Learning of Research Methods in Psychology: The Influence of Affective, Behavioural and Cognitive Factors

Leino, R.

Learning of Research Methods in Psychology: The Influence of Affective, Behavioural and Cognitive Factors

Rosa Katariina Leino

A thesis submitted in partial fulfilment of the requirements of the University of Westminster for the degree of Doctor of Philosophy

September 2021

Abstract

A major part of learning in psychology concerns research methods. Research methods provide a basis to the vast majority of both transferable and subject-specific skills required in a psychology degree, and research methods core modules are required in all British Psychological Society (BPS) accredited psychology courses in the UK. Existing literature acknowledges that university students find courses in research methods particularly challenging. However, most of the research to date has focused on evaluating the outcomes of research methods learning, with few studies addressing the development of research methods learning. In a series of three studies, this thesis applied a holistic approach to explore how *affective, behavioural* and *cognitive* components shape students' research methods learning journeys. As little research has explored the role of affect in the learning of research methods, a particular emphasis on emotions was placed, with the *control-value theory of achievement emotions* (Pekrun, 2019) being at the core of the thesis. Study 1 was a mixed-methods study consisting of two surveys (N=106) and two focus groups (N=7) exploring students' expectations, experiences, and feelings towards research methods at the beginning of their journey. The results suggested that *learning approaches, motivations, self-efficacy,* and a *range of emotions* can have important influences on students' learning processes and supported the need to explore these components together. Study 2 built on these findings and explored students' learning journeys through the research methods curriculum longitudinally across three-time points within two academic years. Drawing on both observational (N=239) and self-reported (N=158) data from the same learning experience, this study examined the influence and development of achievement emotions, learning approaches, motivations, self-regulation, self-efficacy, activity in Virtual Learning Environments (VLEs) and attendance on the learning of research methods. The findings supported the application of the control-value theory, with emotions seen as crucial to learning and *deactivating negative emotions* (boredom and hopelessness) appearing especially detrimental to students' research methods learning trajectories. The study highlighted the usefulness of *VLEs* as a learning tool with online engagement explaining 13% of the variance in research methods grades. Lastly, Study 3 provided deeper qualitative insights into students' learning by interviewing 15 students at the end of their journey, with three learning typologies identified: (1) *Learning by interest and understanding,* (2) *Learning by guidelines and practice*, (3) *Apprehensive Learning Attitude.* This study's results indicated both differences and similarities in psychology students' learning journeys, with students differing in their approach and attitudes while sharing similar struggles. Taken together, this research showed that many affective, cognitive and behavioural variables influence research methods learning journeys. The influence of emotions is highlighted as especially crucial to learning, with the predictive role of VLE engagement and activities also emphasised. This thesis offers proposals on how the literature on achievement emotions and the emerging field of learning analytics (Siemens, 2013) could be combined and applied in higher education. Further recommendations apply to the design of teaching and learning environments that combat specifically deactivating negative emotions and incorporate active learning tools and technologies.

Table of contents

List of Figures:

Chapter 2 Figures:

Chapter 4 Figures:

Chapter 5 figures:

Chapter 6 Figures :

List of Tables:

Chapter 2 Table:

Chapter 4 Tables:

Chapter 5 Tables:

Chapter 6 Tables:

List of Publications and Journal articles:

Parts of this thesis have appeared in the following forms:

Journal Articles:

Leino, R. K., Gardner, M. R., Cartwright, T., & Döring, A. K. (2021). Engagement in a virtual learning environment predicts academic achievement in research methods modules: A longitudinal study combining behavioral and self-reported data. *Scholarship of Teaching and Learning in Psychology.* Advance online publication. https://doi.org/10.1037/stl0000281

Presentations at Scientific Conferences:

Leino, R. K., Döring, A. K., Gardner, M., & Cartwright, T., (2019). Psychology Students' Journey through the Research Methods Curriculum: Insights from One Qualitative and One Longitudinal Study. *European Conference on Educational Research*, Hamburg, Germany.

Leino, R. K., Döring, A. K., Gardner, M., & Cartwright, T., (2018). Psychology Students' Initial Attitudes, Feelings and Expectations towards Research Methods Modules. *European Conference on Educational Research*, Bolzano, Italy.

Leino, R. K., Döring, A. K., Gardner, M., & Cartwright, T., (2018). Psychology Students' Initial Attitudes, Feelings and Expectations towards Research Methods Modules *Division of Academics, Researchers, and Teachers in Psychology Annual Conference*, Birmingham. UK (Poster presentation)

Leino, R. K., Döring, A. K., Gardner, M., & Cartwright, T., (2018). Learning of Research Methods in Psychology -The Influence of Cognitive, Affective and Behavioural Components. *Faculty of Science and Technology Doctoral Conference*. University of Westminster, London, UK.

Leino, R. K., Döring, A. K., Gardner, M., & Cartwright, T., (2018).Psychology Students' Initial Attitudes, Feelings and Expectations towards Research Methods Modules. *Psychology Research Forum*. University of Westminster, London, UK. (Poster presentation)

Acknowledgements:

Firstly, I would like to thank my supervisory team for their invaluable guidance. I have been very lucky to have such a helpful and engaged team. A special thank you to my Director of Studies, Dr Anna Döring, who has been a gracious and supportive mentor throughout my PhD journey. Thank you for boosting my confidence and making me feel better whenever I have doubted myself. A huge thank you also to Dr Mark Gardner for always being at hand to offer his support and expertise, and for stepping up as DoS during Annas leave. Thank you to Dr Tina Cartwright for your encouragement throughout and your invaluable insights on qualitative research.

I would also like to thank all of the students who participated in my studies, without whom there would be no research to speak of. A thank you to all of the psychology department staff who have helped me with the administration of my studies, especially Donna and Mark who kindly let me hijack some time from their lectures/seminars.

An enormous thank you to my PhD friends for listening to me rant and for letting me bounce ideas off them. Thank you to Amy E, Pippa and Zac who started their PhD journey alongside me, and who I have been incredible lucky to have every step of the way. Special thanks also to Amy W, Zoe and Tash for their guidance, kindness and for all the laughs. A thank you also to my friends who have been there for the duration, and especially to Ian for offering up his time and expertise to give me feedback on this thesis.

I would like to thank my parents and sister who I dedicate this thesis to, for their unconditional support and encouragement. You have always listened to my problems and have supported me, even when you have no idea what I am doing or why.

Lastly, I would like to give the biggest thank you to my partner Dean, who has carried me through this journey. Thank you for always making me laugh, for all the proofreading and for the countless dinners you have made. Most of all thank you for always believing in me, and for your love and patience with me. I could not have done this without you.

Author Declaration:

I declare that all the material contained in this thesis is my own work and has not been submitted to any other University.

Rosa Leino

List of Abbreviations:

AEQ – Achievement Emotions Questionnaire

AIC – Akaike Information Criteria

APA– American Psychological Association

AR1– Autoregressive model statistics

ASSIST – Approaches and Study Skills Inventory for Students

BAME – Black, Asian and minority ethnic

BIC – Bayesian information Criteria

BPS – British Psychological Society

BTEC – Business and Technology Education Council

CFI –Comparative fit Index

DLA – Dispositional Learning Analytics

EVT – Expectancy Value Theory

HESA – Higher Education Statistics Agency

IB – International Baccalaureate

ICC – Intraclass Correlation Coefficient

LA – Learning Analytics

LMS– Learning Management system

MLM – Multilevel Model

MSLQ – Motivated Strategies for Learning Questionnaire

ONS – Office for National Statistics

POMS – Proportion of Maximum Scaling Transformation

QAA – The Quality Assurance Agency for Higher Education

RM – Research Methods

RMSEA – The Root Mean Square Error of approximation

SCAS – Statistics Course Anxiety scale

SAL – Students approaches to Learning

SDT – Self-Determination Theory

SRL – Self-regulated Learning

SRS – Student Record System

STARS – The Statistical Anxiety Rating Scale

T1 – Time-point 1

T2 – Time-point 2

T3 – Time-point 3

TA – Thematic Analysis

VIF – Variance Inflation Factor

VLE – Virtual Learning Environment

Chapter 1: Introduction

Research into the learning and teaching of psychology is becoming increasingly important with the number of students studying psychology steadily increasing as higher education in the UK continues to expand (Trapp et al., 2011). According to data from UCAS (2020) psychology continues to be one of the most popular courses in the UK, with over 20,000 applicants in 2020. This PhD thesis focuses specifically on psychology students' learning of research methods. A significant part of teaching in psychology concerns research methods and statistics, with research methods being one of the core modules required in all British Psychological Society (BPS) accredited psychology courses. The Quality Assurance Agency for Higher Education (QAA) Subject Benchmark Statement for Psychology states that graduates are expected to "Demonstrate a systematic knowledge of a range of research paradigms, research methods and measurement techniques, including statistics and probability, and be aware of their limitations" *(QAA, 2019, p.10).*

The term "research methods" represents a combination of knowledge domains and practices encompassing the general principles of science, research paradigms, research approaches and methods, as well as covering practical research skills such as statistics and qualitative research analysis (Murtonen, 2015). The learning of research methods also underpins several of the set curriculum requirements for undergraduate psychology degrees. For example: "Ability to analyse data using both quantitative and qualitative methods" and "Ability to generate and explore hypotheses and research questions" *(BPS, 2017, pp 12-13).* As such, mastering research methods has a great deal of value for students, both in terms of being successful in their degree and in developing the skills that underpin psychological literacy, which is described as "an ability to apply the knowledge, skills and attributes acquired through the study of psychology in a real-world context" (Mair et al., 2013, p.2).

Students gain many transferable skills from research methods courses such as the ability to communicate complex information, writing reports, data analysis as well as problem-solving skills. These skills may be valuable in many professions beyond the field of psychology, such as marketing, human resources, user experience research and policy roles. For example, both quantitative and qualitative research methods are often used for market and user research, whereas psychometric tests are often used as recruitments tools.

Existing literature acknowledges that university students find courses in research methods challenging (Edwards & Thatcher, 2004). These courses are often considered the hardest aspect of a psychology degree (Barry, 2012), making them unpopular with students (Sizemore & Lewandowski, 2009). The difficulties that students experience in research courses can also lead to poor learning and low course grades, and struggles to complete their degrees (Meyer et al., 2005). Previous research indicates that research methods modules are also often associated with lack of interest (Sizemore & Lewandowski, 2009; Vittengl et al., 2004), poor understanding (Lehti & Lehtinen, 2005), anxiety (Onwuegbuzie & Wilson, 2003) as well as students failing to see the relevance of the modules (Earley, 2014).

Although this notion of difficulties of the learning of research methods is not new, the bulk of the evidence has been of a descriptive nature or focusing on specific aspects of the learning environment and curriculum, such as statistics anxiety (e.g., Bourne, 2018a; Macher et al., 2012; Paechter et al., 2017), attitudes to statistics (Dempster & Mccorry, 2009) and attitudes to research (Meyer et al., 2007; Murtonen, 2015). Up to now, far too few empirical studies have addressed research methods in their entirety and the processes underpinning learning, with even less research examining students' learning development longitudinally.

Conversely, evidence from the wider field of educational psychology suggests that individual differences in psychological processes, such as approaches to learning (Diseth, 2011; Diseth et al., 2006; Postareff et al., 2017), motivation (Bailey & Phillips, 2016; Credé &

Phillips, 2011), self-regulated metacognition (Artino & Jones, 2012; Broadbent & Poon, 2015), academic self-efficacy (Artino, 2012; Honicke & Broadbent, 2016), and sensitivity to social contexts may play a significant role in learning success. There is also a growing body of literature indicating that emotions can facilitate students' learning behaviour, achievement and long-term academic development and are important facilitators of successful studying (Harley et al., 2019; Pekrun & Linnenbrink-Garcia, 2012).This emotional or affective component has recently been identified as an important correlate of learning, with research suggesting that a wide range of both positive and negative emotions such as enjoyment, pride, boredom and anxiety are influential for students' learning (e.g. Artino.

Emotions in learning have also been linked with students' learning approaches (Mega et al., 2014; Trigwell et al., 2012), motivation (Mega et al., 2014; Pekrun et al., 2002), self-regulation (Asikainen et al., 2018; Villavicencio & Bernardo, 2013) and self-efficacy (Putwain et al., 2013). What seems to be lacking in the literature is the systematic and longitudinal exploration of these together in an integrative framework. As stated by Linnenbrink-Garcia and Pekrun (2011, p.3) there is a need to *'better understand how emotions unfold and reciprocally relate to motivation, cognitive processes, and academic performance across time'*.

Moreover, the majority of the research in the field has been focused on students' self-reports measuring psychological and individual difference factors related to learning, ignoring the influence of possible behavioural factors such attending classes, following classroom rules, online activity and interactions with peers and teachers. Recent studies (Agudo-Peregrina et al., 2014; Nordmann et al., 2019; Summers et al., 2020) in "Learning Analytics", which refers to the collection, analysis and reporting of data about learners, indicate that adding students' attendance and online behaviour to predictive models of learning can substantially improve the explained variance of academic performance. However, studies combining behavioural learning analytics data with self-reported data on students' emotional and cognitive engagement are sparse, with no studies to date to the best of my knowledge combining emotional, cognitive and behavioural variables to explore research methods learning. Therefore, more research is needed to understand how these factors interact and shape learning in a research method setting, with longitudinal exploration providing an opportunity to explore and compare the development of these factors across several academic years.

Thus, there appears to be a growing need to explore the learning of research methods more comprehensively by identifying the possible factors underpinning students' *learning development and learning journey*. This PhD thesis aims to do just that by exploring the interplay between affective, behavioural and cognitive factors and their development and influence on research methods learning. As less research has explored the role of affect in the learning of research methods a particular emphasis on academic emotions is made, with these being at the core of the thesis. Since research methods modules are key subjects within the psychology degree and are the basis of many transferable and subject-specific skills, insights into this currently under-researched area promise to be beneficial in improving overall learning for psychology students at university. These findings can also be generalised to other degrees with a significant research methods component, such as social sciences or education.

The thesis is divided into seven chapters, supported by material in the appendices at the end of the thesis. Chapter 2 provides a literature review, drawing on a broad spectrum of affective, cognitive and behavioural literature in higher education learning. The chapter reviews and identifies the relevant aspects for learning research methods building a sound theoretical background. Chapter 3 outlines the aims and context of the thesis, stating the research questions and giving an overview of the studies in the thesis. Chapters 4, 5, and 6 present three independent studies, all with the overall aim to explore psychology students' learning of research methods. More specifically, this thesis first aimed to investigate and establish a range of emotional, motivational, and cognitive factors important for learning research methods and the challenges associated with learning. The second aim was to examine how these variables interact and influence students' learning trajectories, behaviour and academic achievement. Finally, the third aim was to establish an in-depth understanding of students' learning by identifying different student types based on their learning journeys. Chapter 7 discusses the implications arising from these findings and suggests areas for improvement and future research. The proposed recommendations apply to the design of teaching and learning environments that combat specific negative feelings and the incorporation of active learning tools and technologies.

Chapter 2: Literature Review

This chapter presents a literature review of factors that have been established as influential in higher education learning. The main objectives are to identify the most relevant factors for the learning of research methods, identify the gaps in the literature and outline the theoretical frameworks for the following three studies. The chapter is divided into five sections. The first section concentrates on affective factors that influence students' learning, providing a brief overview of general emotion models and then discussing emotions in learning, test anxiety and statistics anxiety. This section also gives an overview of the control-value theory of emotions, which is the main theoretical framework adopted for this thesis. The second section reviews research on students' approaches to learning. The third section reviews theories of motivational and meta-cognitive factors and examines their applicability in research methods learning. The fourth section examines the literature on learning analytics and how behavioural factors, such as attendance and engagement in virtual learning environments, can help predict students' academic achievement. The final section examines interactions and the combined effect of all these variables.

2.1. Affect, Emotions and Mood

The literature on educational psychology has in the past primarily been concerned with cognitive and meta-cognitive factors such as IQ and motivation, overshadowing the importance of affective influences (Pekrun, 2011). However, in the last decades, many researchers have also started focusing on understanding the role of affect, moods and emotions in education. The role of affect in higher education learning and achievement has also received increased attention, with emotions playing a key role in shaping student engagement and learning.

The importance of affect and emotions has been recognised in several ways, such as emotional experiences being directly related to students' subjective well-being (Diener, 2000), and emotions impacting the quality of students' learning by affecting motivation, activation of learning resources, learning strategies, and, achievement outcomes (Pekrun et al., 2002).

Furthermore, past research on the relationship between emotions and academic performance have generally shown that both *positive* and *negative* emotions are associated with performance (e.g., Artino et al., 2010; Bosch et al., 2013; Pekrun et al., 2017). Still, more research needs to be conducted to understand the implications of emotions in the learning of research methods. Most of the emphasis to date has been on anxiety, and less on the broad range of negative and positive emotions such as enjoyment, pride, anger and boredom that could influence learning.

Before discussing emotions and learning, it is helpful first to examine how emotions and affect have been conceptualised in the past. However, there does not seem to be a clear consensus as to the best definition of emotions. A definition suggested by the American Psychological Association (APA, 2007), states that an emotion is "a complex reaction pattern, involving experiential, behavioural and physiological elements". The terms emotions, moods, and affect have sometimes been used interchangeably. Affect can be seen as a conceptual umbrella for moods and emotions and is seen as the most general construct in emotion research (Russell, 2009). Affect is divided into two types: affective characteristics, which represent people's general emotional preferences, and affective states, which fluctuate and alter (Linnenbrink, 2007).

Several models have been developed to categorise the numerous expressions that people use to describe their emotional experiences. A historically dominant theory has been the theory of discrete emotions based on neuroscience and psychiatric research, positing that humans are evolutionarily endowed with a discrete and limited set of basic emotions (Ekman, 1992; Panksepp, 1998). Ekman (1992) categorised emotionality into six different basic emotional categories: anger, disgust, fear, happiness, sadness, and surprise. Each of these basic emotions is independent of the others in its behavioural, psychological, and physiological manifestations and arises from activation within the central nervous system (CNS), with each specific emotion mapping onto one neural system. For example, the emotion *happiness* would produce positive feelings and behaviours related to activation within a specific neural system pathway. Whereas other emotions such as *fear* would map onto a different pathway (Posner et al., 2005).

Although this theory has yielded a significant understanding of emotions and affect, it has left many unanswered questions. It has been found incompatible with findings from genetic and affective disorder research, such as explaining the neurophysiological underpinnings of affective disorders (Posner et al., 2005). Thus, other theorists have proposed the use of more dimensional and overlapping models of emotions.

A widely used multidimensional model of emotions is the circumplex model, which proposes that all affective states arise from cognitive interpretations of core neural sensations that are the product of two independent neurophysiological systems, *valence (positive or negative)* and *arousal (high or low*) (Russell, 1980). In this model, emotional states can be represented at any valence and arousal level, with similar emotions often interrelated and indistinct. Another important detail in the circumplex model is the assumption that although negative and positive affect are on the other sides of the valence dimensions, they can still exist together without cancelling each other out.

Another widely used dimensional model of affect is the positive activation and negative activation (PANA) model of emotion (Tellegen et al.,1999). This model is similar to that of the circumflex model using the dimensions of activation and valence and the negative and positive emotions being represented as "opposite" emotions. However, in this model, the assumption is that high arousal emotions tend to be defined by their valence, whereas low arousal tends to be less dependent on valence and tend to be more neutral. The PANA model of emotions also suggest that positive and negative affect are two separate systems, but like the circumplex model, it proposes that they can exist together.

