expectations	Participants experience social anxiety, often resulting in self-doubt and overthinking.
Environmental overstimulation and sensory boundaries (extra personal)	
Need for control and structure amidst uncertainty	Participants feel overwhelmed during moments of uncertainty, often triggered by a loss of control, organisation and structure.
Sensory overload and the quest for environmental	Participants experience sensory overload, often triggered by bright lights, loud noises or crowded environments.

4.1.2 Define

The second phase of the double diamond framework involved working with key informants, specifically one life coach and one psychiatrist, both of whom work professionally with young people in Cape Town. The primary objective of this phase was to triangulate and validate the data received in the first workshop while moving towards the solution space.

a) Instruments and sequence

The define phase employed methods that would facilitate data triangulation and establish the groundwork to move towards a solution space (refer to figure 27). The activities were structured sequentially.

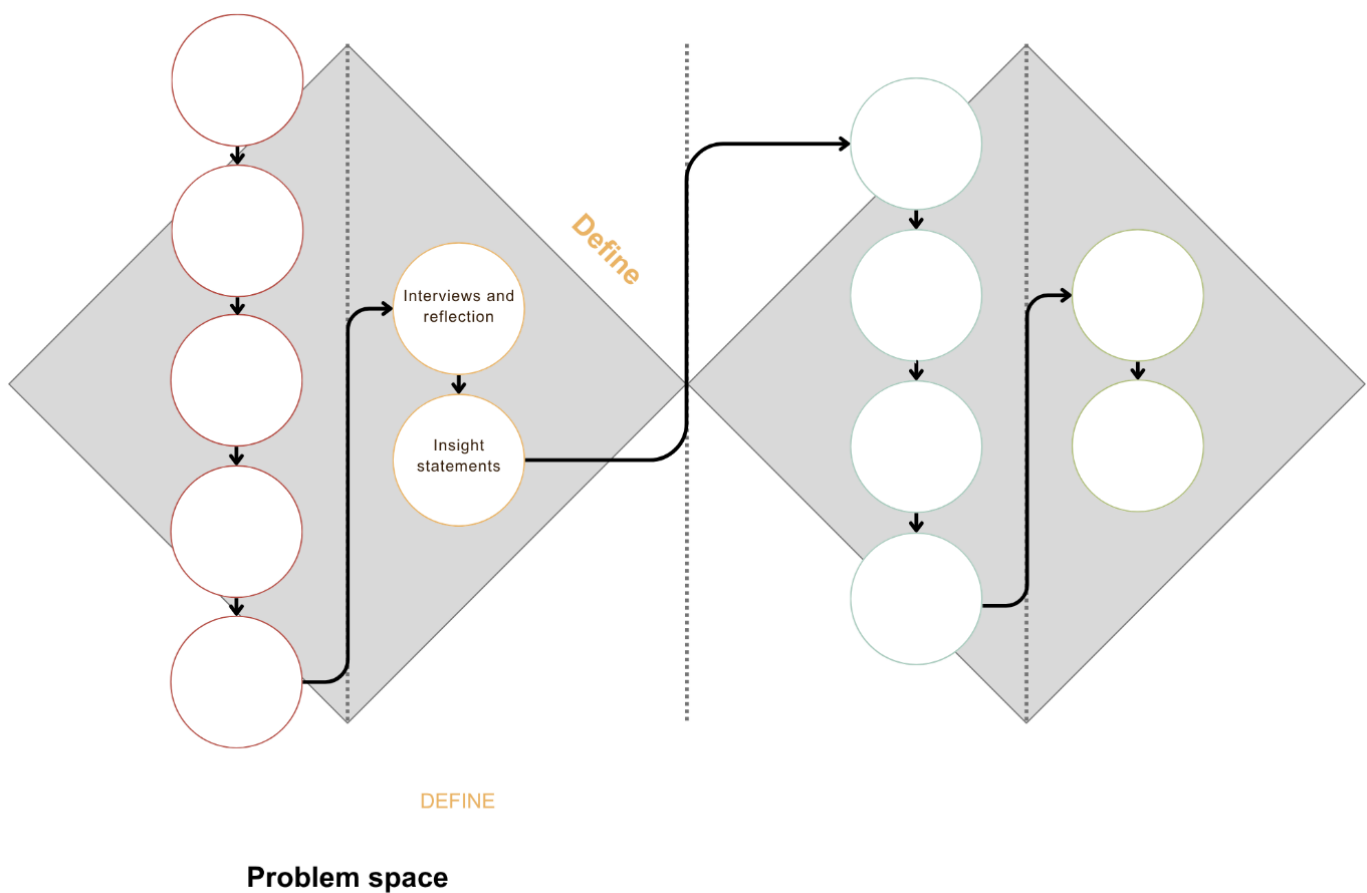


Figure 27: Instruments and sequence of activities in the Define Phase

Source: created by author

Key informants

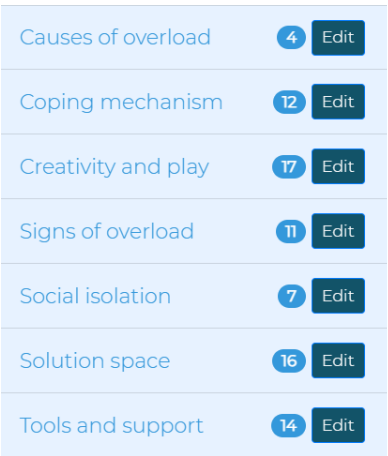
The interviews were conducted with two key informants and were semi-structured (refer to table 26). The objective of the interviews was to validate the data received from the first workshop, move towards a solution space with a focus on play-based design and add any additional insights that may have been overlooked. Interview questions and prompts were created prior to conducting the interviews to guide the discussion, however, the conversation remained open enough to explore new avenues (refer to table 27).

Insight statements

Insight statements were created based on the data from the first workshop and interviews. The second workshop employed the three horizons framework which looks at the current state (horizon one), the desired future state (horizon three) and the bridge between them (horizon 2). The insight statements were written to form horizon one.

b) Data analysis

The interviews were transcribed using the platform Turboscribe and analysed using the platform Taguette (Taguette, n.d.; Turboscribe, n.d.). The analysis employed a deductive approach, guided by the themes that emerged from the first workshop. The first step of the analysis involved reading the interview transcripts to ensure familiarity with the data and to identify relevant segments aligned with the workshop-derived themes. Using Taguette, a preliminary set of codes were created which were refined as the analysis progressed (refer to figure 28). Relevant passages were highlighted, coded and grouped under corresponding thematic categories (refer to figure 29).



Causes of overload	4	Edit
Coping mechanism	12	Edit
Creativity and play	17	Edit
Signs of overload	11	Edit
Social isolation	7	Edit
Solution space	16	Edit
Tools and support	14	Edit

Figure 28: Deductive analysis and thematic arrangement of interview data

Source: Taguette screenshot by author, 2025

what are those coping strategies?

[Speaker 1] (11:11 - 11:27)

So I think the first thing is actually acknowledging. Acknowledging that it's hard, it's not necessarily abnormal that it's hard, and also acknowledging that you've come, you've asked for help, that is a phenomenal coping strategy.

[Speaker 2] (11:27 - 11:28)

That's a huge first step.

[Speaker 1] (11:28 - 14:15)

Yeah, it's huge, and particularly because there's so much stigma about going to a psychiatrist or psychologist. So I think just the **acknowledgement normalises it, and it makes it safer, and that in itself is coping**. And when you can ask for help and receive help and be met, it's easier to ask for help and receive help elsewhere.

And when you don't feel like a freak, then it's easier to just be how you are so you get support.

So if people are kind of losing themselves in the work or like overcompensating and that's making it worse, if there's a sympathy that you find when you're vulnerable and honest, then it's easier to allow yourself to be vulnerable and honest in other social circles and so get more support. That's the first thing.

Figure 29: Deductive analysis and extraction of interview data

Source: Taguette screenshot by author. 2025

c) Define findings: from evidence to design brief

The data from the interviews was multi-faceted: it validated the insights gathered from the first workshop, creating a deeper understanding of the problem space, and it revealed considerations for moving into the solution space. The themes that emerged from the interviews were: causes of overload, coping mechanisms, creativity and play, signs of overload, social isolation, solution space and tools and support (refer to table 8 and table 28).

Table 8: Key quotes extracted from the interview transcripts

Source: Author created table

Theme	Key informant code	Quote
Causes of overload	KI1	"Baseline western lifestyle"
	KI1	"So certainly, a preoccupation with devices. And the problem with that is its constant attention demand and its multiple points of attention. So, if you are on your phone and you are, say, playing a game, then there are all these colours and all these noises and all these sounds and all these ads. And if you go onto google, then one link to the other, to the other, to the other. So, there is a high cognitive demand"
	KI2	"Cell phone"
Coping mechanisms	KI1	"Substances, so alcohol again for the emotional numbing, any plethora of legal or illegal drugs"
	KI1	"So, you feel like you can't cope and then you just sit on your phone, or you binge watch TV"

	KI1	"I think there are very few people who have sufficient insight into this kind of overwhelming overload who have healthy coping mechanisms, such as, taking time off, just stopping, spending time with family and friends, socialising, meditating, moving your body"
	KI2	"But the procrastination is very high, everyone is procrastinating because it is too hard, don't know how to do it, you don't know where to start"
Creativity and play	KI1	"I recommend creativity and then remind people that we are all creative. We are just told that we are not. And whether you are crocheting or knitting or sewing or designing a board game or painting or singing, if you are doing something where you are making something, that's a life force, that's creativity"
	KI2	"But I think calmness comes from the art and act of physically doing something, whether it's a drawing or it's a puzzle or it's a walk or all the different creative things one can do"
	KI2	"I think it lightens the load. It takes away the seriousness of life to be playful again through creativity, play, whatever that might be"
Signs of overload	KI1	"And I see this often in young, or I've seen it often in young people, is that this degree of increased demand and overwhelm and then the inability of the difficulty saying this is too much often leads young people to become despondent and hopeless"
	KI2	"Not sleeping, panic attacks, not being able to self-regulate, crying"
Social isolation	KI1	"Social interaction is crucial for wellbeing as humans. That's how we regulate"
	KI2	"They are not interested in other people. They just don't like people. Yeah. They don't want to be around people"
Solution space	KI1	"So, in terms of your intervention, like a group intervention, because firstly to be more practical and easier and be more wide reaching, but also to then fulfil that social interaction. And, that you could be modelling behaviour and that they'd be fun and they'd be creativity. And so that could lead to better self-regulation"
	KI1	"I'm all about the low hanging fruit. If things are not easy, people don't do it"
	KI2	"But I think it's very personal to them as well as to what they see play to be. But I think they'd be more open to trying the play"
Tools and support	KI1	"SHIMMER, self-care, hydration, inspiration or intention, meditation, move your body, eating right and rest"
	KI2	"Teaching them about self-awareness and being present and actually finding balance"

The key informants highlighted that young adults experience cognitive, emotional and physical overload, often triggered by managing too many tasks, constant digital exposure and societal pressures. Digital devices were identified as the top contributor to cognitive overload, triggered by

constant notifications, colours and light. The increase in digital use was further linked to a reduction in in-person interaction.

The key informants noted that when young adults feel overloaded, they experience anxiety, irritability, emotional dysregulation, distractibility, impulsivity, difficulty focusing, disrupted sleep, panic attacks and fatigue.

It was highlighted that young people tend to resort to unhealthy coping mechanisms when they experience cognitive overload. This includes substance use, binge watching series, pornography and sex. It was noted that healthy coping strategies require a conscious effort and are therefore rarely defaulted too. These coping mechanisms include rest, social interaction, movement, meditation and creative activities.

Creativity emerged as a key element of play and was seen as beneficial on an individual and interpersonal level for self-expression, healthy distraction and social connection. The key informants discussed what the solution space could look like and a defined problem frame, design criteria and success signals emerged.

The key informant interviews provided insights that reflected on the problem space and looked forward towards the solution space. The data was extracted from the interviews to define a problem frame, generate design criteria and pinpoint success signals (refer to table 9).

Table 9: Problem frame, design criteria and success signals developed from the interview insights

Source: Author created table

Problem frame	Digital information and societal demands trigger cognitive overload
	Coping strategies are often insufficient, with unhealthy defaults dominating and healthier practices requiring effort
	Creativity, play and social interaction are underutilised yet essential for wellbeing
Design criteria	Manage cognitive load to support focus, relaxation, emotional regulation and social connection
	Integrate playful, creative engagement for both individual and social participation
	Ensure interventions are accessible, low-cost, intuitive and adaptable to daily routines
	Include community or group-based elements to model and reinforce positive coping behaviours
Success signals	Healthier coping strategies resulting in increased attention, self-regulation and a sense of calm

	Playful activities enabling social connection, a sense of community and shared experiences
	Users engage with playful activities as a healthier coping mechanism
	The design intervention is engaging, enjoyable, accessible and adaptable

4.1.3 Discover and Define Synthesis: Insight Statements

The data from the first workshop and the interview insights were combined to generate eight key insights. The process involved cross-validation and synthesis. The deductive findings and suggestions for the solution space that emerged from the interviews were mapped against the workshop themes. Table 10 illustrates the process of cross-referencing interview insights against participants themes.

Table 10: Cross referencing interview insights against participant themes

Source: Microsoft Word screenshot by author, 2025

Participant theme	Key informant confirmation/insight	Suggestions for moving towards a solution space
Anxiety and panic responses to cognitive and environmental overload	KI1: Young people often experience hopelessness, anxiety and panic due to overwhelming demand and inability to regulate. Signs include emotional dysregulation, distractibility, impulsivity and burnout. KI2: Not being able to self-regulate, crying, mindfulness exercises help.	Include activities that teach self-regulation, mindfulness and grounding. Use creative outlets to express and manage anxiety. Ensure individuals can pause and reset.
Need for control and structure amidst uncertainty	KI1: Low insight into healthy coping and structured routines help regulate KI2: Journaling and structured reflection help give clarity.	Include tools to help participants plan and structure tasks creatively (journals, checklists, “low-hanging fruit” exercises). Focus on small achievable steps to reduce overwhelm.

The suggestions for the solution space were used to generate prompts for activities in the second workshop. The deductive insights from the interviews were combined with the themes that emerged from the workshop to create eight key insight statements:

- When young adults experience cognitive overload, they might become anxious which can result in panic attacks and burnout. It is common to resort to unhealthy coping mechanisms or numbing behaviour such as endless scrolling on social media, binge-watching series or substance use. This generates an ongoing cycle of stress and disconnection.

- Young adults find security in routine, structure and control while living in a chaotic world. In moments of unpredictability, the sense of security is lost, and young adults overcompensate, overwork, or withdraw completely to regain control. This creates a cycle of guilt and shame which generates pressure rather than relief.
- Due to the nature of digital devices, people are constantly connected to information and have an inability to disconnect. This results in young adults feeling mentally exhausted and simple tasks become overwhelming. The default coping mechanisms for this include procrastination, digital distraction, and mental disconnection. These coping strategies expose young people to more information and demand further attention which can lead to burnout.
- Young adults struggle to focus, sit still or complete tasks. Digital demands increase restlessness, irritability and impulsivity. Young adults are being labelled with conditions such as attention deficit disorder; however, these are symptoms of the digital age rather than the disorder.
- Young adults fear judgement; consequently, social interactions can feel like a performance. Young people find it safer to have social engagement in a digital space rather than in person. These connections lack the eye contact, playfulness and energy exchange that is experienced with in person engagement and as a result young adults feel an increased sense of loneliness.
- Young adults value relationships however experience fatigue while simultaneously caring for others and managing personal stress. This results in a balancing act between the need for closeness and the need for space. While they desire connection, it is common for young people to default into overworking or isolation, increasing the cognitive load.
- Young adults often experience sensory overstimulation which leads them to withdraw, avoid public spaces and tightly control their environments. This becomes challenging due to the overstimulation created from physical environments and digital devices and leads to an increased level of stress.
- Young adults often experience health related anxiety and past trauma and the stress caused by this can have physical manifestations such as exhaustion, sleeplessness, pain or emotional outbursts. Young adults find themselves in a constant state of alert. While many attempt to numb these feelings through substances, food, or other escapes, such strategies often intensify anxiety over time. Healthier outlets

(movement, rest, creativity, and play), exist but are harder to access in moments of overload.

The insight statements informed the solution space and formed the first horizon of the Three Horizons framework.

4.2 CONCLUSION

Chapter four detailed the insights that emerged from the design process and was situated in the first part of the double diamond, the problem space. The chapter began with discover. It presented the activities that were employed in a co-design workshop, the thematic analysis of the data and the outcomes that emerged. Chapter five will explore the outcomes and analysis situated in the second part of the double diamond, the solution space.

CHAPTER FIVE: DESIGN PROCESS - SOLUTION SPACE

Chapter five is situated in the solution space of the double diamond (develop and deliver). Develop begins with an overview of the activities used in the first part of a second co-design workshop. Next, it illustrates the thematic analysis of the workshop data. Finally, it presents the findings and insights that emerged from the data. Deliver is initiated with an overview of the activities used in the second part of the co-design workshop. Next, it discusses the analysis of the workshop data. Chapter five ends with the presentation of the concepts that emerged from the second co-design workshop.

5.1 SOLUTION SPACE

The second phase of the research focused on the second diamond of the double diamond framework, develop and deliver, which represents the solution space (refer to figure 30).

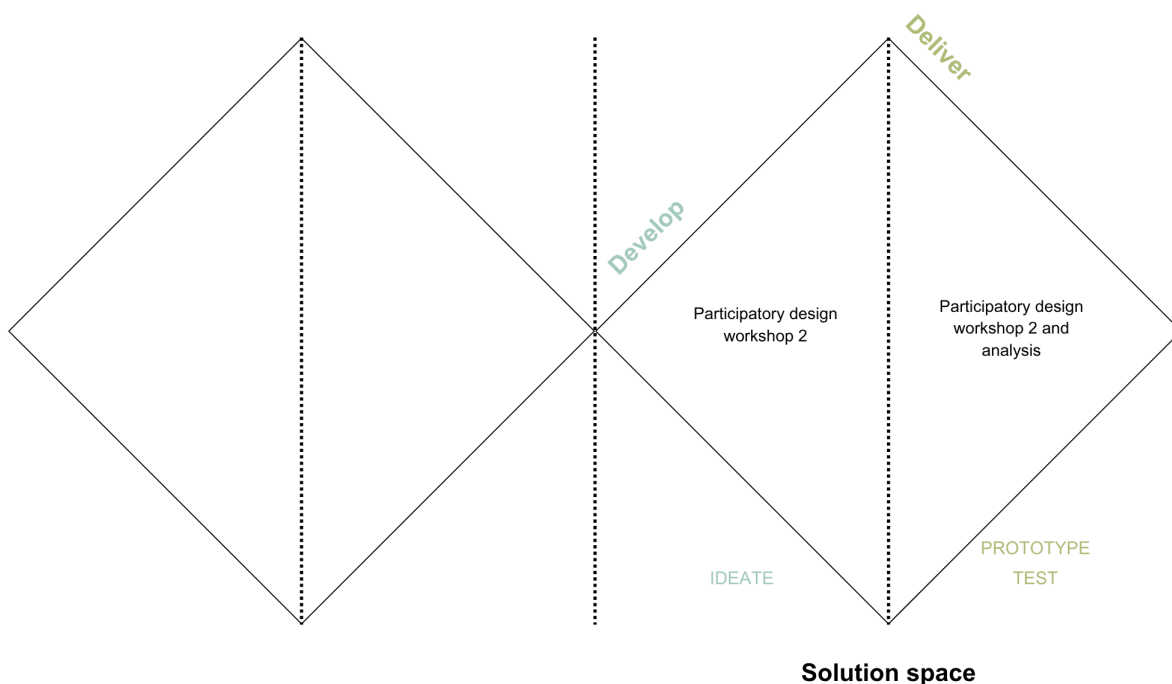


Figure 30: Double diamond solution space

Source: created by author

5.1.1 Develop

The second co-design workshop focused on the second diamond within the double diamond framework. The participant group that engaged in the workshop comprised five young adults who attended the first co-design workshop. The primary objective of the workshop was to collaboratively generate a play-based design intervention for the context identified in the problem space.

a) Co-design tools and sequence

The second co-design workshop followed a sequential structure. It concepts generation and development methods designed to be playful and collaborative (refer to figure 31). The activities were chosen and implemented to conceptualise and develop play-based design interventions that directly relate and respond to the insight statements the emerged from the problem space.

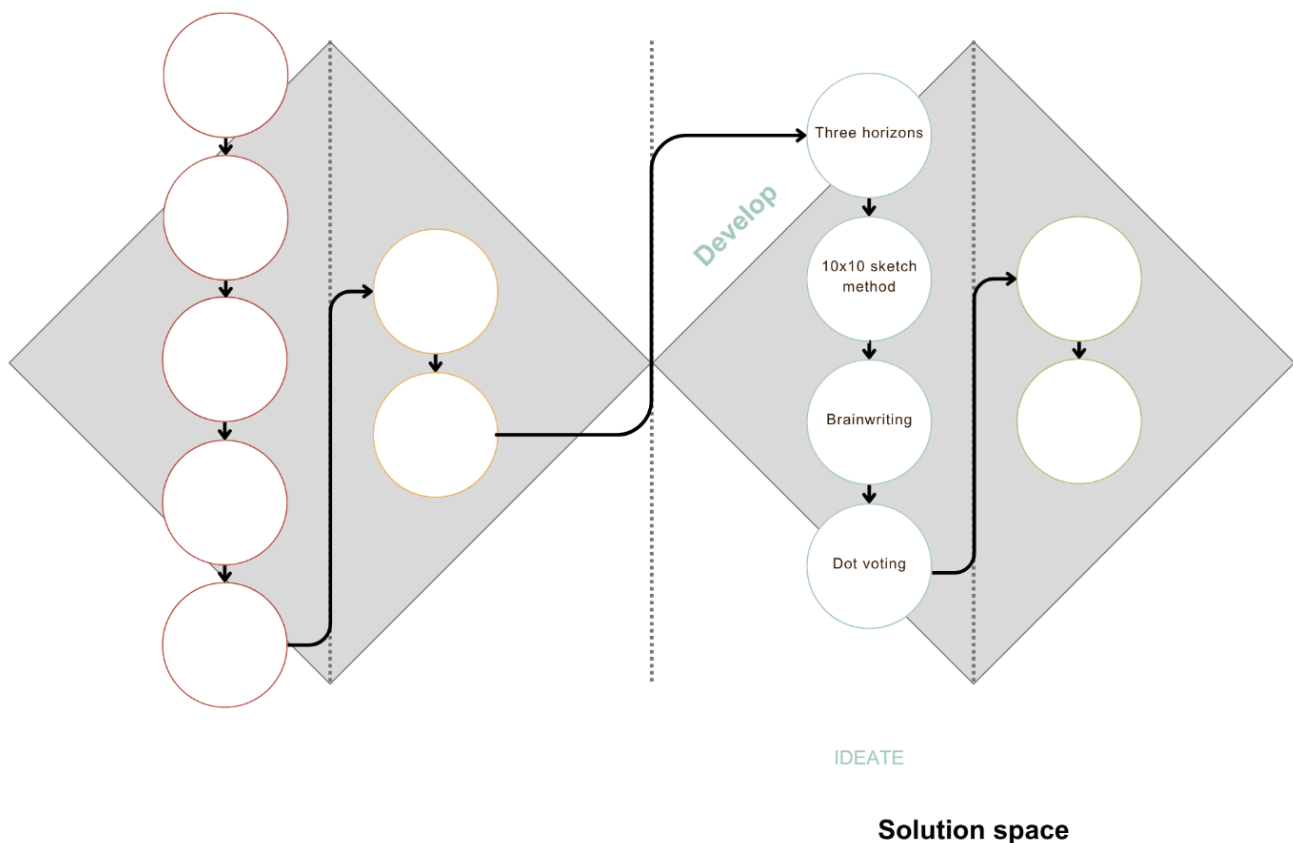


Figure 31: Tools and sequence for concept development in the Develop phase

Source: created by author

The three horizons framework

The session began with an exploration of the third horizon in relation to the first horizon, established in the first participatory design workshop and enriched through interviews with key informants.

[illegible]

Source: photograph by author, 2025

The 10x10 Sketch Method was then employed as a rapid ideation exercise. Participants were provided with paper to generate as many ideas as possible in a short timeframe. Together, they produced twenty-five initial concepts (refer to figure 33).



Figure 33: Outputs of the 10x10 sketch method for rapid ideation

Source: photograph by author, 2025

Brainwriting

To explore the initial concepts further, participants engaged in brainwriting to collaboratively develop selected concepts (refer to figure 34). Each participant chose one of their ideas and passed it around the group. Over five-minute intervals, participants iterated on and refined each concept until all five had been built upon by every participant.



Figure 34: Collaborative refinement of concepts via brainwriting

Source: photograph by author, 2025

Dot voting

Dot voting was employed to identify which of the initial concepts was most widely valued by the broader participant group. Each participant received three dot stickers, and each represented one vote (refer to figure 35). The concept with the most votes was selected for further exploration.



Figure 35: Outputs of the dot voting on generated concepts

Source: photograph by author, 2025

b) Data analysis

The second workshop analysis began with the data from the third horizon of the three horizons framework. The future-oriented points were grouped to identify patterns and establish key focus areas (refer to figure 36 and figure 79).

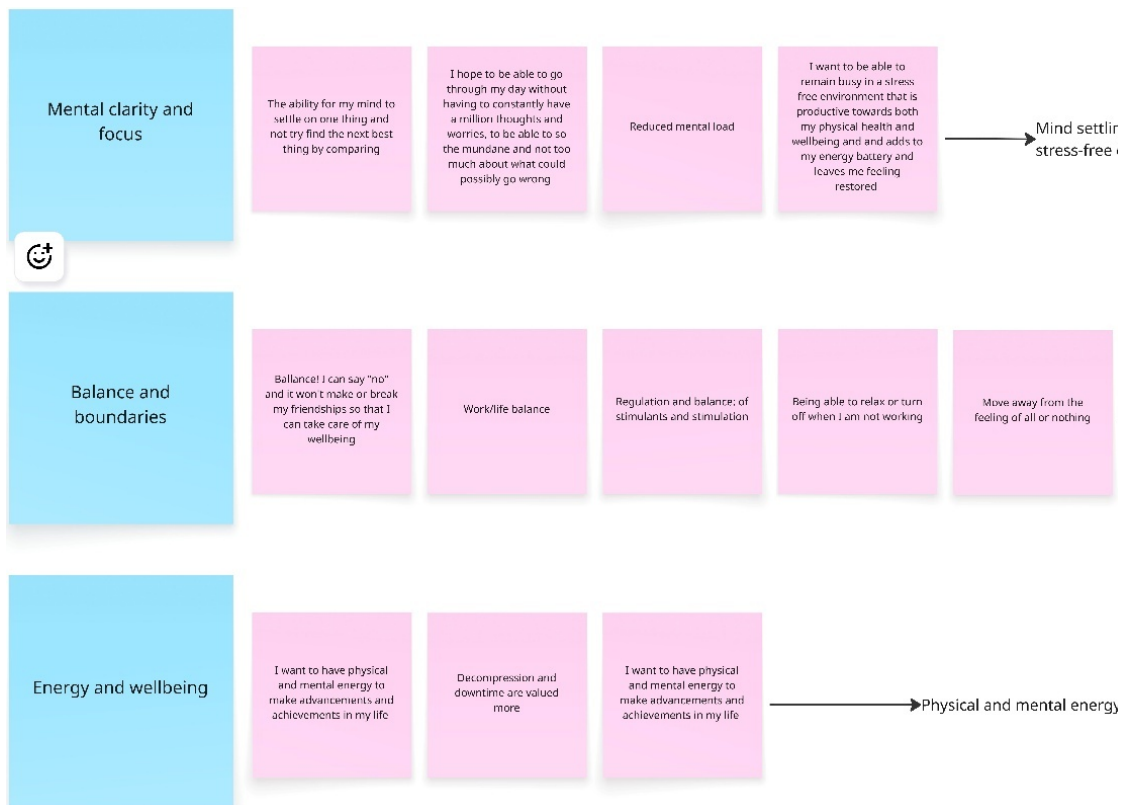


Figure 36: Grouping of future-oriented aspirations (Horizon 3 Data)

Source: Miro screenshot by author, 2025

These themes were refined to generate five final themes that reflected the participants' future-desires regarding improved cognitive load management (refer to figure 37 and figure 80).

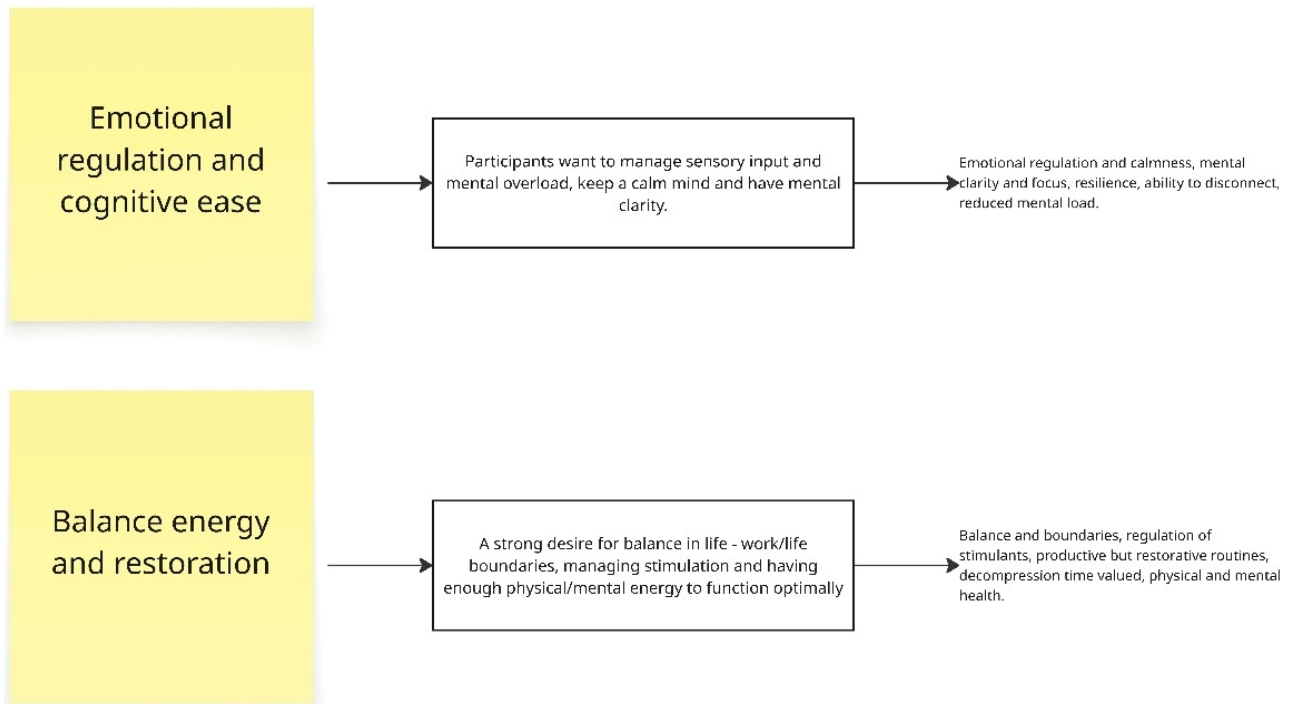


Figure 37: Final thematic refinement of participants' desired futures

Source: Miro screenshot by author, 2025

The 10x10 sketch method and brainwriting activities were analysed, and similar concepts were clustered together. This highlighted overarching patterns and categories were then refined to represent the different forms that a play-based design intervention could take (refer to figure 38 and figure 81).