Based on this theory, feelings can be divided into two categories: states of feeling good or states of feeling bad. The terms "positive" and "negative" affect are used to describe these broad states. Using this basic framework, emotions can be defined as "an acute, intense, and typically brief psycho-physiological change that results from a response to a meaningful situation in an individual's environment" (Artino et al., 2012, p.149). The understanding of emotions being categorised into different dimensions based on valence and activation is relevant in the literature regarding emotions in learning, as is the belief that negative and positive emotions are separate categories but that individuals can feel both simultaneously. Having presented a broad definition of affect, emotions and related constructs, the focus will now be on academic emotions and emotions related to learning.

2.1.1 Emotions in Learning

Although emotions are considered an integral part of educational settings, research in higher education has focused primarily on motivation and cognition when exploring academic achievement and learning in general. However, within the last two decades, the role of emotions and affect has gained more attention, and recent research has revealed that emotions have an impact on learning in a variety of ways (Mega et al., 2014; Trigwell et al., 2012; Postareff et al., 2016).

The first way in which emotions and affect have been linked to learning is through the way information is stored and retrieved from long-term memory, which is referred to as the mood-dependent memory theory (Lewis & Critchley, 2003). The theory posits that affective states are encoded into long-term memory at the same time as other acquired information resulting in the states being intertwined with the information. As such, memory recall can be improved if the individual is in the same mood at the time of retrieval as they were when the memory was initially formed (Schunk et al., 2008). For example, suppose a student is in a very positive mood when learning a new statistical test method. In that case, the student is more likely to recall this information if they are in a similarly positive mood at retrieval time.

Another common route by which emotions can influence learning is through their impact on cognitive resources. Emotions are thought to utilise working memory resources with the primary focus on the object of the emotion, leading to an increase in cognitive load, leaving fewer cognitive resources for the task at hand. This influence of emotions seems to be true mostly for negative emotions, as positive emotions do not seem to deplete cognitive resources in the same way that negative emotions do (Forgas, 2017).

Emotions are also thought to influence learning via their link with motivation, with positive emotions thought to enhance intrinsic motivation; negative emotions, on the other hand, have been linked with both a decrease in intrinsic motivation for a task and also with increased extrinsic motivation. For example, fear of failure (negative emotion) can make students more motivated to study, leading to better learning outcome (Artino et al., 2012). Thus, in general, the previous research indicates that emotions have several ways for influencing learning, with an important neurological pathway to cognition and links to motivation established. Therefore, in order to understand the complex behaviours of humans, we also need to understand how cognition, motivation and emotions are interlinked.

Despite this rich history of investigating affect and emotions, relatively less attention has been given to the influence of emotions in *higher education*. Few researchers have considered how to truly integrate affect or emotions into our understanding of students' learning. However, one framework proposing an integrative theory of emotions in learning has been proposed, called *the control-value theory,* which will be reviewed later in the chapter. Many studies that have looked at the direct link of emotions to learning have been concerned with test or evaluation anxiety or have addressed a small range of emotions such as boredom and shame. Newer findings point to a wide range of feelings associated with academic achievement, such as boredom (Pekrun et al., 2014), happiness (White et al., 2012), and enjoyment (Artino et al., 2010; Putwain et al., 2018). Thus, there seems to be a need to measure a broader range of emotions on a more specific level.

2.1.2 Test- Anxiety

In contrast to emotions more generally, anxiety and its effect on educational performance have received considerable attention. Anxiety is characterised by feelings of helplessness, worry, and anticipation about upcoming negative events (Barlow, 2000). A sense of unpredictability and a lack of control over aversive stimuli and threatening circumstances are at the root of such feelings (Barlow 2000). Several different types of anxiety exist, such as evaluation anxiety, test anxiety, statistical anxiety, and performance anxiety (Matthews et al., 2006; Skinner & Brewer, 1999). Test anxiety is one of the most widely studied emotions within education. Dusek (1980, p. 88) defined test anxiety as "an unpleasant feeling or emotional state that has physiological and behavioural concomitants, and that is experienced in formal testing or other evaluative situations".

In Zeidner and Mathews' (2005) self-regulative model, anxiety is seen primarily as the result of negative self-beliefs maintained by metacognitive strategies. Anxiety or distress is considered the result of the appraisal of an evaluation situation (e.g., exam), as threatening, which in turn influences negative self-beliefs, as well as avoidant motivation (e.g., Preiss, Gayle, & Allen, 2006; Putwain, Daly, Chamberlain, & Sadreddini, 2015). Short-term increases in distress, state anxiety, and worry result from accessing negative self-beliefs and maladaptive coping strategies (O'Carroll & Fisher, 2013; Rogaten et al., 2011). On the other hand, long-term distress is seen as maintaining these negative self-beliefs, leading to maladaptive person-situation interactions (Matthews, Zeidner, & Roberts, 2006). In the context of test anxiety, this could be manifested by students having catastrophic thinking, where they believe that failing a question in one part of a test will lead to failure of the whole test and ultimately to the failure of the whole degree. Thus, the negative impact of anxiety is more to do with how a student copes or responds to anxiety rather than the feeling of anxiety itself (Putwain & Aveyard, 2018).

Furthermore, another way of explaining the influence of test anxiety is by its association with performance and achievement goals, with high-performance goals correlating with increased test anxiety due to fear of failure (Elliot & McGregor, 2001). Performance goals represent a concern with performance in relation to others. The aim could be to perform better than others (approach) or to avoid failure (avoidance). Elliot and McGregor (1999) found a negative relationship between test anxiety and performance for those students who adopted a performance avoidant goal. Students who adopted a performance-approach goal, on the other hand, showed a positive relationship between test anxiety and evaluation performance. Other researchers have provided further support for these negative relationships between performance-avoidance goals and test anxiety (Hannon et al., 2012; Takana et al., 2006), with the relationship between performance-approach goals and test-anxiety shown to be more complex (Putwain et al., 2013; Sideridis, 2005).

Research of test anxiety in university students also supports similar conclusions (Cassady & Johnson, 2002; Conneely & Hughes, 2010; Kurt, Balci, & Kose, 2014). For example, one study investigating the relationship between test anxiety and academic performance in 1,414 undergraduate students found a significant but small inverse relationship between test anxiety and grades (r=-.18) (Chapell et al., 2005). Another study exploring psychology students' test anxiety in conjunction with perfectionism found that test anxiety was inversely associated with both GPA and word recall test scores (Eum & Rice, 2011). Moreover, in Richardson et al.'s (2012) systematic review and meta-analysis of psychological correlates of university students' academic performance, test anxiety showed small negative correlations with academic performance. Furthermore, after controlling for other variables such as IQ and self-regulation, test anxiety did not explain any additional variance and was reduced to non-significance.

In summary, much research has been conducted looking at implications of test anxiety for academic performance, with several models and theories proposed. The results consistently show that test-anxious students are more likely to do worse in exams and tests (Bodas & Ollendick, 2005), generally have poorer academic performance (Cassady & Johnson, 2002b), and lower self-esteem (Alam, 2014). However, several studies (e.g., Cassady & Johnson, 2002; Chapell et al., 2005; Tremblay, Gardner, & Heipel, 2000) and meta-analyses (Seipp, 1991; von der Embse et al., 2018) conducted on test-anxiety show that the average correlation coefficients for the relationship between academic performance and test anxiety have been relatively small and weak (r=-.16 -.26) at explaining learning progress and academic performance. Therefore, other variables should be examined to understand students' learning processes in more depth. In the case of research methods learning, however, another form of anxiety has received considerable attention; statistics anxiety.

2.1.3 Statistics Anxiety

Statistics anxiety can be defined as "the apprehension that occurs when an individual is exposed to statistics content or problems and instructional situations, or evaluative contexts that deal with statistics." (Macher et al., 2015, p. 1). Statistics anxiety is separate from general test anxiety, as it is not just statistical test situations that induce anxiety regarding statistics, as statistics-anxious individuals generally always experience anxiety when doing or even thinking about statistics. Thus, statistics anxiety could be described similarly as a trait-anxiety, as it is seen as habitual and enduring (Macher., et al 2012; Onwuegbuzie & Wilson, 2003).

Previous research has shown that statistics anxiety can harm performance, with a higher level of statistics anxiety related to poorer performance on exams (e.g., Chiesi & Primi, 2010; Keeley et al., 2008; Macher et al., 2012; Macher et al., 2013). For example, the relationship between statistics anxiety, trait anxiety and learning strategies and academic success was explored in a study with 147 psychology students (Macher et al., 2012). The results showed that students with higher statistics anxiety scored lower on the exam and had higher procrastination rates. Statistics anxiety was also related indirectly to spending less effort and time on learning.

Statistics anxiety has been shown to be associated with study problems such as procrastination, and the use of less effective learning strategies (Macher et al., 2012) and has been shown to affect students' self-perceptions (Onwuegbuzie, 2000; Sizemore & Lewandowski, 2009), as well as their confidence and abilities in statistics and research situations (Onwuegbuzie, 1997). In an exam situation, statistics anxiety is related to worry, as it consumes the processing capacity needed for task performance (Macher et al., 2013; Papousek et al., 2012). Thus, statistics anxiety can lead to many disadvantageous outcomes for students (For a review, see Onwuegbuzie & Wilson, 2003). Therefore, it is an important component to investigate to understand students' learning processes, especially in research methods modules, as these generally contain high levels of statistical content.

Because of these detrimental effects on students' academic outcomes, researchers have studied how statistics anxiety develops, exploring its relationship with attitudes to science (Bui & Alfaro, 2011) and previous mathematical experience (Baloğlu, 2003). Common issues in the learning of statistics are often linked to previous difficulties in the learning of mathematics (Murtonen, 2005). However, despite mathematics and statistic anxiety sharing similar concepts, statistics is considered an independent discipline. For psychology students perceptions of feelings towards statistics may be related to mathematics because they are both numerical subjects and because students might have undertaken statistics as part of a mathematics course in previous levels of education (Murtonen, 2005).

Statistics anxiety has been related to grades in previous mathematics classes, mathematics awareness (Chiesi & Primi, 2010), and mathematics self-efficacy in previous studies using various statistics anxiety rating scales (Finney & Schraw, 2003). However, other researchers (Bourne, 2018b; Bui & Alfaro, 2011) have not found these relationships. Qualitative research has also found a connection between psychology students' attitudes and anxiety about statistics and aspects of their previous math experiences (Pan & Tang, 2005; Ramirez & Bond, 2014). Many students mistakenly associate statistics classes with mathematics classes, assuming their bad math experiences will carry on to statistics (Murtonen, 2005). Thus, previous knowledge can be an important predictor of statistics anxiety and should be considered when investigating statistics anxiety and learning processes in general. However, studies in statistics anxiety generally use cross-sectional designs, only measuring bivariate correlations between the two forms of anxiety and do not consider the development of these.

A possible reason for psychology students’ high levels of statistics anxiety could also be their expectations for their degree. According to a study conducted in Northern Ireland, only 46.7 % of undergraduate psychology students were aware of the statistical component of the curriculum (Ruggeri et al., 2008). Conners et al. (1998) identified five barriers to teaching statistics to undergraduate psychology students. These were (1) statistics anxiety, (2) students lacking motivation, (3) performance extremes, (4) students not understanding statistics and (5) learning not lasting long. Similar findings were demonstrated in the Higher Education Academy (HEA) Science, Technology, Engineering, and Mathematics (STEM) tackling transition survey (Field, 2014), which found that statistics anxiety acted as a barrier to learning.

Within the sample, 70% of psychology students (N=179) reported a lack of confidence, while 54% stated anxiety as a main barrier to the learning of quantitative methods.

Lack of confidence can be related to self-efficacy, which refers to one's belief in one's ability to succeed in specific situations or accomplish a task and has been linked with statistics anxiety among students (Perepicska et al., 2011). There was found to be a negative relationship between self-efficacy and statistics anxiety, with some studies indicating that the more self-efficacy students possess, the less statistics anxiety they experience (Perepicska et al., 2011). Other factors that have been linked with statistics anxiety are students' previous academic experience (Baloğlu, 2003) and attitudes towards statistics. Negative attitudes towards statistics are related to a higher level of statistics anxiety (Chiesi & Primi, 2010). However, most of these studies have only looked at correlations between self-efficacy, attitudes to statistic and statistics anxiety without exploring the potential influence of other emotions or students' motivation.

Similar to test anxiety, statistics anxiety could also be explored further by considering students' motivational goals in an educational setting. Statistics anxiety can impact performance by reducing the students' motivation to study (Macher et al., 2015), as students are more likely to put in effort and time when they believe their chances of success are good. Likewise, students with a positive self-concept in statistics tend to rate their chances of success favourably and are more likely to show effective learning behaviour. Students who do not devote enough time and attention to their studies, on the other hand, are more likely to suffer repercussions such as failing an exam (Macher et al., 2015). However, depending on the situational context, the desire to avoid failure can also increase extrinsic motivation (Pekrun et al., 2009). Thus, students with a high degree of statistics anxiety may experience high anxiety levels in the examination but will experience motivation to study for the exam and exhibit appropriate learning behaviours. In these cases, negative effects of anxiety in the examination can be outweighed by enhanced effort in the preparation phase (Macher et al., 2015).

Over the years, numerous studies have found links between statistics anxiety and academic outcomes, study habits, and instructional variables (Chiesi & Primi, 2010; Onwuegbuzie & Wilson, 2003; Nesbit & Bourne, 2018; Zare, Rastegar, & Hosseini, 2011). However, several studies have also found non-significant or no correlations between statistics anxiety and academic performance (Chiesi & Primi, 2010; Macher et al., 2013). Macher et al. (2015) describe these findings with direct and indirect effects of statistics anxiety in their review of 11 studies. They posited that the direct effects of statistics anxiety on the exam are mostly negative; however, the *indirect effect*s on learning and achievement can be both positive and negative. The majority of the negative results are related to time management and procrastination during the planning process. (Macher et al., 2012; Onwuegbuzie, 2004a; Rodarte-Luna & Sherry, 2008). However, as previously mentioned statistics anxiety is also related to positive effects, such as increased effort, provided the anxiety level is not too high (Birenbaum & Eylath, 1994; Macher et al., 2015). Thus, there seems to be evidence supporting statistics anxiety having a two-fold effect with both negative and positive correlations with learning processes.

However, while some studies exist, there have been fewer studies on the relationship between statistics anxiety and other affective factors. In one example, Onwuegbuzie (1998) found that hope accounted for 8% of the total variance in statistic anxiety in a sample of 109 graduate students. As a result, the author concluded that students with lower levels of *hope* often have higher levels of statistics anxiety. In another study, statistics anxiety has been investigated in the context of *worry.* Williams (2013) looked into the connection between worry, intolerance of uncertainty, and anxiety about statistics. The investigator discovered that worry was substantially linked to statistics anxiety in a study of 97 graduate students. The results also showed that by the end of the course, students' anxiety levels had decreased significantly; however, their proclivity for uncertainty and worry had not. The authors attributed this to other confounding factors influencing worry, and to statistics anxiety being a transitory construct that could change as students get familiar with statistics. In contrast, worry was considered to be more dispositional.

In summary, the relationship between statistics anxiety and performance is complex. The evidence linking statistics anxiety to success should be interpreted carefully because the definition of statistics anxiety varies greatly between studies. Under the phrase "statistics anxiety," various research and assessment instruments also include variables such as academic self-concept or attitudes toward statistics (Chiesi et al., 2011; Hanna et al., 2008.; Onwuegbuzie, 2004). For example, the most widely used instrument for measuring statistics anxiety, the statistical anxiety rating scale (STARS), has several subscales which are not directly related to emotional components, such as self-concept and worth of statistics (Hanna et al., 2008).Thus, the measurement and description of statistics anxiety is inconsistent between studies. Moreover, studies in which statistics anxiety and performance in the examination has been measured show ambiguous results depending on the setting.

Overall, these results suggest that the influence of statistics anxiety may differ between different courses and during the course of learning. Studies on research methods learning should move on from solely exploring statistics anxiety and include a broader range of factors influential for learning, such as positive emotions. By exploring the influence of anxiety within a comprehensive framework of learning, we can gain valuable insights into students' experience of statistics anxiety. An integrative framework developed especially for studying the influence of emotions in learning while also considering both motivational and cognitive factors is *the control-value theory of achievement emotions.*

2.1.4 Control-Value of Achievement Emotions Framework.

Pekrun proposed a categorisation of emotions explicitly developed to conceptualise the role of emotions in the context of learning (Pekrun et al., 2002), called the 'control-value theory of achievement emotion'. Pekrun's control-value theory offers an integrative framework that incorporates *"cognitive, motivational, expressive, and peripheral physiological processes"* (Pekrun, 2006, p.316) to analyse the effect of emotions on achievement and learning. The theory builds on Pekrun's previous research on the expectancy-value theory of emotions and cognitive-motivational model concerning the effects of emotions on self-regulated learning and integrating assumptions from causal attribution theories of achievement-related emotions (Weiner, 1985).

Pekrun (2006) proposes a three-dimensional taxonomy of achievement emotions, with the first dimension being *object focus.* Object focus refers to the distinction between the outcome and activity of achievement emotions. Pekrun suggests that achievement emotions are "*tied directly to the achievement activities or achievement outcomes"* (Schutz & Pekrun, 2007, p. 15) and thus should be studied in specific learning situations and outcome. Activity emotions refer to ongoing emotions such as boredom or enjoyment that students experience during or after class. Outcome emotions refer to emotions such as pride or joy that students might feel after academic goals are met, or the shame and anger felt when expectations are not met. The other two dimensions of the control-value theory are *valence* (positive vs negative) and *degree of activation* (activating vs deactivating). See Figure 2.1 for model of the taxonomy.

Figure 2.1

Model of the Control-Value Theory of emotions

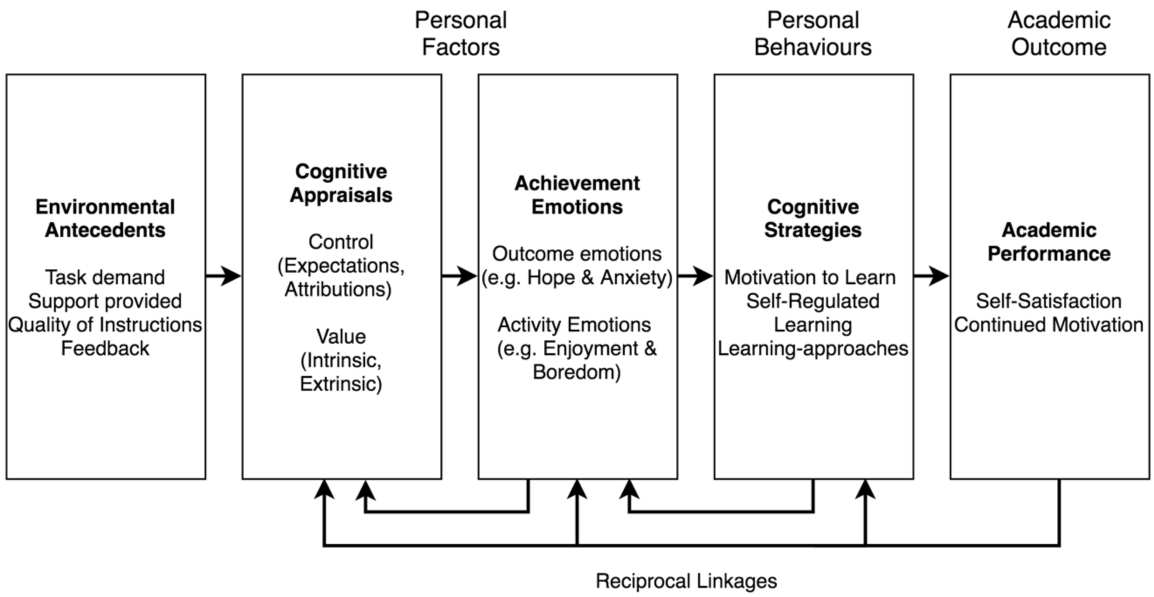


Figure adapted from Pekrun et al. (2006) & Artino et al., (2012).

Pekrun's (2006) theory posits that two types of cognitive appraisals, *control* and *value,* are the primary antecedents for achievement emotions. These refer to the extent to which students feel they have control over achievement activities and their outcomes, such as their module grades and exam scores, and the extent to which these activities and outcomes are perceived to be important. The term 'control appraisal' relates to the perceived controllability of achievement activities and their outcomes.

The theory distinguishes between two types of causal expectations: *action-control,* which refers to the expectancies that an achievement activity can successfully be performed; in other words, also known as self-efficacy. The second expectation is *action-outcome* which refers to the expectations that the activities will lead to a desirable outcome. Examples of these expectations would be a student expecting that they will be able to invest enough time and effort to revise (action-control expectancy) and that because of these efforts, the student will attain a good grade (action-outcome). The literature on perceived control consistently shows that being in control plays a critical role in people's psychological and physical well-being (Pekrun, 2019). Perceived control improves a person's ability to evaluate a situation's controllability and use the appropriate coping strategy. For example, a lack of perceived control is usually associated with task-demands that exceed abilities and should be related to negative emotions. Equally, beliefs related to high competence will be associated with higher levels of positive emotions such as enjoyment (Pekrun et al., 2007).

The term '*value*' refers to the perceived values of actions and outcomes. Outcome values might refer to how important a student feels getting a good grade on an exam is. Value activities would refer to how important revising for the exam is to them. The control value theory distinguishes extrinsic and intrinsic values. Extrinsic values focus on education outcomes, such as income, advancement opportunities, and status attainment. Examples of extrinsic motivation would be valuing academic grades to achieve future career goals or studying to gain recognition from parents or peers. In contrast, intrinsic values focus on the process of education and learning for its own sake and the enjoyment one gains from it irrespective of the contributions to good grades (Ryan & Deci, 2000).

The control value theory predicts that intrinsic value is positively related to activity-related emotions like enjoyment when it comes to the influence of value on emotions. On the other hand, extrinsic beliefs may be linked to any result emotion, positive or negative (such as pride, anxiety, hopelessness or shame) (Pekrun, 2019). However, the control-value theory assumes that these value appraisals are not always made consciously; repeated exposure to a given activity or outcome can lead to emotions being induced automatically (Pekrun & Stephens, 2010). For example, in the case of psychology students, many students might automatically start feeling anxious about the prospect of using statistics, with little or no conscious awareness or cognitive effort required.

Achievement emotions are also thought to hold more distant antecedents, which influence control and value appraisals in the first place (Artino et al., 2012). Examples of such antecedents are individual achievement goals, personality factors, genetic dispositions, cognitive demands of a task and individual control and value beliefs (Pekrun et al., 2007). Factors in the learning environment such as interactions with peers and teachers, feedback, quality of support and instructions can influence control-value appraisals. (Pekrun, 2006; Pekrun et al., 2007, Linnenbrink-Garcia et al., 2016).

The relationships between the emotions and appraisals are thought to be bidirectional, with appraisal influencing emotions and emotions in turn action on appraisals. More specifically, "Control and value appraisals are posited to be antecedents of emotions, but emotions can reciprocally affect these appraisals" (Pekrun, 2006, p. 327). Reciprocal causation implies that the development of emotions can take both beneficial and detrimental forms. The theory suggests that positive feedback loops are common (e.g., enjoying learning, leading to more intrinsic motivation and success on exams, all supporting each other reciprocally). However, negative feedback loops can also be important (e.g., failure-inducing anxiety motivating students to avoid failure in the next exam). Some evidence for these feedback loops has been found using structural equations modelling of longitudinal data on students' academic development in school settings (Pekrun et al., 2017). However, less research has been conducted using the control-value theory to look at potential feedback loops with university students.

2.1.4.1 Achievement Emotions.

The control-value theory makes predictions about how different patterns of *control* and *value* appraisals lead to different *achievement emotions* (Pekrun, 2006). In general, the model proposes that high-level subjective control and high-value beliefs lead to more positive emotions. A low level of control is, by contrast, associated with negative emotions. The role of value for negative emotions is more ambiguous, with studies demonstrating both positive (Pekrun et al., 2002) and negative (Goetz et al., 2006) correlations between value and negative emotion.

With the help of a series of interview studies with high-school and university students, Pekrun and colleagues (2002) identified nine achievement emotions: *enjoyment, hope, pride, anxiety, relief, anger, boredom, shame,* and *hopelessness important* for learning. Achievement emotions are categorised into three broad kinds based on their *object focus*. *Activity emotions* such as enjoyment or boredom during learning, and *outcome emotions*, such as hope and pride related to success, or anxiety, hopelessness, and shame related to failure. There is also an important distinction between *outcome prospective* emotions related to future success or failure (hope, anxiety, hopelessness) and *outcome retrospective* emotions (pride, shame) linked to past success and failure. As such, emotions are considered to be both antecedents and consequences of study behaviour.

The achievement emotions are similarly divided based on the other two dimensions of the control-value theory; *valence* (positive vs negative) and *degree of activation* (activating vs deactivating). As a result, achievement emotion can be categorised into activating positive emotions (enjoyment, hope and pride), deactivating positive emotions (relief and relaxation), activating negative emotions (anger, anxiety and shame) and deactivating negative emotions (hopelessness and boredom). For example, the enjoyment students might feel during class is considered an activating positive activity emotion. In contrast, the shame associated with getting a bad grade would be considered an activating negative, outcome-related achievement emotion. Thus, combining the valence, activation, and object focus dimensions results in a 3×2×2 taxonomy of achievement emotions (Pekrun, 2006). (See Table 2.1).

.

Table 2.1

The three-dimensional taxonomy of Achievement emotions.

	Positive[a]		Negative[b]	
Object focus	Activating	Deactivating	Activating	Deactivating
Activity	Enjoyment	Relaxation	Anger Frustration	Boredom
Outcome/ Prospective	Hope Joy[c]	Relief[c]	Anxiety	Hopelessness
Outcome/ Retrospective	Joy Pride Gratitude	Contentment Relief	Shame Anger	Sadness Disappointment

[a]Positive = pleasant emotion
[b]Negative = unpleasant emotion
[c]Anticipatory joy/relief

Figure Adapted from: *Emotion in education*, Pekrun, R., Frenzel, A. C., Goetz, T., & Perry, R. P., The control-value theory of achievement emotions: An integrative approach to emotions in education. pp. 13-36., (2007) with permission from Elsevier

Furthermore, central to the control theory is the belief that achievement emotions can profoundly affect students' learning and performance. The theory posits that "Achievement emotions affect the cognitive, motivational and regulatory processes mediating learning and achievement, as well as psychological well-being, happiness, and life satisfaction" (Pekrun, 2006, p. 326). It is the interplay between these different mechanisms that influence the effect of achievement emotions on academic achievement. Activating positive emotions such as enjoyment, hope, and pride are thought to increase both intrinsic and extrinsic motivation and facilitate flexible learning strategies such as elaboration, and support self-regulation, all of which are posited to improve academic performance in most circumstances. On the other hand, deactivating negative feelings, such as hopelessness and boredom, are thought to decrease motivation and effortful information processing, suggesting negative effects on achievement. The relationship between activating negative emotions, deactivating positive emotions and achievement is more complicated (Pekrun et al., 2002).

Activating negative emotions such as, anxiety, in particular, can both weaken intrinsic motivation and instil strong extrinsic motivation to put more effort into studying in order to avoid failure. Additionally, these feelings encourage more rigid learning techniques such as preparation and memorising (Pekrun et al., 2011). Consequently, activating negative emotions can have variable effects on students' learning (Lane et al., 2005; Turner & Schallert, 2001). On the other hand, the effect of deactivating positive emotions, such as relief, may also be ambiguous since they may have both positive effects and at the same time minimise the need for effort by signalling that everything is going well (Pekrun & Linnenbrink-Garcia, 2012). The main weakness of the control-value theory is that it fails to account for emotions not related to achievement. The theory acknowledges that social emotions such as gratitude and empathy can manifest in a learning situation; however, the theory does not evaluate how these emotions influence students' learning behaviour and achievement. To take this limitation into account and expand on the influence of emotions, the proposed thesis investigated achievement emotions and students' general feelings towards research methods in more depth, with additional qualitative studies.

2.1.4.2 Empirical Evidence Supporting the Control-Value Theory.

Pekrun (Pekrun et al., 2002) devised a self-reported instrument to measure emotions commonly experienced in an academic setting, called the Achievement Emotions Questionnaire (AEQ). The AEQ was developed using quantitative and qualitative research methods, with the instrument assessing the nine discrete emotions of the control-value theory. The AEQ consist of three sections; the learning-related, class-related and test-related emotions scales, each consisting of 75-80 items measuring academic emotions. The AEQ has been tested in a variety of educational contexts, cultures, and languages (e.g., Frenzel et al., 2007.; Jang & Liu, 2012; Tempelaar, Niculescu, Rienties, Gijselaers, & Giesbers, 2012; Lüftenegger et al., 2016). Internal reliabilities for the emotions subscales are high, ranging from 0.84 to 0.94 (Pekrun et al. 2002), with the AEQ also showing strong evidence of construct and predictive validity (Pekrun et al., 2005).

Empirical evidence with the AEQ has shown that positive achievement emotions are positively associated with student control and value appraisals (Pekrun et al., 2011; Sorić et al., 2013), motivation (Daniels et al., 2008, 2009; Putwain et al., 2013), Self-efficacy (Artino, 2012; Luo et al., 2016; Putwain et al., 2013), Self-regulated learning (Artino & Jones, 2012; Asikainen et al., 2018a; Howell & Buro, 2011) and academic achievement (Artino et al., 2010; Pekrun et al., 2017; Putwain et al., 2018). In contrast, the opposite pattern has generally been found for negative achievement emotions (Artino & Jones, 2012; Daniels et al., 2008; Goetz et al., 2011; Pekrun et al., 2017). For recent meta-analytic reviews of studies using the AEQ, see Camacho-Morles et al. (2021) and Loderer et al. (2018).

Using the control-value theory as a framework and the AEQ as a measure, Pekrun and colleagues conducted a series of cross-sectional, longitudinal, and diary studies using a sample of both university and school students (Pekrun et al., 2002). The results showed that the students experienced a wide range of emotions during their studies and that these emotions appeared intermittently with different intensity depending on the academic situation. Furthermore, the findings also showed that positive emotions such as academic enjoyment, hope, and pride predicted high academic achievement, and negative emotions predicted low achievement. Concerning negative emotions, deactivating emotions such as hopelessness and boredom were more highly correlated with low academic achievement than activating emotions such as anxiety, anger and shame in both the longitudinal and cross-sectional studies. Test anxiety, in particular, was found to be less closely related to academic achievement than hopelessness and boredom, providing further support for the premise that research should move away from measuring only test anxiety when exploring the emotional impact of learning.

In a series of more recent studies, Pekrun et al. (2010) tested the linkage between boredom and university students' appraisal and academic performance using exploratory, cross-sectional, and longitudinal methods involving both American and German university students from psychology and education courses. In line with the assumptions of the control-value theory, boredom was negatively associated with achievement-related subjective control and value as well as intrinsic motivation, effort, self-regulation, and academic performance. These findings were consistent across the studies, which differed in their constructs and methodologies. Taken together, these findings suggest that boredom can have detrimental consequences for students' motivation, behaviour, and performance.

Moreover, Artino & Stephens (2009) assessed the control value beliefs of a group of 481 undergraduate military students during an online course using the AEQ. The study's results supported the control-value theory's predictions, with boredom and frustration being strong predictors of the use of metacognitive control strategies, such as self-efficacy and self-regulation. More specifically, boredom (deactivating negative emotion) emerged as a negative predictor of meta-cognition, course satisfaction and continued enrolment. Frustration (activating negative emotion), on the other hand, was a positive predictor of meta-cognition and a negative predictor of course satisfaction and future enrolment. Artino & Jones (2012) conducted a follow-up analysis with a different group of online students, finding that boredom was a negative predictor of students' metacognitive management techniques, whereas frustration was a positive predictor. The researchers concluded that their results support the control-value theory's suggestion that deactivating negative emotions, like boredom, are particularly detrimental to learning.

In a later study, the relationships between achievement emotions and academic performance of 389 psychology students (Pekrun et al., 2011) were examined. The results supported a positive relationship between positive emotions and academic performance. The relationships were more complex for the activating negative emotions, anger, anxiety, and shame, with all three emotions correlated negatively to intrinsic motivation, elaboration, and self-regulation. However, anxiety and shame were also positively linked to students' extrinsic motivation to achieve their goals and negatively to students' overall self-reported learning effort and academic performance. The study's findings align with the control-value theory's proposition that activating negative emotions can exert variable effects on students' learning. The findings show substantial linkages between emotions and students' engagement and performance. Most of the relationships between the students' GPA and achievement emotions had correlations in the .30 – .50 range, except for anxiety which had a much smaller correlation at $r = -.14$. These findings reinforced the premise that research on students' emotions should move on from anxiety to include a broader range of emotions experienced in academic settings.

Overall, these results suggest that both negative and positive emotions may significantly impact students' learning, and with a full range of emotions identified as important for learning. Positive emotions, such as enjoyment, can increase students' motivation to learn and facilitate the use of self-regulation and deep learning strategies. However, activating negative emotions, such as anxiety, do not necessarily have negative effects. Therefore, students' learning achievement and enjoyment could be improved by promoting their task-related positive emotions by making the learning environment more exciting and making them aware of their importance. Students' learning achievement could also be improved by preventing excessive negative emotions, like boredom, and by helping students to use their negative emotions such as anxiety productively (Pekrun, 2019)

As stated earlier, when it comes to research regarding learning in research methods, emotions apart from anxiety have received little attention. Thereby, using the control-value theory's framework to explore the effect of a wider range of emotions could be useful since the framework has shown that even emotions of the same valence can have differential effects on academic achievement. Although the control-value theory's framework has been used to investigate psychology students' achievement emotions (Daniels et al., 2008; Daniels et al., 2009; Pekrun et al., 2010; Pekrun et al., 2011), these studies have been conducted with North American or German students with less research conducted in the UK. Furthermore, the framework has not been used when exploring research methods learning in psychology. Since emotions have been shown to vary between context and academic subjects, testing the framework in a new setting could provide more insight and understanding of students' research methods learning.

The control-value theory also assumes that emotions facilitate the use of different learning strategies and are linked with motivation and self-regulated learning (Pekrun et al., 2011). Therefore, it is also worthwhile to test academic emotions in conjunction with other variables such as motivation, self-efficacy and learning styles. Previous research has shown that these are some of the main variables influencing students' learning (Richardson et al., 2012).The dynamic mechanism through which feelings and emotions impact the learning process warrants investigation within a longitudinal design. We need to know when the effects of emotional experiences on learning are immediate, direct, and specific to the learning situation and when they are mediated by cognitive or metacognitive factors such as motivation, self-regulation, self-efficacy and learning approaches. Understanding the interplay between these emotions could help understand psychology students' research methods learning processes in more depth. The influence of these components will be discussed more in-depth in the following sections.

2.2 Students' Approaches to Learning

Students' learning and studying in higher education has been the subject of extensive study, with important findings emerging about how students participate in learning, especially in the field of learning styles and approaches. Studies have shown that understanding students' learning styles can be of great benefit for both students and teachers and that the manner students approach learning, whether by choice or by predisposition, has an impact on their academic achievement and outcome (e.g., Asikainen & Gijbels, 2017; Entwistle & Peterson, 2004; Heikkilä & Lonka, 2006).

It is important to note that there are various frameworks and definitions of learning styles in the higher education literature, and much dispute about how to classify preferences for different modes of learning (Cassidy, 2004; Desmedt & Valcke, 2004). However, generally learning styles emphasise the role of environmental preferences, emotional, motivational, cognitive and metacognitive styles (for a literature review, see Cassidy, 2004). One key distinction in students' learning in higher education has been the division between two general perspectives: The Student Approaches to Learning (SAL) and the Self-Regulated Learning (SRL) perspectives. The SRL perspectives derive their constructs in a top-down manner from analysis, and by applying psychological theories of cognition, motivation and self-regulation, focusing on the students' internal processes. SAL models derive their basic constructs from a more phenomenological approach based on students' reports of their learning and studying processes (Entwistle & Mccune, 2004).

The SRL and SAL perspectives also have many overlapping concepts. For example, both perspectives indicate that students create their own meanings, goals, and strategies based on knowledge available in the "external" context along with internal information. In addition, both perspectives accept that students' goals are important; however, the SAL perspective often connects goals and strategies more rigidly than the SRL perspective (Pintrich, 2004). In the current state of the learning styles field, the focus is on creating an integrated student learning model. Therefore, the SAL perspective will be used in the present study to access students' learning approaches. This perspective is the dominant UK and European higher education landscape. However, concepts from the SRL approaches will also be used when measuring students' motivation, self-efficacy and self-regulated learning.

The SAL tradition was born from the works of Marton and Säljö in the 1970s, and developed from levels of processing theory (Craik & Lockhart, 1972). According to levels of processing theory, students showed two ways of processing, surface and deep, and these processes could be changed according to students' perception of the task and the learning environment. Surface processing was related to memorising the text, whereas deep processing indicated concentration on the meaning of the text. Marton and Säljö (1976) build on this by incorporating more experimental data and qualitative interviews from students. The terms "deep approach" and "surface approach" were introduced to describe why students adopted deep level and surface-level processing in experimental settings and deep-level and surface-level thinking in their everyday studies. It was suggested that students who adopt a deep approach to studying have a reconstructive learning concept and take an active role and see learning as something they do. In contrast, those who adopt a surface approach to studying have a reproductive concept to learning and take a passive role and see learning as something that just happens to them (Marton & Svensson, 1979).

This distinction between deep and surface approaches is still a key aspect in the learning approaches literature. It has inspired several other researchers to further explore and measure students' ways of studying both in a general and context-specific manner. Biggs (1987) and Entwistle & Ramsden (1983, 2015) supplemented the qualitative findings of Marton and Säljö with quantitative research, developing self-report questionnaires to measure students' approaches to learning.

2.2.1 Students' approaches to learning inventory

The instrument developed by Entwistle and Ramsden focused on identifying the level and depth of learning (Entwistle & Ramsden, 2015). Their measure was called the Approaches to Study Inventory (ASI), which has been revised several times since its development. The newest form is Approaches and Study Skills Inventory for Students (ASSIST). The original ASI was based on interviews that focused on everyday experiences of studying and the ideas of deep and surface learning by Marton and Säljö and aimed to combine intentions, motivation, and learning processes into broader orientations of studying.