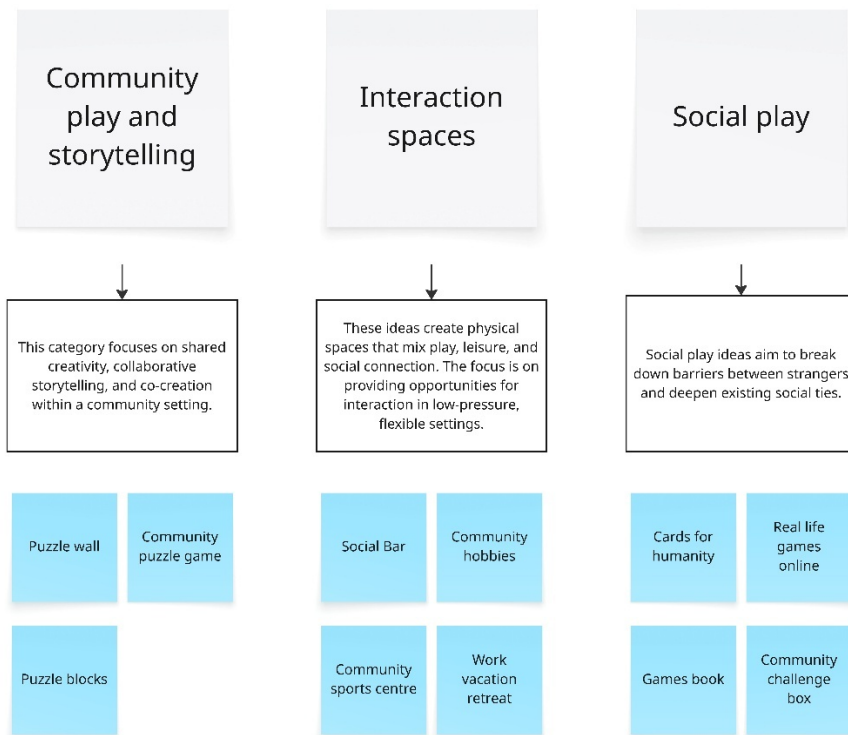


Figure 38: Thematic clustering of concepts from rapid ideation and brainwriting

Source: Miro screenshot by author, 2025

Implicit desires for a play-based design intervention emerged from these groupings (refer to figure 39 and figure 81).

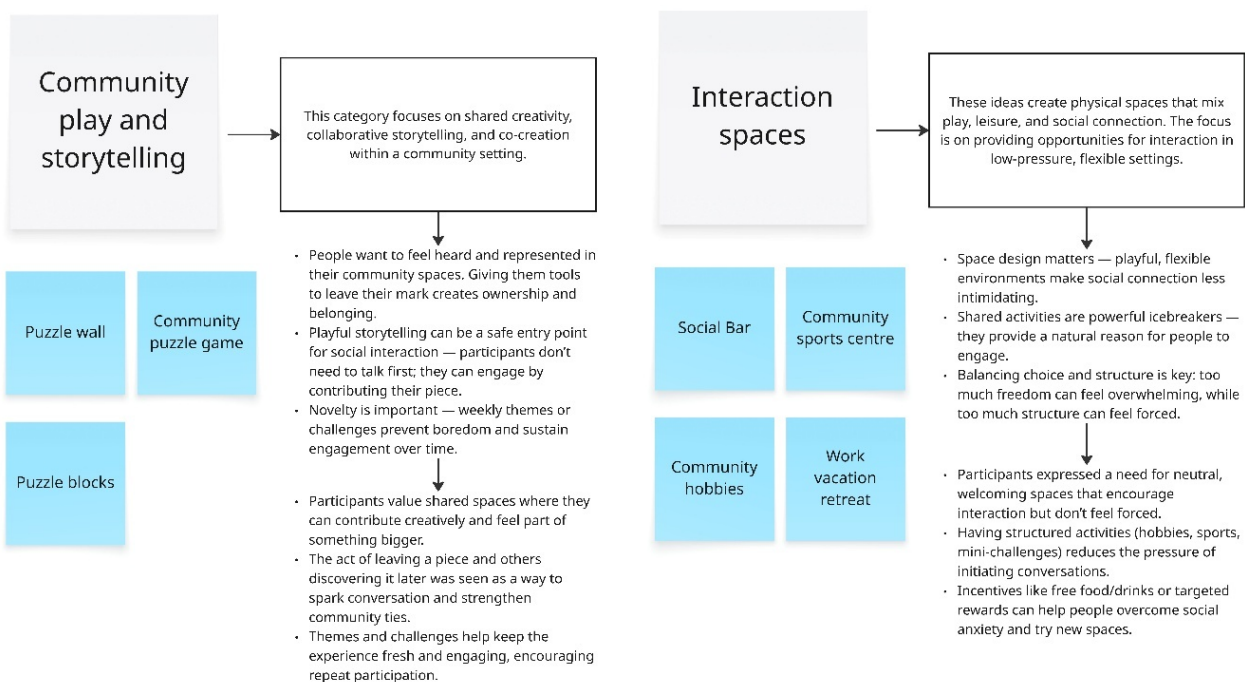


Figure 39: Identified implicit desires guiding design intervention

Source: Miro screenshot by author, 2025

c) Develop findings: themes identified

The desired future states (Horizon Three) were conceptualised in response to the current state of cognitive load management (Horizon One) (refer to table 11). This produced five refined themes.

Table 11: Themes that emerged from brainstorming Horizon Three of the Three Horizons framework

Source: author created table

Theme	Description
Emotional regulation and cognitive ease	Managing sensory triggers and information overload to maintain a sense of calm and increase mental clarity.
Balance, energy and restoration	Creating a work/life balance by managing sensory and informational input and creating boundaries to improve mental functioning.
Authentic self-expression	Expressing oneself through speaking honestly, creativity and creating boundaries without guilt or judgement, especially in social contexts.
Supportive social environment	Building mutually supportive connections and stronger social networks while maintaining personal energy and wellbeing.
Life systems and structures that support wellbeing	Employing tools to improve daily task management, reduce frustration, improve focus and make hobbies more accessible.

The initial concepts that were generated during the rapid ideation activities directly addressed the gap between the first and third horizon of the Three Horizons framework. Each participant selected one of their concepts generated during the 10x10 sketch method activity to explore further. This consisted of the puzzle wall, social bar, the work vacation retreat, the community hobbies hall, and the card game.

The puzzle wall (refer to figure 40) is a community-based storytelling and challenge installation. Individuals use blank puzzle pieces to write stories and or engage in reflective creativity and place it on a wall to build a collaborative puzzle. When a puzzle piece is placed, the individual receives a social-based challenge to complete. The concept promotes social connection through narrative exchange, playful interaction and themed challenges. This further encourages creativity and a sense of belonging within a community.

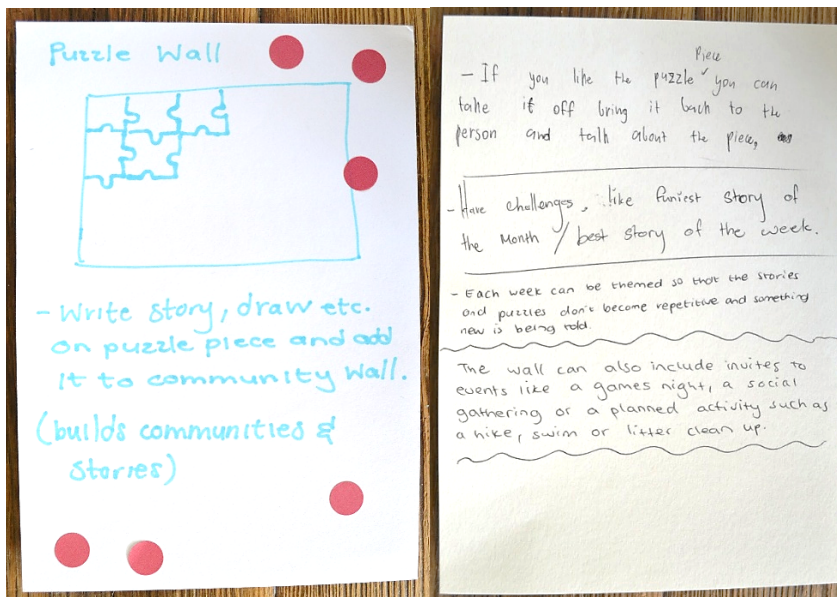


Figure 40: Concept 1: Puzzle wall

Source: photograph by author, 2025

The social bar concept (refer to figure 41) is a pop-up social space. It is designed to encourage spontaneous in-person interaction by encouraging individuals to engage in playful-challenges, mini-games and collaborative activities. Furthermore, aims to facilitate meaningful social engagement by incorporating gamified tasks, a token collection as currency and shared rewards.

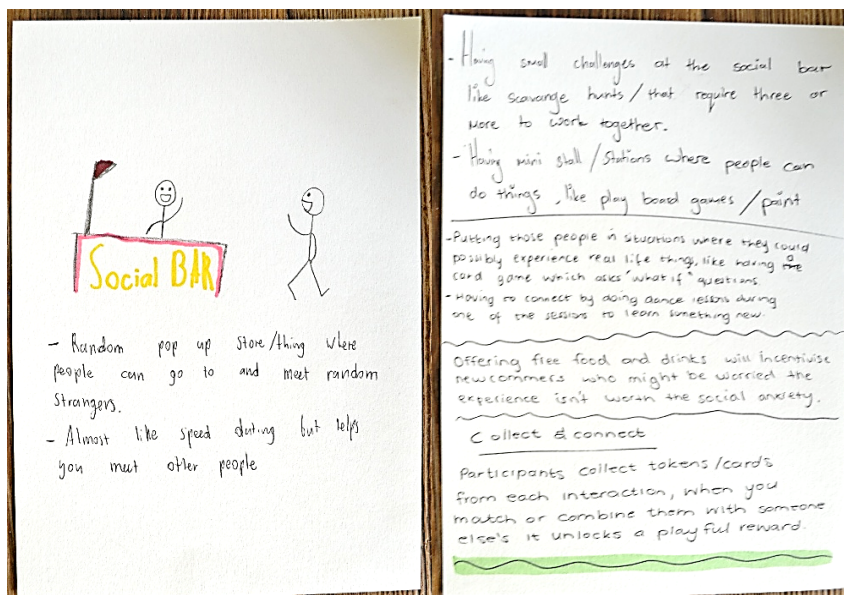


Figure 41: Concept 2: Social bar

Source: photograph by author, 2025

The work vacation retreat (refer to figure 42) is a sanctuary that combines productivity and leisure. The gamified environment encourages individuals to earn play currency by engaging in playful and wellness-focused activities. Individuals are urged to exchange engagement for tangible rewards to incentivise balance and social collaboration.

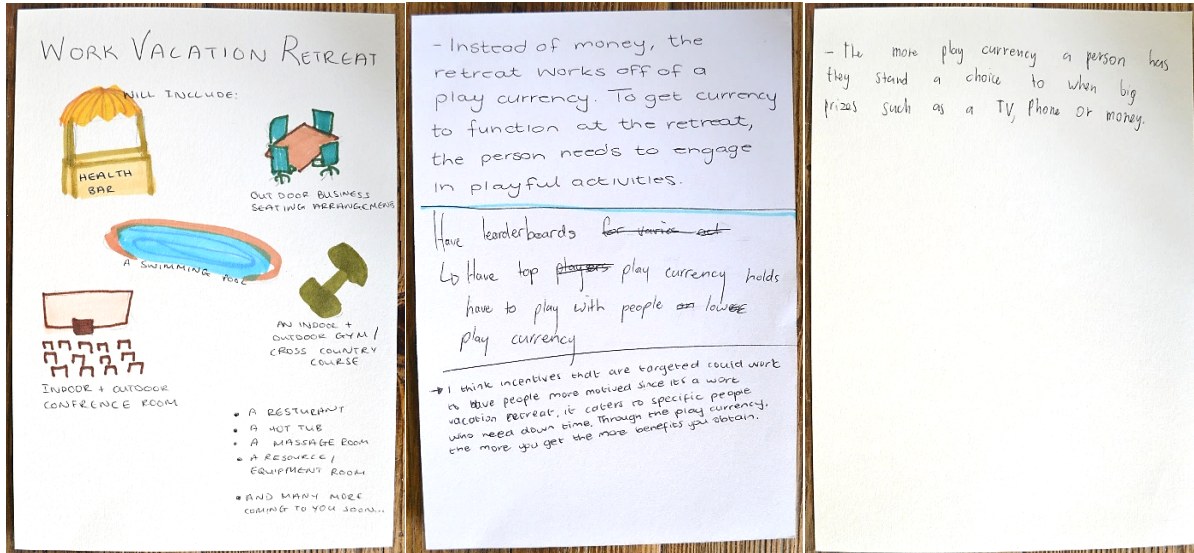


Figure 42: Concept 3: Work vacation retreat

Source: photograph by author, 2025

The community hobbies hall (refer to figure 43) is a community creative space that provides tools, materials and opportunities for individuals to explore, exchange and develop hobbies. The community hobbies hall is designed to encourage skills development to promote income generation, mentorship and creative collaboration.

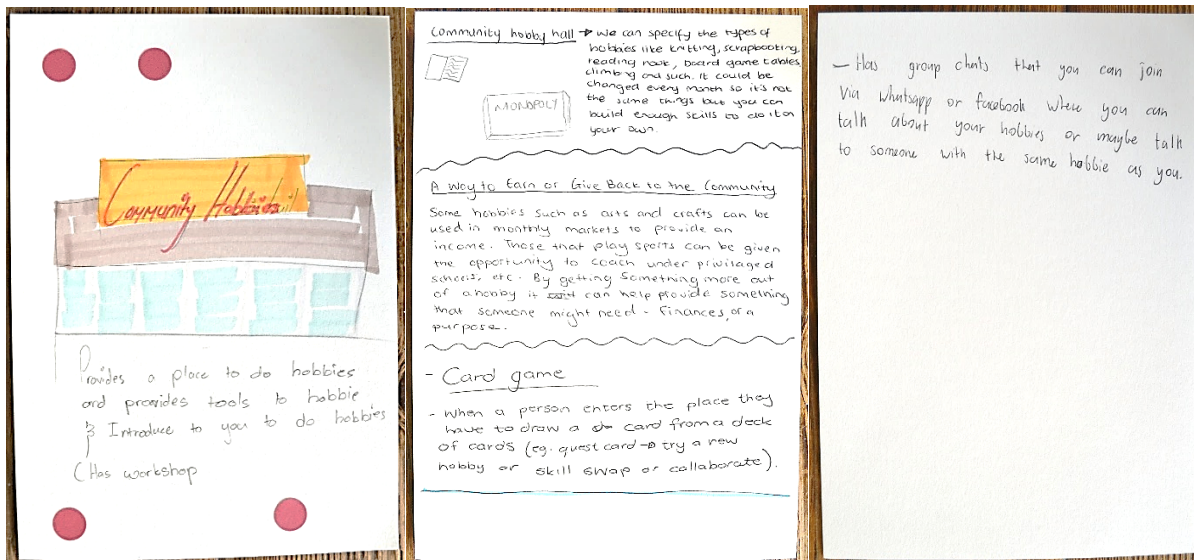


Figure 43: Concept 4: Community hobbies

Source: photograph by author, 2025

The card game concept (refer to figure 44) promotes balanced engagement through interaction with daily play prompts. Each day individuals draw a card from one of two card decks: social play or home play. The social play deck encourages community engagement, and the home play deck encourages play on an individual level. In addition, the card game is linked to a rewards-based system, promoting consistent, low-pressure participation and daily playfulness.

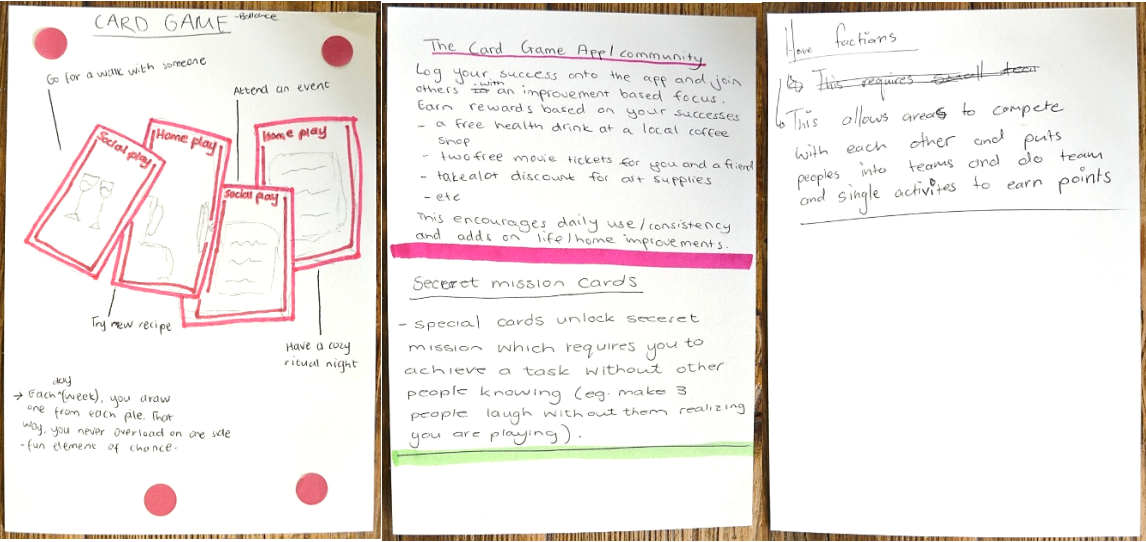


Figure 44: Concept 4: Card game

Source: photograph by author, 2025

The concepts from the 10x10 sketch method and brainwriting activity were grouped into eight overarching themes: community play and storytelling, interaction spaces, social play, gamification and rewards, ambient and sensory play, spontaneous play prompts, digital tools, and other. Further analysis of these categories revealed the participants’ implicit desires regarding a play-based design intervention (refer to table 12).

Table 12: Participants implicit desires extracted from concepts that they developed

Source: author created table

Implicit desire	Description
Shared experiences	Engaging with community to generate shared experiences and a sense of belonging.
Representation	Engaging with tools and activities that result in a tangible outcome in a low-pressure context.
Physical environment	Combining leisure and play in a low-pressure physical environment to encourage social interaction.
Balancing choice and structure	Having too much freedom could increase the sense of overwhelm and too much structure could reduce enjoyment through restriction.

Reduce self-consciousness	Encouraging easing engagement to assist breaking down barriers with strangers and deepening existing relationships.
Rewards-based	Incentivising play and generating friendly competition while avoiding pressure.
Sensory play	Engaging with subtle environmental play-based interventions that employ sensory cues and encourage small moments of joy throughout the day.
Spontaneous play	Integrating spontaneous play prompts into daily living to break routine and encourage small moments of joy throughout the day.

Participants each received three dot stickers to decide on which concepts they wanted to explore further. The concept that received the most votes was the puzzle wall with six votes.

5.1.2 Deliver

The last phase of the double diamond framework involved testing and refining the concept that the participants collectively chose.

a) Instruments and sequence

The workshop employed methods for prototyping, testing and feedback (refer to figure 45). The activities were designed to be engaging and collaborative and were structured sequentially.

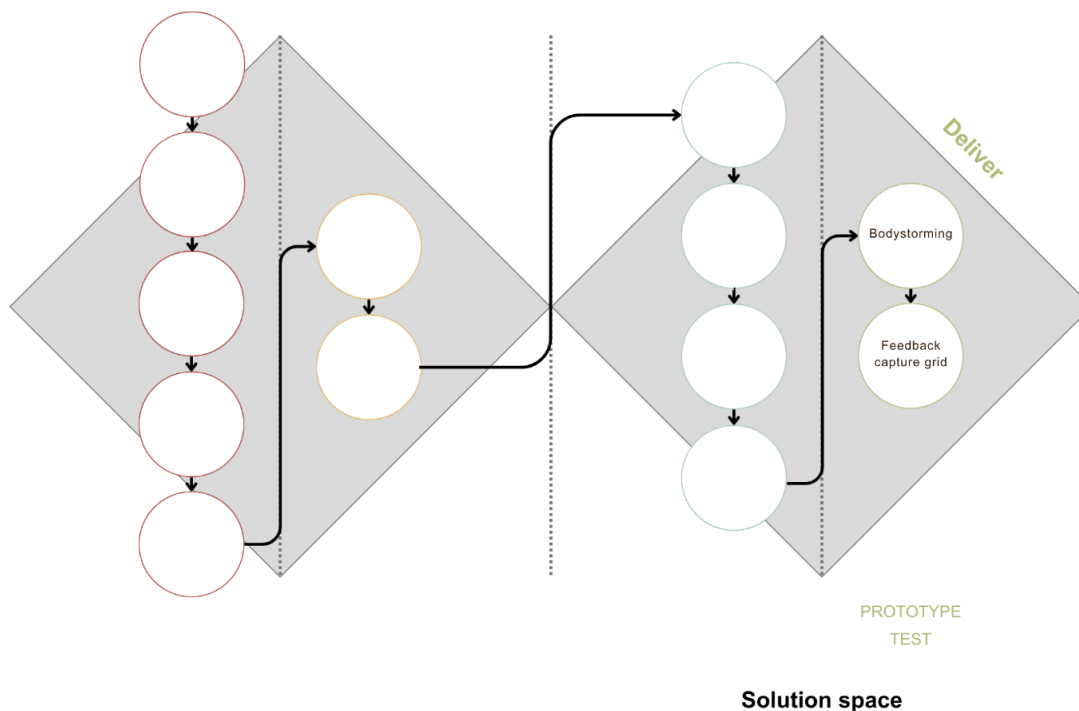


Figure 45: Instruments and sequence for the Deliver phase

Source: created by author

Bodystorming

The bodystorming activity was selected to replicate the interaction between the puzzle wall concept and the participants (refer to figure 46). The objective of this activity was to identify the strengths and weaknesses of the concept for further iteration and refinement. The participants initiated further discussion once they had identified elements that required modification and collectively refined the concept based on their experience of engaging with the mock-up.

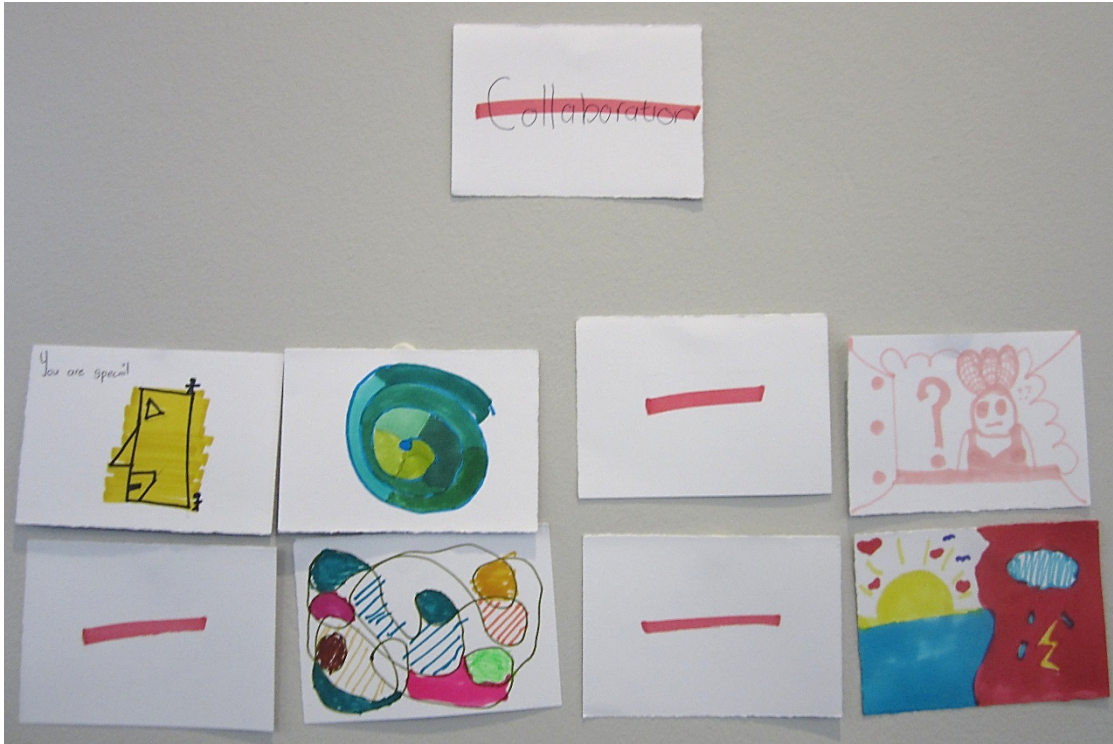


Figure 46: Bodystorming activity for concept testing and refinement

Source: photograph by author, 2025

Feedback capture grid

The feedback capture grid was employed to facilitate participants reflection on the refined puzzle wall concept. They structured their discussion and recorded their insights into four categories:

- Things that worked
- Questions we still have
- New ideas to try
- Needs to change

This structured activity allowed participants to systematically evaluate the concept, surface challenges, and generate potential future refinements.

b) Data analysis

The data analysis of the bodystorming and feedback capture grid was focused on highlighting the strengths and weaknesses of the concept and what the future of this intervention could look like. This was achieved by analysing the data sequentially and documenting the insights as they were achieved at each stage of the deliver process.

c) Deliver findings: Design concepts

The puzzle wall concept was selected for further concept development.

The concept chosen for further development was the Puzzle Wall. The participants highlighted key considerations after they had engaged with the puzzle wall during the bodystorming activity:

- Participants valued specific and engaging prompts that encouraged participation and immediate feedback.
- Participants highlighted the need to contextualise the intervention by making it accessible, relatable and appealing, specifically to young adults who are balancing multiple roles and responsibilities.
- Participants noted that they wanted to reach a wide range of young adults and discussed making the system mobile and adaptable.

The participants adapted the creative prompts and social challenges based on these emergent insights. They wanted them to be more playful and engaging to make the system more effective in supporting young adults (refer to figure 47 and 48). The refined concept was a mobile truck featuring a with a built-in creative space on the inside, and a puzzle piece display mounted externally. The participants valued the notion that the intervention could travel to events and community hubs that are frequented by young adults (refer to figure 49).