The ASI defined three broad approaches to studying: *deep, surface and strategic* (Newble & Entwistle, 1986). Students who have a *deep approach* to study were described as having an intention to understand, with facts and linking concepts as the primary strategies and interest in the subject as the primary motivation (Entwistle, 1990).The *surface approach* to studying was instead characterised by a fear of failure and rote learning techniques, with students memorising study materials that were likely to be assessed at the examination. Students with a *surface approach* were described as lacking the desire for in-depth learning and understanding. Instead, these students' focus lies in learning the bare minimum required to graduate. A target-oriented attitude towards learning and results-driven motivation characterised those with a *strategic approach* to learning. Strategic learners decide and utilise whichever approach strategy is most likely to get them closer to the highest grade based on the assessment's criteria (Entwistle & Peterson, 2004).

These concepts of deep, surface and strategic approaches to learning have been studied in numerous different courses and settings. The ASI, either in its original form or its many revised forms, has been one of the main instruments used in measuring these concepts of learning and their relations to academic achievement (Asikainen & Gijbels, 2017).

Implicit in these studies is that students' approach to learning is not seen as a stable individual trait. Instead, students use approaches best suited to the learning situation and the learning context. Students may adopt different approaches to learning in different courses or even for different topics within a single course depending on the course demands and their prior knowledge and experience of studying (Biggs, 1987). Multiple-choice tests, for example, have been shown to encourage surface learning, while essays and exams have been shown to promote deep learning (Pereira et al., 2016; Scouller, 1998). More specifically, it is how students perceive the learning environment that influences their learning (Entwistle, 1991). Students who perceive the assessment as assessing higher cognitive processing levels are found to employ deep approaches. In contrast, students who perceive the assessment as assessing lower, knowledge-based intellectual processing levels tend to employ surface approaches (Segers et al., 2006).

In general, negative perceptions of the learning environment, such as the nature of the assessment, heavy workload and teaching methods or course design, have been associated with the surface approach to learning. On the other hand, positive perceptions of the learning environment, such as a clear understanding of assignment guidelines or assessment related to future professional practice, may evoke a deep approach to learning (Entwistle & Peterson, 2004; Gulikers et al., 2008; Richardson, 2005). Positive relationships have also been found between the deep approach and a preference for teaching methods that encourage students to think for themselves, open questions in examinations and group discussion (Byrne, Flood & Willis, 2004; Chamorro-Premuzic, Furnham, & Lewis, 2007; Entwistle & Tait, 1990). These concepts have been used to build intervention studies to encourage students to utilise deeper approaches to improve their learning (Richardson, 2005).

2.2.2 Empirical evidence of approaches to learning

The majority of the research using the ASI or its revised forms (ASSIST) have found a positive relationship between the deep approach to studying and students' academic achievement (e.g., Román et al., 2008; Trigwell et al., 2012; Zeegers, 2001), as well as a negative association between the surface and academic achievement **(**Diseth, 2003; Herrmann et al., 2017**)**. However, the magnitude of these correlations has been inconsistent.

Regarding psychology students' approaches to learning specifically, the Approaches to Learning Inventory (ASSIST) has been used in numerous studies, with the scale showing overall good predictive validity. Diseth and colleagues conducted seven studies (Diseth, 2003, 2007, 2011; Diseth et al., 2006, 2010; Diseth & Kobbeltvedt, 2010; Diseth & Martinsen, 2003) exploring the relationship between approaches to studying and academic performance with Norwegian psychology undergraduate students. Overall, the results identified relationships between students' approaches to learning and academic performance. The results of six of these studies (Diseth, 2003, 2011; Diseth et al., 2006, 2010; Diseth & Kobbeltvedt, 2010) showed a significant positive relationship between the deep approach and academic achievement, with small to moderate coefficients (.16 - .31).

Similar results were found for the strategic approach, but with the studies indicating moderate coefficients (.31 - .43) (Diseth, 2007; Diseth et al., 2006, 2007, 2010; Diseth & Kobbeltvedt, 2010; Diseth & Martinsen, 2003). In all of the studies, the surface approach was negatively correlated with academic achievement with small to moderate coefficients (from -.16 to -.38). (Diseth, 2003, 2007, 2011; Diseth et al., 2006, 2010; Diseth & Kobbeltvedt, 2010; Diseth & Martinsen, 2003). Taken together, these findings show that the strategic and surface approaches to learning are better predictors of students' academic success than the deep approach. Thus, the authors concluded that it is more important to prevent the surface approach to studying than promote the deep approach in order to increase learning and performance.

Moreover, Cassidy & Eachus (2000) explored the correlations between approaches to learning, research methods proficiency and final degree mark of 130 social science undergraduate students across two-year groups. The findings showed that strategic approaches to learning were positively correlated with the final degree mark and research methods proficiency. In contrast, surface approaches were negatively correlated with research methods proficiency scores, whereas the deep approach failed to be correlated with academic achievement.

However, it is important to note that although this study was conducted in a research methods module setting, the students were not from psychology degrees and instead consisted of students from health Sciences, Social Policy, Exercise, Complementary Medicine and counselling courses. Furthermore, although other studies, such as Diseth et al. (e.g., 2006, 2010, 2011) have also found links between the academic achievement of psychology students, their perception of the learning environment and approaches to learning, these approaches to learning were not specifically correlated with students' research methods learning. Thus, as learning approaches are seen as situation-specific, it is worthwhile to test these in a psychology research method setting.

Two meta-analytic reviews offer a systematic overview of the literature on the association between approaches to learning and academic success (Richardson, Abraham, & Bond, 2012; Watkins, 2001). Watkins' (2001) meta-analysis reported that for Western university students, the average correlation with academic achievement was positive but weak for both deep ($r = .18$) and strategic ($r = .20$) approaches. The average correlation between surface learning and academic achievement was also reported to be modest but negative ($r = -.12$). In a more recent meta-analysis (Richardson et al., 2012) exploring the psychological correlates of academic performance, learning approaches were recognised as one of the important constructs for university students' grade point average (GPA), with a modest negative correlation between surface and academic achievement (r = .-18) whereas a positive but weak correlation was found for both deep (r = .14) and strategic approaches (r = .23).

Thus, although extensive research has been carried out on the way students study and learn in higher education, research on students' learning approaches and their correlation to students' academic achievement has been somewhat inconsistent. A possible explanation for this is that higher education assessment systems might not always reward the use of deep approaches. Aspects of students' learning strategies such as critical and analytical thinking might not always be rewarded in all context, such as multiple-choice tests (Herrmann et al, 2017). Therefore, assessment grades might not always entirely reflect the quality of a student's learning (Asikainen et al., 2013). Another likely factor contributing to the inconsistency of the results could also be the different contexts of the studies, as perhaps the use of deep approaches is more favourable and beneficial in certain academic disciplines and modules than others. Nevertheless, the majority of the papers reviewed here suggest that students who adopt a less meaningful approach to learning, such as the surface approach, are likely to achieve lower success within research methods modules. By identifying these ineffective approaches, interventions can be set in place to develop students' learning strategies and increase their academic achievement.

2.2.3 Learning Approaches and Emotions

As demonstrated above, the learning environment and students' perceptions of the learning environment are seen as influential factors that can lead to markedly different approaches to studying. Furthermore, the literature also acknowledges that university students find courses in research methods difficult and challenging (Edwards & Thatcher, 2004) and that the courses are perceived to be complex and technical, resulting in low student interest in the material (Ball & Pelco, 2006). Therefore, a negative view of research methods might make students more inclined to adopt one of the less favourable learning strategies such as a surface approach, which in turn could affect their academic outcome, whereas positive perceptions, such as assessments related to future professional practice, may instead evoke a deep approach to learning (Trigwell et al., 2012; Postareff et al., 2016).

For example, a study exploring the interlink between emotions and university students' learning approaches found that a deep learning approach was related to positive emotions such as pride and hope, and the surface approach to negative emotions such as anger, anxiety and boredom (Trigwell et al., 2012). Chamorro-Premuzic et al. (Chamorro-Premuzic & Furnham, 2009) looked at the topic from a different angle, demonstrating that learning approaches were linked to emotional stability as determined by the Big Five personality scale, with the deep approach to learning being linked with more emotional stability. More recent research also found similar results, with neuroticism being linked to the surface approach (Vanthournout et al., 2012). However, less research has explored the relations between emotions and learning approaches and their influence on academic achievement longitudinally.

Furthermore, studies investigating emotions and learning strategies together within a research methods setting are limited, but with some evidence of students who do better in statistics courses being more likely to use learning techniques like self-monitoring, visualisation, applying techniques to the real world, and keeping up with the material than students who do not (Schutz et al., 1998). This indicates deeper or meaning-orientated approaches to learning. Similarly, statistics anxiety is linked to less time spent on learning and ineffective learning and study strategies (Macher et al., 2013).

Since research methods modules seem to be modules that introduce anxiety and general negative emotions, it is worth researching emotions in conjunction with learning approaches, especially because emotional components of learning are lacking in the learning approaches inventories. This was also suggested in Vermunt and Donche's (2017) review of learning patterns, where the authors suggested that an interesting perspective would be to look at possible connections or integrations of the dimensionality of emotions within the control-value theory of achievement emotions (Pekrun et al., 2007). Within this model, interrelations between emotions and approaches to learning have been found, as the deep approach to learning was associated with positive emotions and the surface approach with negative emotions (Trigwell et al., 2012; Pekrun et al., 2002). However, no studies testing this model within research methods learning have been conducted yet.

Another factor that has been identified as influential to students' learning is the cultural and social values they hold regarding education, influencing students' motivation to study. These motivations can also be associated with learning approaches. It is generally believed that students who have more intrinsic motivations also adopt more effective learning styles such as deep or strategic approaches. The influence of these motivational components will be discussed more in-depth in the next section.

2.3 Motivational, Self-beliefs and Self-regulatory Factors Related to Learning

Previous research has highlighted the importance of motivational, self-beliefs and self-regulatory factors related to learning and academic performance, with students' motivational processes consistently found to explain a considerable amount of variance in academic achievement (e.g., Multon, Brown, & Lent, 1991; Zusho, Pintrich, & Coppola, 2003; Pintrich & DeGroot, 1990, Richardson et al., 2012). Much like the field of learning approaches and styles, the field of research on university students' motivation is rather diverse, and there are many different models and perspectives. Motivation involves the biological, emotional, social, and cognitive forces that activate behaviour, and as such, it can be seen to be both an affective and cognitive process. In general, the motivational aspect of studying can be viewed from three broad concepts of motivation focusing on students' reason for engagement, expectations, values and goals. This part of the literature review will briefly cover some of the most important theories in the field of education (for a full review of motivational theories, see Eccles & Wigfield, 2002) along with theories of self-efficacy and self-regulation and give examples of how insight gained from these can contribute to students' learning.

2.3.1 Self-efficacy and Learning

Firstly, a specific concept that is relevant to students' motivations and has received much attention regarding students' learning is the concept of self-efficacy. Bandura (Bandura et al., 1999) defined self-efficacy as an individual's belief in their ability to carry out and complete a task. More specifically, self-efficacy refers to a person's belief in their ability to succeed in a particular situation, such as education. Students have different degrees of self-efficacy for learning in an educational environment. As a result, some students may have a clear sense of general effectiveness in their studies, whereas others may have narrower competence values. Some students may believe they are capable of completing even the most challenging tasks, while others believe they can only complete the simpler ones (Artino, 2012b). Students' self-efficacy is influenced by variables such as goals, social models, rewards and social comparisons.

Bandura identified four main sources of self-efficacy beliefs (Schunk & Pajares, 2002): (1) Prior experiences of mastering tasks, (2) watching others mastering tasks, (3) messages or "persuasion" from others, and (4) emotional and physiological states, which can either hinder or increase self-efficacy. It is important to note that self-efficacy beliefs are *self-constructed*, implying that they are based on a student's personal experiences and views. As a result, there are gaps between a person's self-efficacy beliefs and their skills. Students' desire to learn is often influenced by self-efficacy, with motivation being boosted when thy believe they are making progress in their studies. Likewise, when students become more adjusted and gain skills in tasks, they will also increase their self-efficacy beliefs of performing well (Schunk, 1995).

Self-efficacy is correlated with university students' motivation and academic achievement across a variety of content areas (Cassidy, 2011; Honicke & Broadbent, 2016; Robbins et al., 2004). These include self-efficacy for completing subject-specific tasks like algebra or geometry problems (Zimmerman & Martinez-Pons, 1990), self-efficacy for successful performance and attainment of a specific grade in a subject (Neuville et al., 2007) and self-efficacy for general success within a university course (Bartimote-Aufflick et al., 2016; Komarraju & Nadler, 2013; Richardson et al., 2012). Irrespective of the educational setting in which it is measured, self-efficacy has consistently been shown to positively correlate with academic performance, with meta-analytic studies reporting moderate effect sizes (Honicke & Broadbent, 2016; Richardson et al., 2012). Findings from a meta-analysis conducted by Richardson et al. (2012) showed that self-efficacy beliefs were the strongest correlate (out of 50 measures, including cognitive capacity, previous academic performance, demographic variables and non-intellectual constructs) of students' achievement including GPA, with self-efficacy beliefs accounting for up to 9% of the variance.

In terms of research methods learning, self-efficacy has been linked to students' confidence in performing research tasks, which helps them learn and interact with research methods (Forester et al., 2004; Shaw et al., 2013). Students' motivation and achievement have also been related to self-efficacy, which is thought to affect self-regulation and goals (Van Dinther et al., 2011). As a result, self-efficacy is also an important factor to consider in the learning of research methods.

2.3.2 Self-determination Theory of Motivation

Common to many theories built around the concept of motivation is the distinction between intrinsic and extrinsic motivation. One of the main motivational theories that make this important distinction is the Self-Determination Theory (SDT) proposed by Deci and Ryan (1985). The theory splits motivation into three types: Amotivation, Intrinsic Motivation and Extrinsic Motivation. Students who are amotivated lack the motivation to act, and their actions are not self-determined. Intrinsic motivation, in turn, refers to a person's ability to do things that interest them and meet their personal desires for individuality and competence (Ryan & Deci, 1985). Finally, extrinsic motivation is a drive to behave in certain ways that comes from external sources and results in external rewards. Examples of such sources are grade schemes, priorities, rewards, and recognition and appreciation from others. The self-determination theory differentiates between four extrinsic motivational styles that reflect a continuum from most externally controlled to internally controlled or self-determined (See Figure 2.2 for model).

Central to the theory is the belief that individuals have innate psychological needs towards competence, relatedness and autonomy (Ryan & Deci, 2000). It is these conditions that foster individuals' motivation and engagement. Autonomy refers to an individuals' need to feel in control of their behaviour when students initiate and regulate their behaviours with a sense of choice (Deci & Ryan, 1985). Competence refers to the need for students to feel like they are capable and can master tasks. Students with a sense of competence seek out challenges. Ryan & Deci, 2000). Relatedness is the need to establish a sense of belonging and attachment with others; when related, students feel emotionally connected (Baumeister & Leary, 1995; Ryan & Deci, 2000). According to Deci and Ryan (1985), individuals seek optimum stimulation and challenging tasks, finding these activities intrinsically motivating due to a basic need for competence. This intrinsic motivation is maintained only when individuals feel competent and are self-determined. The basic needs for competence and self-determination also play a role in more extrinsically motivated behaviour. According to the theory giving people extrinsic rewards for already intrinsically motivated behaviour can undermine autonomy. However, extrinsic motivators such as incentives or deadlines may also motivate individuals to complete a task they are not intrinsically motivated to do.

Previous research using the self-determination theory within educational contexts has found that self-determined sources of academic motivation, such as intrinsic and extrinsic motivation, are positively correlated with academic achievement (Guay et al., 2010; Jeno et al., 2018; Niemic & Ryan, 2009) and academic satisfaction (Miquelon et al., 2005; Ratelle et al., 2007). In contrast, less autonomous motivation has been linked to anxiety (Mouratidis et al., 2009; Ratelle et al., 2007) and negatively to academic achievement (Taylor et al., 2014) and well-being (Walls & Little, 2005).

Figure 2.2

The Self-Determination Continuum Showing Types of Motivation with Their Regulatory Styles, Loci of Causality, and Corresponding Processes

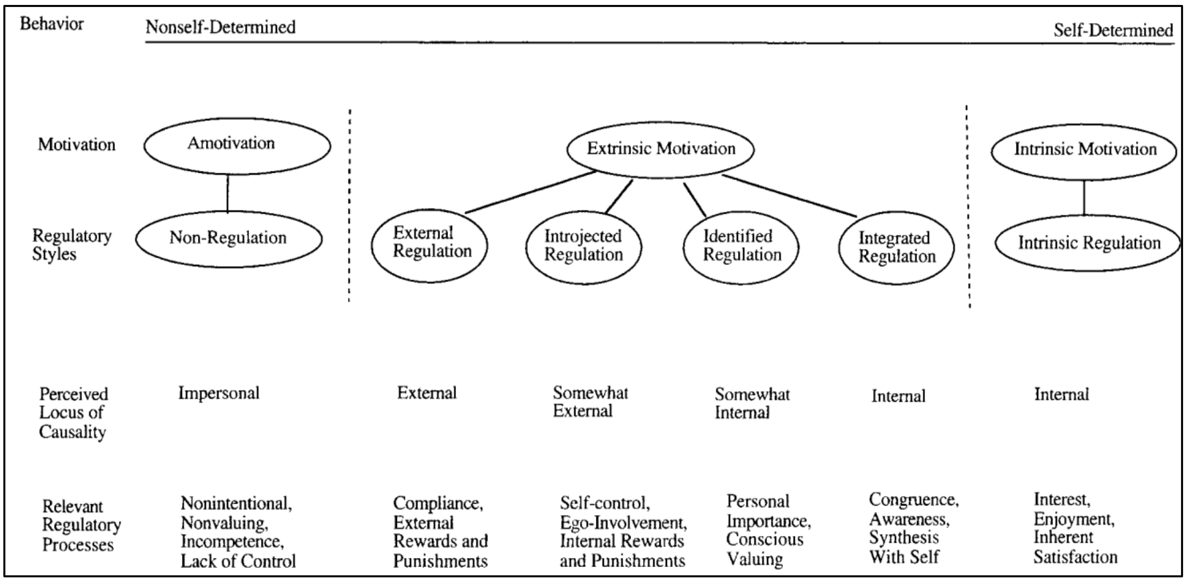


Figure Reprinted from Contemporary educational psychology, 25(1), Ryan, R. M., & Deci, E. L, Intrinsic and extrinsic motivations: Classic definitions and new directions, 54-67., (2000) with permission from Elsevier.

2.3.3 Expectancy-Value Theory of Motivation

The Expectancy–Value Theory (EVT) is another long-standing perspective on motivation. According to this theory, individuals' motivation and success can be explained by their expectations of how well they can perform and how much they value the activity (Atkinson, 1957; Wigfield, 1994; Wigfield & Eccles, 1992), with the theory emphasising the importance of having a reason for conducting tasks.

The expectancy component of the module is defined as the broad belief in one's competence in a particular area and is tied to the concept of self-efficacy. Eccles and colleagues (2015) defined different components for the value part of the model: 1. *Attainment value* or importance is the personal importance of doing well on a task and how it relates to an individual's identity (e.g., positive self-worth). 2. *Intrinsic value* is similar to that of self-determination theory and refers to the enjoyment an individual gets from undertaking a particular task. 3. *Utility value* or usefulness refers to how a task fits into an individual's plans, for instance, taking a research methods class to fulfil a requirement for a psychology degree. *4. Cost* is conceptualised in terms of negative aspects of engaging in an activity, for example how the cost of engaging in one activity limits engagement in another activity, (e.g., prioritising university work over spending time with friends), the emotional cost of an activity such as anxiety or fear of failure and the amount of effort needed to succeed. Hence, the expectancy-value theory is similar to the control value theory, as both theories acknowledge the intrinsic or extrinsic reasons for valuing an activity and the influence of one's beliefs in their competencies, which can be compared to the control part of the CVT.