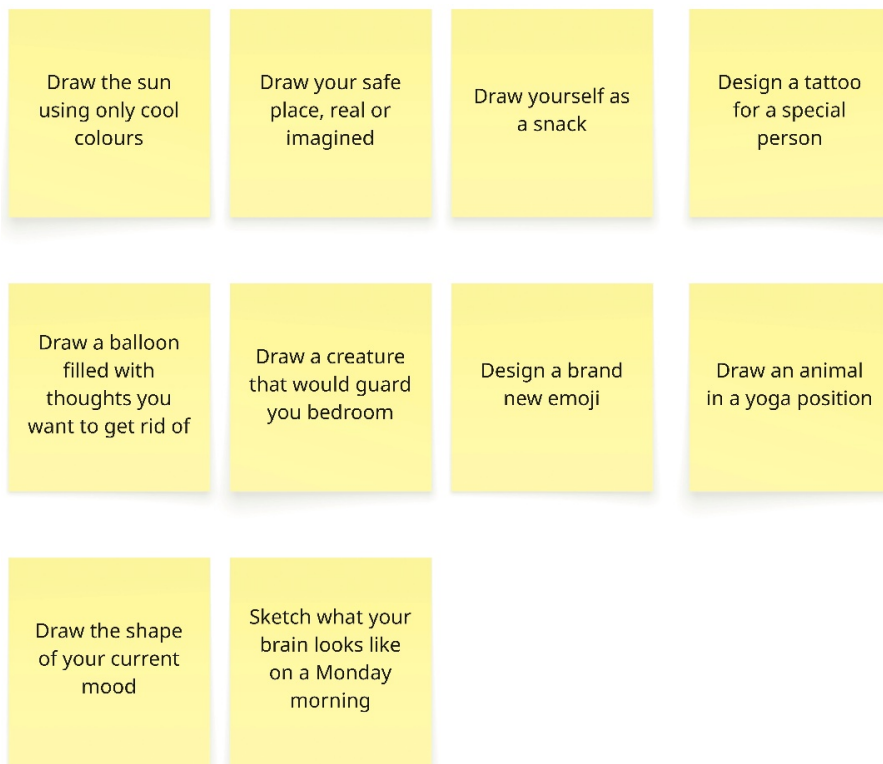


Figure 47: Adapted creative prompt ideas

Source: Miro screenshot by author, 2025



Figure 48: Adapted social challenge ideas

Source: Miro screenshot by author, 2025

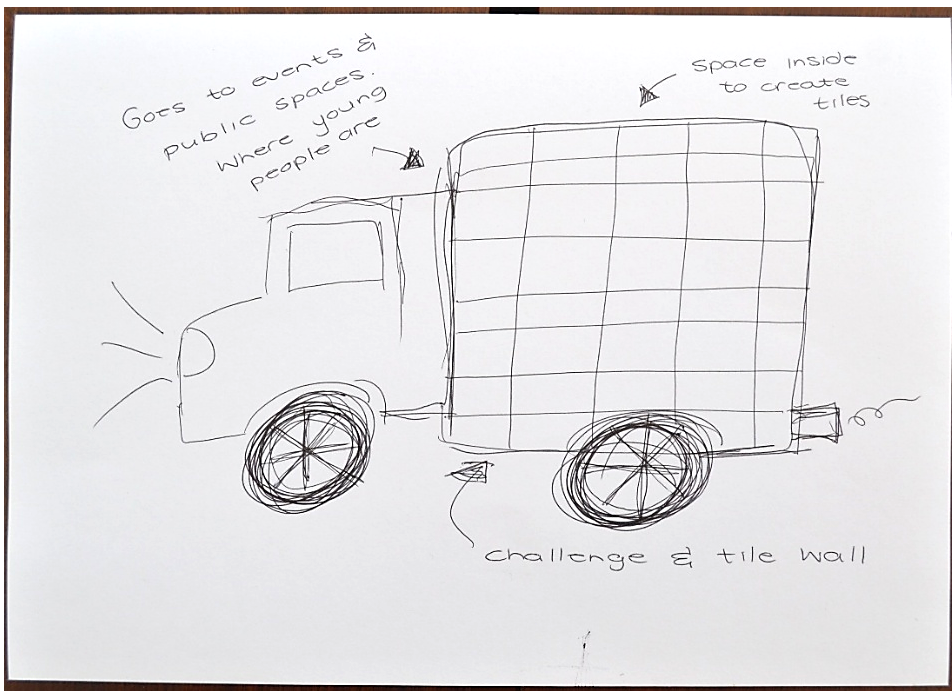


Figure 49: The refined concept: The Puzzle Truck

Source: photograph by author, 2025

Following this discussion, the participants established key parameters and considerations for further concept refinement:

- Incorporate enjoyable and meaningful challenges
- Allow both individual and collaborative participation
- Be non-digital and focused on physical interaction
- Provide a relaxing and positive experience for young adults
- Maintain mobility to appear in locations frequented by young adults

Participants engaged with the feedback capture grid activity to analyse the concept's feasibility and establish a foundation for potential further iterations of the intervention (refer to figure 50).

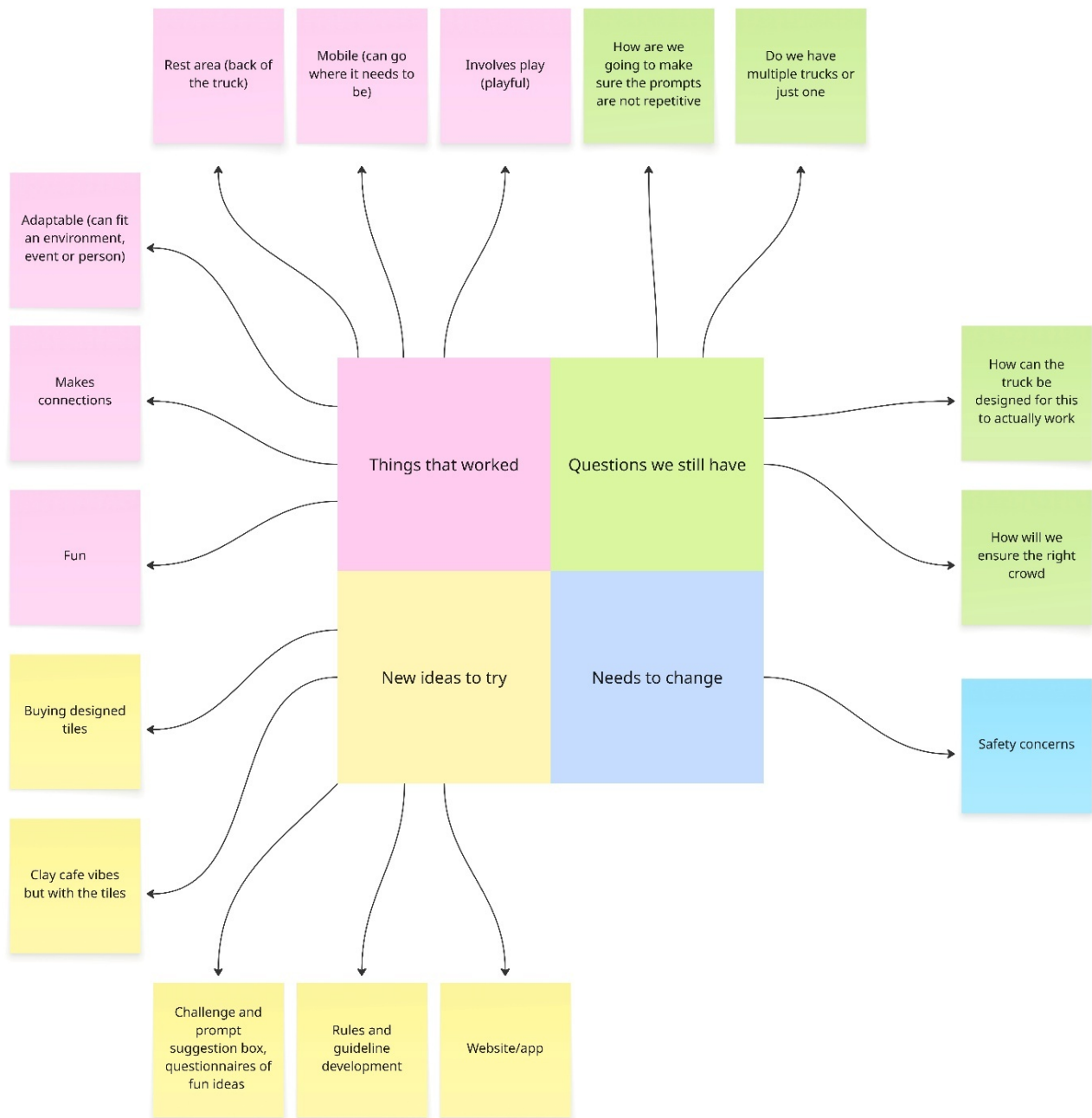


Figure 50: Feedback capture grid data

Source: Miro screenshot by author, 2025

The discussion of the mobile truck highlighted several key strengths. The participants described it as fun, playful, and genuinely engaging. They also noted that it offered meaningful moments of social interaction. The concept could adapt to different environments and events which was seen as an advantage. The inclusion of a quiet rest area at the back of the truck was also well received. It provides a calm space for decompression when necessary. Another strength was the concept's

mobility. It can reach diverse community settings and directly engage with the people it aims to support.

Participants were also able to generate questions that should be considered during future development of the concept. They discussed how the prompts could remain fresh and varied over time. Furthermore, they questioned if it would be more effective to have several smaller mobile units or a single truck. They also considered the real-world implementation of the system and considered how they could attract and sustain engagement from the targeted demographic. These reflections highlighted the need for careful planning to ensure that the concept remains both relevant and usable.

The activity also sparked several ideas to enhance the puzzle wall. Participants suggested that community members could design or purchase their own puzzle tiles or contribute ideas through a suggestion box for new prompts and challenges. They emphasised the value of having clear rules and guidelines to keep the activity accessible to everyone. Another idea was to develop a smaller version, such as a card deck, for use at home or in small groups. The participants proposed designing prompts that intentionally support cognitive load management which strengthens the intervention's connection to its original aim.

Finally, several practical adjustments were identified to support implementation. Ensuring personal safety was seen as essential, along with developing strategies to make the experience consistently available rather than limited to specific events. Together, these insights offer valuable direction for refining the mobile puzzle wall concept, enhancing its usability, accessibility, and potential for long-term engagement as a playful, community-based intervention for young adults.

5.2 CONCLUSION

Chapter five detailed the activities that were situated in the second part of the double diamond, the solution space. This chapter began with a presentation of the tools and activities that were employed in the first part of a second co-design workshop during the develop phase of the research, a thematic analysis of the data and presented the findings that emerged. The deliver phase presented an overview of the methods that were adopted in the second part of the co-design workshop, the analysis of the data and a presentation of the play-based design interventions that emerged from

the design research project. Chapter six will apply a conceptual lens to the outcomes discussed in chapters four and five. It will analyse the data against the Three Horizons Framework through three main dimensions in which participants experienced cognitive overload.

CHAPTER SIX: DESIGN PROCESS - APPLYING A CONCEPTUAL LENS

Chapter six presents the application of a conceptual lens to the outcomes of the design process. The design-led methodology is iterative and reflective and has influenced the decision to include this chapter. It offers a structured and interpretive view of the data introduced in chapters four and five. Three recurring domains emerged from the analysis of the first co-design workshop: intrapersonal, interpersonal and extra personal. These domains were identified as the main dimension through which participants experienced cognitive load.

The insight statements that were generated in chapter four became the starting point for the second workshop. In reaction to the insight statements, the participants were invited to envision what a more balanced and playful future might look like. The Three Horizons Framework was introduced as a tool to guide this process. The framework was employed to perform a dual role: as a qualitative structure for the co-design activities and as an analytical lens.

The chapter primarily presents empirical outcomes, however, refers to relevant literature to contextualise and substantiate emerging insights. This chapter is structured to reflect the iterative process in the order that the participants completed the activities. It begins with Horizon One (current states), moves to Horizon Three (desired future) and ends with Horizon Two (transitional pathways).

6.1 THREE HORIZONS

Three Horizons (refer to figure 51) is a conceptual model and tool that assists in bridging the current state with the envisioned future (International Training Centre, n.d.:2). The first horizon reflects the present systems and established practices, the second horizon explores ways to counter, adapt to or leverage change and the third horizon represents the desired future (International Training Centre, n.d.).

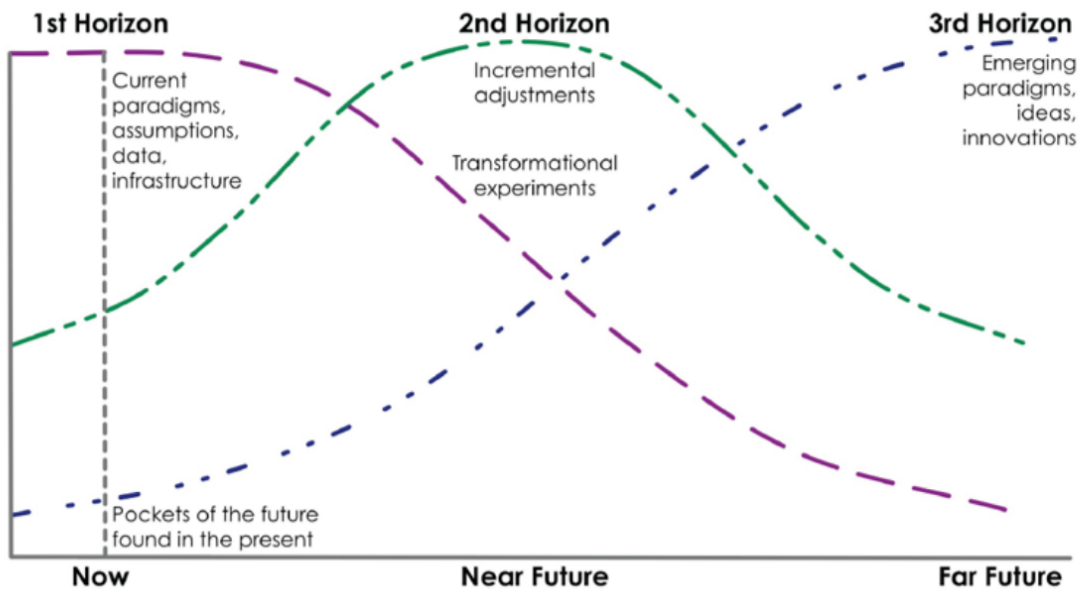


Figure 51: Three horizons framework

Source: (International Training Centre, n.d.:4)

In this study, the Three Horizons model was employed as a qualitative framework that structured workshop activities to enable participants to identify challenges within the current state of play and identify opportunities for strategic innovation. This model was particularly well-suited to the co-design workshop that engaged a diverse group of participants who were able to collaboratively explore play-based design interventions to bridge the gap between horizon one and horizon three.

Furthermore, The Three Horizons model is adopted as an analytical lens for interpreting the finding. The model is mapped out in reference to the three domains identified in the findings: intrapersonal, interpersonal and extra personal. This lens enables an exploration of change that occurs across multiple layers of lived experience.

6.1.1 Horizon One (current state)

The first horizon (refer to figure 52) represents the current context in which the participants navigate their daily life with specific reference to cognitive overload. Horizon One was defined by the insight statements that were generated from the synthesis of the data that emerged from the problem space.

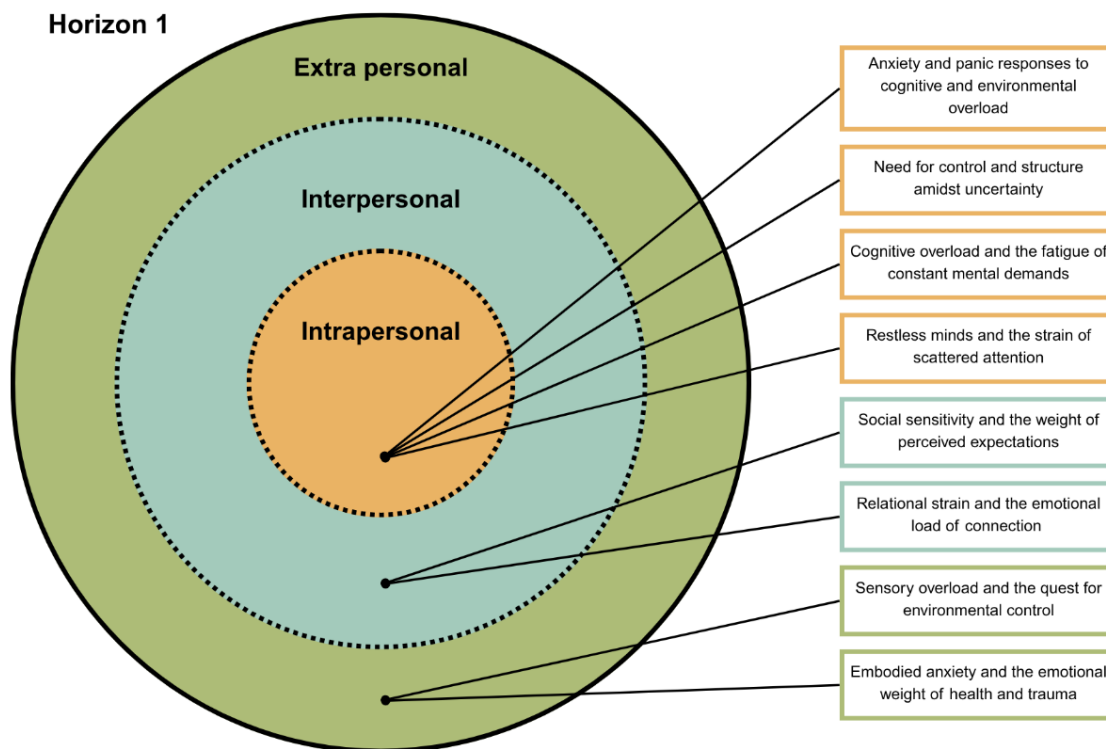


Figure 52: Horizon One

Source: created by author

a) Intrapersonal

The intrapersonal domain explores cycles of stress, anxiety and emotional exhaustion. The findings show that, on an internal level, manifestations of cognitive overload frequently present as anxiety, panic attacks and burnout. The result of this is the adoption of unhealthy coping mechanisms such as excessive screentime, binge-watching television and substance use. A key informant one (KI1) mentioned that the adoption of healthy coping mechanisms requires greater effort and states: “the greatest thing is losing yourself in something else, whether that is Netflix, whether that is food, whether that is even pornography or sex, it is often just an escape. The challenge is that it then compounds the problem, as opposed to helps the problem”.

The findings highlight an expressed need for structure and control to navigate uncertainty. Participant three (P3) expressed that “being organised helps me feel in control of my life which helps to alleviate some stress. I struggle when I must work. I make plans with people who do not have the same values as me or are last minute planners” and “I always like to be somewhere five minutes early and I get stressed when things are not running on time. This is 99.5% of the time due to other ADHD people’s poor time management”. P5 mentioned that: “when I do something I do it in a specific

order and I get frustrated when it is not done in that specific way". The findings show that when young adults feel a loss of control, they overcompensate by overworking or withdrawing in moments of unpredictability. This enhances feelings of guilt and shame which intensifies cognitive and emotional load.

Characterised by contemporary life, constant digital connectivity contributes to persistent mental fatigue and reduced attention. KI2 stated that the most significant contribution to cognitive overload in young adults is the cell phone. Similarly, KI1 argued: "I think ADHD is a very real diagnosis and a real biology. But I also think there is a massive increase in the number of people who are being called ADHD. And I am not convinced all of them are. I think some may be casualties of the age of information". The symptoms of constant digital connectivity manifest as restlessness, irritability and impulsivity.

b) Interpersonal

The interpersonal domain explores how cognitive overload disrupts social connection and contributes to loneliness. Despite the lack of spontaneity and playful qualities, online interaction provides a sense of safety and control while in person social engagement is seen as performative and driven by a fear of judgement. P8 mentioned that: "when more than one person looks at me when I am talking, I feel like what I say never matters so I start to panic" while P3 stated: "I get very anxious in crowded public spaces or when I am the centre of attention (or standing next to said person). I keep my head down and avoid eye contact as I feel I am being scrutinised".

The findings indicate that social play, a key mechanism for empathy and mutual regulation, has been replaced by digital connectivity. KI1 argues that: "social interaction is crucial for wellbeing as humans. That's how we regulate" and "it is lovely that we can connect with people all over the world on WhatsApp, on Facebook or whatever. But it is an energetic exchange that when you are with another human being and you can make eye contact and you can feel seen and witnessed, that is incredibly helpful". KI1 stated that: "I have got some people that do not know how to talk to each other" and "they are just like ordinary social intelligences, and I have noticed that people don't play anymore". KI2 mentions: "the one person, just whoever this person is, does not realise that all these people are also going through this. They think they are the only ones going through difficult times.

c) Extra personal

The extra personal domain focuses on environmental and societal factors that reinforce cognitive overload. Physical and digital overstimulation is common amongst young adults. The findings highlight that young adults avoid crowded or noisy environments and have a need to tightly control their surroundings. P1 states that: “I struggle to keep one thought or focus when there are a lot of people around the area I am trying to focus in; I tend to get distracted unless I put headphones in”. P4 mentioned that: “I get easily overwhelmed by loud noises. My siblings scream and shout at each other very often. This overwhelms and overstimulates me and I feel like my brain starts to shut down” and “I get overstimulated and very overwhelmed when I am in a loud, busy grocery store. There are too many people and too many sounds”.

The findings indicate that opportunities for rest and unstructured leisure have been reduced because of societal pressures equating productivity to self-worth. P6 expressed that: “it is so stressful to think that all I do in my life is wake up and go, even when I don’t feel like it, even when I feel sick. I don’t allow myself to stay behind even for a moment. To be honest I feel tired but have nowhere to go or anyone to tell”.

6.1.2 Horizon Three (future state)

The third horizon represents the desired future (refer to figure 53) where a play-based design intervention is adopted as a restorative, grounding and connecting tool for young adults living in Cape Town. In this horizon, play is framed as a sustained practice that nurtures wellbeing, balance and belonging rather than it being perceived as frivolous or limited to childhood. Horizon Three is defined by that data that emerged from the Horizon Three brainstorming activity which responded to the insight statements in Horizon One.

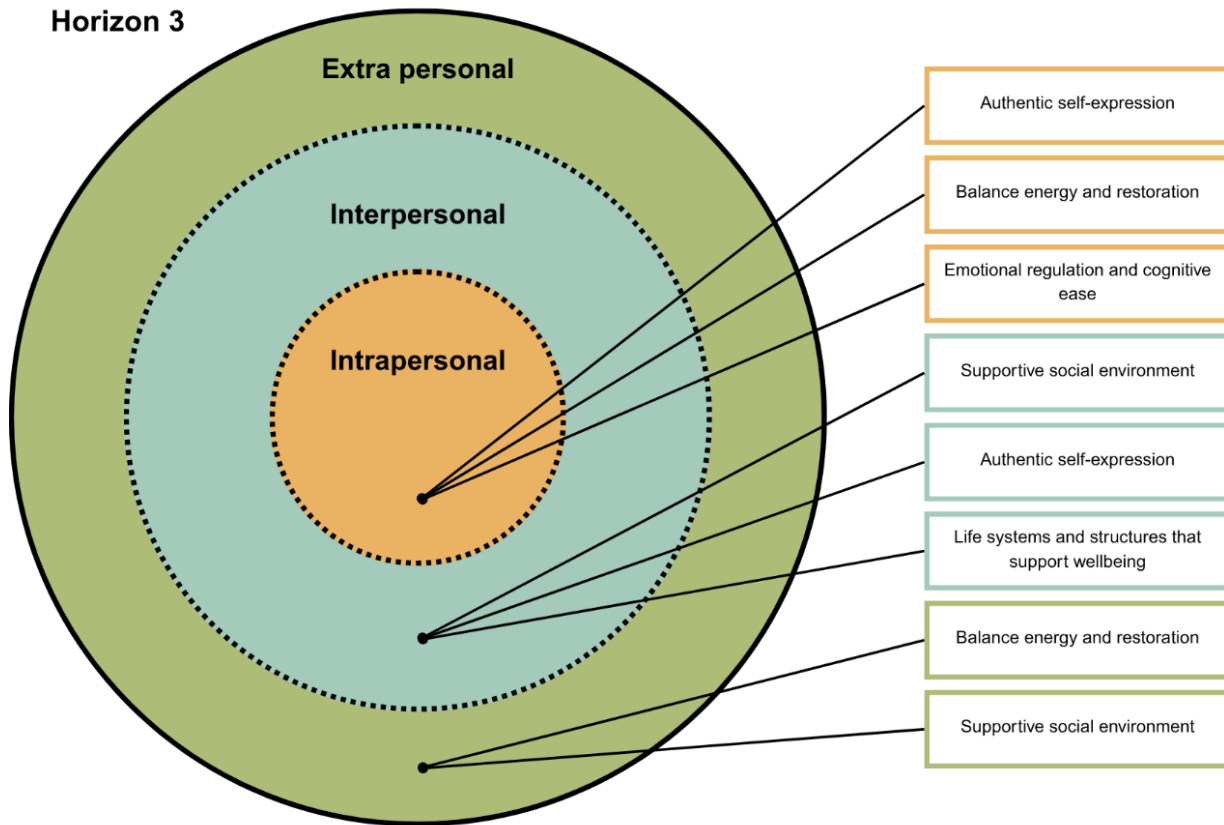


Figure 53: Horizon three

Source: created by author

a) Intrapersonal

The intrapersonal domain focuses on a future where engaging in play is adopted as a tool to manage overstimulation and support psychological restoration. Play, in this domain, is suggested to be self-directed, calming and expressive. The concepts proposed on an intrapersonal level use play to counterbalance cognitive and emotional fatigue and restore energy and focus. On an intrapersonal level, the findings suggest a future where young adults are encouraged to engage in tactile, sensory or creative play as acts of self-care and personal grounding. P3 stated that: "I hope to be able to go through my day without having to constantly have a million thoughts and worries, to be able to do the mundane and not to worry too much about what could possibly go wrong". P5 mentioned that they desire a future where there is the "regulation and balance of stimulants and stimulation" and "resilience and the ability to bounce back from stressful situations". KI1 stated that a play-based design intervention should assist in "finding the calm and decrease stimulation". Similarly, KI2 states that: "I suppose that need for calm is what we are looking for". The play-based design interventions illustrated in the findings suggest a growing shift towards mindful and embodied engagement.

b) Interpersonal

The interpersonal domain presents a desired future where engagement with play-based design interventions creates a broader cultural shift towards authentic self-expression within supportive social systems. Play is reframed as a social connector that bridges the gap between isolation and belonging, offering a non-judgemental and light-hearted means of engaging with others. The desired future on an interpersonal level uses playful interactions as the foundation for empathetic communication and collective wellbeing. In this domain, participants communicated their desired futures, stating that they want to:

- “Find people with common interests and values” – P4
- “Have mutual supporters and the ability to rely on others and trust others” – P5
- “Be able to take the pressure I put on myself away in social settings and be 100% myself without worrying about anyone else” – P3
- “Build stronger social connections” – P4
- “Have honest communication where I can speak my truth without hurting others or feeling bad” – P1
- “A stronger sense of self and the confidence to be myself completely” – P1
- “A healthier social life which benefits not only myself but others too, provided it doesn't take away from me and my energy stores” – P3

The findings frame social play, such as shared games, storytelling or collaborative challenges, as a tool to enable individuals to connect. This can result in the easing of social anxieties which are often associated with performance or comparison.

c) Extra personal

The extra personal domain in the third horizon explores a desired future where environments are created to be inherently restorative and socially supportive. The spaces are designed to allow people to retreat, recharge and reconnect. As opposed to the interpersonal domain where play is introduced into existing environments, the extra personal level emphasises the creation of new, purpose-built spaces that allow individuals to momentarily step outside of the demands of everyday life. These imagined environments provide a physical and psychological distancing from overstimulation which encourages a rhythm of rest and engagement.

6.1.3 Horizon Two (transition state)

The second horizon (refer to figure 54) represents the transitional space. Participants explored potential ways to bridge the gap between their current state of cognitive load and their desired future of improved cognitive load management. Through the exploration and generation of play-based design concepts, tools emerged as playful coping mechanisms for reintroducing creativity, spontaneity and social interaction into the lives of young adults.

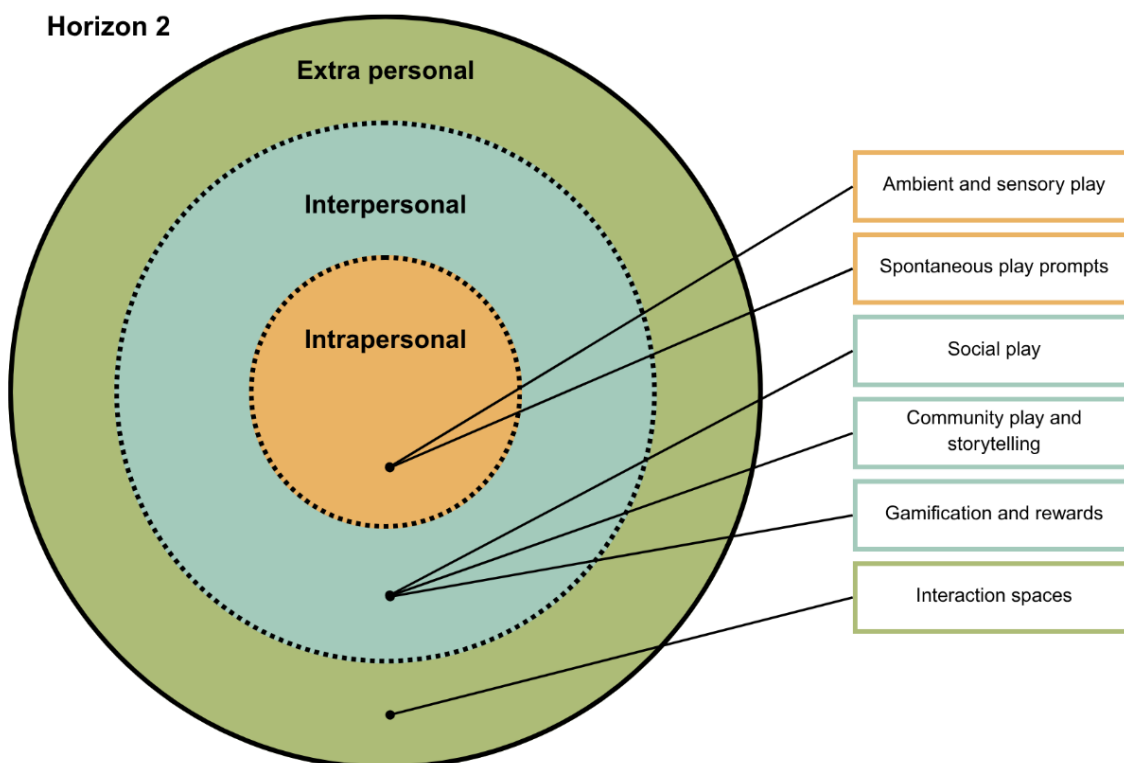


Figure 54: Horizon two

Source: created by author

a) Intrapersonal

The intrapersonal domain explores how young adults could introduce play into their lives on an individual level and how it could operate as a restorative and sensory practice to support emotional regulation and stress relief. The overarching concept categories that emerged in the findings and are included in this domain are ambient and sensory play and spontaneous play prompts. The findings suggest that playful interaction can be quiet, sensory-rich experiences that serve as tools for grounding and reflection as opposed to overtly active or social. The findings highlight a desire for tactile, calming and rhythmic experiences for subtle, restorative engagement during moments of

stress emerged amongst young adults. Concepts that were explored within these categories include the ambient play wall (refer to figure 55), interactive furniture (refer to figure 56) and the disruption dice (refer to figure 57).

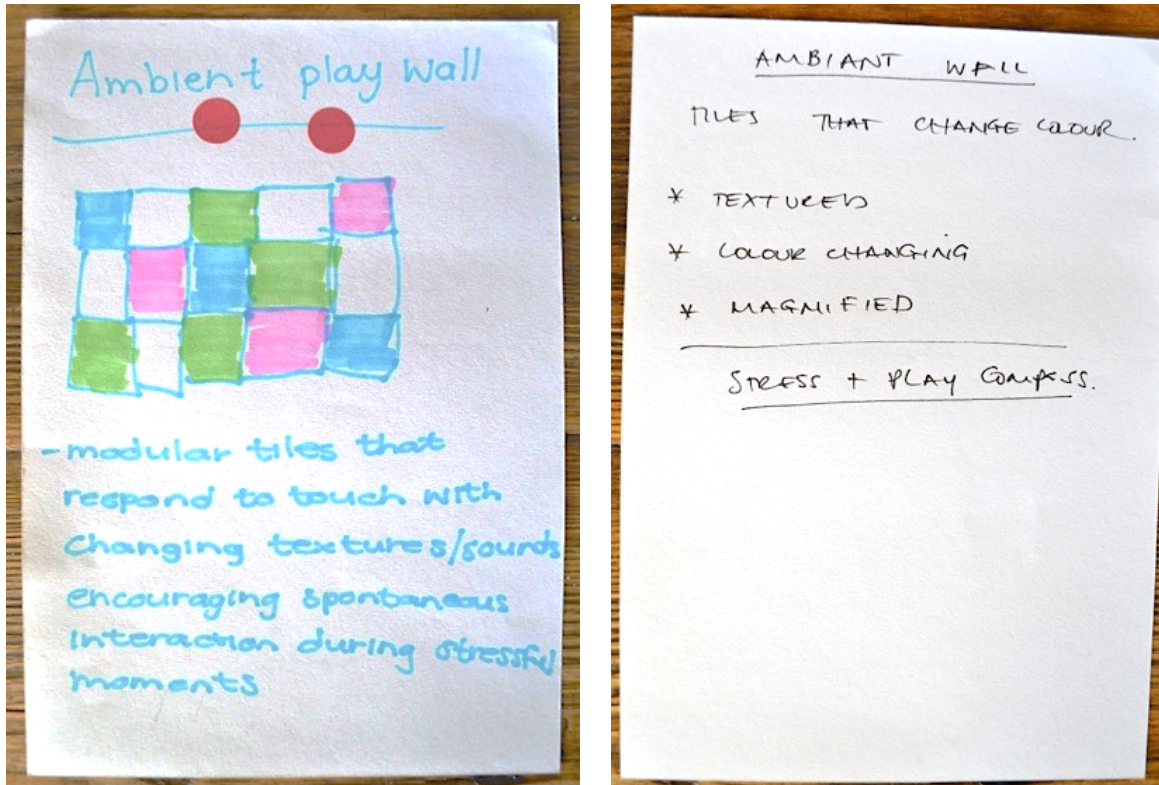


Figure 55: Ambient play wall

Source: created by author

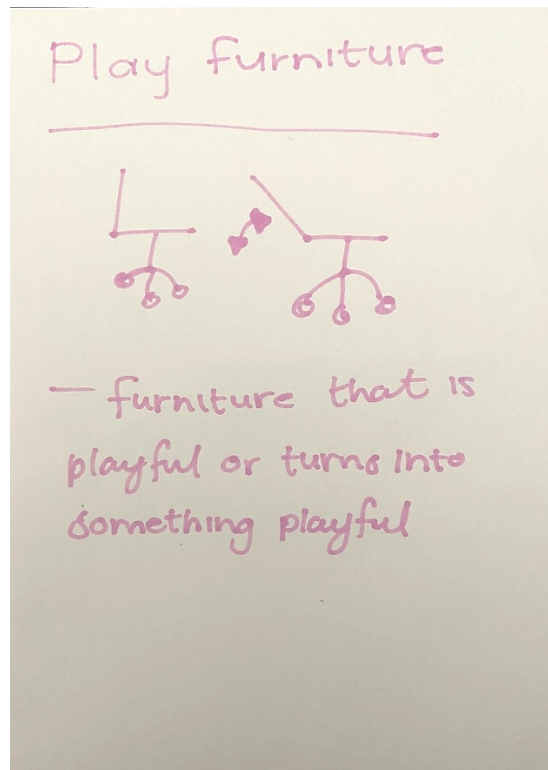


Figure 56: Interactive furniture

Source: created by author

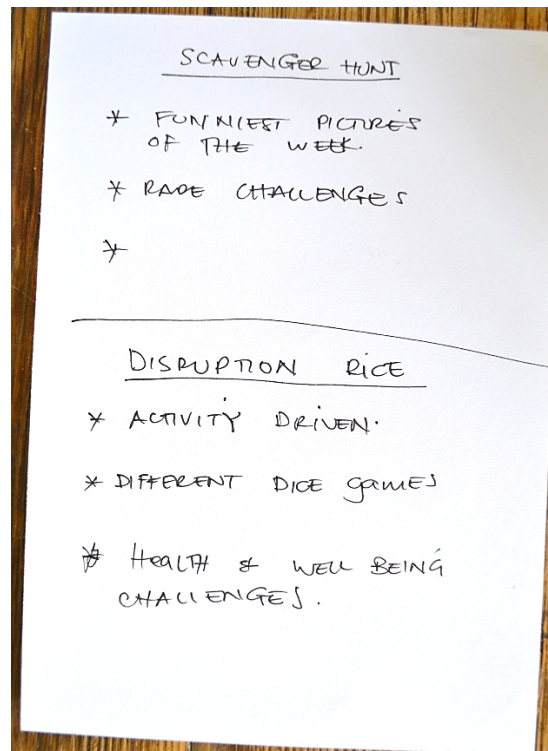
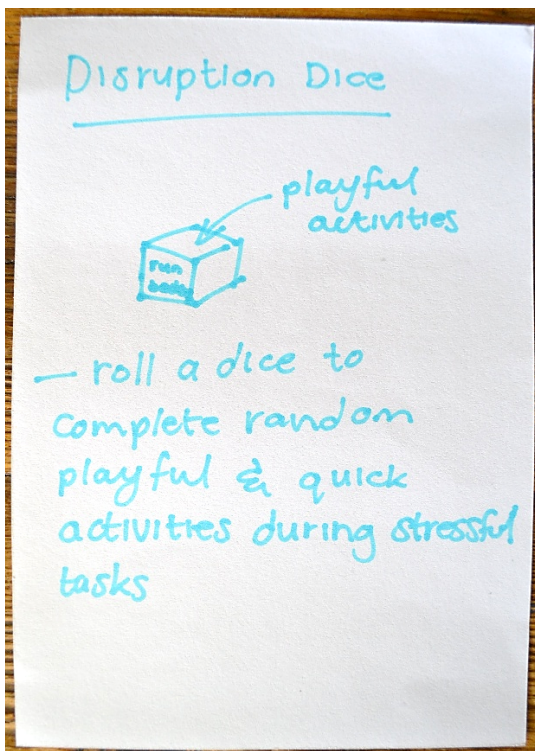


Figure 57: Disruption dice

Source: created by author

The generation of these concepts show a need for low-stakes, playful environments to promote psychological restoration. This aligns with literature's notion of free play, which is characterised by being intrinsically motivated, internally satisfying, self-selected and self-directed (National Institute for Play, n.d.). The findings suggest that, within the intrapersonal domain, designing for subtle sensory play and calm, sensorially balanced spaces can aid in mitigating the effects of sensory overload. KI1 mentioned that: "it is all about the low-hanging fruit. If things are not easy, people don't do it". The findings advocate for embedding gentle cues for curiosity and interaction into commonly frequented environments. KI1 stated that: "we know trees and plants are in total communication with each other. We know that a tree a thousand kilometres away from another tree has the message relayed to it by the root system like almost instantaneously. And they have also found that colour does that. So, even introducing colour into a workspace can be therapeutic". This idea is supported by the argument that regulating sensory input is key to managing overstimulation (Doucé & Adams, 2020:2) and aligns with the participants expressed desire to make play an accessible and self-directed part of daily living.

Kang (2020:573), argues that play is a human survival instinct that is as fundamental as the impulse to eat or sleep. Furthermore, it is noted that play is linked to the development of the pre-frontal cortex in the brain that is responsible for identifying relevant information, goal direction, abstract concepts, decision-making, monitoring and organising thoughts and feelings, delaying gratification and future planning (Kang, 2020:573). KI1 noted that: "we are meant to play. I think playing and time out and having fun, it's crucial to everyone's wellbeing" and "play has a massive role in wellbeing. It is easily accessible. It does not need to be expensive. It does not come with side effects".

b) Interpersonal

The interpersonal domain explores play as a tool for building connections, easing self-consciousness and establishing belonging. The concepts that were generated in this domain lean towards creating authentic human connection by lowering social barriers and generating a shared purpose. The findings indicate that, despite social interactions often feeling performative or draining, play could act as a leveller by creating shared humour, purpose and ease within social dynamics. The overarching play categories that emerged in the findings and are situated in this domain are social play, community play and storytelling and gamification and rewards.

Interpersonal play-based design interventions include energy banking (refer to figure 58), puzzle wall (refer to figure 40), card game (refer to figure 44), token game (refer to figure 59). It is important to note that the energy banking and token game concepts can be introduced on an intrapersonal level however, participants suggested developing them into an interactive experience where individuals engage in low-stakes, friendly competition to receive rewards.

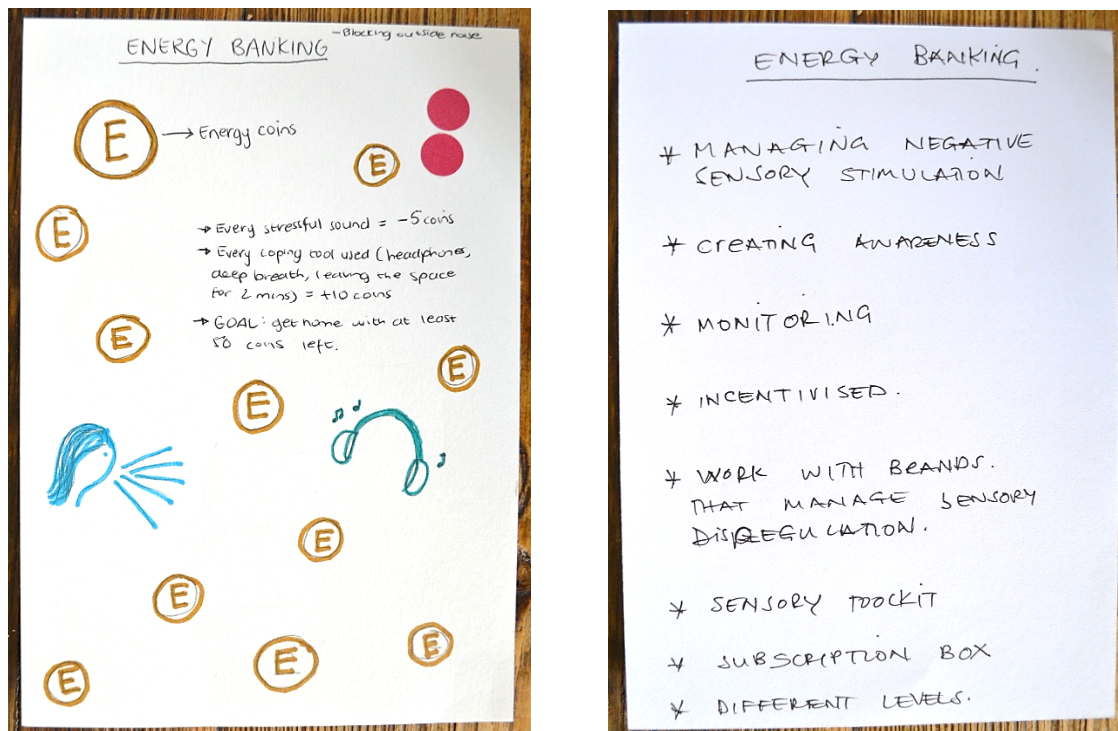


Figure 58: Energy banking

Source: created by author

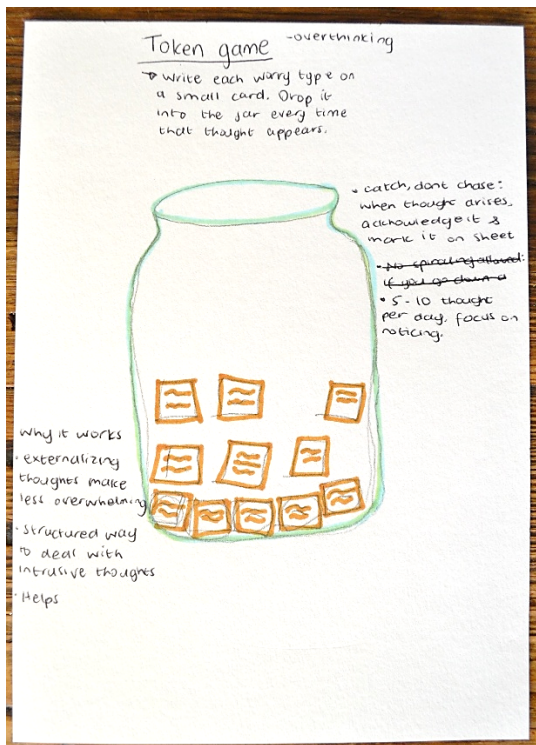


Figure 59: Token game

Source: created by author

In relation to a play-based design intervention, KI1 suggested that: “a group intervention, because firstly to be more practical and easier and be more wide reaching, but also to fulfil that social interaction. And that could be modelling behaviour and that would be fun, and they would be creative. And so that could lead to better self-regulation”. Through the community-oriented ideas that emerged from the findings, play can be seen as a mechanism for reconnection and emotional support rather than an escape.

This notion that play is associated with healthy human development and can manifest in social environments (Brown, 2019). Play can be used to support the finding highlighting a balancing act between the need for closeness and the desire for space. Whitton (2022:4) argues that play is a communal experience that encourages belonging, empathy and joy. Nance (2022:165) describes play as an unstructured and creative outlet that supports social interaction. Powell (2023:24) argues that play effects how individuals relate to themselves, others and the world around them and that integrating play into adult life challenges cultural narratives of productivity.

c) Extra personal

The extra personal domain explores the creation of playful, restorative spaces that allow individuals to temporarily disengage from daily pressures. These environments are not extensions of existing ecosystems but rather alternative ones. The notion of connection is extended to this domain. The overarching play category that emerged from the findings and is included in the extra personal domain is interaction spaces. This reimagines how public and communal settings could function as support tools for young adults in mental recovery and social play. The concepts emerge from this category are the social bar (refer to figure 41), work vacation retreat (refer to figure 42) and community hobbies (refer to figure 43).

The findings indicate that cognitive load can be shaped by the environments that people inhabit and not only in isolation. The extra personal ideas represent a shift towards creating new ecosystems of play that could act as sanctuaries for restoration or social renewal. With safety, curiosity and collective engagement being prioritised, these spaces are proposed to rebalance the external pressures of contemporary life. These environments can be preventative and/or restorative.

The findings suggest that the restorative nature of the proposed interventions redefines productivity by linking it to wellbeing. Furthermore, young adults would have the ability to engage with play individually or socially. Having the ability to choose between individual or social play is vital. KI2 discussed that play is an experience that is personal to the individual, however, the findings show that play can encourage a sense of belonging, self-expression and mutual support. The proposed play-based design interventions can support both divergent and convergent play, giving individuals the freedom to decide how they engage with it. The need for play-based design intervention of this nature aligns with literature which asserts that the time and place for engaging in play is diminishing (Powell, 2023).

6.2 SYNTHESIS

Table 13: Synthesis of the Three Horizons Framework organised into the intrapersonal, interpersonal and extra personal domains

Source: author created table

Domain	Horizon One – current state (participants experiences)	Horizon Two – transitional pathways (emerging ideas/concepts)	Horizon Three – desired futures (participants aspirations)
Intrapersonal	- Cognitive overload manifests as anxiety, panic attacks, burnout, and emotional exhaustion. - Unhealthy coping mechanisms, such as excessive screen time, binge-watching, or substance use, are adopted to escape stress. - There is a strong need for structure, routine, and control and individuals tend to overwork or withdraw in times of uncertainty. - Constant digital connectivity contributes to mental fatigue, restlessness, irritability, and impulsivity, with many symptoms resembling attention-related disorders.	- Concepts included: ambient play wall, interactive furniture and disruption dice. - Play is a restorative and sensory practice for emotional regulation and stress relief. - Playful interaction is quiet, sensory-rich, and reflective rather than overtly active or social. - Tactile, calming, and rhythmic experiences offer subtle, restorative engagement during moments of stress. - Gentle cues for curiosity and interaction embedded within everyday environments to make play self-directed and easy to access.	- Play is used as a tool to manage overstimulation and restore psychological balance. - Play is self-directed, calming, and expressive to function as a tool for personal grounding and emotional recovery. - Tactile, sensory, and creative play is encouraged to counter cognitive and emotional fatigue. - Calm, balance and resilience are maintained in daily life. - Mindful and embodied forms of play help individuals regulate emotions, manage stress and restore focus.
Interpersonal	- Cognitive overload disrupts social connection which increases loneliness and social anxiety. - Fear of judgement makes in-person interaction feel performative, leading to avoidance and withdrawal. - Digital communication has replaced social	- Concepts included: energy banking, puzzle wall, card game and token game. - Play is a source of connection to help to ease self-consciousness and foster belonging. - Play is a social leveller to reduce barriers and encourage shared	- Play supports authentic self-expression, empathy and belonging within social systems. - Play is a social connector that bridges isolation and community by providing a light-hearted and non-judgemental space for interaction. - Play encourages mutual support, trust, open

	interaction, reducing emotional connection. - Balancing the need for closeness and the need for space contributes to emotional strain.	purpose and ease within group dynamics. - Interactive activities are adopted to promote friendly competition, cooperation, and social engagement.	communication, confidence, and balance in relationships.
Extra personal	- Cognitive overload is reinforced by environmental and societal pressures, such as, constant sensory stimulation and information exposure. - Overstimulation is triggered by noise, light and crowds, leading to avoidance of public spaces and a desire for controlled environments.	- Concepts included: social bar, work vacation retreat and community hobbies hall. - Playful, restorative environments. - Alternative ecosystems designed for mental recovery, social play, and collective wellbeing. - Offers a choice between individual and social play to encourage engagement according to personal comfort and needs.	- Environments are inherently restorative and socially supportive by offering opportunities to retreat, recharge, and reconnect. - There is a creation of new, purpose-built spaces designed to relieve cognitive and sensory overload. - Collective sanctuaries for play promote creativity, social interaction, and low-pressure engagement to support both individual and communal wellbeing.

The first horizon reveals a lived experience that is epitomised by overload, control and disconnection across the intrapersonal, interpersonal and extra personal domains. Young adults' capacity for emotional regulation, connection and joy has been suppressed by cognitive and sensory overstimulation and opportunities for playful engagement have been reduced by societal and environmental structures and expectations and digital connectivity.

The second horizon reflects a collective reimagining of how play could act as a bridge between the current state of cognitive overload and a desired future of balance, connection and wellbeing. Participants began envisioning play as restorative, embodied and a socially meaningful practice. Analysing the concepts across the intrapersonal, interpersonal and extra personal domains illustrates how play can operate across multiple layers of human experience, from the internal management of stress to the collective reactivation of social and environmental wellbeing. It is recognised that cognitive load management requires more than individual coping but rather a reconfiguration of how people relate to themselves, others and the spaces they inhabit. The second

horizon therefore represents a shift from play as an escape to play as an engaged recovery that incorporates a creative, collective process of rebalancing the cognitive and emotional demands of contemporary adulthood.

The third horizon communicates a desired future which is centred around a cohesive and balanced ecosystem of play that supports the mental wellbeing of young adults through interconnected layers of experience. The intrapersonal domain nurtures self-awareness, emotional regulation and cognitive balance. The interpersonal domain extends these benefits into authentic and empathetic relationships. The extra personal domain situates both the intrapersonal and interpersonal future desires within restorative and inclusive environments. Collectively, these domains represent a future where managing cognitive load requires alignment between self, others and the environment. Within the desired future, play functions as the mediating force that restores equilibrium. Horizon three represents a world where play is a core design principle which guides how individuals express themselves, relate to others and inhabit the spaces around them.

6.3 CONCLUSION

Chapter six applied a conceptual lens to the outcomes of the design process presented in chapters four and five. This was done using the Three Horizons Framework. It discussed three dimensions in which the participants experienced cognitive overload. It began with an overview of the Three Horizons Framework. Next, it presented horizon one, horizon three and horizon two. Each horizon explored the intrapersonal, interpersonal and extra personal domains that emerged from the data. Chapter five ends with a synthesis of the three horizons. Chapter seven will discuss the research outcomes, from chapters four, five and six, in relation to the aims of the design research project.

CHAPTER SEVEN: DISCUSSION

Chapter seven discusses and interprets the research outcomes in relation to the study's aim. The discussion is structured around three key sections, each corresponding to one of the study's research questions. The first section applies the Three Horizons Framework to the research findings in response to sub-question one: what factors contribute to cognitive overload in young adults living in Cape Town who manage multiple roles and responsibilities? The second section identifies and discusses, design principles for play-based design intervention in response to sub-question two: what types of play-based interventions could help support young adults, living in Cape Town with who manage multiple roles and responsibilities, with cognitive load management? The final section reflects on the co-design process, responding to sub-question three: how can co-design inform the development of a play-based design intervention that addresses the cognitive load management needs of young adults living in Cape Town who manage multiple roles and responsibilities? Together, these sections link the findings to theory and design practice, demonstrating how play can serve as a restorative and relational design strategy.

7.1 UNDERSTANDING FACTORS CONTRIBUTING TO COGNITIVE OVERLOAD

The first section of chapter five addresses sub-question one: “what factors contribute to cognitive overload in young adults living in Cape Town who manage multiple roles and responsibilities?”. This section interprets the contributing factors of cognitive overload among young adults in Cape Town and discusses the empirical findings against supporting literature (refer to table 14).

Table 14: Empirical findings compared against academic literature

Source: author created table

Domain	Key challenges (from findings II, Horizon One)	Interpretation/supporting literature
Intrapersonal	- Cognitive overload manifests as anxiety, panic attacks, burnout, and emotional exhaustion. - Unhealthy coping mechanisms, such as excessive screen time, binge-watching, or substance use, are adopted to escape stress. - There is a strong need for structure, routine, and control and individuals	- Information overload occurs when the brain's ability to process information has passed its limit (Kashada et al., 2020:53). - Information overload influences concentration, the ability to keep pace with contemporary society,

	tend to overwork or withdraw in times of uncertainty. - Constant digital connectivity contributes to mental fatigue, restlessness, irritability, and impulsivity, with many symptoms resembling attention-related disorders.	irritability, overstimulation and stress which effects quality of work, mental and psychological related issues, limits information processing capacity and productivity (Kashada et al., 2020:55). - The contemporary workplace is epitomised by trends of burnout, anxiety, depression and absenteeism (Kang, 2020:573).
Interpersonal	- Cognitive overload disrupts social connection which increases loneliness and social anxiety. - Fear of judgement makes in-person interaction feel performative, leading to avoidance and withdrawal. - Digital communication has replaced social interaction, reducing emotional connection. - Balancing the need for closeness and the need for space contributes to emotional strain.	- The amount of information available due to the increase in mobile technology is a major contributing factor to information overload (Kashada et al., 2020:54). - Humans require a high level of social interaction (Tonkin & Whitaker, 2021:1). - Connection is a fundamental pillar to wellbeing (Tonkin & Whitaker, 2021:2).
Extra personal	- Cognitive overload is reinforced by environmental and societal pressures, such as, constant sensory stimulation and information exposure. - Overstimulation is triggered by noise, light and crowds, leading to avoidance of public spaces and a desire for controlled environments.	- Sensory overload occurs when individuals are unable to process input stimuli (Douc�� & Adams, 2020:2). - The effects of sensory overload include confusion, frustration and withdrawal (Douc�� & Adams, 2020).

Horizon One indicates that cognitive overload is a multi-layered experience that encompasses the self, relationships and the environment. Across domains, the participants experience of cognitive overload converges around overstimulation, loss of control and a reduced opportunity for restoration. This highlights a systemic cycle of overload as the domains are not experienced in isolation. Instead, emotional strain, social fatigue and environmental overstimulation reinforce each other. The findings indicates that cognitive overload is influenced by social and environmental conditions and is not only experienced on an individual level. The language that the participants used to describe their feelings of cognitive overload within the different domains further indicate that it is both an embodied and relational experience (refer to table 15).

Table 15: Language used by participants to describe cognitive overload

Source: author created table

Participant code	Participant quote
P1	"I tend to cry" "I tend to get distracted" "I feel pressure"
P2	"They are disturbing my peace"
P3	"I feel stressed" "It is exhausting and overwhelming" "I get anxious" "I feel like I am being scrutinised" "I can't concentrate" "I feel like I am being trampled on" "I feel restless"
P4	"My brain feels tired" "I get over stimulated" "I get anxious" "I get stressed" "I feel overwhelmed" "I feel confused" "I can't make decisions" "They disturb the peace"
P5	"I feel stupid" "I feel like I can't do anything right" "I get annoyed" "I feel uncomfortable"
P6	"I feel stressed" "I think too much" "I feel tired" "I feel guilt"
P8	"I get into a negative mindset" "I start to stress"

Participants described cognitive overload using phrases such as "I tend to cry", "my brain feels tired" and "I get overstimulated" which highlights how stress is internalised and felt through the body. Participants described feelings of exhaustion, restless and difficulty concentrating. This indicates the external manifestations of internal pressures. Expectations, judgement and responsibility towards others reflect the social and interpersonal dimensions of cognitive overload through statements such as "I feel pressure", "I feel like I am being scrutinised" and "they are disturbing my peace". The findings indicate that play-based design interventions should address the multiple layers of cognitive overload simultaneously and respond to embodied and relational experiences.

The findings indicate that control and avoidance behaviours are dominant coping mechanisms for cognitive overload. Statements such as "I need to be organised to feel in control of my life" or "I tend to overdo it during the day because I am constantly thinking about things I need to do" illustrate how

participants use structure, rigid schedules, routines and overactivity to attempt to counteract cognitive overload. The key informants indicate that social withdrawal and escaping into digital spaces is a common coping mechanism amongst young adults. These control-oriented strategies offer temporary relief and reinforce isolation and fatigue. Furthermore, it limits opportunities for spontaneity, creativity and emotional recovery. The research indicates that playful behaviour can replace these coping strategies to prioritise restoration through play rather than coping through control.

Interaction with restorative play has decreased, being replaced by passive or screen-based forms of disengagement. Statements such as “I don’t allow myself to stay behind even for a moment” or “I feel like I can’t have fun especially on the weekend when I work” indicate a broader challenge: post-digital fatigue and the pace of contemporary society. The findings indicate that this occurs when the constant demands of connectivity and performance drain the cognitive and emotional capacity. The feelings of fatigue and overstimulation impact the participants ability to engage in restorative play. Leisure has become a source of exhaustion rather than restoration. This presents an opportunity for play-based design interventions to respond to post-digital fatigue and fast pace living by reclaiming play as a restorative practice to counterbalance control, digital fatigue and emotional strain through embodied, social and creative engagement.

7.2 DESIGN PRINCIPLES FOR PLAY-BASED INTERVENTION

Several recurring patterns emerged from the co-design workshops and interviews which relate to the conceptualisation of play as a tool for managing cognitive load. Translating these patterns into actionable design principles provides a bridge between insight and intervention and creates a guideline for structuring play-based interventions that respond to the cognitive, emotional and social experiences of young adults living in overloaded realities (refer to table 16).

The Three Horizons Framework was applied as a conceptual lens to the insights that emerged from the previous phases of the design process. This was used to understand the current challenges, ideal future state and to extract barriers and opportunities for play. Three domains were identified through the design process: intrapersonal, interpersonal and extra personal. These domains represent the context in which the participants experience the identified challenges. Each domain explored design interventions, created by the participants, that explores ways to bridge the gap

(horizon two) between horizon one and horizon three. This was supported by literature and the design principles for play-based interventions identified in chapter two. Play-based design principles emerged as a creative response to the identified needs, participant prototypes and supporting literature.

Table 16: Design principles for play-based design interventions emerging from the design process

Source: author created table

Design need identified in horizon one and horizon three	Domain	Example concepts	Supporting literature	Supporting principle extracted from literature	Play-based design principle (response)
Challenge: overstimulation, emotional fatigue and unhealthy coping mechanisms, intensified by constant cognitive and digital demand. Design need: restorative engagement, mindful interaction, integration into daily life, psychological balance, alternative to escapism.	Intrapersonal	Ambient play wall, interactive furniture and disruption dice	Free play is intrinsically motivated, internally satisfying self-selected and self-directed (National Institute for Play, n.d.). Regulating sensory input is key to managing over-stimulation (Doucé & Adams, 2020:2). Play is a human survival instinct that is as fundamental as the impulse to eat or sleep (Kang, 2020:573). Play is linked to the development of the pre-frontal cortex, which is responsible for identifying relevant information, goal direction, abstract concepts, decision-making, monitoring and organising thoughts and feelings, delaying gratification and future planning (Kang, 2020:573). The barriers that reduce playful interaction can be dismantled by	Voluntariness and intrinsic motivation Material and environmental design Accessibility and barrier reduction Emotional regulation and resilience	Encourage spontaneous moments of play, design for sensory balance and restorative engagement, embed play within everyday environments

			adopting play as a tool for well-being and giving individuals permission to engage in play (Chinyakata et al., 2022:204).		
Challenge: social disconnection, fear of judgement and emotional strain, intensified by digital dependency and performance anxiety. Design need: social play, connection through play, ease of participation, balance of engagement and supportive communication.	Interpersonal	Energy banking, puzzle wall, card game and token game	Play is associated with healthy human development and can manifest in social environments (Brown, 2019). Play is a communal experience that encourages belonging, empathy and joy (Whitton, 2022:4). Play is an unstructured and creative outlet that supports social interaction (Nance, 2022:165). Play effects how individuals relate to themselves, others and the world around them and that integrating play into adult life challenges cultural narratives of productivity (Powell, 2023:24).	Voluntariness and intrinsic motivation Social interaction and co-creation Material and environmental design Accessibility and barrier reduction Emotional regulation and resilience	Encourage social connection through shared play experiences, embed play within everyday environments, design for co-creation and community ownership
Challenge: environmental overstimulation and societal pressures, result in stress, avoidance and cognitive fatigue. Design need: restorative environments, playful ecosystems, accessibility and choice,	Extra personal	Social bar, work vacation retreat and community hobbies hall	The time and place for engaging in play is diminishing (Powell, 2023:24). The play experienced can be protected and enriched through collaboration among families, communities and stakeholders, resulting in intrapersonal, interpersonal and extra personal	Voluntariness and intrinsic motivation Social interaction and co-creation Material and environmental design Accessibility and barrier reduction	Encourage social connection through shared play experiences, design for sensory balance and restorative engagement, design for co-creation and community ownership

community wellbeing and sanctuaries for balance			benefits (Chinyakata et al., 2022:204). The significance of adult play needs to be recognised by mainstreaming play and countering the misconception that play lacks value (Chinyakata et al., 2022:204). There is a need for increased playful resources in urban design (Powell, 2023:24).	Emotional regulation and resilience	
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7.2.1 Encourage Spontaneous Moments of Play

Adult life is often characterised by a structured, outcome-driven rhythm. Spontaneous play emerged as a desired counterbalance to this belief. The findings suggest that quick prompts or tactile objects are two examples of small disruptions that provide relief from monotony and performance pressure by inviting unplanned interaction. Concepts like the disruption dice (refer to figure 57) and ambient play wall (refer to figure 55) demonstrate how gentle, low-stakes invitations to engage in play could be integrated into daily routines.