The EVT predicts that students will put more effort into activities that they simultaneously perceive to have value and expect to succeed (Wigfield & Eccles, 2000). Previous research also suggests that expectancies and values interact to predict important outcomes such as engagement, continuing interest, and academic achievement (Durik et al., 2015; Nagengast et al., 2011).

2.3.4 Achievement Goal Theory of Motivation

A slightly different view of students' motivation can be seen in goal theories of motivation, focusing on students' constructions of the meaning of success and the goals they strive to achieve. Several different approaches within the goal theories exist, with an important advance in this field being *achievement goals*, which refers to individuals' motivation for engaging in achievement behaviour and how a person responds to these achievement situations (Linnenbrink & Pintrich, 2002). These goals can guide and direct students' achievement behaviour, and they can influence how students approach learning and performance in a classroom setting (Elliot & McGregor, 1999a; Harackiewicz et al., 2000). The achievement goal theory makes a distinction between mastery and performance goals. *Mastery goals* are characterised by students' demand for increasing their competence and comprehension of the learning content and the desire to develop and gain skills and knowledge (Covington, 2000; Heyman & Dweck, 1992; Zimmerman, 2008). The value is placed on the process of learning itself; thus, this can be compared to intrinsic motivation.

Consequently, when holding a *performance goal,* individuals judge their competence by comparing themselves to others. Performance goals are divided into *performance-approach* and *performance-avoidance* goals. When students pursue performance-approach goals, their concern is to be judged capable, outperform others, and obtain good judgment about their competence. In contrast, performance-avoidance goals concern disengagement in order not to appear worse than others (Covington, 2000).

As mastery goals are defined by students' desire for knowledge, this can be broadly compared to notations of intrinsic motivation/value as defined by the SDT and EVT.

Performance goals, in turn, can be compared to extrinsic motivation or utility value. Indeed, mastery goals have been found to be correlated with intrinsic motivation, whereas both performance approach and avoidance goals have been correlated with extrinsic motivation (Ryan & Deci 2000).

Performance avoidance goals have also been associated with surface approach (Coutinho & Neuman, 2008; Elliot & McGregor, 2001), higher levels of test anxiety (Elliot & McGregor, 1999; Hannon, 2012) as well as lower academic achievement (Harackiewicz et al., 2008; Hulleman et al., 2010; Van Yperen et al., 2014), lower intrinsic motivation (Elliot & Church, 1997; Elliot & Murayman, 2008). Mastery goals have in turn been associated with a deeper level of information processing (Pintrich, 2004), more cognitive engagement in a task (McGregor & Elliot, 2002), use of more metacognitive and self-regulating strategies (Meece et al., 1988; Cellar et al., 2011), as well higher academic achievement (Alhadabi & Karpinski, 2020; Vansteenkiste et al., 2004; Zusho et al., 2003).

Overall, common to all of these theories of motivation is the belief about competence. As such, although defined slightly differently in these various theories, the theories all address the same broad question of "Can I?', with the question being more (self-efficacy theory) or less (expectancy-value theory) specific and task-orientated depending on the theory. Another common aspect of all these theories is the beliefs about value. This refers to students' reason for choosing to do a task. These include task-specific value or the broader terms of the value of the outcome of the task, as well as the intrinsic and extrinsic values of a task. This aspect of the theories can be seen to address the broad question of "Why do I want to complete a task/learn?". These two themes are also central in the control-value theory, with control referring to students' expectations of competence and value referring to student reasons for doing a task.

2.3.5 Self-Regulation of Learning and Metacognition

As suggested by the theories above, students' self-efficacy values and motives can be either more general or linked to a specific feature of learning, such as the desire to self-regulate one's learning. There are various definitions of self-regulated learning (see Boekaerts & Cascallar, 2006; Zimmerman, 2002) with a domain of "learning approach" research encapsulated by the umbrella term 'Self-regulated Learning (SRL). However, reviewing the extensive literature on SRL is beyond the scope of this chapter, and thus this will only cover a general definition of self-regulated learning and those aspect that are relevant for this thesis.

Zimmerman (2002) described self-regulated students as meta-cognitively, motivationally, and behaviourally active in their learning processes and achieving their own goals; thus, self-regulated learning is directly connected to motivation and students' learning approaches. A distinction can be made between self-regulation processes, such as self-efficacy perceptions, and techniques designed to optimise these processes, such as goal setting. *Goal setting* involves establishing standards or objectives to guide one's actions and enhance self-regulation through its effects on motivation and self-efficacy (Schunk & Ertmer, 2000). *Self-efficacy for self-regulation* reflects an individual's perceptions and belief in his or her capabilities to use various learning strategies, resist distractions and complete study relevant tasks. Furthermore, close links between *metacognition* and self-regulated behaviour (Dignath et al., 2008; Zimmerman & Martinez-Pons, 1990) have also been made. This refers to the learner's ability to think consciously about their cognition and have control over their cognitive processes (Zimmerman, 1989), which is linked to the learner's ability to track, plan, organise, and assess their learning.

To some extent, all learners use regulatory processes, but a self-regulated student has sensible task-related goals, can maintain motivation and takes responsibility for their learning. These students can also vary their strategies to accomplish academic tasks, meaning that they can monitor their strategy use (Heikkilä & Lonka, 2006). Thus, *Self-regulated learning* describes the process of taking control of and evaluating one's own learning and behaviour. Self-regulated learning has been measured in a myriad of ways, with the research generally indicating that self-regulated learning is positively associated with academic performance (Heikkila & Lonka, 2006; Postareff et al., 2014; Pintrich & de Groot, 1990; Richardson, 2012.; Zimmerman & Martinez-Pons, 1990). Therefore, self-regulation is also an important factor that needs to be studied in the learning of research methods.

2.3.6 Motivated Strategies for Learning

A measure that incorporates motivation, self-efficacy and self-regulated learning was proposed by Pintrich (Pintrich & de Groot, 1990) and is called the Motivated Strategies for Learning Questionnaire (MSLQ). The MSLQ is based on a general social-cognitive view of motivation and learning strategies. The student is viewed as "an active processor of information whose beliefs and cognitions mediate important instructional input" (Pintrich et al., 1993, p.801).

The MSLQ is composed of two primary sections: Motivation and Learning Strategies. The motivational scales are based on achievement goal theory and expectancy value theory and measure components categorised into three general constructs: Value, Expectancy, and Affect. Value components focus on why students engage in an academic task and the value given to the task. Three of the sub-scales in the MSLQ measure value beliefs: *intrinsic goal orientation,* which focuses on learning and mastery, *extrinsic goal orientation*, which focuses on grades and seeking approval from others, and lastly, *task value beliefs*, which refers to students' judgments of how interesting, important or useful the course is. The expectancy components refer to the students' beliefs that they can accomplish a task. This part consists of two scales. The first scale refers to judgments of one's belief that outcomes depend on effort and ability *(control beliefs of learning)*. The second scale refers to the confidence and judgement of one's skills to perform a task successfully (*self-efficacy)*. The third general motivational construct is affect measured in terms of responses to a test anxiety scale (Pintrich et al., 1993).

The learning strategies section of the MSLQ consists of three general types of scales: cognitive, metacognitive, and resource management. The cognitive strategies scales can be compared with the concepts of Deep, Surface and Strategic learners and include students' use of strategies for the processing of information during learning. The second general category is metacognitive control strategies, measured by one large subscale related to using strategies to control and regulate cognition. This subscale is called the Meta-cognitive self-regulation scale and includes planning (setting goals), monitoring (of one's comprehension), and regulating (e.g., adjusting reading speed depending on the task). The resource management category assesses students' ability to manage their environment, for example, time and study regulation and effort regulation. The MSLQ also includes other scales related to students' resource management and the use of other peers in learning (Pintrich et al., 1993).

The MSLQ was developed with the scales used together or separately and was designed to be used with post-secondary students. Data presented in the manual (Pintrich et al., 1991) are based on a sample of 380 American college students from different courses, with 125 (32.9%) psychology students. The scale's correlations with final grade were deemed to be mostly significant, although ranging from small to moderate (r=.13-.41). The MSLQ, either in its entirety or sub-scales, has been used to study university students in a wide variety of countries (Credé & Phillips, 2011), and in different contexts, such as undergraduates studying statistics (Bandalos et al., 2003), chemistry (Zusho et al., 2003) and engineering (Vogt et al., 2003). In 2011, a meta-analysis by Credé and Phillips identified 67 studies that had used the MSLQ across 19,900 college students, with the results indicating that the subscales of the MSLQ vary in their ability to predict grades, with coefficients ranging from moderate (.40) to non-significant (.05), with the highest coefficients being found for the meta-cognitive self-regulation scale and effort regulation scale. Given that many other factors not measured by the MSLQ, such as skills, previous knowledge and IQ, and the fact that course grades are not always the best way to measure learning and performance, these moderate and significant correlations seem reasonable.

2.3.7 Empirical Evidence of Motivation, Self-Regulated Learning and Self-Efficacy in Psychology Learning

In terms of psychology students' learning and motivation, both the MSLQ and other motivational measures have been used in many studies (e.g., Balloo et al., 2016; Daniels et al., 2008; Van Den Boom et al., 2004). For example, in a study by Hofer and Yu (2003), the impact of an undergraduate psychology course designed to teach students to be self-regulated learners was evaluated by looking at the relationship between motivation and cognition, as measured by the MSLQ. The study found that intrinsic goal orientation was positively correlated with deep processing (r = .26) and metacognition (r = .42). Self-efficacy was also correlated with deep processing (r = .30). Extrinsic goal orientation was positively correlated with metacognition (r = .28), as well as memorisation strategies (r = .35) and the final course grade (r = .25).

In another study (Harackiewicz et al., 2000), students' achievement goals were measured during an "Introductory to Psychology" course to predict interest and performance over time using an adapted version of the MSLQ motivation scales. The results showed that Mastery goals (intrinsic motivation) positively predicted subsequent interest in the course, but not course grades. Furthermore, mastery goals also predicted subsequent enrolment in psychology courses, whereas performance goals predicted long-term academic performance. Performance goals also positively predicted course grades but not interest. The author suggested that these findings could be explained by university success depending on both performance and interest, with motivation playing a different role in each. It was suggested that the optimal goal adoption pattern may include both mastery and performance goals because neither type of goal predicted both outcomes. However, more research is needed to explore whether these findings would extend beyond the first year of undergraduate study and during research methods modules.

In addition, a study investigating psychology students' performance in two sets of introductory statistics classes found the motivational factors to be significant in predicting performance (Lalonde & Gardner, 1993). A motivational intensity scale designed to measure motivation to study statistics was significantly correlated to both the number of assignments submitted ($r = .39$), second term exam score ($r = .31$) and final grade ($r = .32$). The authors concluded that motivation along with attitudes and anxiety are important predictors of performance. However, Lalonde and Gardner made no attempt to consider different forms of motivation, such as extrinsic and intrinsic motivation, and only measured motivation in relation to statistics and not research methods in general. Thus, more research is needed to understand the possible influence of both intrinsic and extrinsic motivation in research methods learning.

Furthermore, Balloo et al. (2016) investigated psychology undergraduates' development of research methods knowledge and skills. The self-efficacy for performance and learning, and the meta-cognitive-self-regulation scale from the MSLQ were used amongst various measures such as test and statistics anxiety, strategic and surface approach to learning. The study found that students' development of research methods knowledge was significantly positively correlated with both performance self-efficacy ($r = .33$), and metacognitive self-regulation ($r = .31$), and knowledge change with strategic learning ($r = .37$). This finding emphasises the influence of self-efficacy and self-regulation for research methods learning. However, although this study followed students' research methods knowledge development across three years, the psychological correlates were only measured once (during the first year).

As such, it is not possible to make any causal inferences, as it is possible that an increase in knowledge resulted in a change in self-efficacy and self-regulation factors rather than the other way around. Moreover, the study did not explore nor measure the interactions and relations between self-regulation, self-efficacy, and learning approaches specifically.

Thus far, the present thesis has argued that emotions, learning approaches, motivation, self-efficacy and self-regulation all play an important part in students' learning development and academic achievement. The chapter now moves on to consider the interplay and possible combined influence of these factors on learning and especially research methods learning.

2.3.8 The Interplay Between Motivational Constructs, Learning Approaches and Emotions

The role of motivation is often highlighted within learning approach theories (Cassidy, 2004). Previous theories focusing on the relationship between motivation and learning approaches have generally associated intrinsic motivation with deep learning and extrinsic motivation with surface learning (Newble & Entwistle, 1986; Prat-Sala & Redford, 2010). This is unsurprising given that many behaviours are associated both with intrinsic motivation and deep learning, such as inherent interest in the learning tasks. In addition, students with intrinsic motivations, high self-efficacy and task value beliefs usually engage in deep approach strategies and metacognitive regulation (Guay et al., 2010a; Pintrich et al., 1991). However, students who hold less adaptive motivational beliefs such as extrinsic motivation or performance-approach goals may turn to a surface approach to achieve minimum standards and course requirements (Crumpton & Gregory, 2011; Fenollar et al., 2007; Lange & Mavondo, 2004).

There is also some evidence for the relationship between self-efficacy and approaches to studying (Liem et al., 2008; Spada et al., 2006), with self-efficacy being negatively correlated with the surface approach and positively to deep and strategic approaches.

Furthermore, the connection between students' motivational and emotional experiences has also been made. For example, completing an educational task for intrinsic reasons is associated with positive affect (Lovoll et al., 2017; Putwain et al., 2018; Simonton & Garn, 2020), as well as enjoyment and interest (Black & Deci, 2000), and negatively correlated to negative affect (Walls & Little, 2005) and anxiety in class or during exams (Mouratidis et al., 2009; Ratelle et al., 2007). In contrast, extrinsic motivation has been correlated with both emotions (Pekrun et al., 2011) and anxiety (Ratelle et al., 2007) and negatively to academic well-being (Walls & Little, 2005). Learning-related enjoyment has also been connected with students' sense of being able to master the task. The intensity of these emotions is related to the task's perceived difficulty (Pekrun et al., 2002). For instance, students often report high positive affect when a perceived high challenge is combined with high self-efficacy beliefs. (Lonka & Ketonen, 2012).

These links between emotions, learning approaches, self-regulation and motivations have also been found in the previously mentioned control-value theory framework, with positive emotions positively correlating with self-regulation, motivation and learning strategies among university and school students (Pekrun et al., 2019). The model posits a bi-directional link between emotions and motivation and that students' emotions influence their self-regulated learning and motivation, which, in turn, affects academic achievement (Pekrun et al., 2006).

Similar to the expectancy-value model by Eccles and Wigfield (2002), the perceived control and the subjective value of the activities and outcomes play an important part in the model and are seen as antecedents for students' emotions. The control-value theory suggests that subjective personal control and a high level of personal relevance are related to greater positive affect. In contrast, the effect of value, particularly on negative emotions, seems to be more ambiguous. The theory suggests that intrinsic value is positively related to positive emotions such as enjoyment. However, extrinsic value has also been positively related to both positive emotions, such as pride, and negative emotions, such as anxiety (Pekrun et al., 2011). These findings can be explained by the model making distinctions between types of negative emotions and not assuming one-directional effects exclusively. Thereby, students' motivations might, on the one hand, be the antecedents of emotions, and on the other hand, be influenced by these emotions. For example, students might judge their competencies more favourably and might be more motivated to study when they experience positive academic emotions. (Goetz et al., 2006). Consequently, some negative emotions like shame and anxiety can instead weaken intrinsic motivation and influence extrinsic motivation to avoid failure (Pekrun et al., 2002). Thus, there seems to be an important relationship between emotions and motivation, with more research needed to identify the relationships between emotions and achievement goals.

Some recent attempts have been made to explore the interrelations between cognition, motivation and emotions amongst university students. For example, Asikainen et al. (2018) explored the relationships between self-regulated learning, achievement emotions, psychological flexibility and study success during university studies. The findings of correlations and path analyses showed that there was a strong correlation between students' emotions and self-regulation, with emotions appearing to mediate the effect of self-regulation on study success.

Furthermore, a study by Mega, Ronconi and De Beni (2014) linked emotions, self-regulated learning, and motivation to academic achievement by using the control-value theory, which was conducted with 5,805 Italian undergraduate students. The results of structural equation analyses showed that students' emotions were correlated with their self-regulated learning and motivation and that these, in turn, affected academic achievement. The authors concluded that self-regulated learning and motivation mediate the effects of emotions on academic achievement. Furthermore, it was also suggested that the role of positive emotions was important, as students' positive emotions particularly affected their organisation of academic study time and summarisation of study materials. Positive emotions were also found to positively affect students' evaluation of learning and performance, strategic preparation for exams, and metacognitive reflection during their study. Furthermore, positive emotions were seen as having a greater impact on self-regulated learning and motivation than negative emotions. These results highlight the relevance of emotions to self-regulatory strategies and motivation to learn, reinforcing the premise that research on students' affect should move towards including a broader range of emotions experienced in academic settings.

However, as can be seen from the studies reviewed here, emotions alone are not enough to predict academic achievement. The evidence suggests that *motivational, learning approaches, self-regulation and self-efficacy* all have important connections with *emotions* and that these variables have a pertinent role in learning. Therefore, more research is needed to understand how these variables interact and shape learning in a research method setting, with longitudinal exploration providing an opportunity to explore and compare the development of these factors across several academic years. Up to now, only a few studies have explored these variables together, with only one study conducted in a research-methods setting (Balloo et al., 2016), with this study lacking in the measurement of a broad range of emotions and any interactions between these variables.

Another limitation of the studies reviewed here is their use of self-report questionnaires to assess learning. Self-reports may be influenced by response biases and may not accurately represent actual behaviours or include real-time estimates of students' learning processes. Therefore, behavioural variables of learning should be studied together with self-reports of *achievement emotions, learning approaches, motivation, self-efficacy and meta-cognitive variables* in order to get more accurate estimates of students' learning. The impact of behavioural predictors of learning is discussed more in-depth in the next section.

2.4 Behavioural Factors Related to Learning

Learning is an active process, and as such students' actions and behaviours play a crucial role in learning. Students' learning behaviours are often referred to as behavioural engagement, which encompasses all actions or behaviours that students engage in the classroom and at university as well as during self-directed study outside of the classroom. This includes many different aspects of learning, for example attending classes, following classroom rules, online activity and interactions with peers and teachers (Finn & Zimmer, 2012), with no real definition of what counts as behavioural engagement.

Recent research has attempted to identify the significant behavioural predictors of learning performances through examining data from learning management systems, including attendance (Bevitt et al., 2010; Newman-Ford et al., 2008b, 2009), time spent online (Agudo-Peregrina et al., 2014; Cerezo et al., 2016) and scores on computer-assisted formative assessments (Tempelaar et al., 2015a, 2015b). This evidence demonstrates that attendance (Credé et al., 2010; Newman-Ford et al., 2008) and Virtual Learning Environment (VLE) activity (Boulton et al., 2018) can be used to evaluate students' learning behaviour and predict academic achievement, as such these will be reviewed next.