The findings indicate that young adults could detach from continuous task performance through micro-moments of restoration and can be achieved with unstructured and spontaneous play that counterbalances cognitive overload. This principle promotes emotional regulation. Furthermore, it establishes a sense of presence and mental equilibrium during moments of informational and sensory overwhelm.

7.2.2 Design for Sensory Balance and Restorative Engagement

The findings uncovered a need for calm, tactile and rhythmic forms of play. Sensory play can be adopted to provide a sense of relief. The data showed an association between overstimulation and anxiety, fatigue and an inability to focus. It highlights that play can be experienced in stillness and subtle interaction. The findings suggest that sensory play can be encouraged by embedding texture, movement and light into environments or artefacts. This principle reframes play from mere

entertainment to an active recovery tool. Play, in this sense, can be used to encourage grounding and mindfulness to support cognitive balance.

7.2.3 Encourage Social Connection Through Shared Play Experiences

The findings indicate a need for connection and belonging. Play can be used to reduce social barriers, create humour and encourage genuine connection. The puzzle wall concept (refer to figure 40) exemplifies play that generates light competition and collective storytelling. This principle suggests that designers can reconfigure social engagement from performative to authentic connection that supports interpersonal resilience and mutual regulation. Play-based design interventions can achieve this through the adoption of shared challenges and creative prompts. The findings suggest that cognitive load can be reduced by using play-based design to build social support networks encourage emotional co-regulation. Furthermore, the research highlights the benefits of play in reducing the effects of loneliness by promoting social reciprocity.

7.2.4 Embed Play Within Everyday Environments

The findings indicate that a lack of time is a notable barrier to engaging in play. The pace of contemporary society reduces the frequency of unstructured leisure. Micro-moments of restoration could be embedded into daily activity and ordinary environments. This principle can be applied to subtly counter-balance overstimulation. This study suggests that play can be made accessible without demanding additional cognitive effort or planning. The integration of tactile materials, visual prompts and spatial affordances in everyday scenarios could generate moments of incidental play. The interactive furniture concept (refer to figure 56) exemplifies how functional spaces can be transformed into opportunities for spontaneous engagement.

7.2.5 Design for Co-Creation and Community Ownership

The findings identified community-driven and social play as an expressed desire among young adults. This principle refers to play that is collaborative and outcomes are shaped collectively. Co-creation can be viewed beyond the context of design and extended to being reframed as play, a process of shared discovery and invention. The puzzle wall (refer to figure 40) and the puzzle truck (refer to figure 49) concepts are examples of collaborative installations and storytelling systems that extends the benefits of play beyond individuals by embedding it into social and cultural ecosystems.

The findings suggest that involving individuals as contributors to a communal play-based project can encourage a sense of ownership and long-term engagement with play.

7.3 REFLECTIVE INSIGHTS ON THE CO-DESIGN PROCESS

The final section of chapter six reflects on the co-design process. This was not derived from existing theory; therefore, the reflection contributes to practice-led methodological knowledge rather than theoretical generalisation. It is noted that the reflection lacks external triangulation of prior literature, however, it provides situated, process-specific insight into designing for wellbeing through play.

The co-design approach became a methodological bridge between understanding the problem space and exploring potential play-based design interventions. Two co-design workshops were conducted at different phases of the double diamond framework. To ensure that the design outcomes were grounded in lived experience rather than assumption-based data, the participants, young adults living in Cape Town, were included as co-designers. Participants contributed to insight generation and concept development.

The outcomes of the design research project were shaped by the co-design process. It informed the mapping of the Three Horizons and the development of the five design principles for play-based interventions. The first co-design workshop developed empathy and contextual understanding. The second co-design workshop supported participants in creating play-based design interventions that responded to the themes that emerged from prior phases of the design research. The workshops were iterative and collaborative and encouraged creativity and emotional openness. The workshop activities were selected and designed to ensure that the emerging concepts aligned with the needs of the participant group. The outcomes of the co-design process illustrated how co-design can be used to generate artefacts and a deeper understanding of the social and psychological dimensions of cognitive load and play.

7.3.1 Strengths of Involving Participants in Playful, Collaborative Ways

This study highlighted several strengths of co-design. It created an environment that was emotionally open, creative and respectful. The activities were designed to be playful and non-hierarchical. The participants were able to communicate their own lived experiences authentically

without fear of judgement. The physical workshop environment was comfortable and informal which created a sense of agency among participants. Playful facilitation strategies, such as icebreakers and play objects, were incorporated to encourage spontaneity and mutual engagement.

The participant interaction and social reciprocity evolved throughout the workshops. The first notable moment of mutual engagement emerged organically. The participants began to play with the office chairs which swivelled on an axis and rocked back and forth. This interaction generated laughter and indicated a shift from individuals isolating themselves to group cohesion. This micro-moment of play was rooted in shared experience and encouraged emotional release and connection. A strong sense of community started to emerge as the participants began to acknowledge their shared experiences. The sense of emotional co-regulation through shared experience developed a sense of belonging and trust.

The structure of the workshop and the workshop activities were guided by participant feedback. The brainwriting activity exemplified this practice. After one round of brainwriting, the participants decided to continue the activity but in the form of a group discussion. Furthermore, the participants influenced the pacing of the co-design workshops which provided them with agency. This contributed to their maintained engagement and ensured that the workshop accommodated fluctuating levels of energy and concentration.

7.3.2 Limitations and Challenges of the Co-Design Process

In this study, the co-design process highlighted several challenges. The most notable limitation was working with non-designers in a solution-oriented workshop. The first co-design workshop generated valuable data; however, the participants design literacy skills limited concept iteration and refinement in the second co-design workshop. While this was a limitation, it is important to note that the inclusion of non-designers in co-design was valuable. This is supported by literature which argues that participants are active contributors and a vital part of the design team as experts of their own experiences (Sanders & Stappers, 2008:12). The challenges that occur in co-design are become methodological and are related to the facilitation of non-designers (Steen, 2013:5). Designers are needed in co-design because of the relevance of their highly developed skills such as visual thinking, conducting creative processes and making decisions in the absence of complete information (Sanders & Stappers, 2008:15). In this study, the balance of inclusivity and the practical demands of design expertise reflected a duality within co-design.

Time constraints were a secondary challenge when conducting the co-design workshops. The workshops were carefully structured according to time management however the prototyping would have benefitted from an additional day for more meaningful exploration and iteration. The addition of a follow-up sessions with professional design support and additional prototyping and refinement-based activities would have allowed for a greater depth of exploration.

Participant mental energy levels proved to be a minor limitation. This effected engagement levels, particularly towards the end of the multi-day sessions. Despite the workshop schedule being designed to be flexible, which did mitigate this to some extent, the emotional and cognitive demands of the workshops occasionally led to reduced participation and creative energy. The workshop was run over two-day weekends to accommodate the schedules of young adults however, in hindsight, it would have been beneficial to run the workshops over more days to reduce the length of each session.

7.3.3 Learnings About Using Co-Design to Explore Wellbeing and Play

This study offers insight into the potential and limitations of play for cognitive load management within co-design. The findings suggest the co-design for play can operate as a process and an outcome. It allowed participants to communicate complex experiences through sketching, storytelling and collaborative mapping. This reduced cognitive barriers and encouraged emotional expression, psychological safety and engagement.

This design research project highlighted the importance of balancing structure and flexibility within co-design. The facilitation of the co-design workshops prioritised maintained focus to ensure productive outcomes. The activities were designed to be playful and encourage creativity and connection. The workshops were designed to sustain momentum and translate insights into actionable outcomes while being adaptable and participant led.

Ethical considerations and practices were embedded throughout the design research process. These considerations included voluntary participation, anonymity and continuous consent. The co-design workshops were carefully designed to prevent the replication of cognitive overload. The physical workshop environment was comfortable and collaborative. Fidget toys were incorporated into the

workshop to encourage micro-moments of restoration. The ethical practices adopted in this study were essential in ensuring trust, wellbeing and authentic participation in the co-design process.

7.4 CONCLUSION

Chapter seven discussed the research findings in relation to the study's aim. The discussion was structured around three key sections, each corresponding to one of the study's research questions. The first section applied the Three Horizons Framework to the research findings. The second section extracted and discussed design principles for play-based design intervention from the findings. Chapter six ended with a reflection on the co-design process. Together, these sections linked the findings to theory and design practice to demonstrate how play can serve as a restorative and relational design strategy. Chapter seven will conclude the design research project. It will summarise the main outcomes and address what can be learned from this study.

CHAPTER EIGHT: CONCLUSION

Chapter eight concludes the study by summarising the key findings and proposes recommendations for future research and practice. The first section summarises the main outcomes of the design research in relation to the three sub-questions discussed in chapter one. The second section discusses what can be learned from the study, and the third section highlights the main contributions of the research in the field of design. The final section proposes recommendations for further research, policy and practice.

8.1 SUMMARY

The design research project investigated how play-based design interventions can support young adults in Cape Town who experience cognitive overload while managing multiple roles and responsibilities.

Chapter one highlighted the increase in cognitive overload challenges in the contemporary society. It noted that cognitive overload is a product of digital, environmental and sensory pressures. It recognised that play has cognitive benefits, however, there are limited play-based design interventions that support cognitive load management. This created a gap in the research for practice-led design exploration.

Chapter two explored existing literature that relates to play as a supportive tool. It identified play as a restorative tool that has intrapersonal, interpersonal and extra personal benefits. The literature was synthesised to extract design principles for play-based intervention. The conceptual framework was introduced and integrates play theory, the Three Horizons framework and the Double Diamond model into the design research project.

Chapter three presented the research design and methodology. It introduced co-creation and design thinking, structured around the double diamond model, as an appropriate methodological framework for the practice-led design research project. This chapter introduced two co-design workshops with participants and two interviews with key informants.

Chapters four and five presented and discussed the findings of the design research project which showed that:

- Cognitive overload is a systemic issue that is embodied, relational and environmentally reinforced.
- Young adults who experience cognitive overload often adopt unhealthy coping mechanisms which intensifies the cycle of overload.
- There is an increase in cognitive overload due to the adoption of digital technology.
- Adult play can be reframed from frivolous entertainment to a restorative, sensory and social tool to counteract cognitive overload.
- Five design for play-based intervention principles can be adopted to inform the creation of future play-based design interventions.
- The co-design process enabled participants to translate their lived experiences into design opportunities.

Chapter six uses these insights that were presented in chapters four and five as the foundation for the reflective discussion. This chapter addresses the contributing factors of cognitive overload, the design principles for play-based intervention extracted from the findings and the adoption of co-design in this design research project.

8.2 DISCUSSION

This section reflects on the lessons that can be drawn from the design research. It examines how the methodological choices influenced the outcomes, the advantages and constraints of those decisions and presents alternative approaches.

8.2.1 Methodological Reflection

The research process revealed strengths and limitations that influenced the depth and direction of this study. These reflections can be viewed across five areas: sampling, participants and key informants, workshop design and data collection, interview design and data collection, data analysis and ethics and researcher responsibility.

The co-design methodology was effective in generating rich experiential data from the participants lived experiences within the problem space, however, the limited design literacy skills within the participants group was a limitation during concept iteration and refinement within the solution space. The inclusion of the key informant interviews proved beneficial for data triangulation and guidance towards the solution space. On the other hand, sections of the data were omitted due to it targeting a younger demographic. The workshop was conducted over two weekend days to accommodate the participants' schedules, however, introducing more, shorter sessions would have reduced day-to-day fatigue. The workshop environment and activities were designed to be engaging and playful - which heightened participant enthusiasm, but occasionally disrupted flow and focus. Participant guidance when approaching the workshop activities gave the participant group agency, however, it resulted in less visual and structured data at times. The sequential structure of the design research activities developed a narrative flow but also created a dependence on the data from preceding activities. This meant that a disruption in one activity would slow down the entire design research process. The incorporation of semi-structured interviews provided a balance between data triangulation and emergent insights that guided the design research towards the solution space but at times led to off-topic, lengthy and repetitive responses. The thematic analysis on Miro was visual and playful. It provided depth of analysis and documentation; however, the process was slow, and a qualitative analysis software would have made data extraction more efficient. The deductive analysis on Taguette was well suited to the nature of interview data but it became stagnant after the initial coding was completed. Finally, the ethical practices promoted trust and openness but introduced procedural constraints that demanded additional planning. Table 17 summarises the methodological considerations with reference to their advantages, constraints and implications of similar practice-led and co-design studies.

Table 17: Methodological choices, advantages, constraints and implications

Source: author created table

Thematic area	Advantages	Disadvantages/constraints	Implications and reflection focus
Sampling, participants and key informants	The participants provided insights based in lived experience. The key informants supported data triangulation and guided the design research project towards the solution space.	A participant group with limited design literacy skills was not ideal for concept iteration and refinement. Expert insights occasionally applied more to a younger demographic resulting in data omission.	Manage expectations, carefully select tools to align with participants abilities, include participants with design literacy skills. Provide clarity about targeted demographics and research objectives.

Workshop design and data collection	The two-day workshops ran over the weekend to accommodate participant schedules. The workshop environment was clean, comfortable, collaborative, playful and efficient. Participant guidance encouraged engagement, agency and choice. The activities were structured sequentially which strengthened the narrative flow.	The long sessions were tiring and led to reduced engagement towards the end of the day. The participants sometimes got distracted by playful prompts or humorous conversations. A participant guided approach to activities sometimes generated less visual or structured data. The sequential structure of activities meant disruption in one activity would slow the whole research process down.	Structure shorter more frequent sessions, balance agency with structure in facilitation approach, create clear transitions between play and focus moments and design an adaptable workshop.
Interview design and data collection	The semi-structured interviews and interview questions provided a balance between data triangulation and emergent insights.	The open-ended structure occasionally led to lengthy, off-topic discussions. Some Responses became repetitive.	Incorporate measures for tighter facilitation and increase refinement of questions to remove topic overlap.
Data analysis	The thematic analysis on Miro generated playful engagement with the data and documented the entire analysis process visually. The deductive analysis on Taguette supported text-based coding that aligns with the nature of interview data.	The visual analysis was time consuming and required additional effort for manual data extraction. The deductive analysis felt static after initial coding.	Use qualitative analysis software and combine deductive analysis tools with visual mapping tools.
Ethics and researcher responsibility	The ethical considerations and practices increased openness and promoted control and psychological safety.	The ethical practices create restrictions during workshop planning.	Ensure extra time when designing the workshop.

Some methodological challenges only became evident during the design research process. First, the incorporation of participants with existing design literacy skills would have strengthened and supported concept iteration and refinement. Similarly, conducting shorter workshop sessions over more days would have reduced the day-to-day fatigue and sustained engagement. Approaching the key informant interviews with more clarity of research objectives, goals and targeted demographics would have improved the focus on the discussion and reduced data omission.

The use of Miro proved to be effective; however, the introduction of qualitative analysis software and tools would have streamlined coding and data extraction, making the process more efficient. The use of visual analysis mapping and deductive analysis software and tools in combination would have provided a richer analysis of the interview data beyond the initial coding.

These reflections indicate that increased attention to participant recruitment, workshop structure and length, facilitation strategies and hybrid analysis tool could enhance the effectiveness of future practice-led and co-design research.

8.2.2 Substantive Reflection: positioning within the literature

This section positions the findings of the design research within the broader academic discourse. It highlights the study's theoretical and practical significance by reflecting on the literature and comparing it with insights generated through co-creation and practice-led inquiry. The discussion responds directly to the three research sub-questions, presented in chapter one, and outlines how each one has been addressed through empirical findings and design outcomes. It establishes the study's contribution to the fields of cognitive load management, play theory and co-design. It situates the research within contemporary discussions on wellbeing, play-based design and co-creation design practices.

Answer to sub-question one:

What factors contribute to cognitive overload in young adults living in Cape Town who manage multiple roles and responsibilities?

Cognitive overload is influenced by information and sensory overstimulation. Digital connectivity amplifies this experience. The findings indicate that young adults often adopt unhealthy coping strategies which amplifies the cycle of overload. This manifests as overcompensation, escapism and withdrawal. Prior studies attribute cognitive overload to being a psychological or informational issue. Cognitive overload is a systemic issue that is an embodied, relational and environmental experience and not only felt in isolation. This is often caused by societal expectations and constant cognitive demand. This understanding of cognitive overload lives in multiple domains that need to be addressed simultaneously. Table 18 summarises the research findings in relation to research sub-question one.

Table 18: Findings responding to research sub-question one

Source: author created table

Theme	What the literature establishes	What this study found	Implications
Cognitive overload as a systemic and embodied experience	Information overload influences concentration and the ability to keep pace with contemporary society (Kashada et al., 2020:53-55). Sensory overload can lead to confusion, frustration and withdrawal (Douc�� & Adams, 2020:2). Individuals adopt unhealthy coping mechanisms such as substance use, isolation, denial and avoidance when play is limited (Whitton, 2022:165).	Anxiety, panic attacks, burnout and emotional exhaustion were common. Need for structure, routine and control. Noise, light and crowds triggered overstimulation. Young adults sometimes default to unhealthy coping mechanisms when they feel overloaded.	Cognitive overload is not experienced in isolation and influenced by personal, social and environmental factors. It is systemic and embodied.
Social disconnection and relational strain	Humans require a high level of social interaction (Tonkin & Whitaker, 2021:1). Connection is a fundamental pillar to wellbeing (Tonkin & Whitaker, 2021:2).	Cognitive overload disrupted social connection, leading to loneliness and social anxiety. Fear of judgement lead to avoidance and withdrawal. Digital devices replaced in-person social interaction, leading to reduced emotional connection.	Cognitive overload and social wellbeing are correlated. Design should enable safe social reconnection.
Digital connectivity	The amount of information available due to the increase in mobile technology is a major contributing factor to overload (Kashada et al., 2020:54).	Restlessness, impulsivity, mental fatigue, irritability and symptoms resembling attention-related disorders triggered by constant digital connectivity were common.	Play-based design interventions must consider contemporary societal practices that amplify overload.

Answer to sub-question two:

What types of play-based interventions could help support young adults living in Cape Town, who manage multiple roles and responsibilities, with cognitive load management?

Adult play can be reframed as a restorative tool to counteract cognitive overload as opposed to frivolous entertainment. The findings indicate that cognitive load can be managed through the adoption of sensory, social and spontaneous play experiences. The design research suggests that play can either be embedded into everyday routine or be presented as a novel experience. The findings show that play can be adopted as an alternative to unhealthy coping strategies to balance mental and emotional energy in adulthood. The study extracts five design principles for play-based intervention that can inform future design interventions for cognitive load management. These

principles include encourage spontaneous moments of play, design for sensory balance and restorative engagement, encourage social connection through shared play experiences, embed play within everyday environments and design for co-creation and community ownership. These principles illustrate how play-based design can operate as a strategy for cognitive restoration. Table 19 summarises the five design principles for play-based intervention in response to research sub-question two.

Table 19: Findings responding research sub-question two

Source: created by author

Theme	What the literature establishes	What this study found	Implications
Encourage spontaneous moments of play	Play increases engagement, creativity, mindfulness, innovation (Nance, 2022:164), emotional resilience, imagination, problem solving (Whitton, 2022:5), stress relief and relaxation (Chinyakata et al., 2022:191). It decreases boredom, stress, tension and nervousness (Nance, 2022:164).	Unstructured and spontaneous play can counterbalance cognitive overload through micro-moments of restoration.	Frame play as a restorative tool. Design for casual, sensory and self-directed forms of play.
Design for sensory balance and restorative engagement	Sensory cues that can influence cognitive overload include light, scent and sound (Kim et al., 2021:4). Innovation, flexibility, adaptability and resilience are influenced by physical movement (Kang, 2020).	Calm, tactile and rhythmic forms of play can provide a sense of relief.	Design using texture, movement and light as gentle sensory cues for play.
Encourage social connection through shared play experiences	Play influences how individuals relate to themselves and others in the world (Powell, 2023:24) and facilitates social interaction (Whitton, 2022:5). Play encourages communication, self-expression, positive social relationships, attachment and empathy (Heljakka, 2020).	Humour and genuine connection generated through play can reduce social barriers.	Design for shared purpose, light competition and collective storytelling.
Embed play within everyday environments	Many adults work as a means of survival and do not have the time to engage in playful activities (Chinyakata et al., 2022:202).	Micro-moments of play that are embedded in ordinary environments can make play more accessible for individuals with limited time.	Design using tactile materials, visual prompts and spatial affordances embedded into ordinary environments.
Design for co-creation	Play is linked to the healthy development of individuals and	Community-driven and social play can encourage	Design for collaboration and

and community ownership	communities (Powell, 2023:2). Play should be accessible in public spaces to reduce social isolation and build community cohesion (Hartt et al., 2023).	collaboration and collective outcomes that can encourage a sense of ownership and belonging.	co-created outcomes.
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Answer to sub-question three:

How can co-design inform the development of a play-based design intervention that addresses the cognitive load management needs of young adults living in Cape Town who manage multiple roles and responsibilities?

The study highlights the value of co-design from a methodological perspective. It created a bridge between understanding and intervention and enabled participants to translate their lived experiences, of young adults in Cape Town, into design opportunities. They were able to identify and articulate their cognitive load challenges and co-create future play-based design interventions that support cognitive load management. The participants' experiential knowledge provided valuable insights that grounded the findings in authenticity and empathy. In contrast, the participants had limited design literacy which presented as a challenge during the concept iteration and refinement phase. The study expands on co-design knowledge by illustrating how playful design methods can support participant engagement and cognitive accessibility when working with abstract topics such as cognitive overload. Table 20 summarises the findings in response to research sub-question three.

Table 20: Findings responding to research sub-question three

Source: author created table

Theme	What the literature establishes	What this study found	Implications
Co-design as a bridge between insight and intervention	Design researchers guide participants to identify opportunities, consider the current reality, identify what is important, recall previous experience, reflect on underlying values and guide the thinking towards a desirable future state (Sanders & Stappers, n.d.).	Co-design generates empathy from lived experiences which can be collaboratively translated into play-based design outcomes.	Co-design is a suitable approach for dealing with abstract complex problems based in lived experience.
Co-design tools supporting non-designers	Co-design encourages non-designers to participate in the design process and tools have emerged to support the inclusion of participants and stakeholders into the design	Limited design literacy slowed concept iteration and refinements and limited depth of exploration.	Co-design tools should be carefully considered and selected to align with participants ability.

	process (Sanders & Stappers, n.d.:29).		
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In summary, the design research project expands on the existing body of knowledge. It intersects design for play and cognitive load management. It positions play as an essential component of well-being and offers theoretical and practical insights into how play-based design interventions can encourage emotional restoration, social connection and cognitive balance within contemporary, overstimulated contexts.

8.3 THE CONTRIBUTION OF THIS STUDY

The design research project contributes to the existing body of knowledge through a situated understanding of cognitive load management, the development of design principles for play-based interventions and methodological insights into participatory design practice.

8.3.1 Theoretical Contribution: a situated understanding of cognitive load management

The design research contributes to theoretical understanding by framing cognitive overload as a systemic, embodied and relational experience, as opposed to being only a psychological or informational issue. It situates this perspective within the lived experiences of young adults in Cape Town and reveals how informational, sensory, digital, emotional and social pressures intersect with contemporary living. This localised understanding contributes to global discourse, societal expectations and constant cognitive demands influence the lived experience of cognitive overload.

8.3.2 Design Contribution: guiding principles for play-based design intervention

The design study reframes the play as a restorative and regulatory tool for cognitive load management. It introduces five design principles for play-based interventions to inform future play-based design interventions for cognitive load management. These principles contribute to the practical and theoretical understanding of how play-based intervention can move beyond leisure to actively support cognitive load management in adulthood.

8.3.3 Methodological Contribution: co-design as a framework for empathetic engagement

The design research project demonstrates how co-design can be adopted to explore abstract topics such as cognitive overload. The incorporation of playful and participatory activities allowed participants to externalise and reimagine their experiences and translate overload challenges into tangible design opportunities. This approach contributes to existing design research by illustrating how playful co-design methods can support empathy, accessibility and meaningful participant engagement within practice-led inquiry.

8.4 RECOMMENDATIONS

The design research project highlights the growing need to address cognitive overload among young adults in Cape Town, South Africa. It demonstrates how play-based design supports cognitive load management.

In practice, designers should recognise play as a restorative cognitive-load management tool in adulthood. It can be used to integrate brief, spontaneous moments of play into everyday environments and routines to support attention and cognitive balance. Designing for calm, sensory and social experiences can reduce overstimulation and isolation. Furthermore, play-based design should encourage collective participation and ownership to encourage connection and belonging within communities.

Further research could extend these insights by exploring the long-term impact of play-based design interventions of cognitive load management in adulthood and compare these experiences across different cultural and socio-economic settings. In addition, future studies could explore the evolving relationship between digital and analogue play with a focus on how adults use hybrid forms of play to manage stress and regain focus.

Finally, future development should focus on applying the play-based design principles identified in this study to the development of tangible tools, methods and processes for cognitive load management in young adults. It could focus on designing, prototyping and testing physical play-

based design interventions that encourage spontaneous, sensory and social play within everyday contexts. The development of play-based co-design tools that improve cognitive accessibility when engaging with complex topics, such as cognitive overload, could be explored as a methodological contribution. Process-oriented research should explore how play-based interventions are implemented and sustained within different settings and scenarios. Attention should be given to creating adaptable, accessible and context-specific forms of play that can be embedded into daily routine and scaled across diverse settings. This design research project emphasises that designing for play is not only a source of entertainment but can contribute to communal wellbeing and sustainable human flourishing.

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APPENDICES

APPENDIX A: ETHICS AND CONSENT



23 August 2025

To whom it may concern,

Re: Introductory letter for the collection of research data

I, Julia Pascal Bugler am currently registered for the Master in Design degree at the Cape Peninsula University of Technology. My thesis is titled:

Design for play to support mental wellbeing in young adults with cognitive overload.

The research is practice-led, involving a hands-on exploration of how play-based elements can aid young adults in managing cognitive load in their daily lives. It examines how analogue play can foster mental equilibrium among young adults who experience cognitive overload from balancing multiple responsibilities.

The primary aim is to create a design intervention that supports cognitive load management for young adults. This includes exploring the current role of play in adulthood, identifying factors influencing the acceptance and adoption of play, and incorporating play-based elements into a prototype that addresses the needs of young adults managing multiple roles. Qualitative data will be gathered through collaborative activities in a co-design workshop, where participants will generate a play design intervention. The data will consist of written notes, sketches, and anonymized audio recordings.

Participants involved in the research will offer valuable contributions in designing a play design intervention. Their participation not only facilitates development through collaborative engagement but also exposes them to innovative approaches. The study will include two five

hour co-design sessions. Participants may reach out post-study with any questions or for follow-up sessions. As an appreciation, participants will receive a voucher after the workshop is completed.

Participants should be aware of potential risks before participating in the research. Risks include confidentiality breaches, which will be mitigated by anonymizing data, using pseudonyms, restricting access to data, and encrypting it securely. Personal repercussions will be addressed by ensuring anonymity and presenting insights without revealing identity. These measures aim to minimize risks and ensure a smooth, confidential, and respectful research process.

To comply with the Protection of Personal Information (POPI) Act of 2013, all personal information provided by participants will be securely collected, processed, and stored to ensure privacy and confidentiality. The data will be exclusively used for this research and will remain anonymized to protect participants identities. Data management follows institutional data protection policies, with informants retaining the right to access, correct, or request the deletion of their personal information as stipulated by the POPI Act.

Applied Design HoD: **Dr M. Di Ruvo**

Cape Peninsula University of Technology, South Africa

E-mail: diruvom@cput.ac.za

Investigator: **Julia Bugler**

Cape Peninsula University of Technology, South Africa

E-mail: Julia.bugler1998@gmail.com

Supervisor: **Dr V. Barnes**

Cape Peninsula University of Technology, South Africa

E-mail: barnesv@cput.ac.za

Co-supervisor: **R. Cilliers**

Cape Peninsula University of Technology, South Africa

Email: cilliersr@cput.ac.za

In order to meet the requirements of the university's Higher Degrees Committee (HDC) students must obtain consent to collect data from organisations or individuals which they have identified as potential sources of data.

If you agree to this, you are requested to complete the "Agreement to Take Part in Research Activities". Signing the agreement does not imply that you are required to take part, as all research interactions are completely voluntary.

For further clarification on this matter please contact either the Applied Design Head of Department (HoD), investigator or supervisor(s) identified above, the Faculty of Informatics and Design Research Ethics Committee (FID-REC) secretary (Ms V Naidoo) at 021 469 1012 or naidoove@cput.ac.za or the Faculty of Health and Wellness Sciences Research Ethics Committee (HWS-REC) secretary (Ms N Seth) at sethn@cput.ac.za.

Yours sincerely

Julia Bugler



Agreement to Take Part in Research Activities

Full Name: _____

I give consent for Ms. Bugler, a student at the Cape Peninsula University of Technology, to collect data from research interactions with me (or individuals in my organization) for her Master's (Design) project. The nature and purpose of the research, as well as the data to be collected, have been explained to me. I understand the following:

- The nature of the research is about using play and design to help young adults manage cognitive load.
- The purpose of the research is to develop a design intervention to support people who manage multiple roles and responsibilities.
- I will participate in two five hour long co-design sessions.
-

What it means for me as a key informant:

- I will play a role in advancing research on cognitive load management through play, particularly for young adults with multiple roles and responsibilities.
- My insights will contribute to shaping a play-based design intervention, influencing practical approaches to support cognitive load management.
- I will gain a deeper understanding of the relationship between play and cognitive overload.
- Collaborative dialogue fosters shared insights and learning, creating a valuable exchange between me and the researcher.
- Exploring the experiences of young adults with cognitive overload may inspire new perspectives and potential applications in my own life.

Risks:

I understand that there are potential risks involved in this study. I acknowledge that measures have been implemented to mitigate these risks, including strict data protection protocols, maintaining anonymity, and accommodating my schedule to minimize disruption.

Voluntary participation and withdrawal:

Participation is voluntary, and I may withdraw at any time without any negative consequences.

Confidentiality and anonymity:

- My identity will remain anonymous and confidential.

- Any audio recordings taken during the research will be edited so that I cannot be identified.
- Pseudonyms will be used, and no personally identifying information will be collected.

I understand that my data will be securely stored and anonymized in compliance with the POPI Act. I reserve the right to access, correct, or request deletion of my personal information.

To create a safe, collaborative environment, it is asked that participants respect the confidentiality of personal or sensitive information shared during the study. This includes refraining from discussing any personal stories outside of the research setting. By participating, I agree to contribute respectfully and to protect the personal information shared within the group.

Permission to use workshop artefacts (such as drawings, sketches or any other material I create during the workshop) and unidentifiable and anonymized photographs. (Tick as appropriate).

	Workshop artefacts	Unidentifiable audio recordings
Yes		
No		

In addition, my name may or may not be used in academic dissemination as indicated below (Tick as appropriate).

	Thesis	Conference paper	Journal article	Research poster
Yes				
No				

Date: _____

Signature: _____

Figure 60: Participant introduction letter and consent form

Source: created by author

4 August 2025

To whom it may concern,

Re: Introductory letter for the collection of research data

I, Julia Pascal Bugler am currently registered for the Master in Design degree at the Cape Peninsula University of Technology. My thesis is titled:

Design for play to support mental wellbeing in young adults with cognitive overload.

The research is practice-led, involving a hands-on exploration of how play-based elements can aid young adults in managing cognitive load in their daily lives. It examines how analogue play can foster mental equilibrium among young adults who experience cognitive overload from balancing multiple responsibilities.

The primary aim is to create a design intervention that supports cognitive load management for young adults. This includes exploring the current role of play in adulthood, identifying factors influencing the acceptance and adoption of play, and incorporating play-based elements into a prototype that addresses the needs of young adults managing multiple roles. Qualitative data will be gathered through insights from interviews and reflections on a co-design workshop, where participants engaged in activities and discussions around play and cognitive load. The data will consist of written notes, sketches, and anonymized audio recordings.

Key informants involved in the research will offer valuable insights into cognitive overload, contributing to a deeper understanding that may guide future interventions. Their participation not only facilitates professional development through collaborative engagement but also exposes them to innovative approaches within this field. Additionally, the research's reflective nature benefits both key informants and the researcher by fostering shared insights and enriching their understanding of cognitive load management and play.

The study will include a semi-structured, 90-minute interview scheduled according to the availability of the researcher and key informant. Key informants may reach out post-study with any questions or for follow-up sessions. As an appreciation, key informants will receive a voucher after their interview.

Key informants should be aware of potential risks before participating in the research. Risks include confidentiality breaches, which will be mitigated by anonymizing data, using pseudonyms, restricting access to data, and encrypting it securely. Professional repercussions will be addressed by ensuring anonymity and presenting insights without revealing identity. Time commitment concerns will be managed by scheduling interviews at convenient times, keeping them brief, and clearly communicating the expected duration. These measures aim to minimize risks and ensure a smooth, confidential, and respectful research process.

To comply with the Protection of Personal Information (POPI) Act of 2013, all personal information provided by key informants will be securely collected, processed, and stored to ensure privacy and confidentiality. The data will be exclusively used for this research and will remain anonymized to protect informants' identities. Data management follows institutional data protection policies, with informants retaining the right to access, correct, or request the deletion of their personal information as stipulated by the POPI Act.

Applied Design HoD: **Dr M. Di Ruvo**

Cape Peninsula University of Technology, South Africa

E-mail: diruvom@cput.ac.za

Investigator: **Julia Bugler**

Cape Peninsula University of Technology, South Africa

E-mail: Julia.bugler1998@gmail.com

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Cape Peninsula University of Technology, South Africa

E-mail: barnesv@cput.ac.za

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Cape Peninsula University of Technology, South Africa

Email: cilliersr@cput.ac.za

In order to meet the requirements of the university's Higher Degrees Committee (HDC) students must obtain consent to collect data from organisations or individuals which they have identified as potential sources of data.

If you agree to this, you are requested to complete the "Agreement to Take Part in Research Activities". Signing the agreement does not imply that you are required to take part, as all research interactions are completely voluntary.

For further clarification on this matter please contact either the Applied Design Head of Department (HoD), investigator or supervisor(s) identified above, the Faculty of Informatics and Design Research Ethics Committee (FID-REC) secretary (Ms V Naidoo) at 021 469 1012 or naidoove@cput.ac.za or the Faculty of Health and Wellness Sciences Research Ethics Committee (HWS-REC) secretary (Ms N Seth) at sethn@cput.ac.za.

Yours sincerely

Julia Bugler



Agreement to Take Part in Research Activities

Full Name: _____

I give consent for Ms. Bugler, a student at the Cape Peninsula University of Technology, to collect data from research interactions with me (or individuals in my organization) for her Master's (Design) project. The nature and purpose of the research, as well as the data to be collected, have been explained to me. I understand the following:

- The nature of the research is about using play and design to help young adults manage cognitive load.
- The purpose of the research is to develop a design intervention to support people who manage multiple roles and responsibilities.
- I will participate in a 90-minute semi-structured interview/reflection session.
-

What it means for me as a key informant:

- I will play a role in advancing research on cognitive load management through play, particularly for young adults with multiple roles and responsibilities.
- My insights will contribute to shaping a play-based design intervention, influencing practical approaches to support cognitive load management.
- I will gain a deeper understanding of the relationship between play and cognitive overload, which I may apply in professional contexts.
- Collaborative dialogue fosters shared insights and learning, creating a valuable exchange between me and the researcher.
- Exploring the experiences of young adults with cognitive overload may inspire new perspectives and potential applications in my own work or field.

Risks:

I understand that there are potential risks involved in this study. I acknowledge that measures have been implemented to mitigate these risks, including strict data protection protocols, maintaining anonymity, and accommodating my schedule to minimize disruption.

Voluntary participation and withdrawal:

Participation is voluntary, and I may withdraw at any time without any negative consequences.

Confidentiality and anonymity:

- My identity will remain anonymous and confidential.

- Any audio recordings taken during the research will be edited so that I cannot be identified.
- Pseudonyms will be used, and no personally identifying information will be collected.

I understand that my data will be securely stored and anonymized in compliance with the POPI Act. I reserve the right to access, correct, or request deletion of my personal information.

To create a safe, collaborative environment, it is asked that key informants respect the confidentiality of personal or sensitive information shared during the study. This includes refraining from discussing any personal stories outside of the research setting. By participating, I agree to contribute respectfully and to protect the personal information shared within the group.

Permission to use workshop artefacts (such as drawings, sketches or any other material I create during the workshop) and unidentifiable and anonymized photographs. (Tick as appropriate).

	Workshop artefacts	Unidentifiable audio recordings
Yes		
No		

In addition, my name may or may not be used in academic dissemination as indicated below (Tick as appropriate).

	Thesis	Conference paper	Journal article	Research poster
Yes				
No				

Date: _____

Signature: _____

Figure 61: Key informant introduction letter and consent form

Source: created by author

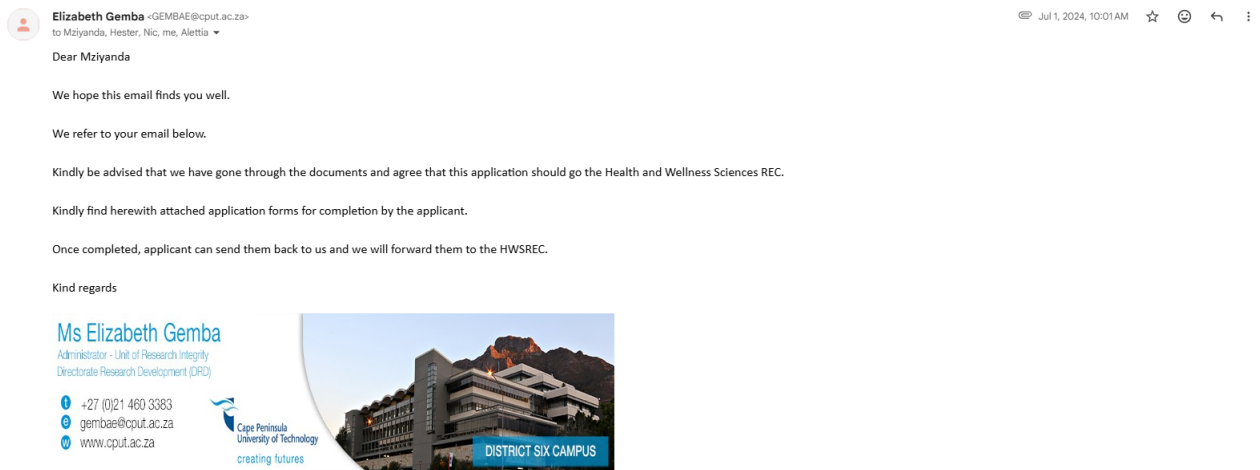


Figure 62: FID-REC ethics referral email to HWS-REC

Source: Screenshot of e-mail from FID-REC

HEALTH AND WELLNESS SCIENCES RESEARCH ETHICS COMMITTEE (HWS-REC)

Registration Number NHREC: REC- 230408-014

P.O. Box 1906 • Bellville 7535 South Africa
Symphony Road Bellville 7535
Tel: +27 21 959 6917
Email: sethn@cput.ac.za

18 March 2025

**HWS-REC Approval Reference
No: CPUT/HWS-REC 2025/S4**

Faculty of Health and Wellness Sciences

Dear Ms. Julia Pascal Bugler (Unit of Research Integrity Application)

Re: APPLICATION TO THE CPUT HWS-REC FOR ETHICS CLEARANCE

Approval was granted by the Health and Wellness Sciences-REC to **Ms. JP Bugler** for ethical clearance. This approval is for research activities related to research for **Ms. JP Bugler** at Cape Peninsula University of Technology.

TITLE: Designforplayforcognitive load management in young adults.

Supervisor/s: Ms. R Cilliers

Comment: Approval will not extend beyond 19 March 2026. An extension should be applied for 6 weeks before this expiry date should data collection and use/analysis of data, information and/or samples for this study continue beyond this date.

The investigator(s) should understand the ethical conditions under which they are authorized to carry out this study and they should be compliant to these conditions. It is required that the investigator(s) complete an **annual progress report** that should be submitted to the CPUT HWS-REC in December of that particular year, for the CPUT HWS-REC to be kept informed of the progress and of any problems you may have encountered.

Kind Regards



Dr. Samantha Meyer
Chairperson – Research Ethics Committee
Faculty of Health and Wellness Sciences

Figure 63: Ethics approval certificate from HWS-REC

Source: CPUT HWS-REC

Emotional distress or discomfort A participant becomes emotionally distressed during a workshop.	Misunderstanding or miscommunication Participants misunderstand the research objectives, procedures, or their role.	Challenges in group dynamics Conflicts or issues that could arise within the group during a workshop.
I will ensure the presence of a counselor, who will act as a co-facilitator and has a clear protocol for addressing distress.	I will use simple, clear language in all communications and consent forms.	I will establish and communicate clear ground rules for respectful behavior at the beginning of the workshops.
1 Preparation	1 Clarity	1 Ground rules
I will create a safe and comfortable environment, with quiet areas where participants can retreat if they feel overwhelmed.	I will incorporate visual aids to explain complex concepts.	I will collaborate with a skilled facilitator who can manage group dynamics and mediate conflicts effectively.
2 Environment	2 Visual aids	2 Facilitation
I will promptly recognize signs of distress, provide immediate support, and if necessary, remove the participant from the activity to a private, calming space. Ensure they receive appropriate care and follow-up support.	I will regularly check participants' understanding throughout the research process.	I will be prepared to provide individual support if group interactions become problematic for any participant.
3 Response	3 Check-ins	1 Individual support

Figure 64: Considerations for potential for harm scenarios

Source: created by author

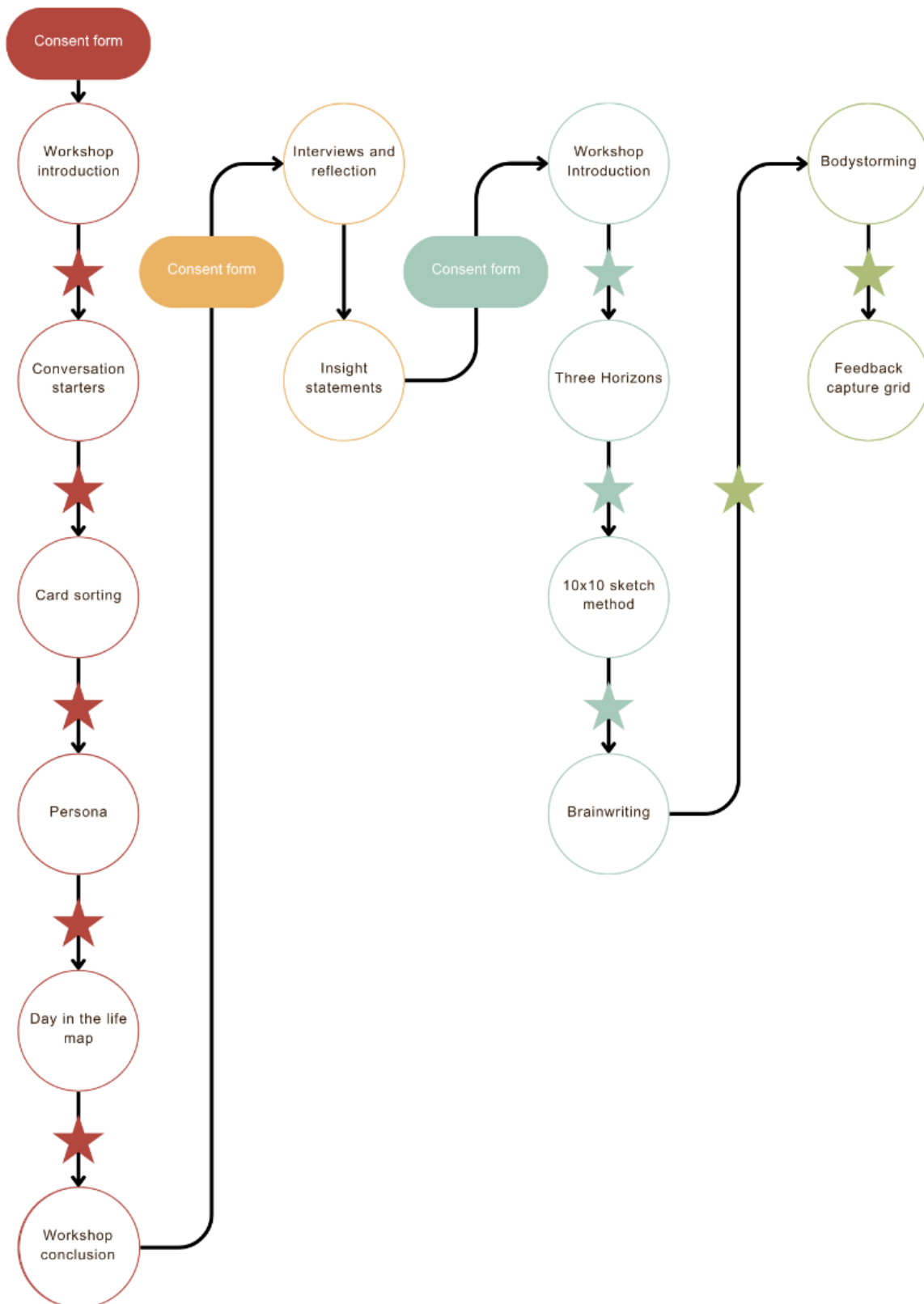


Figure 65: Continuous consent checkpoints

Source: created by author

APPENDIX B: WORKSHOP MATERIAL

Table 21: Participants

Source: author created table

Participant code	Age	Roles and responsibilities	Workshop one	Workshop two
P1	25-29	Full-time employment and odd jobs	Yes	Yes
P2	18-24	Full-time employment and odd jobs	Yes	Yes
P3	25-29	Odd jobs and family responsibilities	Yes	Yes
P4	18-24	Student and family responsibilities	Yes	No
P5	18-24	Full-time employment, odd jobs and family responsibilities	Yes	Yes
P6	30-35	Full-time employment and parenting responsibilities	Yes	No
P7	25-29	Job searching, employed and family responsibilities	Yes	Yes
P8	25-29	Full-time employment and family responsibility	Yes	No

Table 22: Key informants

Source: author created table

Key informant code	Professional role	Area of expertise	Purpose in study
KI1	Psychiatrist	Integrative psychiatry, teenagers and young adults	Triangulated workshop data and contributed playful approaches to inform the solution space.
KI2	Life coach	Executive function training, teenagers and young adults	Triangulated data and contributed playful behavioural strategies to inform the solution space.

Table 23: Co-design workshop one activities

Source: author created table

Activity	Group size	Resources	Objective	Action	Reference
Introduction	Whole group	Name tags, agenda (refer to figure 65), introduction letter and consent form (refer to figure 60)	Promote transparency, establish shared understanding, articulate goals, receive informed consent	The facilitator welcomed the participants to the workshop, outlined the goals and agenda and received informed consent from the participants.	(HUD Exchange, 2021:11)
Conversation starters	Pairs then larger group	Conversation prompt cards (refer to figure 66)	Encourage inclusivity, stimulate discussions, alleviate formality	The participants formed pairs and used prompt cards to initiate conversation; they then introduced	(HUD Exchange, 2021:12) (IDEO Design Kit, n.d.)

				their partner to the larger group based on what they learned about the other person during their discussion.	
Card activity	Individual, group sharing	Blank card templates (refer to figure 12), markers	Initiate discussions, uncover lived experiences of young adults in Cape Town	The individual participants created cards using blank templates that titled, visualised and described the cognitive overload challenges that they experience which they then presented to the larger group.	(IDEO Design Kit, n.d.)
Persona	Whole group	Paper, markers	Contextualise and elaborate on participant challenges, build foundation for proceeding activities	The participants worked collaboratively to create a fictional person that represented them as a whole group and highlighted the challenges that were identified during the issue card activity.	(Curedale, 2019:392) (This Is Service Design Doing, n.d.)
Day in the life mapping	Whole group	Paper, marker, sticky notes	Contextualise and elaborate on participant challenges, identifying stress points in the daily routine	The participants collaboratively mapped out a typical daily routine for the persona and highlighted the highs and lows that were experienced throughout the day.	(Creately, n.d.)
As-is scenario map	Whole group, individual contributions	Paper, markers	Contextualise and elaborate on participant challenges, explore key stress point in depth	The participants divided a page into phases and based on the highlighted information from the preceding activities and their own lived experiences,	(IBM, n.d.)

				individually filled out sticky notes based on what the persona was doing, thinking and feeling within each phase and collaboratively organised the generated information on the page.	
Conclusion	Whole group	Material produced in workshop	Recap key findings, outline next stages of design research, express gratitude for participation	The facilitator recapped the workshop activities, discussed the next phases of the design research, invited the participants to the second co-design workshop and thanked the participants for their engagement and participation in the design research project.	(HUD Exchange, 2021:25)

Table 24: Co-design workshop two, part one activities

Source: author created table

Activity	Group size	Resources	Objective	Action	Reference
Introduction and Reflection	Whole group	Consent forms, insight statements	Articulate goals and objectives of the workshop, receive informed consent	The facilitator presented preceding design research findings, discussed the workshop goals and objectives, introduced the workshop outline and received informed consent from the participants.	(HUD Exchange, 2021:11)
Three horizons: horizon 3	Individual, group sharing	Sticky notes, markers, insight statements	Envision desired futures in relation to cognitive overload that respond to insight statements	The participants referred to the list of insight statements and generated sticky notes in response that related to their desired futures in connection with cognitive overload management which they then shared with the larger group.	(International Training Centre, n.d.:3-4)

10 x 10 Sketch Method	Individuals then whole group	Markers, sticky notes, prompts (refer to figure 67)	Rapid concept generation	The participants worked individually to generate concepts that responded to horizon one and horizon 3 using pre-generated prompts based on the insights that emerged from the key informant interviews.	(Curedale, 2019:493) (This Is Service Design Doing, n.d.)
Brainwriting	Individual	A5 paper sheets, markers	Explore and refine concepts	The participants each chose one of their concepts which they passed around the group for the other participants to make additions and adjustments to, until each concept had been worked on by every participant	(Interaction Design Foundation, n.d.)
Dot voting	Individual	Dot stickers, concept cards	Select concept for further exploration and refinement	The participants each received three dot stickers which they used to stick on the concepts that resonated with them most	(Gibbons, 2019)

Table 25: Co-design workshop two, part two activities

Source: author created table

Activity	Group size	Resources	Objective	Action	Reference
Bodystorming	Whole group	Paper, markers	Transform idea into tangible forms, interact with concept, refine concept, gather user feedback	The participants voted for a system which they prototyped and engaged with, recreating every interaction point, and then they used those insights to iterate and refine the concept.	(Curedale 2019:495)
Feedback Capture Grid	Whole group	Paper, markers, sticky notes	Generate and organise feedback from prototyping activity	The participants used the insights that emerged from the bodystorming activity to identify the strengths, weakness, opportunities and further considerations based on the refined concept.	(Curedale, 2019:536) (IBM, n.d.)
Workshop Conclusion and Reflection	Whole group and/or individual	Workshop artefacts	Reflect on workshop activities, thank participants for attending workshop	The facilitator discussed the preceding and proceeding design research and results communication and thanked the participants for returning to and engaging with the second co-design workshop.	(HUD Exchange, 2021:25)



3-4 May 2025



WORKSHOP 1 OUTLINE

Design for play for cognitive load
management in young adults

WORKSHOP

Dear Participants,

Welcome to the workshop, "design for play for cognitive load management in young adults". This is the first of two participatory/co-design workshops. I am thrilled to have you all here and deeply appreciate your willingness to participate and share your experiences.

This workshop is an integral part of my master's research in industrial design, focusing on exploring the challenges faced by young adults managing multiple responsibilities and roles. My goal is to understand how physical play can be a powerful tool to support cognitive load management for those experiencing cognitive overload.

Over the next two days, we will engage in a series of interactive activities designed to uncover insights, foster collaboration, and spark creativity. Your input is invaluable, and together, we will identify meaningful design interventions that can make a difference in our daily lives.

Thank you for your time, energy, and openness. I look forward to learning from each of you and working together to create innovative solutions that promote cognitive load management through play.

Best regards,
Julia Bugler

WELCOME

WORKSHOP

Objectives and goals

This workshop aims to explore the challenges faced by young adults who are managing multiple responsibilities and roles, and to identify how analogue play can support their cognitive load management. The specific objectives are to:

- Understand the concept of cognitive overload and its impact on mental wellbeing.
- Identify the obstacles that prevent young adults from engaging in play.
- Identify a context for a design for play intervention for improved cognitive load management.

Expected outcomes

- A clearer understanding of the challenges associated with cognitive overload.
- A prioritized list of obstacles to engaging in play.
- Root causes of these obstacles identified.
- A detailed as-is scenario map outlining the current experience of managing cognitive overload.
- A foundation to build the design for play intervention on.

Workshop structure

The workshop is structured to facilitate active participation and collaboration through a series of interactive activities. The main activities include:

- Introduction
- Conversation Starter Activity
- Card Making
- Card Sorting
- Scenario development
- As-Is Scenario Map
- Conclusion

OVERVIEW

RESEARCH

Title

Design for play for cognitive load management in young adults.

Aim

The aim of this research is to explore the challenges faced by young adults who are managing multiple responsibilities and roles, and to identify how physical play can be utilized to support their cognitive load. This study seeks to uncover the underlying issues related to cognitive overload and to develop a design intervention that promotes cognitive load management through play.

Background

Cognitive overload occurs when individuals are overwhelmed by the demands placed on their mental resources, often leading to stress, anxiety, and burnout. This is particularly prevalent among young adults who juggle various responsibilities, such as work, studies, and personal commitments. Play, especially physical play, has been shown to have numerous benefits for mental health, including reducing stress, improving mood, and enhancing overall wellbeing.

Key concepts

- **Cognitive Overload:** A state of mental overwhelm caused by excessive cognitive demands, resulting in decreased performance and increased stress.
- **Play:** Engaging in activities that are fun, physical, and often social, which can help reduce stress and improve mental wellbeing.

OVERVIEW

DAY ONE

	Activity	Description
9:30-10:30	Introduction	• Welcome and introduction to the workshop's schedule and objectives. • Receive informed consent from participants.
10:15-10:45	Conversation starters	• Split into pairs. • Each pair receives a set of conversation starter prompts. • Discuss each prompt, sharing thoughts and reactions. • Introduce your partner to the larger group.
Break		
11:00-12:00	Card making	• Create cards using words or images that depict challenges you face regarding these topics.
Break		
12:30-13:30	Card sorting	• Collectively group the cards created during the card making session. • Sort the cards in order of priority, from the most significant challenges to the least. • Discuss why certain challenges are more important and how they affect you.
13:30-14:00	Discussion	• Recap the key insights and main points from the day's activities.

3 MAY

DAY TWO

	Activity	Description
9:30-10:00	Check-in	• Quick check-in to see how everyone is feeling. • Brief recap of the key findings from the previous day.
10:00-10:45	Scenario development	• Select a top challenge from the card sorting activity. • Develop a scenario based on the challenge. • Vote on 3 scenarios that resonate with you.
Break		
11:15-12:30	As-is scenario map	• Brainstorm individually and write what you are doing, thinking, and feeling in an identified context on sticky notes. • Collaborate to cluster similar notes, refine the order, and draw columns representing unique phases of the experience. • Highlight positive, negative, and unclear areas.
12:30-13:30	Conclusion and reflection	• Recap the insights and discoveries from the workshop. • Engage in a reflective discussion about the experiences and outcomes. • Discuss the second workshop.

4 MAY

WORKSHOP

Respect each other

- Listen actively and attentively when someone is speaking.
- Avoid interrupting or speaking over others.
- Show appreciation for different perspectives and experiences.

Participate actively

- Engage fully in all activities and discussions.
- Share your thoughts and ideas openly and honestly.
- Encourage and support others to contribute.

Maintain confidentiality

- Respect the privacy of your fellow participants.
- Do not share personal stories or information outside of the workshop.

Embrace creativity and playfulness

- Approach activities with an open mind and a willingness to try new things.
- Encourage a playful and creative atmosphere.

Keep an open mind

- Be willing to explore new concepts and challenge your own assumptions.
- Accept that there may be multiple valid perspectives.

RULES

RESEARCH

In my workshop, I am committed to upholding the highest ethical standards to ensure a respectful, safe, and productive environment for all participants. Below are the key ethical principles and guidelines I will follow:

Informed consent

- **Transparency:** All participants will be fully informed about the purpose, scope, and potential outcomes of the workshop before they consent to participate.
- **Voluntary Participation:** Participation is entirely voluntary, and participants can withdraw at any time without any negative consequences.

Confidentiality

- **Privacy Protection:** Personal information and any sensitive data shared during the workshop will be kept confidential. I will use anonymized data and pseudo names in any reports or publications resulting from this research.
- **Secure Data Handling:** All data collected will be securely stored and only accessible to the research team.

Transparency and honesty

- **Clear Communication:** I will maintain open and honest communication with participants about the workshop's goals, procedures, and any potential risks.
- **Honest Reporting:** Findings and results will be reported honestly and accurately, ensuring that the research reflects the true experiences and insights of the participants.
- **Results communication:** All results and findings that are extracted from the research will be shared with the participants.

ETHICS

THANK YOU

Dear Participants,

I want to express my heartfelt gratitude for your willingness to participate in my “design for play to support cognitive load management in young adults” participatory design workshop.

Your willingness to share your time, experiences, and insights is invaluable to this research. Your contributions will be the cornerstone of this study, helping me explore the challenges you face and identify meaningful design interventions to support your mental wellbeing.

I appreciate your openness and collaboration in this journey. Your unique perspectives will not only enrich the research but also contribute to creating a supportive and engaging environment for everyone involved.

Thank you for your commitment and enthusiasm. I look forward to working with you and learning from your valuable input.