2.4.1 Attendance as a Predictor for Learning

Attendance is one of the most widely studied behavioural predictors of learning achievement. Although independent learning is one of the cornerstones of higher education and attendance is voluntary in many higher education institutions, it remains important for students' learning and academic success. Attending classes allows students to deepen understanding of key concepts and provides them with a forum for discussion and other activities to enhance their understanding. Furthermore, attending classes allows students to obtain information not contained in textbooks or lecture materials presented online and gives students a diverse learning environment. Although the debate around the relative effectiveness of different modes of instruction (e.g., lectures, seminar, computer labs video-based instruction) continues (Mayer, 2009; O'flaherty & Phillips, 2015), there is considerable evidence to suggest that lecture attendance and academic performance are significantly correlated (e.g., Bijsmans & Schakel, 2018; Doyle et al., 2008; Halpern, 2007).

For example, Woodfield, Jessop, and McMillan (Woodfield et al., 2006) investigated the causal relationship between attendance and degree outcomes of 650 undergraduate students at a UK university. Students' attendance was measured using end of year tutorial reports, with the percentage of absent seminars calculated for each student. The results showed that attendance was the strongest predictor of degree outcome, along with entry qualifications and student self-reported openness to experience scores. However, this study fails to consider the significance of attendance across the whole course, as lecture attendance was not measured.

Similarly, in another UK university, Colby (2005) explored the link between attendance and success in assessment on a first-year BSc computing module with a total of 178 students. Students' attendance was measured using signatures that were requested from them during lectures and seminars. A strong, positive relationship between student attendance and attainment in the module was found. Attendance over time during the semester was also linked to results and final degree success. These findings were replicated in another study at Durham University (Burd et al., 2006), but in this case, across all modules within a second-year computer science undergraduate course, using data collected on attendance and attainment over five years. The results showed a strong correlation between attendance and attainment for most of the modules and years.

In addition to these UK-based studies, several international studies have investigated the link between class attendance and final results, with an abundance of literature suggesting both a significant correlation between attendance and academic performance (e.g., Cortright et al., 2011; Marburger, 2006; Paisey & Paisey, 2004) as well as attainment at university (e.g., Clark et al., 2011; Kassarnig et al., 2017; Rodgers, 2001). In a meta-analysis (Credé et al., 2010), the relationship between class attendance in college and college grades was explored, with 90 independent samples and data from a total of 28,034 students. The results revealed that attendance has strong relationships with both class grade ($\rho = .44$) and GPA ($\rho = .41$) and explained around 14% of the variance in grades. The authors argued that a "unique effects model", in which there is a strong relationship between attendance and grades with only a weak role for student characteristics, offers the best explanatory value (p. 286).

These links between attendance, academic performance and outcomes has also been established within psychology classes (Thatcher et al., 2007; Van Blerkom, 1996; Wigley, 2009). For example, Van Blerkom (1996) investigated attendance and assessment outcomes in two psychology classes (N=140). The results showed significant correlations between attendance and assessment outcome ($r = .46$). Thatcher et al. (2007) investigated the link between attendance and academic performance in a cohort of 289 second-year cognitive psychology students, with attendance measured by students' signatures gathered during seven weeks of lectures. Statistically significant correlations were found between attendance and three academic assessments (a test, an essay, and the examination) and the final mark ($r = .18 - .28$).

However, not all studies have found these associations between attendance and academic performance (Büchele, 2021; St. Clair, 1999). For example, Eisen et al. (2015) found that non-attendance in learning sessions had no negative impact on study outcomes in their study of the value of attendance for second-year medical students' academic success. Several researchers have also commented that attendance may be linked to other forms of motivation and commitment (Gump, 2005; Marburger, 2006), with attendance seen as a "broad measure of active engagement" (Gracia & Jenkins, 2003) or as a measure of "students' motivations for learning" (Newman-Ford et al., 2008). Others, on the other hand, have suggested that attendance has effects on learning that are independent of students' abilities and motivation. For example, Romer (1993) found a statistically significant relationship between attendance and academic performance in undergraduate economics classes at three universities, even after adjusting for other potential factors such as motivation. Similarly, Stanca (2006) considered the influence of unobservable factors correlated with attendance, such as ability, effort, and motivation, and discovered that attendance had an important, positive impact on performance.

In these studies, attendance has been measured in several different ways, including self-report methods via questionnaire and students signing a register. Research (Woodfield, et al., 2006) has shown that these methods are not always entirely predictive of actual patterns of attendance and problems with data collection arise from students not signing in, students signing in their peers, and illegible signatures (Colby, 2005). However, in recent years there has arguably been an impact from the increased availability of technology, with electronic attendance monitoring systems becoming more common, especially in UK universities.

For example, Newman-Ford et al. (2008, 2009) explored factors affecting performance for 748 students over 22 compulsory first-year modules at the University of Glamorgan. The results of the study revealed a clear and statistically significant connection between attendance and academic achievement. According to the results, the more often students attended classes, the less likely they were to fail academic tests and the more likely they were to receive good grades. Another study (Bevitt et al., 2010) used a centralised system monitoring attendance and performance among first-year students in Biomedical Sciences at a UK University. The findings showed that level of attendance at non-lecture classes was a predictor of academic achievement and that an early intervention strategy was associated with improvements in attendance. Attendance monitoring has also been highlighted in several reports as a useful tool in improving student retention (Bowen et al., 2005; Martinez, 2001).

However, while many of these studies suggest that attendance is an important factor for students' learning and provides positive educational outcomes, few have investigated measured attendance alongside other behaviour variables. Students simply being present in a class on its own does not represent students' learning engagement or behaviour fully. In order to make more in-depth and detailed predictions of students' learning-related behaviour and achievement, research has started to look towards learning analytics and the use of VLEs.

2.4.2 Behaviours in Virtual Learning Environments and Their Role in Learning Achievement

Technology-mediated online learning experiences are becoming increasingly popular. The past two decades have seen a rise in various forms of "flexible" education, ranging from purely distant online learning to blended learning, involving a mix of online and face-to-face teaching (Oliver & Trigwell, 2005).Given the rise in interest for such forms of learning, more and more educational institutions have introduced VLEs alongside traditional face-to-face teaching.

VLEs are defined as online learning technologies to create, manage, and deliver course material (Turnbull et al., 2020). These include platforms such as Blackboard Learn, Moodle and Canvas. VLEs provide students with convenient access to different online tools such as peer discussion forums, lecture recordings and online quizzes, and access to teaching materials and assessment information. The rise of use in these online systems has led to the emergence of a new field of research called "Learning analytics," which involves analysing data about learners and their activities to inform teaching and learning practices (Long & Siemens, 2011). Using VLE data, researchers can gain an in-depth understanding of what, when and how students engage in their learning and ultimately get a better understanding of their learning behaviour. For example learning analytics studies have used data generated from learner activities, such as the number of clicks (Kuzilek et al., 2015), learner participation in discussion forums (Macfadyen & Dawson, 2010) and the viewing of lecture recordings (Gardner, 2020) to explore students' engagement and learning. Previous studies have also established strong correlations between VLE engagement (Agudo-Peregrina et al., 2014; Boulton et al., 2018; Cerezo et al., 2016) and academic success.

For instance, in an early study, Morris et al. (2005) examined student engagement and behaviour in several online courses using student access computer logs. The results showed significant differences in online participation between students who withdrew and students who completed their studies and between successful and non-successful completers, with 31% of the variability in achievement accounted for by the students' online behaviour. More recent research has also established similar correlations between engagement in online learning activities and academic performance, with VLE activity accounting for a significant amount of variance in module grades in online and blended learning courses (Agudo-Peregrina et al., 2014; Cerezo et al., 2016; Kuzilek et al., 2015). For example, Nguyen et al. (2018) investigated students' timing of engagement with the use of VLE data and found that high-performing students not only studied harder (i.e. spent more time on task) but also smarter (i.e. spent more time studying in advance) than low-performing students. However, less research has found these connections in traditional face-to face-based universities where VLEs are used as a supplement to teaching.

In a face-to-face-based learning university (Boulton et al., 2018), the relationship between students' VLE activity and module grades was explored for students in 38 different modules. The findings showed that high VLE activity was associated with high grades, but low activity was not associated with low grades. More specifically, the majority of students interacted very little with the VLE and still received good grades. The overall correlation between VLE activity and module results was relatively small (r_s =0.26). However, when students were grouped into high and low performances, a stronger correlation between VLE usage and module results in students with grades below 40% ($r_s = 0.50$) compared to students with grades above 40% ($r_s = 0.30$) was found. These findings indicated that VLE usage can predict learning performance in some settings, such as online courses. However, students' engagement with learning at a face to face dominant course is hard to determine due to the predominance of other offline on-campus activities.

These results are consistent with the findings of Agudo-Peregrina et al. (2014), who compared the role of VLE in academic achievement between online courses and traditional university courses with face-to-face teaching supported by VLE. For the online courses, the study yielded several significant interactions between VLE activity and academic achievement; however, for face-to-face teaching, no such correlations could be found. Furthermore, even less research has been conducted combining VLE and attendance monitoring system data, with the exception of a very recent study by Summers et al. (2020). This study explored the attendance and VLE activity of first-year undergraduate students at a face-to-face teaching-based University in the UK, with regression results showing that early measures of attendance and VLE activity were important predictors of students’ end of year results. The main weakness in Summers study was that only parts of students' VLE behaviour were subjected to a regression analysis, and as such, the results only show students’ interaction with assessment materials and online quizzes and not their whole VLE activity. This study also does not measure VLE activity or attendance past the first year limiting the longitudinal exploration.

Taken together, these studies support the notion that VLE data can improve our understanding of students' learning performance and behaviour. VLE data can also give us a more nuanced understanding of students' learning by assessing students' behavioural changes and activity instead of assessing the cognitive achievement in the learner alone. However, the evidence of the effectiveness of VLE in traditional campus-based settings are mixed, with student behaviour seen as a complex and multidimensional construct. A way of further understanding students' learning behaviour is by exploring the usage of VLEs longitudinally across several academic years to establish possible causal relationships with academic achievement. A second opportunity is to combine the detailed behavioural information gained from VLEs with other behavioural measures such as class attendance and self-reported data from other factors important for learning, such as emotions. The combined influence of these factors will be reviewed next.

2.5. The Combined Effect of Emotional, Cognitive, Motivational and Behavioural Variables on Learning

As can be seen, there are large individual bodies of literature on emotional (i.e. achievement emotions, statistics' anxiety, test-anxiety), cognitive/meta-cognitive (i.e. learning strategies, self-regulation), motivational (i.e., Intrinsic/extrinsic and self-efficacy) and behavioural (i.e., attendance and VLE activity) engagement. However, these studies remain narrow in focus, dealing only with one or two of these aspects, with more integrative research lacking. To the best of my knowledge, no single study exists that explores affective, cognitive and behavioural variables in a psychology research method setting.

Some researchers have noted that using solely learning analytics data to assess students' learning may have drawbacks (Buckingham Shum & Deakin Crick, 2012).These researches argue that we have a weak understanding of what learning analytics data means without first understanding the students' intent for using these analytic systems (Boyd & Crawford, 2012). Learning analytics may only tell us what students click and view online and for how long, but without giving any deeper understanding of students learning (Scheffel et al., 2014). To address these potential problems, it has been suggested that learning analytic techniques should be combined with other techniques such as self-reported measures to better understand the links between learning and learning analytics (Buckingham Shum & Crick, 2012).

An integrative framework called the Dispositional Learning Analytics (DLA) framework was proposed by Buckingham Shum and Deakin Crick (2012). This framework combines learning data from VLEs and other learning analytic software with students' dispositions, such as beliefs and behaviours, as assessed by self-reported surveys. These learning dispositions include characteristics that affect learning processes and can include affective, behavioural, and cognitive facets (Tempelaar et al., 2018a). Despite the suggestion of possible benefits of this area of research, only a few studies have attempted to combine both learning analytics data and other measurements, such as self-reports, to predict achievement. Most empirical studies exploring these concepts have been conducted by Tempelaar and Rienties, either in blended -learning or fully online settings (e.g., Tempelaar et al., 2012, 2015a, 2015b, 2018a, 2018b, 2020, 2021).

For example, Tempelaar et al. (2015a) explored the learning of 922 Economic and Business school undergraduate students on an introductory quantitative methods module delivered through blended learning. The researchers used a dynamic, longitudinal perspective to predict students' performance and captured both VLE data and learning disposition. In the study, learning dispositions of three different types were included: learning styles, learning motivation and learning emotions, measured using the AEQ. The results indicate that computer-assisted formative maths and statistics tutorials were the best predictors for detecting underperforming students and academic performance. Basic VLE data such as the number of clicks per week only explained 4% of the variance. Learning dispositions were better predictors of students' performance than VLE data alone. However, this was only until data from online formative assessments were taken into account, at which point these were the best predictor of academic achievement. The predictive power of learning emotions was harder to establish because they were measured during the middle of the course and, as such, were best viewed as a mixture of disposition and outcome of the learning process. Similar results were found in a follow-up study with two cohorts of business and economic students (Tempelaar et al., 2015b). Tempelaar's later studies have instead found that learning disposition data, such as emotions, motivation and self-regulation, can predict VLE activity and tools (Tempelaar 2018a, 2018b). Based on their results, the authors noted the need to move beyond simple engagement metrics, with DLA providing a "bridge between learning analytics and educational interventions" (Tempelaar et al., 2017,p.1).

Another study within the DLA literature was conducted by Ellis et al. (2017) and explored the learning approaches and digital resource interactions of 290 engineering students on a blended learning course. The study's findings showed that these measures predicted 34% of the variance in grades. However, the interactions with online learning tools accounted for more than double of the variance (25%) than students' reporting their learning approaches (9%). These results supported Tempelaar et al.'s finding that behavioural variables are a better predictor of academic achievement than self-reported measures of psychological correlates. Connections between VLE usage and learning approaches have also been made in further studies with strategic and deep approach associated with higher VLE activity (Hoskins & Van Hooff, 2005; Knight, 2010) and more positive views towards VLEs (Buckley et al., 2010). However, these studies have mainly been aimed at evaluating the design of VLE environments and not learning outcomes.

Few studies within the DLA literature have been conducted in traditional face-to face-based modules where VLEs resources supplement and facilitate teaching. This "supplement" approach is common in UK universities, where VLEs are often used as a repository of materials and is seen as useful for administrative purposes and to give students access to information (Conole & Dyke, 2004) . While the studies by Ellis and Tempelaar et al. take into account both self-reported components and VLE activity, these studies were conducted in blended-learning environments where teaching was split between online and face-to-face, involving a different kind of learning engagement than traditional courses. For example, it has been shown that graduate students in online modules reported significantly higher levels of technology-related anger, anxiety, and helplessness than on-campus students (Butz et al., 2015). Similarly, Stephan et al. (2019) found that students who attended online courses reported higher levels of negative emotions but less enjoyment than students attending on-campus modules. These studies also leave out an important part of students' learning behaviour and experiences, namely attendance.

Additionally, although most of Tempelaars' studies were conducted in (quantitative) research methods classes, these findings might not be entirely comparable to psychology students' learning of research methods, as previous research indicates that psychology students often see research methods modules as the most challenging part of their degree (Barry, 2012). Unlike business and economic courses, where the prevalence of statistics might be expected, psychology students often fail to see the relevance of statistics for their degree (Murtonen et al., 2008; Ruggeri et al., 2008), with statistics anxiety widely spread among students (Onwuegbuzie & Wilson, 2003). It is also this part of research methods learning that has received the most attention (Bourne, 2018a; Onwuegbuzie & Wilson, 2003; Ruggeri et al., 2008), with less research focused on the influence of other emotional and cognitive variables. Thus, the current thesis aims to fill this gap and bring together separate lines of learning analytics, emotional, motivational, and cognitive research and combine different data sources to explore psychology students' research methods learning.

A point of convergence with the literature on *student engagement* should be made, which is a multidimensional or "meta"-construct that includes the three dimensions of emotional, cognitive and behavioural engagement and covers various aspects of students' learning (Christenson et al., 2012; Fredricks et al., 2004). In recent years, students' engagement has received a lot of coverage in a variety of educational settings (e.g., Carmona–Halty et al., 2018; Kahu & Nelson, 2018). Engaged students have been shown to have higher academic achievement (Fredricks et al., 2004; Hughes et al., 2008; Ladd & Dinella, 2009) and be less likely to leave their studies (Lonka & Ketonen, 2012).

However, there is some disagreement about the construct's exact definition and scope. One major issue is the lack of distinction between the state of engagement, its antecedents, and its implications. Furthermore, there is significant variance in the construct's meanings, naming, and operationalisation (see Appleton et al., 2008). Behavioural elements (i.e. participation in learning activities) are usually included in all meanings, and many often include emotional components (i.e. positive and negative feelings). Many concepts also include a cognitive dimension (i.e. attitudes, values, and learning strategies) in addition to behavioural and emotional aspects (Fredricks et al., 2004). However, while most conceptualisations agree on the multidimensionality of engagement, to date many studies have only examined one or two dimensions of engagement simultaneously (Fredricks et al., 2004; Li et al., 2010). A few studies within blended-learning environments (Tempelaar et al., 2015a, 2015b), online courses (Hewson, 2018; Pilotti, 2017) and school environments (Ben-Eliyahu et al., 2018; Li & Lerner, 2013) combine all three.

Pekrun and Linnenbrink-Garcia (2012) also offered their opinions on students' engagement and suggested engagement mediates the relationship between emotions and learning. They believe that academic emotions affect students' engagement and achievement but that achievement results can influence appraisals and emotions in the opposite direction. Academic emotions, their antecedents, and their consequences are thought to be related over time through reciprocal correlation, which means that emotions influence students' engagement, and engagement influences students' emotions. For example, the enjoyment of learning can facilitate students' engagement via their influence on self-regulation and learning strategies, as outlined earlier. Self-regulated involvement with tasks may, in turn, promote students' enjoyment, suggesting reciprocal linkages. Similarly, emotions can influence students' motivational engagement, with these motivations and goals, in turn, influencing emotions (Linnenbrink & Pintrich, 2002). In summary, although the concept of *student engagement* is not a focus in this PhD thesis, by exploring the influence of *emotional, cognitive* and *behavioural* variables on students' academic performance, student engagement can also be indirectly explored.

2.6. Chapter Conclusion

In sum, the current literature review indicates that affective, cognitive and behavioural variables are all influential in students' learning. Firstly, the review showed that emotions are an important correlate for learning (e.g., Artino & Jones, 2012; Forgas, 2000; Mega et al., 2014; Pekrun et al., 2011), with students shown to experience a wide range of emotions in different academic settings. The review of the empirical studies generally provided support for a positive relationship between positive emotions and academic achievement. However, the relationships between negative emotions and academic achievement are more complex (Artino et al., 2012; Mega et al., 2014; Pekrun et al., 2011). The existing research also indicates that emotions can facilitate students' learning behaviour, achievement and long-term academic development and are important facilitators of successful studying in various ways (e.g., Pekrun, 2019; Pekrun & Linnenbrink-Garcia, 2012). However, only a few of the studies explored the effect of a broader range of emotions on academic performance. In the case of research methods, studies have mainly been focused on negative emotions such as test and statistics anxiety (e.g., Bourne, 2018a, Macher et al., 2012, 2013, 2015, Ruggeri et al., 2008).

Past research has also identified several cognitive and meta-cognitive variables important for psychology students' academic achievement, namely motivation (Zusho et al., 2003, Credé & Phillips, 2011), self-efficacy (Eccles & Wigfield, 2002, Richardson, 2012) and self-regulation (Pintrich & de Groot, 1990; Balloo et al., 2016). Furthermore, students' learning approaches have been identified as important correlates of learning and linked with emotional variables (Trigwell, Ellis, & Han, 2012; Postareff et al., 2016). Similarly, relationships with motivational constructs such as intrinsic and extrinsic motivation (Pekrun et al., 2007b; Mega et al., 2014), self-regulation (Asikainen et al 2018; Pekrun et al., 2011), self-efficacy (Eccles & Wigfield, 2002; Lonka & Ketonen,2012) and emotions have been found.