Warm regards,
Julia

THANK YOU

Figure 66: Co-design workshop one introduction and guide

Source: created by author



Figure 67: Conversation starter prompt cards

Source: created by author

Table 26: interview structure and guide

Source: author created table

Section	Time	Description
Introduction and consent	10 minutes	Introduction, purpose of interview, consent
Professional background	20 minutes	Understanding key informants background, context and experience
Theme reflection	30 minutes	Discussion of relevant themes from the first workshop
Exploring play	20 minutes	The role of play in wellbeing and possible interventions
Closing and final reflections	10 minutes	Wrap up, additional comments, wrap up

Table 27: Interview questions and prompts

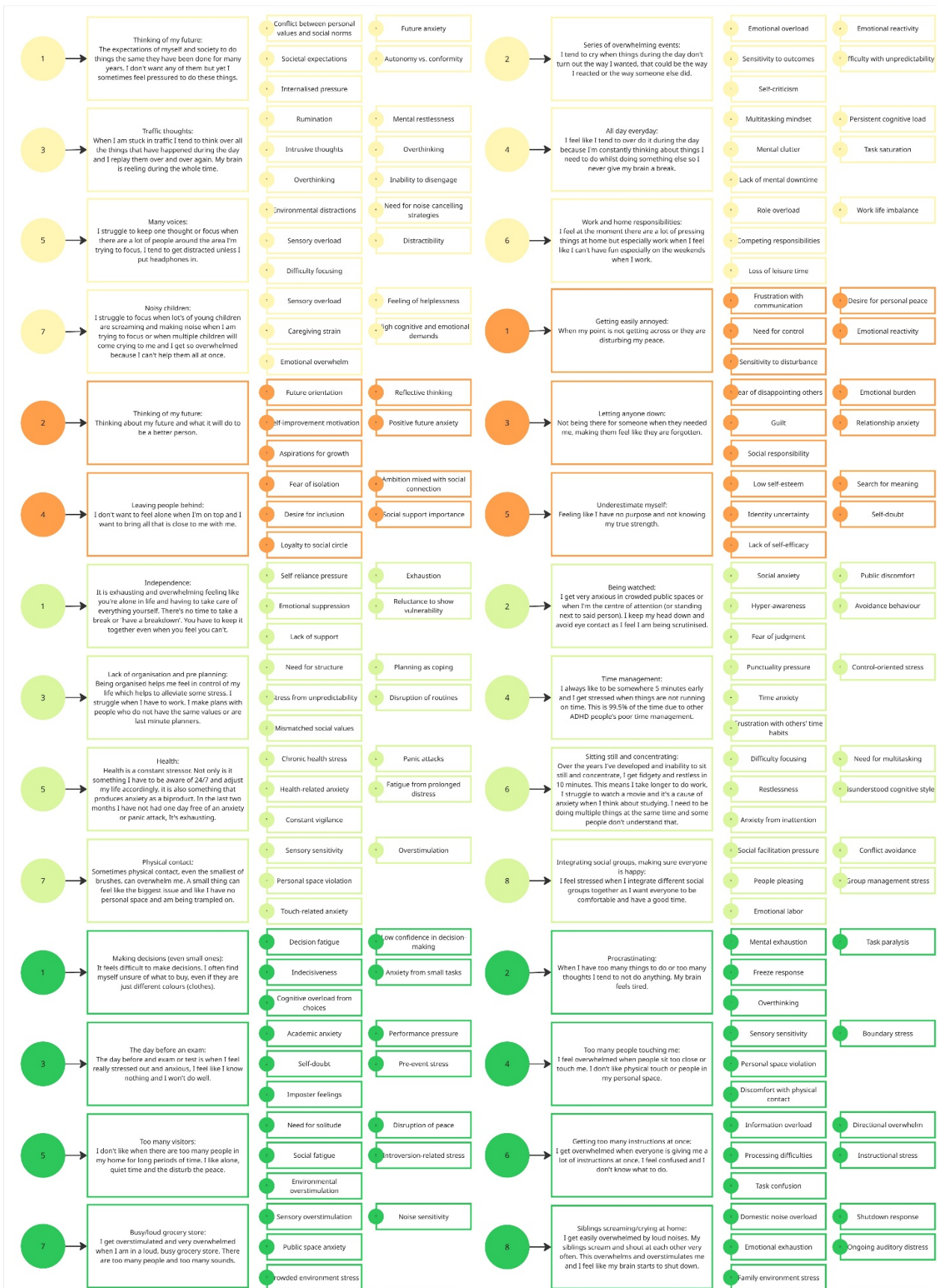
Source: author created table

Introduction and consent
• Introduce research topic, aims and objectives • Present key informant with consent form
Professional background
• Can you tell me about your background and the work you do? • What demographic do you usually work with? • What kind of challenges do the people you work with typically face in terms of cognitive overload or day to day stress? • What kinds of coping mechanisms (healthy or unhealthy) do people tend to use when they feel overwhelmed? • How do you support or guide people towards healthier coping strategies? • What kinds of resources or interventions have been helpful?
Theme reflection
• Do these challenges resonate with what you have seen in your own work? • Are there gaps or nuances that you think are missing in these findings? • Which issues seem the hardest to address using conventional tools? • How do you see people navigating these types of challenges in daily life?
Exploring play
• Have you ever used play, creativity or physical activity as part of your support work? • What role do you think play could have in helping people cope with overwhelm? • What might play look like for young adults that don't see themselves as playful? • What barriers do people have when it comes to engaging in playful experiences? • Do you know of any interventions, tools or spaces that use play to support cognitive regulation? • If you were to imagine a playful intervention for overwhelmed young adults, what might it look like?
Closing and final reflections
• Is there anything you think I should be paying more attention to as I move toward my second workshop? • Would you be interested in seeing the outcomes of this project?

P1	Thinking of my future: The expectations of myself and society is to do the same thing have been there for many years. I don't want any of them but yet I sometimes feel pressured to do those things.	Series of overwhelming events: I tend to cry when things during the day don't turn out the way I wanted. That could be the way I focus or the way someone else did.	Self's thought: When I am sick or in pain, I tend to think over all the things that have happened during the day and I replay them over and over again. My brain is racing during the whole time.	All day everything: I feel like I need to do so during the day because I'm constantly thinking about things I need to do while doing something else so I never give my brain a break.	Many values: I struggle to keep one thought or focus when there are a lot of people around me and I'm trying to focus. I tend to get distracted unless I put headphones on.	Work and home responsibilities: I feel at the moment there are a lot of pressing things at home but especially work when I feel like I can't have fun especially on the weekends when I want.	Many children: I struggle to focus when I have a young children are screaming and making noise when I'm trying to focus or when multiple children will come crying to me and I get so overwhelmed because I can't help them all at once.	
P2	Getting easily annoyed: When my point is not getting across or they are disrupting my peace.	Thinking of my future: Thinking about my future and what it will do to be a better person.	Letting someone down: Not being there for someone when they needed me, making them feel like they are forgotten.	Leaving people behind: I don't want to lose anyone when I'm on top and I want to bring all that is close to me with me.	Understanding myself: Feeling like I have no purpose and not knowing my true strength.			
P3	Indifferent: It is exhausting and overwhelming feeling like you're alone in life and having to take care of everything yourself. There's no time to take a break or "have a moment". You have to keep it together even when you feel you can't.	Being excited: I get very anxious in crowded public spaces or when I'm the center of attention for something week to week person. I keep my head down and avoid eye contact as I feel I am being scrutinized.	Lack of organization and planning: Being organized helps me not be overwhelmed by the things that happen to me. I struggle when I have a week to week person. I keep my head down and avoid eye contact as I feel I am being scrutinized.	"Two managers": I always like to be somewhere 5 minutes early and I am stressed when things are not coming on time. This is 99.9% of the time due to other ADHD people's poor time management.	Health: Health is a constant concern how easy it is something I have to be aware of 24/7 and adjust my life accordingly. It is also something that produces anxiety in a moment. In the last two months I have had the day time of a anxiety or panic attack. It's debilitating.	Being still and concentrating: Over the years I've developed and ability to sit still and concentrate. I get fidgety and restless in my thoughts. This means I can't sit still to do work I struggle to watch a movie and it's a waste of money when I think about it sitting I want to be doing multiple things at the same time and some people don't understand that.	Physical recovery: Sometimes physical contact, even the smallest of hugs, can overwhelm me. A small hug can feel like the biggest hug and like I have to personally space and am being trapped in it.	Integrating social groups, making sure everyone is happy: I feel awkward when I integrate different social groups together as I want everyone to be comfortable and have a good time.
P4	Missing decisions seem small ones: I feel difficult to make decisions. I often find myself "are we of value to buy, even if they are just different colors or textures?	Instant regret: When I have too many things to do or too many thoughts I tend to not do anything. My brain tells me I can't.	The day before an exam: The day before an exam is the worst. I feel like I can't do anything. I feel like I can't do anything. I feel like I can't do anything.	Too many people touching me: I feel overwhelmed when someone is touching me or when I am touched. I feel like I can't do anything. I feel like I can't do anything.	Too many visitors: I don't like when there are too many people in my house for long periods of time. I like alone quiet time and the silence of the house.	Getting too many instructions at once: I get overwhelmed when someone is giving me a lot of instructions at once. I feel confused and I don't know what to do.	Rutted-out grocery stores: I get overwhelmed when someone is giving me a lot of instructions at once. I feel confused and I don't know what to do.	Subliminal commercials at home: I can't really understand what they are saying. My senses are overwhelmed by loud noises. My senses are overwhelmed by loud noises. My senses are overwhelmed by loud noises.
P5	Feeling overwhelmed: Feeling overwhelmed by everything that is going on in my life. I feel like I can't do anything right.	Dealing with emotions: I struggle dealing with negative emotions. As well as I feel those negative emotions very strongly. I struggle to identify those emotions.	Overthinking: Thinking too much about everything. I feel like I can't do anything. I feel like I can't do anything.	When something is not done in the correct order or way: When I am doing something I feel like I can't do anything. I feel like I can't do anything.	Unwanted touching: I don't like when I am being touched for long periods of time. I feel like I can't do anything.	Getting annoyed when people don't understand as I do as I feel: When I am doing something I feel like I can't do anything. I feel like I can't do anything.	Showering expectations: When I am doing something I feel like I can't do anything. I feel like I can't do anything.	When I don't understand something and nobody else understands it: When I don't understand something and nobody else understands it, I feel like I can't do anything.
P6	When I feel guilty: I feel guilty when I think about my past and I feel guilty about it. I feel like I can't do anything.	When I want to cry: When I think about my mother and I feel like I want to cry. I feel like I can't do anything.	When I think about my mother and I feel like I want to cry. I feel like I can't do anything.	When I think about my mother and I feel like I want to cry. I feel like I can't do anything.	When I think about my mother and I feel like I want to cry. I feel like I can't do anything.	When I think about my mother and I feel like I want to cry. I feel like I can't do anything.	When I think about my mother and I feel like I want to cry. I feel like I can't do anything.	When I think about my mother and I feel like I want to cry. I feel like I can't do anything.
P7	Job searching: The search for a satisfying job is so stressful and I feel like I can't do anything. I feel like I can't do anything.	Intergenerational difficulties: Trying to make contact is so difficult and requires a lot of work and attention which can become very stressful and overwhelming for me.	A day in the future: Thinking in 48 degree heat and on my period feeling it all at once. It's so stressful and overwhelming. I feel like I can't do anything.	When I think about my mother and I feel like I want to cry. I feel like I can't do anything.	When I think about my mother and I feel like I want to cry. I feel like I can't do anything.	When I think about my mother and I feel like I want to cry. I feel like I can't do anything.	When I think about my mother and I feel like I want to cry. I feel like I can't do anything.	When I think about my mother and I feel like I want to cry. I feel like I can't do anything.
P8	Overthinking: When I was younger my dad always called me fat and all today I'm fat and I feel like I can't do anything.	Being by myself: I always need to be with someone. I can never be alone because I can't stand being by myself.	Living with pain: When I'm sick, the pain of my teeth. I get overwhelmed because I know there is going to be a hospital visit for it. I feel like I can't do anything.	People hounding on me: When there are too many people on me when I am talking, I feel like I can't do anything.	The brain: When the above and not doing anything my brain starts to then starts everything from the past but I never want and when I thought that I might lose the person, it's like.	When things are on my table: When things are on my table and I'm not doing anything and I'm not doing anything and I'm not doing anything.	When I can't have fun and I'm not doing anything and I'm not doing anything and I'm not doing anything.	When I can't have fun and I'm not doing anything and I'm not doing anything and I'm not doing anything.

Figure 68: Complete restructuring issue cards by participant origin and assigned colour

Source: Miro screenshot by author, 2025



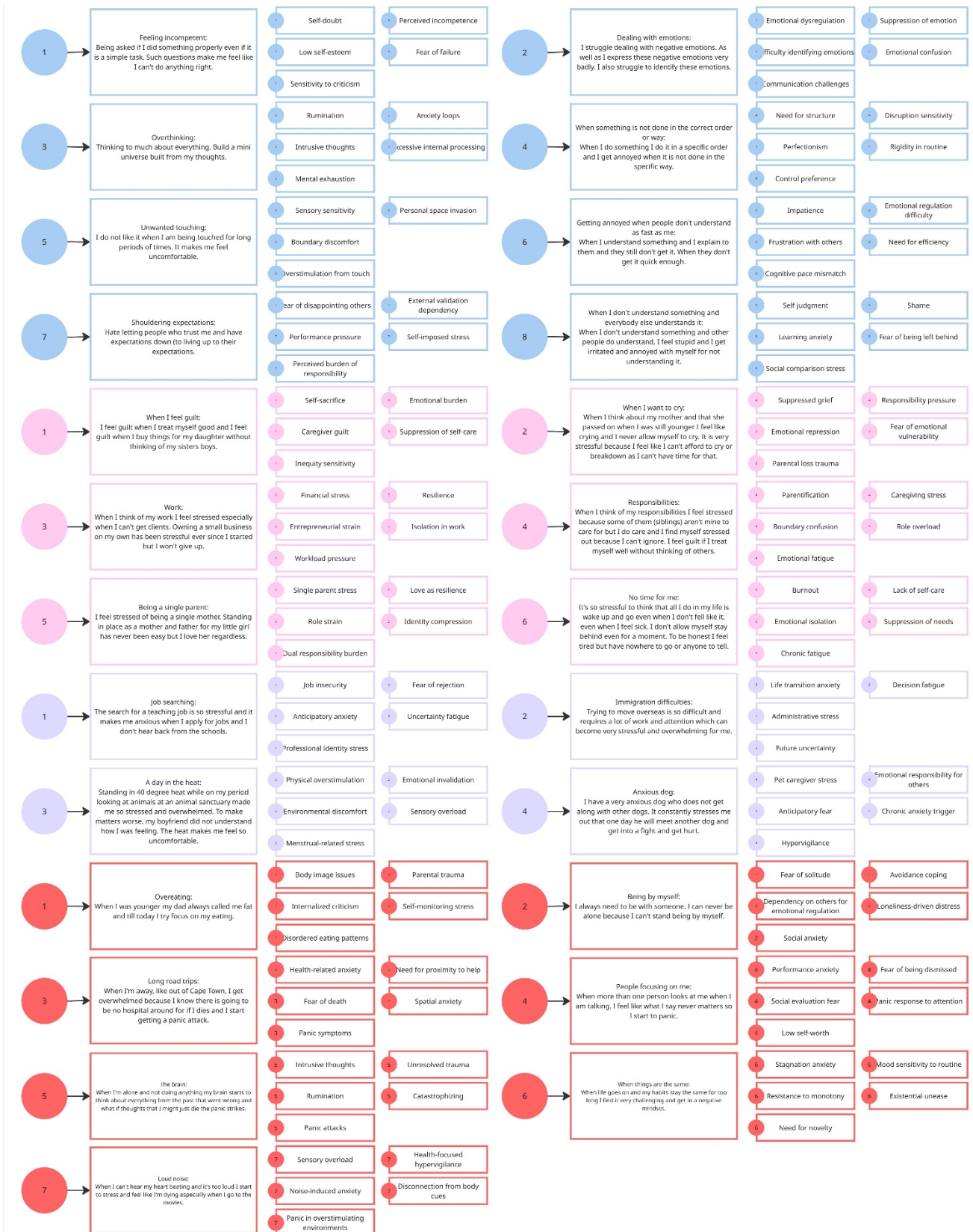


Figure 69: Complete coding, and numbering for data traceability

Source: Miro screenshot by author, 2025

Identity and self-perception

- 5 Self-doubt
- 1 Self-doubt
- 5 Low self-esteem
- 1 Low self-esteem
- 1 Body image issues
- 5 Lack of self-efficacy
- 5 Identity compression
- 5 Identity uncertainty
- 2 Fear of judgment
- 7 External validation dependency
- 2 Self-criticism
- 8 Self-judgment
- 8 Shame
- 6 Misunderstood cognitive style
- 1 Self-reliance pressure
- 1 Perceived incompetence
- 1 Fear of rejection
- 5 Introversion-related stress
- 3 Imposter feelings
- 1 Internalized criticism
- 1 Self-sacrifice
- 1 Sensitivity to criticism
- 3 Low confidence in decision-making
- 2 Reflective thinking
- 4 Low self-worth
- 7 Self-imposed stress
- 5 Love as resilience
- 3 Guilt
- 1 Conflict between personal values and social norms
- 1 Societal expectations
- 3 Self-doubt
- 1 Inequity sensitivity

Emotional regulation and overload

- 2 Emotional dysregulation
- 2 Emotional repression
- 1 Emotional suppression
- 2 Emotional confusion
- 8 Emotional labor
- 1 Emotional burden
- 3 Emotional invalidation
- 7 Emotional overwhelm
- 5 Emotional exhaustion
- 4 Emotional fatigue
- 2 Suppressed grief
- 5 Panic attacks
- 5 Panic attacks
- 4 Panic response to attention
- 3 Overthinking
- 3 Overthinking
- 5 Intrusive thoughts
- 4 Mental clutter
- 3 Mental restlessness
- 2 Mental exhaustion
- 1 Anticipatory anxiety
- 2 Freeze response
- 3 Anxiety loops
- 1 Emotional reactivity
- 3 Intrusive thoughts
- 2 Suppression of emotion
- 2 Emotional overload
- 2 Difficulty identifying emotions
- 6 Emotional regulation difficulty
- 4 Chronic anxiety trigger
- 5 Fatigue from prolonged distress
- 3 Panic symptoms
- 7 Panic in overstimulating environments
- 6 Stagnation anxiety
- 7 Feeling of helplessness
- 6 Emotional isolation
- 3 Emotional burden
- 2 Fear of emotional vulnerability
- 2 Emotional reactivity
- 5 Shutdown response

Social and relational stress

- 2 Social anxiety
- 4 Social evaluation fear
- 5 Social fatigue
- 3 Fear of disappointing others
- 8 People-pleasing
- 3 Relationship anxiety
- 4 Desire for inclusion
- 8 Conflict avoidance
- 3 Mismatched social values
- 4 Loyalty to social circle
- 4 Fear of being dismissed
- 2 Communication challenges
- 2 Fear of judgment
- 1 Fear of rejection
- 2 Social anxiety
- 1 Lack of support
- 1 Frustration with communication
- 1 Reluctance to show vulnerability
- 6 Frustration with others
- 4 Frustration with others' time habits
- 4 Boundary confusion
- 2 Public discomfort
- 7 Fear of disappointing others
- 4 Social support importance
- 7 Perceived burden of responsibility
- 3 Need for proximity to help
- 8 Social facilitation pressure
- 3 Resilience
- 3 Excessive internal processing
- 8 Social comparison stress

Cognitive load and executive function

- 1 Decision fatigue
- 5 Difficulty focusing
- 6 Difficulty focusing
- 5 Distractibility
- 3 Planning as coping
- 2 Task paralysis
- 6 Task confusion
- 4 Task saturation
- 6 Competing responsibilities
- 1 Cognitive overload from choices
- 4 Persistent cognitive load
- 6 Need for multitasking
- 4 Multitasking mindset
- 6 Directional overwhelm
- 3 Pre-event stress
- 6 Instructional stress
- 2 Mental exhaustion
- 3 Mental restlessness
- 1 Indecisiveness
- 2 Decision fatigue
- 1 Self-monitoring stress
- 6 Processing difficulties
- 2 Avoidance coping
- 2 Avoidance behaviour
- 8 Learning anxiety
- 6 Burnout
- 6 Lack of self-care
- 6 Restlessness
- 6 Cognitive pace mismatch
- 6 Information overload
- 6 Work-life imbalance
- 6 Chronic fatigue
- 4 Lack of mental downtime
- 7 High cognitive and emotional demands
- 3 Mental exhaustion
- 1 Uncertainty fatigue

Sensory and environmental overwhelm

- 7 Sensory overload
- 3 Sensory overload
- 5 Sensory overload
- 7 Sensory overload
- 7 Sensory overstimulation
- 7 Noise sensitivity
- 7 Noise-induced anxiety
- 8 Domestic noise overload
- 7 Environmental overstimulation
- 3 Environmental discomfort
- 7 Overstimulation
- 8 Ongoing auditory distress
- 5 Overstimulation from touch
- 7 Touch-related anxiety
- 4 Discomfort with physical contact
- 6 Personal space violation
- 7 Crowded environment stress
- 5 Need for noise-cancelling strategies
- 3 Spatial anxiety
- 5 Environmental distractions
- 3 Physical overstimulation
- 7 Sensory sensitivity
- 5 Personal space invasion
- 7 Personal space violation
- 6 Anxiety from inattention
- 6 Mood sensitivity to routine
- 7 Public space anxiety
- 4 Sensory sensitivity
- 5 Need for solitude
- 5 Boundary discomfort
- 5 Disruption of peace
- 5 Sensory sensitivity

Stress from responsibilities and roles

- 1 Caregiver guilt
- 7 Responsibility pressure
- 5 Single parent stress
- 4 Parentification
- 4 Emotional responsibility for others
- 5 Dual responsibility burden
- 4 Role overload
- 5 Role strain
- 3 Social responsibility
- 3 Workload pressure
- 4 Caregiving stress
- 7 Caregiving strain
- 1 Professional identity stress
- 3 Entrepreneurial strain
- 1 Parental trauma
- 6 Loss of leisure time
- 6 Suppression of needs
- 1 Job insecurity
- 6 Role overload
- 5 Boundary stress
- 4 Pet caregiver stress
- 8 Family environment stress
- 8 Group management stress
- 3 Financial stress
- 1 Exhaustion
- 6 Impatience

Trauma and past experience

- 2 Parental loss trauma
- 3 Isolation in work
- 2 Dependency on others for emotional regulation
- 7 Disconnection from body cues
- 4 Disruption sensitivity
- 2 Suppressed grief
- 5 Unresolved trauma
- 5 Chronic health stress
- 7 Health-focused hypervigilance
- 3 Disordered eating patterns
- 2 Loneliness-driven distress
- 2 Sensitivity to outcomes
- 3 Menstrual-related stress

Anxiety and anticipation

- 2 Positive future anxiety
- 1 Future anxiety
- 2 Life transition anxiety
- 2 Fear of solitude
- 5 Health-related anxiety
- 3 Health-related anxiety
- 3 Fear of death
- 6 Existential unease
- 2 Future uncertainty
- 5 Catastrophizing
- 8 Fear of being left behind
- 4 Anticipatory fear
- 2 Future orientation
- 3 Stress from unpredictability
- 4 Fear of isolation
- 5 Search for meaning
- 4 Time anxiety
- 4 Punctuality pressure
- 3 Anxiety from small tasks
- 3 Intrusive thoughts
- 5 Rumination
- 3 Rumination
- 3 Rumination
- 5 Performance anxiety

Control, structure and routine

- 1 Need for control
- 3 Need for structure
- 4 Control preference
- 6 Resistance to monotony
- 4 Rigidity in routine
- 4 Hypervigilance
- 5 Constant vigilance
- 2 Administrative stress
- 3 Inability to disengage
- 6 Suppression of needs
- 3 Planning as coping
- 4 Control-oriented stress
- 4 Need for structure
- 3 Disruption of routines
- 2 Hyper-awareness
- 2 Difficulty with unpredictability
- 1 Suppression of self-care
- 6 Need for efficiency

Ambition, growth and self-expectations

- 2 Aspirations for growth
- 4 Perfectionism
- 7 Performance pressure
- 4 Ambition mixed with social connection
- 1 Fear of failure
- 5 Academic anxiety
- 5 Need for novelty
- 1 Desire for personal peace
- 1 Autonomy vs. conformity
- 5 Self-doubt
- 2 Self-improvement motivation
- 5 Performance pressure
- 1 Internalised pressure
- 1 Sensitivity to disturbance

Figure 70: Complete clustering of codes to reveal thematic patterns and participant diversity

Source: Miro screenshot by author, 2025

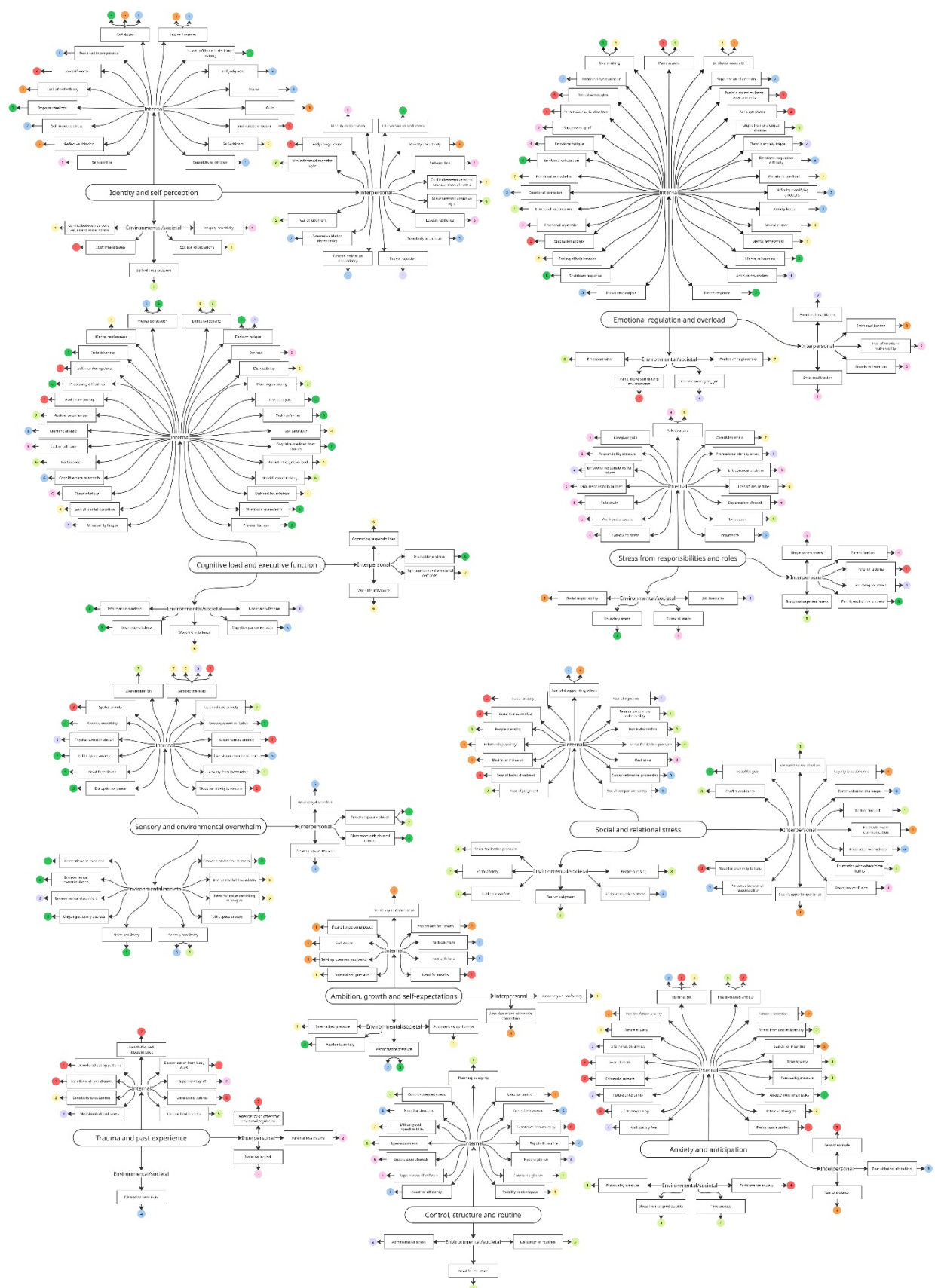


Figure 71: Complete organising clustered codes within the three domains

Source: Miro screenshot by author, 2025

Source: Miro screenshot by author, 2025

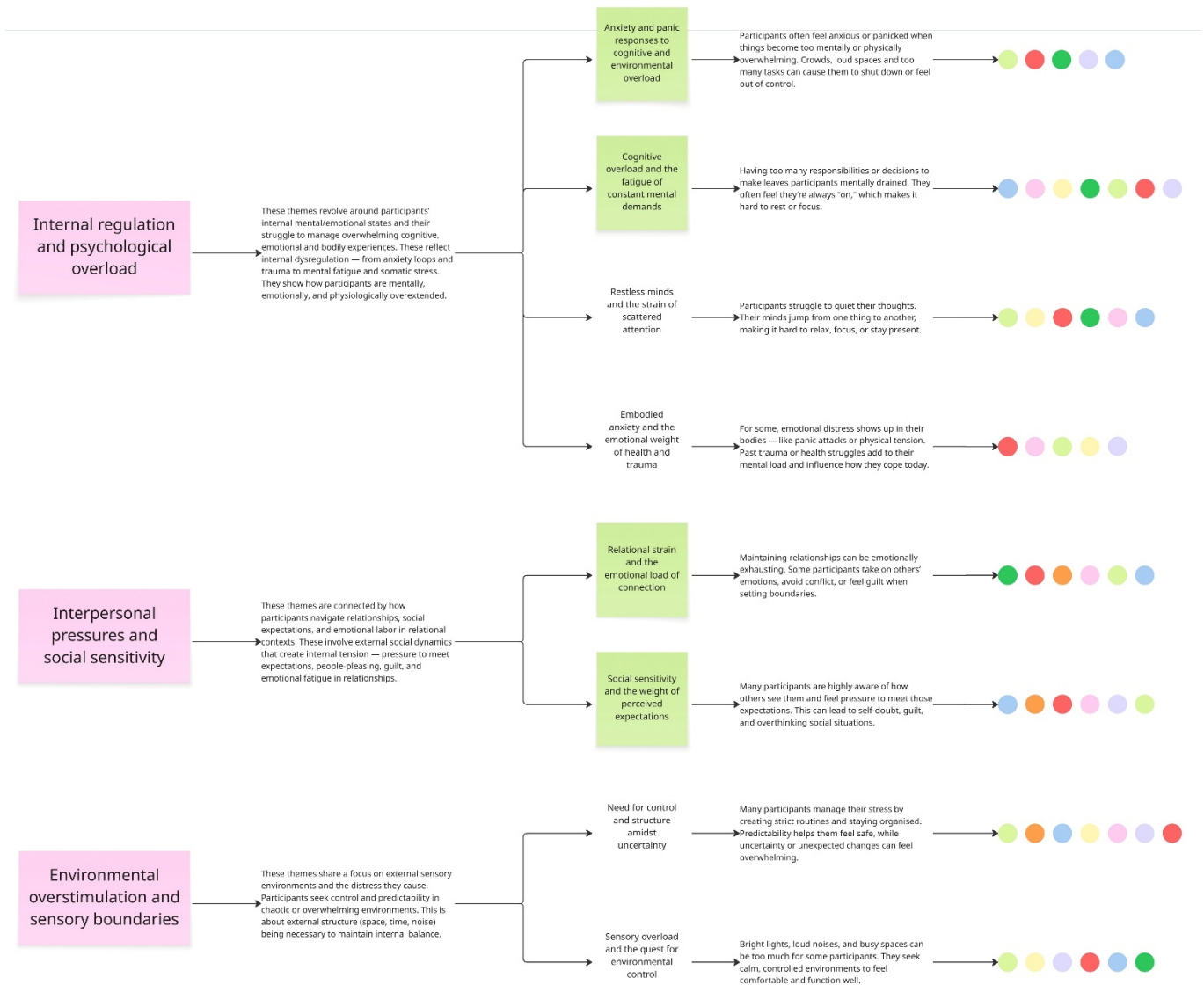


Figure 74: Complete final thematic grouping (8 key themes) aligned with intrapersonal, interpersonal and extra personal domains

Source: Miro screenshot by author, 2025

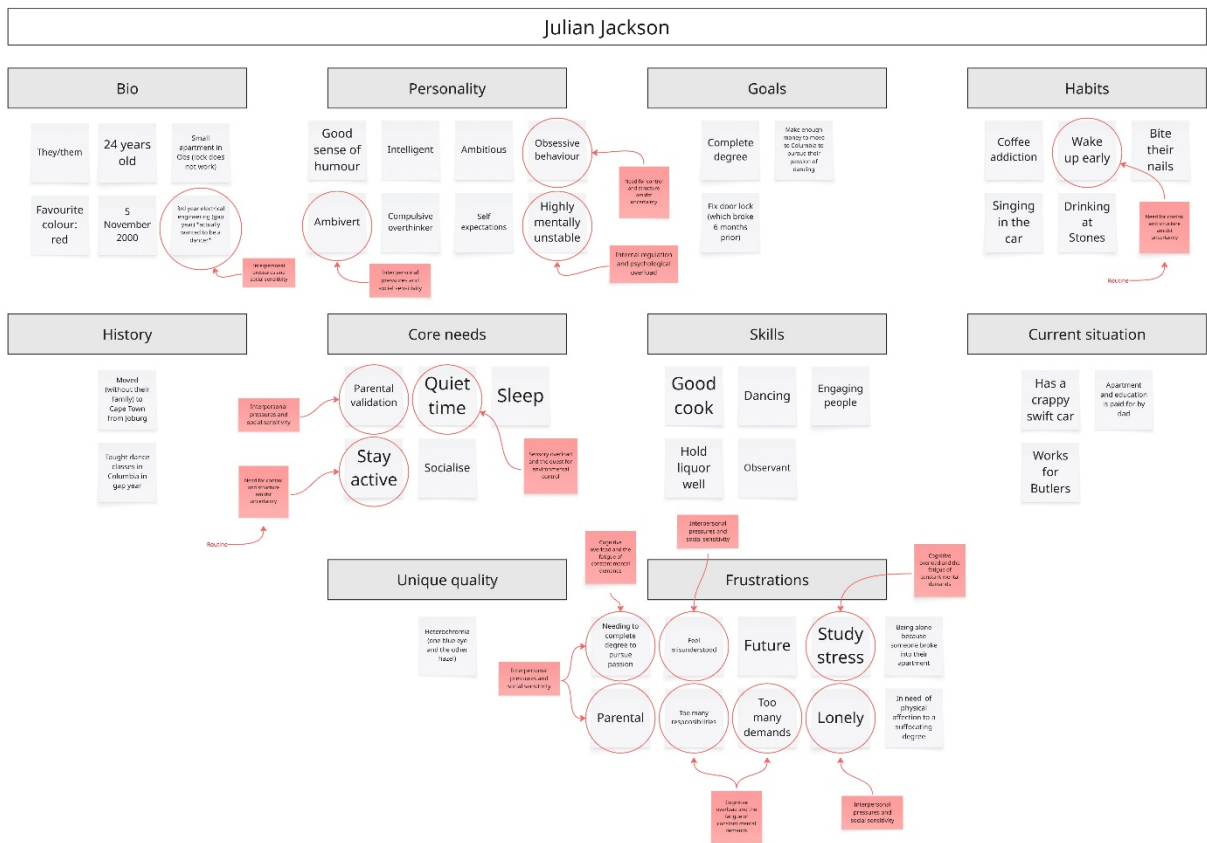


Figure 75: Complete deductive validation using the persona ("JJ")

Source: Miro screenshot by author, 2025

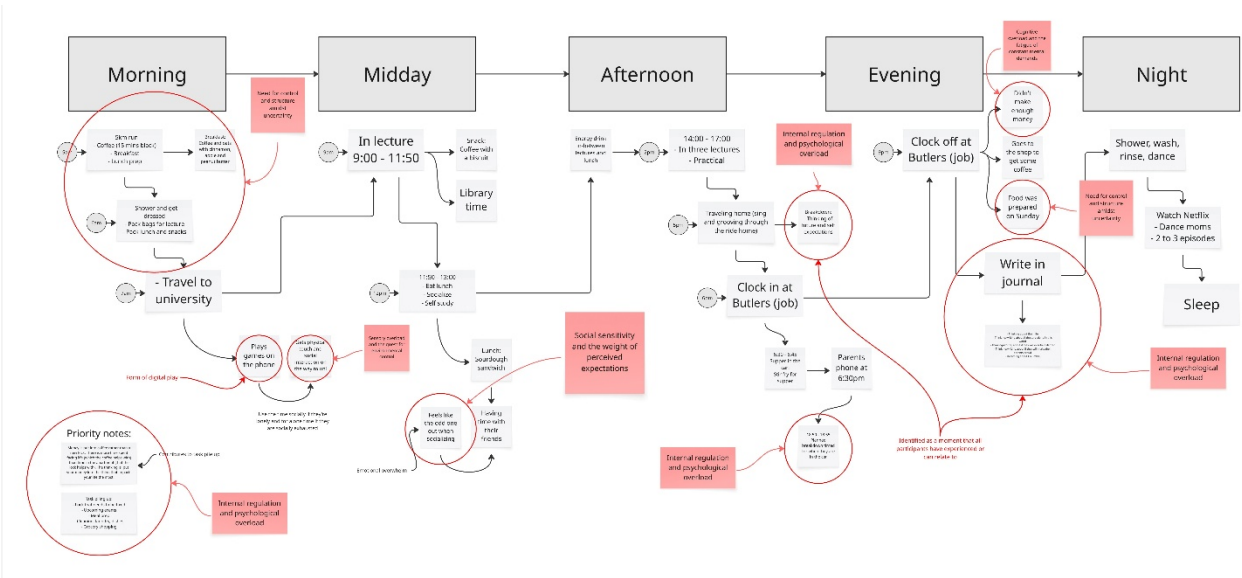


Figure 76: Complete deductive validation using day-in-the-life

Source: Miro screenshot by author, 2025

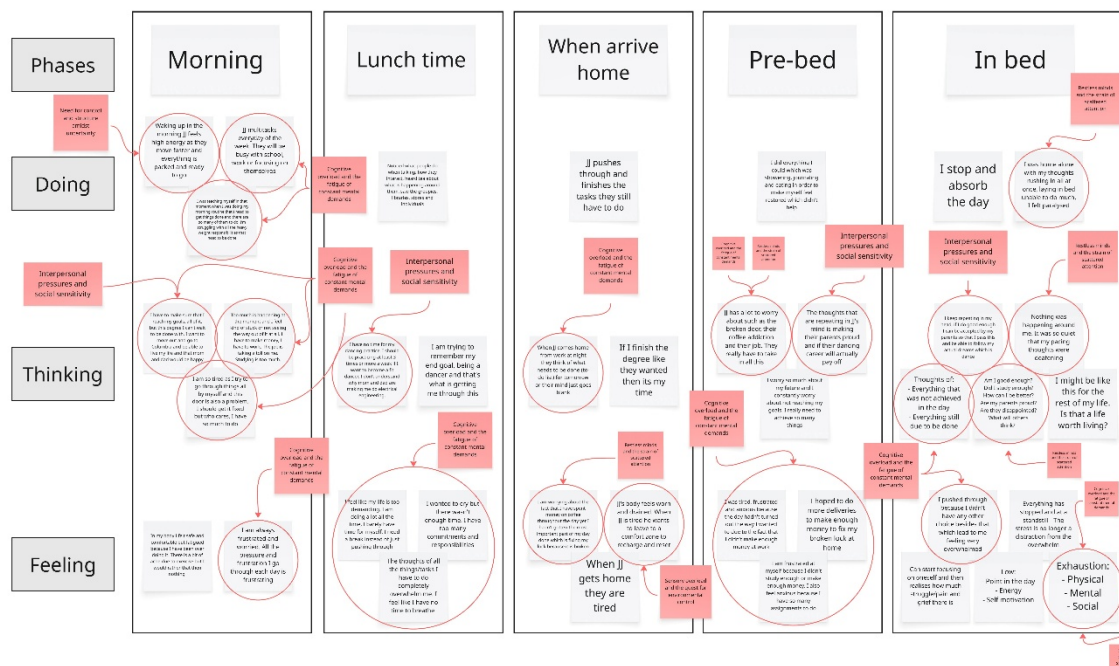


Figure 77: Complete deductive validation using As-Is Scenario Map

Source: Miro screenshot by author, 2025

Table 28: Complete code list of deductive analysis of interview data

Source: author created table

Code	Description	KI	Quote
Tools and support	Professional strategies used to help clients manage overload.	KI1	"And so I encourage people to meditate"
			"And so I turned it into a programme I shared with patients called Shimmer. And each letter stands for something that I now say to my patients, do this. These are the things that were helpful"
			"And so if I had a little chart, every day I would tick which of those I got right. And when I was severely depressed, I had low expectations of myself. And so if on any day I got four out of those seven, I considered that like gold star"
			"Self-care"
			"Hydration"
			"Inspiration or intention"
			"Meditation"
			"Move your body"
			"Eating right"
			"Rest"
		KI2	"I recommend creativity and then remind people that we're all creative. We're just told that we're not. And whether you are crocheting or knitting or sewing or designing a board game or if you're painting or if you're singing, if you're doing something where you are making something, that's a life force, that's creativity"
			"Teaching them about self-awareness and being present and actually finding balance"
			"I do a bit of mindfulness breathing exercises, journaling, teaching them how to journal, journaling between themselves and their

			parents so they're right to each other. Just giving themselves space and time on their own" "I mean, I do, for example, I do a photographic exercise with them, where they do use a phone because you can't take a phone away. But I use it in a better way where they go out and they take photographs of what's meaningful to them. So say they're sitting and they see that candle, they take a picture of it, there's a reason why that's meaningful. And they discuss it and they keep it to the side, but they use it, they keep it so that later when they want that feeling, they can go back to it. And it offers a different message to just snap, snap, snap a picture because you want to put it on Facebook or on Instagram. It's more about what does that do for you? And that is, for me, I think that's a bit of play and creativity because together it creates and I ask them why is it meaningful? What emotion comes up for you when you see the picture? And, you know, how did you feel? And all these kinds of things. And then collectively it puts them in a picture of how, what is the message that comes through from this exercise? Is that I'm feeling like, what would they say? I've done so many of them. They would kind of go, well, I'm unhappy. Or, I need family. I need friends. I need connection. So they're learning through the play about what their needs might be as opposed to not exploring it. So I do believe that play is vital. It is just, I mean, even if you had to look at my website, I've got their play. I used to do drawings with them and that kind of shifted a little bit. But always looking for an alternative to just talking and physically doing something. Because remember, with coaching, it's about a result base. If something changes, they want something tangible. So with your design or play, there's something to show for how you're feeling"
Coping mechanism	The natural coping mechanisms that people tend to turn to, healthy or unhealthy.	KI1	"Emotional numbing"
			"So you feel you can't cope and then you just sit on your phone or you binge watch TV"
			"Substances, so alcohol again for the numbing, any of a plethora of legal and illegal drugs"
			"There's a theory that depression is evolutionary, and that that is also a coping mechanism, that when you can't anymore, when it's too much, you just shut down, right, like animals hibernate, so I don't think that's a conscious thing, but I think it's an unconscious coping mechanism"
			"I think there are very few people who have sufficient insight into this kind of overwhelming overload who have healthy coping mechanisms, such as taking time off, just stopping, spending time with family and friends, socialising, meditating, moving your body"
			The greatest is losing yourself in something else, whether that is Netflix, whether that is food, whether that is even pornography or sex, it is often just an escape from it, and the problem is that that then compounds the problem, as opposed to helps the problem"
			"So the healthy escapes don't seem to be where people go to. The healthy coping mechanisms, those are things that often I have to bring up and that we work at"
			Acknowledgement normalises it, and it makes it safer, and that in itself is coping"
			"So if people are kind of losing themselves in the work or like overcompensating and that's making it worse, if there's a sympathy that you find when you're vulnerable and honest, then it's easier to

			allow yourself to be vulnerable and honest in other social circles and so get more support"
			"But now weed has sort of taken over from that. And it's a normal thing. I think it's for themselves to bring themselves down to some level of calm"
		KI2	"Cell phone"
			"But the procrastination is very high. Everyone's procrastinating because it's too hard, don't know how to do it. You don't know where to start"
Signs of overload	Emotional, physical or cognitive signs of overload.	KI1	"The obvious ones are people being quite emotionally dysregulated"
			"Becoming anxious, irritable very easily, being quite impulsive, struggling to focus on tasks"
			"I think ADHD is a very real diagnosis and the real biology. But I also think there's a massive increase in the number of people who are being called ADHD. And I'm not convinced all of them are. I think some of them may be casualties of the age of information. So, you're unable to focus"
			"And I see lots of people getting burnt out. So, I can't imagine that at 17, you should be so stressed that you are totally burnt out from life. So, I see young people being burnt out, which for me is an indication of total overload"
			"I think I see the symptoms that I generally will pick up is any kind of emotional dysregulation and distractibility"
			"And people can't relax. They always have to be doing something, which is why people are quite like puzzled"
			"And maybe you brought it up when you talked about the anxiety and the sense of panic. And I see this often in young, or I've seen it often in young people, is that this degree of increased demand and overwhelm and then the inability of the difficulty saying this is too much often leads young people to become despondent and hopeless"
		KI2	"Body attacks"
			"Not sleeping"
			"Not being able to self-regulate"
Social isolation	Feeling alone in struggles and hiding difficulties from others.	KI1	"Crying"
			"I also see people, instead of connecting face-to-face, are connecting digitally"
			"I've got some people that don't know how to talk to each other"
			"They're like social, just ordinary social intelligences. I think at least, yeah. If I noticed that, I noticed people don't play anymore"
			"Social interaction is crucial for wellbeing as humans. That's how we regulate"
			"It's been very, it's lovely that we can connect with people all over the world on WhatsApp or on Facebook or whatever. But it's an energetic exchange that when you are with another human being and you can make eye contact and you can feel seen and witnessed, that is incredibly helpful"
		KI2	"The one person, just whoever this person is, doesn't realise that all these people are also going through this. They don't... Or the ones that sit with me, they think they're the only ones that are going through difficult times"
			"They are not interested in other people. They just don't like people. Yeah. They don't want to be around people"

Solution space	Insights that would be important to consider in the solution space.	KI1	"I'm all about the low hanging fruit. If things are not easy, people don't do it"
			"Social interaction is crucial for wellbeing as humans. That's how we regulate"
			"It's been very, it's lovely that we can connect with people all over the world on WhatsApp or on Facebook or whatever. But it's an energetic exchange that when you are with another human being and you can make eye contact and you can feel seen and witnessed, that is incredibly helpful"
			"I mean, we know that trees and plants are in total communication with each other. We know that a tree a thousand kilometres away from another tree has the message relayed to it by the root system like almost instantaneously. And interestingly, they've also found that colour does that. So, even introducing colour into a workplace environment can be therapeutic"
			"Managing to find the calm and decrease stimulation"
			"I think you can actually combine all those things into one. But something that is more kind of, oddly enough, self-focused, but done in community"
			"So in terms of your intervention, like a group intervention, because firstly to be more practical and easy and be more wide reaching, but also to then fulfil that social interaction. And also that you could be modelling behaviour and that they'd be fun and they'd be creativity. And so that could lead to better self-regulation"
			"So interventions around that anxiety or panic, I think would be very useful, particularly because we talked about how social interaction and moving your body and being quiet in the moment would be helpful"
			"Google offices"
			"But yeah, I think there are ways to integrate work and play where they don't have to be so separate"
			"And you asked me earlier about which of those things that I think would be easiest to find an intervention for. And my answer was that I'm not convinced that those things occur in isolation, or that we should address one, that they, that's actually one thing"
		KI2	"I suppose that need for calm is what we're looking for"
			"I mean, I do, for example, I do a photographic exercise with them, where they do use a phone because you can't take a phone away. But I use it in a better way where they go out and they take photographs of what's meaningful to them. So say they're sitting and they see that candle, they take a picture of it, there's a reason why that's meaningful. And they discuss it and they keep it to the side, but they use it, they keep it so that later when they want that feeling, they can go back to it. And it offers a different message to just snap, snap, snap a picture because you want to put it on Facebook or on Instagram. It's more about what does that do for you? And that is, for me, I think that's a bit of play and creativity because together it creates and I ask them why is it meaningful? What emotion comes up for you when you see the picture? And, you know, how did you feel? And all these kinds of things. And then collectively it puts them in a picture of how, what is the message that comes through from this exercise? Is that I'm feeling like, what would they say? I've done so many of them. They would kind of go, well, I'm unhappy. Or, I need family. I need friends. I need connection. So they're learning through the play about what their

			needs might be as opposed to not exploring it. So I do believe that play is vital. It is just, I mean, even if you had to look at my website, I've got their play. I used to do drawings with them and that kind of shifted a little bit. But always looking for an alternative to just talking and physically doing something. Because remember, with coaching, it's about a result base. If something changes, they want something tangible. So with your design or play, there's something to show for how you're feeling"
			"Bridge. You must now how do you interpret the word bridge? And they come up with all these weird and wonderful things but it's coming from them"
			"I almost think that somebody who's 18 to 35 is going to tend to go more to the conventional creative play as opposed to the little ones. The younger ones. So they may very well respond to a number of different kinds of play"
			"But I think it's very personal to them as well as to what they see play to be. But I think they'd be more open to trying the play"
Creativity and play	The role of play and creativity from the POV of key informants.	KI1	"I recommend creativity and then remind people that we're all creative. We're just told that we're not. And whether you are crocheting or knitting or sewing or designing a board game or if you're painting or if you're singing, if you're doing something where you are making something, that's a life force, that's creativity"
			"We're meant to play, so I think playfulness, I think playing and time out and having fun, it's crucial to everyone's wellbeing"
			"A massive role. It's easily accessible. It doesn't have to be expensive"
		KI2	"But by being creative is so valuable because it's about getting what's in your head out"
			"It's about putting stuff out on paper so that you can see reality and feel calm"
			"But I think the calmness comes from the art and act of physically doing something, whether it's a drawing or it's a puzzle or it's a walk or all the different creative things that one can do"
			"And immersing themselves in that and focussing on that, which clears the mind and just kind of gets you thinking about something else"
			"I think it lightens things. Okay. It takes away the seriousness of life to be playful again through creativity, whatever that, play, whatever that might be"
			"It just takes away, there's such a level of deep, dark, like darkness and negativity that if you are playing or you're being creative in some way, it just elevates that and releases that and relieves you"
			"I mean, I do, for example, I do a photographic exercise with them, where they do use a phone because you can't take a phone away. But I use it in a better way where they go out and they take photographs of what's meaningful to them. So say they're sitting and they see that candle, they take a picture of it, there's a reason why that's meaningful. And they discuss it and they keep it to the side, but they use it, they keep it so that later when they want that feeling, they can go back to it. And it offers a different message to just snap, snap, snap a picture because you want to put it on Facebook or on Instagram. It's more about what does that do for you? And that is, for me, I think that's a bit of play and creativity because together it creates and I ask them why is it meaningful? What emotion comes up for you when you see the picture? And,

			you know, how did you feel? And all these kinds of things. And then collectively it puts them in a picture of how, what is the message that comes through from this exercise? Is that I'm feeling like, what would they say? I've done so many of them. They would kind of go, well, I'm unhappy. Or, I need family. I need friends. I need connection. So they're learning through the play about what their needs might be as opposed to not exploring it. So I do believe that play is vital. It is just, I mean, even if you had to look at my website, I've got their play. I used to do drawings with them and that kind of shifted a little bit. But always looking for an alternative to just talking and physically doing something. Because remember, with coaching, it's about a result base. If something changes, they want something tangible. So with your design or play, there's something to show for how you're feeling"
			"I've got these girls beading, crocheting"
			"Crochet. You can see the clothes they are making. I've got one of my girls, she's a matricular, beading. A lot of them want to do puzzles. They are wanting something. Colour by number way"
			"Boys go to games. So they're creative within the game. Yeah"
			"But if boys will then tend to do, then they'll move to sport"
			"Be creative on a surfboard"
			"And go out into the sea. Or they'll go and be adventurous and want to go spearfishing. Or they'll go and explore the underneath. And that's their creative outlet. Or they go swimming"
			"Bridge. You must now how do you interpret the word bridge? And they come up with all these weird and wonderful things but it's coming from them"
Causes of overload	The factors that increase the feeling of overload.	KI1	"Baseline western lifestyle"
			"Symptoms of depression or anxiety"
			"So certainly a total preoccupation with, sorry, with devices. And the problem with that is it's a constant attention demand and it's multiple points of attention. So if you're on your phone and you are, say, playing a game, then there are all these colours and all these noises and all these sounds and all these ads. And if you go onto Google, then one link to the other, to the other, to the other. So there's a really high cognitive demand. So I see that habit all the time"
		KI2	"Cell phone"

Horizon 2 – Opportunity Statements (Solution Space Exploration)

1. Play as a tool for regulation

- o How might we use play as a simple, low-pressure way for young adults to manage stress, panic, and overload in the moment?
 - o What if playful movement, creativity, or humour could act as quick resets during overwhelming situations?
-

2. Safe and stigma-free spaces

- o How might we create safe spaces where adults can engage in play without fear of judgment or embarrassment?
 - o What if play was reframed as a sign of strength and self-care rather than “childish” or “wasting time”?
-

3. Play woven into daily routines

- o How might we make play something that naturally fits into daily life rather than an extra task to add to a busy schedule?
 - o What if playful breaks and micro-moments of fun became part of everyday rituals?
-

4. Sensory-friendly and adaptive design

- o How might we design playful activities that are calming, adaptable, and supportive for people who experience sensory overload?
 - o What if play environments could be adjusted to suit different sensory needs (quiet vs. active, solo vs. group)?
-

5. Play for connection and belonging

- o How might we use play to reduce isolation and strengthen social connections among young adults?
- o What if playful interactions became a way to share empathy and regulate together, instead of facing overload alone?

Figure 78: Prompts based on key informant feedback for 10x10 sketch method activity

Source: created by author

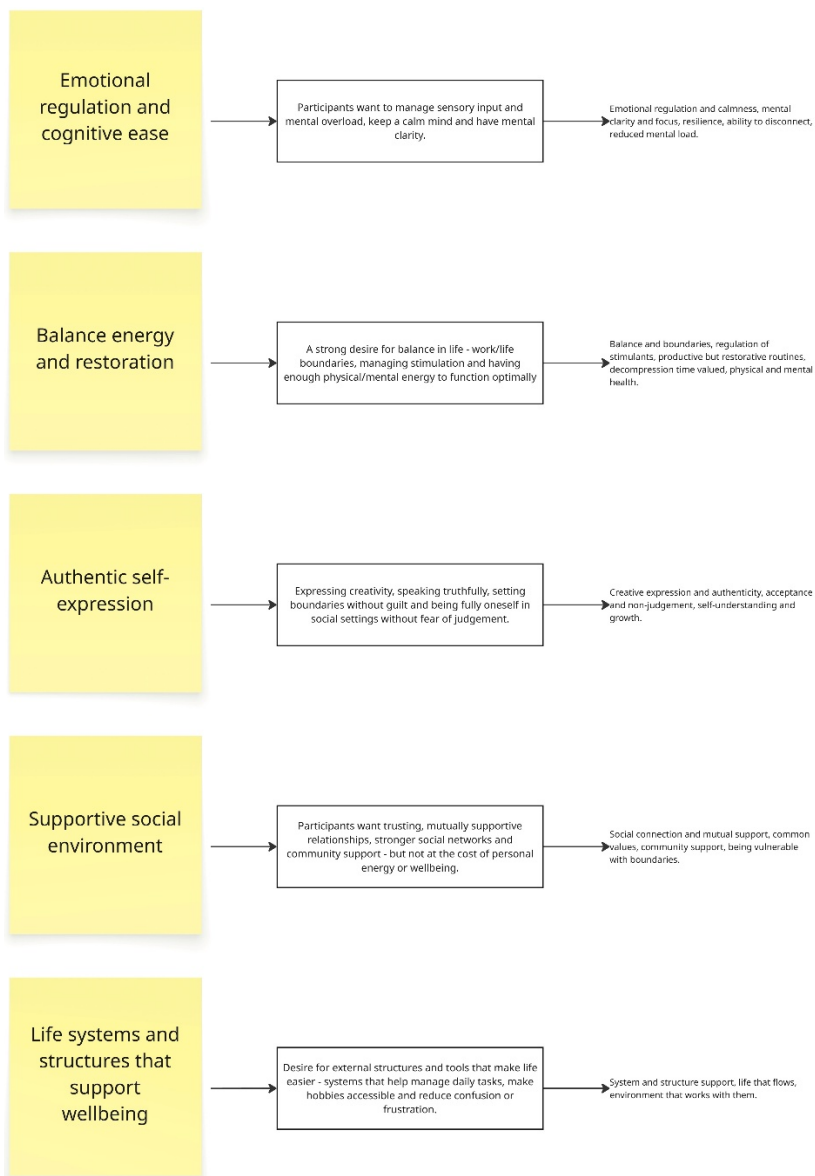


Figure 80: Complete final thematic refinement of participants' desired futures

Source: Miro screenshot by author, 2025

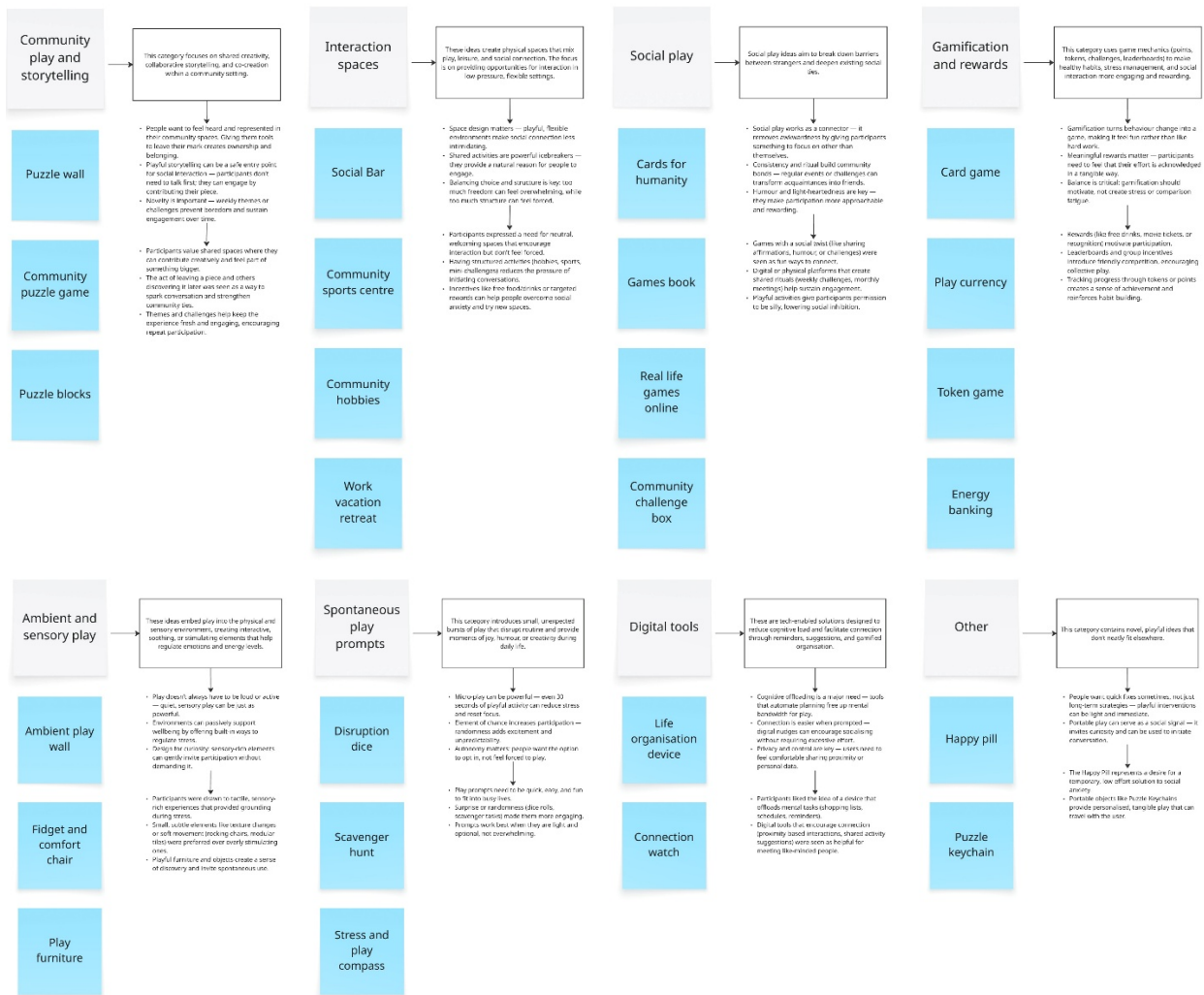


Figure 81: Complete thematic clustering of concepts from rapid ideation and brainwriting and identified implicit desires guiding design intervention

Source: Miro screenshot by author, 2025