This thesis' literature review also identified several gaps in the literature, with most of the studies exploring a single aspect of students' learning and finding small to moderate correlations. A few studies have analysed links between emotions, motivation and self-regulation (Mega et al., 2014). Others have explored emotions and learning approaches (Postareff et al., 2017; Trigwell et al., 2012). However, so far, no one has investigated the role of achievement emotions, self-regulated learning, learning approaches, and motivations together in a research method setting.

This supports the need to study these concepts together within a framework of learning, such as the control-value theory, in order to explore when the effects of emotion on learning are direct and when they are mediated by cognitive or metacognitive factors such as motivation, self-regulation, self-efficacy as well as learning approaches. The control value theory also posits that emotions are influenced by the educational context, subject area, and task (Linnenbrink-Garcia, Patall & Pekrun, 2016) and thereby should be studied in specific learning contexts such as research methods learning. While achievement emotions have been explored in a statistic setting (Tempelaar et al., 2012) and in quantitative modules in general (Tempelaar et al., 2015a, 2015b), no research to date has explored these emotions in a psychology research method setting. It is particularly important to understand which feelings and emotions facilitate, inhibit, or have no effect on learning, as previous research indicates that psychology students often struggle with research methods modules and find this complex (Field, 2014).

Furthermore, the majority of the research in the field has been focused on students' *self-reports* to measure factors related to learning. However, with technological advances and the use of learning management systems (LMS), a new and exciting research path has emerged that can provide more accurate insights into learning behaviour. Recent studies in learning analytics (Agudo-Peregrina et al., 2014; Summers et al., 2020) indicate that adding students' online user behaviour to predictive models of learning can substantially improve the explained variance of academic performance. However, the studies combining VLE data with self-reported data on students' emotional and cognitive engagement are sparse and usually conducted within blended learning courses (Ellis et al., 2017; Tempelaar et al., 2015a, 2015b), which involve a different kind of learning engagement than traditional courses. Furthermore, even less research has been conducted combining VLE and attendance monitoring system data.

Therefore, to more fully understand students' learning processes and build on the predictor models of academic achievement, more research is needed. As shown by this literature review, it is worthwhile to explore observational behavioural data, such as attendance and VLE activity along with self-reports of emotional, motivational and cognitive variables, to get deeper insights into students' learning processes.

Chapter 3: Overview of The Current Thesis and Research questions

The overall goal of this PhD project was to investigate psychology students' learning of research methods by exploring how the complex interplay of affective, cognitive and behavioural variables shape and influence students' learning journeys. The thesis aimed to use the control-value theory of achievement emotions as an integrative framework to explore the associations between these variables and their influence on research methods learning.

The affective, cognitive and behavioural literature presented in the literature review (Chapter 2) provides an important theoretical framework that helps to clarify the conceptualisation of these variables in the learning of research methods. The literature review identified several gaps in the literature, with limited empirical research conducted on the learning of research methods and the numerous factors involved in the learning process. To the researcher's knowledge, no previous research has investigated affective, cognitive and behavioural components of learning in research methods. Limited research has also explored the learning of research methods over time, with few longitudinal studies conducted. Here I aim to research the affective, cognitive, and behavioural components of learning in research methods, including longitudinal study on the learning of research methods over time, all within the framework of control-value theory.

Taken together, this project contributes to the literature by exploring the learning journeys of psychology students, and by evaluating the importance of affective, cognitive and behavioural components related to learning. The project offers a novel approach by following students learning journeys through first- and second-year research methods modules. These years are particularly important, as the students need to build a foundation of research methods in order for them to be able to conduct an independent research project for their third-year dissertation.

The project consists of three studies, with the first study focused on exploring the beginning of students research methods journey in a mixed-methods fashion. The second study followed on from these findings and explored students learning journeys longitudinally across the first and second year. The third study offered deeper qualitative insights into students learning with a sub-set of students interviewed at the end of their journey. Overall, the findings from these studies may provide guidance for lecturers on how the teaching of research methods could be improved and build on the current models of learning. This ties in with the UK government's Teaching and Excellence Framework's (TEF) aim to raise teaching standards and improve student teaching (Forstenzer, 2016).

3.1 Overview of Studies & Research Questions

Study 1:

The first study was a mixed-methods exploratory investigation into first-year psychology students' prior expectations, experiences, feelings and initial perceptions towards research methods. The study aimed to find out whether students find research methods particularly difficult, the potential reasons why, and to determine whether students' previous experiences, initial feelings and thoughts influence their learning.

The study consisted of two online surveys (N = 106), administered at the start of the first year "*Introduction to psychological research methods module*" and at the end of the module, with questions regarding the students' expectations, experiences, and feelings towards the module and research methods in general. The surveys were followed up with two focus groups (n = 7), in which a subset of the students were asked to elaborate on their attitudes and feelings towards the first-year research method modules. The survey findings were analysed using content analysis and inferential statistical analysis techniques, and the focus groups by thematic analysis, with the findings integrated in the discussion section.

The research questions for the first study were:

1. What are the initial perceptions, feelings and expectations that psychology students have regarding research methods modules, and how are these influenced by previous experience?
2. Do psychology students find research methods modules particularly challenging compared to other modules, and what are the potential reasons why?

Study 2:

The second study directly followed on from the first study's findings, which highlighted the need to study a range of emotions in conjunction with learning approaches and students' meta-cognitive factors. Thus, this study's goal was to build on the findings from the first study by further investigating the learning of research methods by bringing together separate lines of learning analytics, emotional, motivational and cognitive learning research. By drawing on both observational and self-reported data from the same learning experience, this study aimed to examine the influence and relations between emotions, learning approaches, motivations, self-regulation, self-efficacy, VLE activity and attendance on the learning of research methods across two academic years.

The study employed a longitudinal quantitative survey design, with three measurement time points for one year, measuring the students during their first introductory seminar, during their first, second-year research methods seminar and after their final second-year research methods seminar. The surveys (N = 158) consisted of questionnaires measuring motivation, self-efficacy, self-regulation, learning approaches, statistics anxiety and learning-related emotions. The survey answers were analysed together with data (N = 239) from the university's LMS, including attendance and engagement within the VLE (Blackboard), and module grades for both the first- and second-year modules.

The research questions for the second study were:

1. Can research methods performance and learning be explained by individual differences in emotional, motivational and metacognitive factors?
2. Does research methods performance and the influence of these individual difference factors change throughout the modules?
3. What contributions do behavioural variables make to the learning of research methods?
4. Is the effect of students' affective factors and learning behaviours on academic achievement mediated by other individual differences factors, such as motivation and learning approaches?

Study 3:

The third study consisted of qualitative interviews conducted after students had completed their second-year research methods module. The interviews explored students' overall research methods journeys to get insights into different developmental trajectories/pathways on their journey through research methods. A subset of the participants (*n*=15) from the previous study were invited to take part in semi-structured interviews regarding their experiences on the research methods modules. The data were analysed using thematic and typology analysis, with one common theme and three distinct student typologies identified. These findings were compared to the longitudinal study findings to further build on the models for research methods learning.

The research questions for the third study were:

1. What learning experiences and factors are present and influential during students' research methods journey? How do such factors compare between student types?
2. What kinds of challenges do students experience during their research methods journey? And how can students overcome these?

3.2 Overall Educational Context

All three studies were conducted in the Department of Psychology of the University of Westminster, which is a post-92 university set in an inner-city London location. The University of Westminster is a multicultural university with students from over 150 nations. The University of Westminster is a highly diverse university with a high rate of participation of young first-degree entrants drawn from under-represented groups, with state school students making up 97% of the student population.

Furthermore, as 50% of London's postcodes fall within the 40% of most deprived neighbourhoods by the Index of multiple deprivation (IMD) and as a result of concerted outreach activity in these areas, the University of Westminster recruits disproportionately from these disadvantaged group. In 2017/18, 29.1% of full-time undergraduate entrants and 21% of part-time undergraduate entrants were recruited from the 20% of neighbourhoods with the highest levels of deprivation and 60.8% and 49% respectively from the most disadvantaged 40%. Moreover, almost 60% of university of Westminster 's UK-domiciled undergraduate entrants, and over 63% of full-time entrants, are from Black, Asian and minority ethnic (BAME) backgrounds. The university also has a large number of first-generation (41%) and international (26%) undergraduate students (University of Westminster, Access and Participation plan 2020/2021).

The participants were enrolled in one of the following BSc honours courses run by the Department of Psychology: Psychology, Psychology and Counselling, or Cognitive and Clinical Neuroscience. Entry requirements ranged from CCC-BBB. All students were enrolled in the first-year research methods module "*Introduction to psychological research methods*" which runs in the second term (spring term) of the first year.

3.3 Statement of Reflexivity

Reflexivity refers to the researcher's ability to reflect upon how interactions with participants and the interpretation of results might be influenced by their professional background, experiences and prior assumptions (Braun & Clarke, 2019). Reflexivity is especially important in qualitative and mixed-methods research due to the subjective nature of qualitative data and methodology and has been established as one of the ways qualitative researchers can ensure rigor and quality in their work.

The focus groups in study 1 and the interviews in study 3 (qualitative sections of the thesis) were both conducted, transcribed and analysed by me, a doctoral researcher at the Department of Psychology at the University of Westminster. My academic background includes an UK undergraduate degree in psychology and a Master of Research degree in research methods in psychology. Thus, I have a particular interest in research methods and have had generally positive experiences, which has shaped my views.

My interest in conducting this project arose from working in a support role at a UK university. More specifically, I provided one-to-one academic support to students, with research methods being the subject psychology students needed the most help with. The current research provided an opportunity for me to explore why so many students seemed to struggle with this aspect of the degree. Thus, even before starting on this PhD project, I had pre-existing beliefs of students' feelings and challenges of research methods, which could have influenced my interpretation of the focus groups and interviews.

Furthermore, during the time I was working on this thesis, I was also a seminar leader on both the "*Introduction to research methods*" and the second-year research methods "*Data Analysis for Psychology"* module. This provided me with valuable insight into the teachings of the modules and the learning environment in general. It is important to note that I had no involvement in the design of these modules, and instead I was only delivering the seminar and practical sessions.

Nevertheless, this dual role of a teacher and researcher could have affected my interpretation of the interviews and focus groups and the students' willingness to participate and talk openly about their experiences on the modules. However, both the focus-groups and interviews took place after the modules had taken place, and thus I was no longer a teacher on the modules. Furthermore, no students in the seminars I taught were included in the focus group or interviews to reduce the risk of a power-imbalance. However, even though no students were from my personal seminar groups, at least some were likely aware of my role as a seminar leader and could have held back their true feelings about the modules. This was kept in mind when conducting the focus groups and interviews. Participants were encouraged to talk freely and assured that the conversations would only be used for this research and that no personal information would be shared.

My active role as an interpreter of participants' stories was also acknowledged, with possible pre-existing beliefs kept in mind throughout the process of coding and creating themes and typologies, with biases critically examined. To help with this, at significant points during the process of data analysis, I met with members of the wider research team to discuss emerging codes and categories and the interpretation of key texts and potential new lines of enquiry, thereby drawing on the team's combined insights with a broader perspective of methodological and open disclosure issues.

Chapter 4: Study 1- Students' Attitudes to Psychological Research Methods: A Mixed Methods Study

4.1 Introduction

Considerable research has been carried out on first-year university students' experiences, with most of the research implemented to identify factors that influence student withdrawal and student retention in general. Many of these studies have highlighted personal and economic reasons, as well as students' expectations of university not being met (Rowley, et al., 2008). Studies that analyse student expectations, aspirations and decision-making (Longden, 2006; Smith & Hopkins, 2005) indicate that students' expectations of their course often do not match the reality of the course, which can cause disengagement with the academic process.

Similarly, students entering a psychology degree are also likely to have a range of *expectations* and *perceptions* towards their degree, which can influence learning processes such as feelings, learning approaches, motivation and learning behaviour (Pekrun et al., 2006). For students without previous psychology experience, research methods modules cover completely new concepts, which might trigger a number of responses, including stress, uncertainty and anxiety. For example, a study investigating 132 first-year undergraduate psychology students' *experiences* and *expectations* at an English university found that students without pre-university (A-level) qualification in psychology felt less well-prepared for studying psychology than students with an A-level qualification at the beginning of the year (Rowley et al., 2008), with difficulties associated with research methods, statistics and the overall scientific nature of the course being common. Therefore, understanding these *expectations* and *perceptions* of students in relation to their university experience is crucial to develop and enhance students' learning experiences and engagement.

Furthermore, students often have negative *attitudes* (Hardcastle & Bisman, 2003; Onwuegbuzie, 2001; Papanastasiou, 2005), or *misconceptions* about research in general (Meyer et al., 2005), which can negatively affect their learning. (e.g., Lehti & Lehtinen, 2005; Marton & Säljö, 1976; Trigwell & Ashwin, 2006). For instance, in a Finnish study (Murtonen et al., 2008) looking at undergraduate students' learning of research methods, it was revealed that students who did not view research skills as important for their future work experienced more difficulties in the learning of quantitative methods. These students also expressed more superficial learning approaches than those students who believed research methods would be useful for their future career. The authors concluded that students' views of future work, motivational factors and *difficulties* were connected. These findings suggest that if psychology students do not see the value of research methods in their future lives and careers, they can struggle to stay motivated to learn the subject, leading to a more surface approach to learning.

The transition to university is also recognised as an emotional time for students (Christie et al., 2008). Anxiety and negative attitudes may serve as barriers to learning, influencing how much effort students are able to put into learning a particular topic, such as research methods, or even influencing how well they perform in a module (Papanastasiou & Zembylas, 2008). Similarly, having a more optimistic attitude toward research methods is thought to contribute to intrinsic motivation to conduct research (Evans, 2011), highlighting the importance of assessing students' *attitudes* and *emotions* in research methods modules.

Most of the literature thus far has explored students' general expectations for starting university, primarily focusing on issues affecting retention and successful completion of degrees. Less research has looked at module-specific expectations, with the majority focusing specifically on expectations relating to statistics. These studies often emphasise the role of past *experiences* (Bond et al., 2012; Ruggeri et al., 2008), especially highlighting past experience of statistics as a source of *negative expectations* and attitudes towards research methods. This quantitative and statistical part of research methods learning has received the most attention in previous research, with a wealth of literature on psychology students' statistics anxiety (Field, 2014; Onwuegbuzie and Wilson, 2003; Ruggeri et al., 2008). However, a student survey (n=472) from the Higher Education Academy (HEA) revealed that only 38% of psychology students identified themselves as struggling with quantitative research methods. In addition, when comparing performance on quantitative methods assessments to other areas of their degree, only 21% reported doing worse on quantitative methods assessments (Field, 2014). However, very little research has examined other aspects related to psychology students learning of research methods. Thus, a more holistic research approach is required to explore students' *expectations, emotions, and perceptions* of research methods as a whole, taking into account both negative and positive expectations, emotions, and past experiences.

4.1.1 Study 1 Aims and Research Questions

Research shows that there is the potential for the expectations, views and feelings students hold in regard to learning and research to have an effect on students' motivation, learning strategies, and achievement; as such, these variables should be studied further in more depth. To date, there are few studies that have explored psychology students' perceptions, feelings and expectations towards learning of research methods as a whole. Furthermore, research looking at emotions and learning, in general, has until recently also been focused on the influence of specific negative emotions, such as anxiety overshadowing the possible influence of other emotions. Conversely, more recent studies examining the relationship between emotions in studying academic performance have highlighted the importance of a broad range of both positive and negative emotions for learning achievement (e.g., Pekrun et al., 2011, Pekrun & Linnenbrink- Garcia, 2012). This study will consider the role of all emotions expressed by students and will explore the utility of the control-value theory in the learning of research methods.

Moreover, there has been limited qualitative and mixed methods research on students experiences and attitudes towards research methods. Therefore, a deeper investigation into this area may allow for more understanding of psychology students' attitudes, experiences, and challenges in their research methods learning. Thus, this study is an exploratory investigation into first-year psychology students' prior expectations, experiences, and initial perceptions and feelings towards research methods investigating the following two research questions:

1. *What are the initial perceptions, feelings and expectations that psychology students have regarding research methods modules, and how are these influenced by previous experience?*
2. *Do psychology students find research methods modules particularly challenging compared to other modules, and what are the potential reasons why?*

4.2.1 General Design & Overview of Study 1

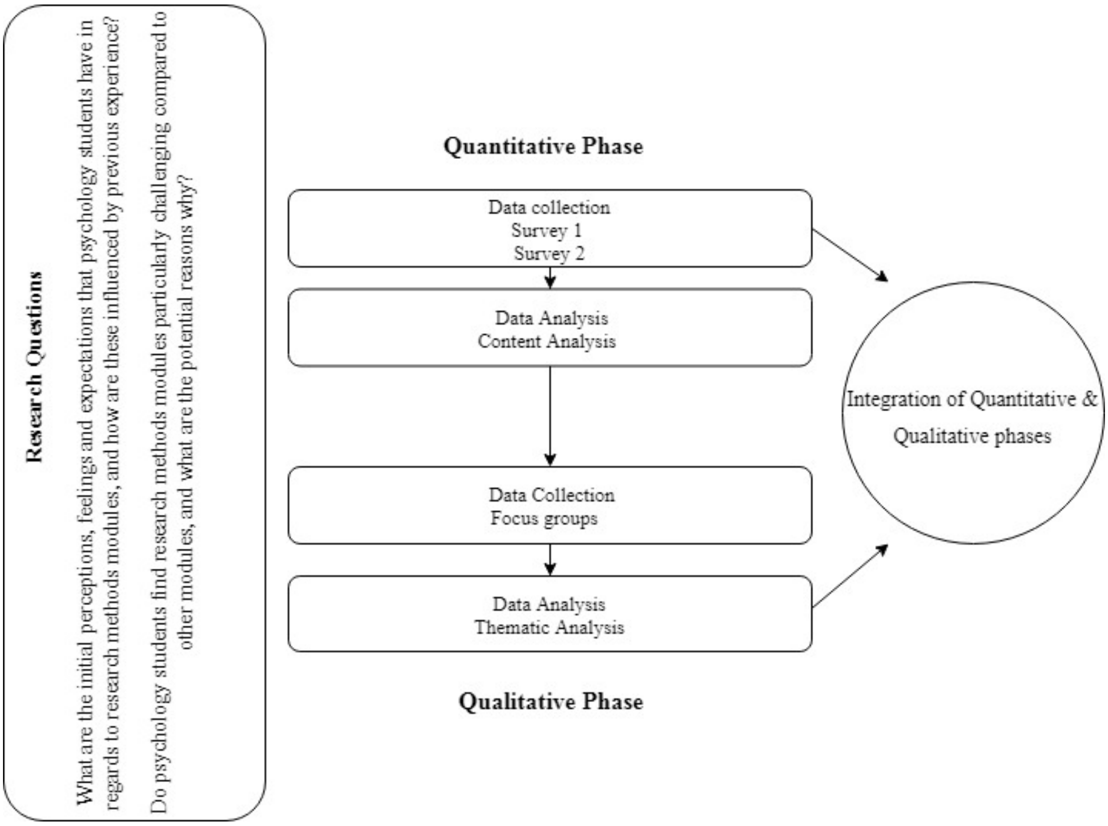
The study employed a longitudinal sequential explanatory mixed methods design, with two online surveys with open-ended and Likert-scale questions and two focus groups. The mixed-methods sequential explanatory design consisting of two distinct phases: quantitative*[1] followed by qualitative (Meissner et al., 2011). The qualitative data helps to

* In this study the online surveys were treated as a quantitative method, as the open-ended question were analysed using quantitative content analysis to enable descriptive and inferential analysis.

explain and build upon initial quantitative results (Fetters et al., 2013). In this study, a partially mixed approach was chosen. The data were gathered and analysed separately, but recruited from the same population, and then mixed at the data interpretation stage with both phases having equal weight. The sequential mixed methods design was seen as the most pragmatic choice for this research in order to explore the initial findings from the surveys in more depth, using a qualitative approach. (See figure 4.1 for details). The strengths of using mixed-methods research lie in its ability to answer broader research questions and provide stronger evidence for a conclusion trough corroboration of findings (Johnson & Onwuegbuzie, 2004).

Figure 4.1

Visual Model of the Sequential Explanatory Mixed Methods Design used in the study.



4.2.1.1 Educational Context of Study 1

All of the students attended the "*Introduction to Psychological Research methods*" module, which ran on the second term of the first year of their undergraduate degree. This is the first research methods module that students attend during their degree. The module consisted of 11 teaching weeks, consisting of 1h 30 min lecture, 1h seminar, and a 1 h 30-minute computer lab, with a total of 44h teaching hours. The assessments on the module consisted of a formative research report (peer-reviewed), summative report (50% weighting), in-Class SPSS test (open-book, 20% weighting) and an exam consisting of short and multiple-choice questions (1h, 30% weighting).

The module covered both quantitative and qualitative research methodologies. More specifically, the research methods covered included controlled experiments, correlational research, observational studies, questionnaires, surveys, interviews and case studies. The students were also taught how to consider the most appropriate research designs, the strength and weakness of these designs, and ethical considerations. For the quantitative part of the module, the data analysis concepts covered included: summarising and graphing data, normal distribution, the formation and testing of hypotheses, the concept of probability and estimates of probability, one- and two-tailed hypotheses and tests, and inferential statistics tests- such as t-tests and non-parametric equivalents. The students were also taught how to use SPSS to analyse data, interpret the SPSS output, and report the various statistics during the labs. For qualitative research, data analysis concepts covered included Content Analysis and Thematic Analysis. In addition, the module also aimed to teach the students how to write research reports and how to analyse and communicate their findings and ideas clearly.

4.2.1.2 Ethics

The study was conducted in accordance with the British Psychological Society guidelines and the ethical approval provided by the Psychology Department Ethics Committee of the University of Westminster. All participants in the quantitative phase consented to undertake the quantitative surveys and were debriefed upon completion of the surveys. The raw data was securely stored on the Qualtrics platform.

Participants in the qualitative phase focus groups also gave their written consent and were debriefed at the end. No identifying information was revealed during the focus groups. The audio data was securely transcribed and stored in compliance with the Data Protection Act 2018 and General Data Protection Regulations (GDPR) 2018. Once the research is fully complete, the digital recording will be securely destroyed. (See Appendix 4.1 for Ethics Committee approval letters for both parts of the study).

4.3 Quantitative Phase – Method

4.3.1 Design

The quantitative phase consisted of two online surveys administered during the student's first "*Introduction psychological research methods*" module seminar and after their last seminar, thus, utilising a longitudinal design. The two surveys formed the study's quantitative phase with the open-ended questions analysed using content analysis and converted into quantitative data. This data was then used in further statistical analysis along with Likert scale questions. This method was chosen to get data from a broad range of students and thus generalise the magnitude of effect (Fetters et al., 2013). The open-ended questions facilitated the exploratory nature of the study giving a general understanding of students' initial thoughts, feelings and expectations for the research methods module without restricting their answers.

The follow-up survey was administered in order to detect any developments and changes in students' attitudes. Furthermore, the follow-up survey also provides data regarding the students' grades, and thus the influence of attitudes and expectations regarding academic achievement could be analysed. The results from these two surveys addressed the first research question of: "What are the initial perceptions, feelings and expectations that psychology students have regarding research methods modules?". However, to address *how* the students' perceptions, feelings, and expectations were influenced by previous experience and the *potential reasons* students find research methods challenging, focus groups were conducted at the end of the module.

4.3.2 Participants

The study was conducted at University of Westminster in the Department of Psychology during the spring term of the academic year 2017/2018. A purposive sampling design was used with the complete cohort of 2017/2018 first-year psychology BSc and Cognitive & Clinical Neuroscience BSc students invited to participate in this study. Participants' self-reported demographic and socio-economic characteristics are summarised in Table 4.1

The survey 1 sample consisted of 106 students, of whom 12 (11%) were males, and 94 (89 %) were females, with ages ranging from 18 to 43 (M = 20.59, SD = 4.2). This gender imbalance is considered typical of undergraduate Psychology cohorts in the UK. 45% of the students were from white ethnic backgrounds, 36 % from Asian or mixed Asian backgrounds, 11% from black or mixed black backgrounds, 8% from other ethnic backgrounds. Students socio-economic background variables were also measured, with 17% of participants from working-class backgrounds and 31% being first-generation university students. First-generation students are defined as students with neither of their parents having attended university.

The post-module survey sample consisted of a total of 47 participants, but with only 24 participants taking part in both part 1 and part 2 of the surveys. This high attrition rate was deemed to be due to the time of year, as the survey was distributed at the end of the semester when many students stop attending classes. Participants' complete self-reported demographic and socio-economic characteristics are summarised in Table 4.1

Table 4.1

Sample sizes and demographic and socio-economic variables for survey 1 & 2.

	Survey 1 –Sample		Survey 2- Sub Sample (Matched participants)	
	N	%	N	%
Gender				
Female	94	88.7%	21	87.5%
Male	12	11.3%	3	12.5%
Student status				
Home	70	66%	12	50%
EU	27	25.5%	10	41.7%
International	7	6.6%	2	8.3%
Missing	2	1.9%	0	0%
Ethnicity				
White	48	45.3%	13	54.2%
Black or mixed black	12	11.3%	4	16.7%
Asian or mixed Asian	38	35.8%	5	20.8%
Other ethnic backgrounds	8	7.5%	2	8.3%
Highest qualification				
A-level	67	63.2%	15	62.5%
IB	6	5.7%	0	0%
BTEC	9	8.5%	0	0%
He *A*ccess course	9	8.5%	3	12.5%
Foundation degree	5	4.7%	2	8.3%
Previous BSc	2	1.9%	2	8.3%
Other	8	7.5%	2	8.3%
Student-generation				
First-generation student	33	31.1%	7	29.2%
Continuing generation student	47	44.4%	8	33.3%
Missing	26	24.5%	9	37.5%
Economic class				
Working-class	18	17.0%	4	16.7%
Middle class	25	23.6%	4	16.7%
Upper/upper-middle class	25	23.6%	5	20.8%
Other	21	19.8%	7	29.1%
Missing	17	16%	4	16.7%

4.3.3 Procedure and Materials

The survey data was collected using the online survey tool "Qualtrics". The first part of data collection took place during the first "*Introduction to psychological research methods*" module computer lab and after it, with the survey left open for two weeks.

The students were approached by their seminar leaders and asked to participate in a PhD project regarding students' attitudes towards research methods. The students were asked to access the study through the psychology department Research Participation Scheme (RPS) and were offered 0.25 credits for taking part. For the students to use the RPS in their third year to recruit participants, they were required to complete at least 5 RPS hours at Level 4 and at least 5 hours of RPS participation at level 5. The students were made aware that participation was entirely voluntary and that if they did not wish to take part, they could explore the module blackboard page during this time instead.

Upon accessing the survey, the participants were first briefed, asked for consent, and then asked to report demographic information, including questions about socio-economic status. The participants were then asked to complete the survey (See Appendix 4.2 for full survey including an information sheet and debrief) containing four open-ended questions: *Do you have any previous experience or knowledge of psychological research methods?; What thoughts come to mind when you think about the term "Research Methods"?; What feelings come to mind when you hear the term "Research Methods"?;* and *What are your expectations for this module?* The participants were asked to write a few sentences for each of these questions.

The students also rated the expected difficulty of the module, by comparing it to other modules on their course on a 5- point Likert scale ranging from 1- very easy to 5-very difficult, with participants asked to justify their rating using an open-ended question "Why *do you think that? Please expand on your answer*". The survey took approx. 10-15 minutes to complete. After completing the survey, the participants were debriefed and thanked for their participation.

The second part of data collection took place at the end of the semester, during the last computer lab, and after it, with the survey left open for three weeks. The participants were once again offered 0.25 RPS credits for taking part. The survey (See Appendix 4.3) followed the same structure as the first survey, with the exclusion of the question regarding expectations. The participants were also asked to self-report the grades they received for the in-class test, the summative report, and their expected overall module grade. The expected overall grade was asked to be reported as the survey took place after the students had conducted the final exam for the module, but before they had received their grades for it.

4.3.4 Data analysis

The open-ended questions from the survey were analysed using quantitative content analysis. Content analysis can be defined as "A research method for the subjective interpretation of the content of text data through the systematic classification process of coding and identifying themes or patterns" (Hsieh & Shannon, 2005, p.1278). Content analysis can be applied to open-ended questions in order to code those answers into categories that can be used in further quantitative statistical analysis.

An inductive approach was used during coding allowing the data to determine the codes, with all of the open-ended questions coded separately. The first step for the content analysis was to familiarise with the data, reading through the answers and then starting to generate initial codes. In the course of coding and analysing the data, the common patterns and concepts were determined, with additional coding schemes added as needed, after which a coding matrix for each question was generated. In order to establish inter-rater reliability, a subset (n=25) of the interviews were independently by a colleague with no research interest in the study. This resulted in an inter-rater reliability of 0.82 (Cohen's Kappa). The proposed codes were then shared and agreed upon with the rest of the research team.

For the questions regarding feelings towards research methods, all answers that described an emotional reaction were coded using the participants' own words, after which preliminary codes were generated, and the transcripts examined again with these codes in mind. The frequency of use for each code was then calculated, and participants divided into groups based on these codes and used in subsequent statistical analysis. The categorisation of emotions into groups was done deductively based on theories of emotions which usually cluster emotions based on their valence (e.g., Pekrun et al., 2006; Russel, 1980; Tellegen et al., 1999). Participants who reported only positive emotions were in the positive emotions group. Students who reported only negative emotions were in the negative emotions group, and students who expressed both positive and negative emotions were placed in the mixed emotions group.

For the questions regarding previous experience, a similar way of inductive coding was conducted. The researcher read through all of the answers and noted the student's previous experience, after which preliminary codes were generated and then the codes refined until distinct categories were formed. This same procedure was also repeated for the participants' thoughts, reasons for difficulty ratings and expectations. Students' expectations were further refined deductively by developing categories of these codes based on concepts represented in the literature review, with students grouped into a *Knowledge gain* and *other* group. Knowledge gain was defined as students who had expectations of acquiring knowledge and can be compared to both a mastery goal orientation (Zimmerman, 2008). The *other* group was defined as any other reason that did not explicitly mention desires to learn or gain knowledge.

The categories of emotions, expectations, and previous experience were then used in further statistical analysis along with the Likert scale scores of students' ratings of the module difficulty (See Appendix 4.4 for coding frameworks). These content-analysis steps were repeated for the second survey. The coding for the second part was conducted deductively based on the coding framework of the first survey, apart from the addition of one new emotion not previously mentioned by the students. The codes were then used in conjunction with students' self-reports of in-class test grades, report grades, and expected module grades to conduct further statistical analysis to explore whether students' feelings, expectations and previous experience changed and influenced learning.

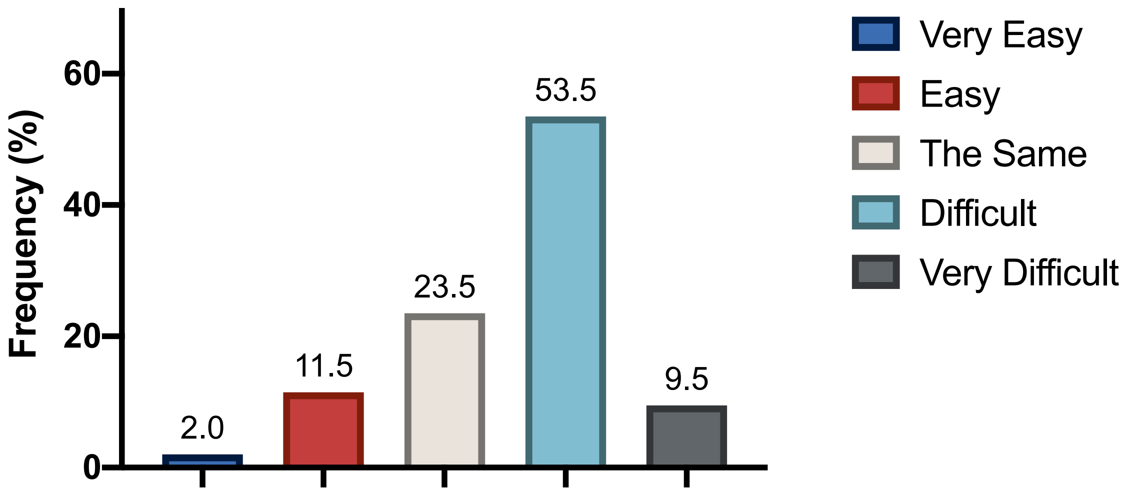
4.4 Quantitative Phase- Results

4.4.1 Expected difficulty of the Research methods module – Baseline Survey

The mean score was drawn from the students' ratings of difficulty to explore the research question regarding students' views on the difficulty of the research methods module. Figure 4.2 shows the frequency distribution of the answers to the question. The mean score was 3.58 (*SD = 0.*86), which was compared to the mean of 3 (3 = *the same*) using a one-sample t-test. The results showed a significant difference $t(105) = 6.709$, $p < .001$, indicating that the students expected the module to be slightly more difficult than other modules on their course.

Figure 4.2

Bar chart showing the frequency distribution for the question "Compared to other subjects on your course, how difficult do you think this module will be? (n=106).



61.5% of the students who expected the module to be easier or very much easier than other modules, reported previous knowledge of research methods as the reason. Other reasons included liking statistics, and research methods being seen as something "straightforward". The main reasons students expected the module to be difficult or very difficult was due to the module being seen as requiring *mathematic and numbers*. Other reasons included the module requiring more effort, involving statistics, and the students hearing from others that the module would be challenging. The categories can be seen in Table 4.2, and an explanation for these categories can be found in the coding matrix (See Appendix 4.4.)

Table 4.2

Frequency table showing the frequency distribution of ratings of difficulty and students' coded reasons for these difficulty rating

	Very Easy/Easy	*The Same*	*Difficult/ Very Difficult*	*Total*
Requires Maths/numbers	0	1	30	31
Previous RM knowledge	8	3	4	15
More effort	0	1	11	12
Involves Statistics	2	2	7	10
Heard from others	0	1	6	7
New Content/Programs	0	3	2	5
Straightforward	1	1	1	3
Not enough Info to say	0	3	0	3
Other	2	7	4	14
No response	0	2	2	4
Total	13	24	67	104

Other include answers such as: "RM skills not great", "Same level as other", "Certain aspects hard."

4.4.2 Students' Expectations and Thoughts Towards Research methods – Baseline Survey

Students' expectations for the module were coded and grouped. Firstly, the students were divided into those with expectations related to *knowledge gain* (N=54, 49.5%) and those with *other* expectations (N=43, 41.1%), with 9 missing answers. See Table 4.3, for examples of these categories

Table 4.3

Examples of students' expectations coded" knowledge gain" and" other".

Code	Examples
Knowledge gain	*-"To learn about research methods, be able to apply research methods to situations identify tests and experimental designs."* *-"I hope to attain a comprehensive understanding of research methods as well as data collection and analysis methods. "* *-"To enhance my knowledge on the module and expect a broader understanding and explanation of it and how to apply research methods."*
Other	*-"My expectations are that the lecturers will go through the basics of research methods first and then gradually introduce us to the more complex parts of the module."* *-"To pass."* *-"Good grades, easy stuff "*

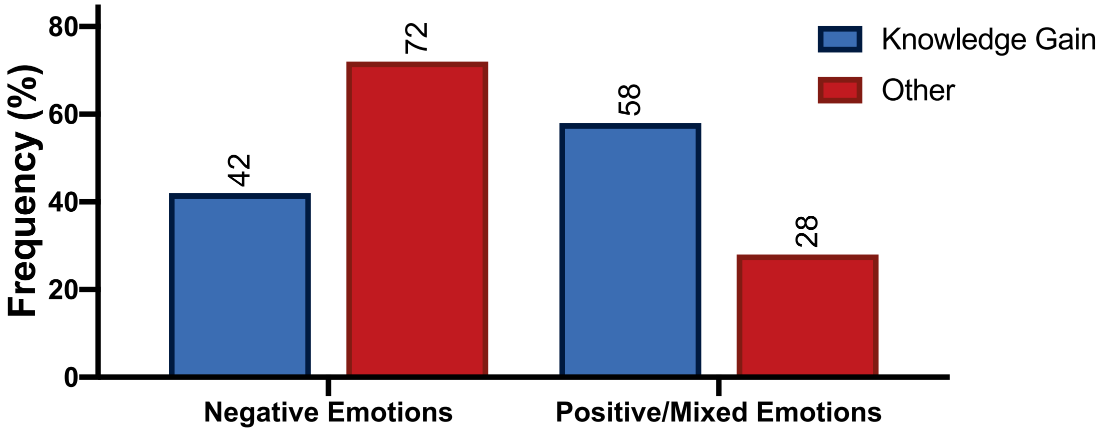
Participants were also split into two groups based on their previous qualifications, *A-level or higher* (n=74) and *no A-level (n=30)*. The A-level or higher group included students who report A-level, foundation or previous degree as their highest qualification to date. No A-level included BTEC, international baccalaureate, HE Access course, and other qualifications.

A chi-square test of independence was performed to examine the relation between the students' previous qualifications (A-level & no A-level) and their expectations for the module (knowledge gain/& other). However, no associations between previous qualification and expectations were found, X^2 (1, n = 97) = .874, p=.35.

Another chi-square test of independence was performed to examine the relationship between the student's feelings towards research methods (positive/mixed *vs*. negative) and their expectations for the module (knowledge gain / other). The relation between these variables was significant, X^2 (1, n = 75) = 6.946, p = .008 with a medium effect size (Cramer's V=.30 (Cohen, 1988). Students with positive or mixed feelings were more likely to report expectations for acquiring knowledge. In contrast, students with negative feelings were more likely to report expectations unrelated to gaining knowledge (See figure 4.4).

Figure 4.3

Bar chart showing the students' expectations grouped by the expectations "Knowledge Gain" and "Other" distributed by negative and positive/mixed emotions groups.



The student's initial thoughts were analysed and coded into categories (Table. 4.4). A majority of the students expressed thoughts related to the module's content, with Statistics (26.5%) and Mathematics (20%) being most highly cited. A proportion of the students also reported conducting research (13%), experiments (16%,) ethics (12 %) and data collection (11%) in their initial thoughts. Further explanation for these categories can be found in the coding matrix (See Appendix 4.4).

Table 4.4

Frequency table showing coded answers for the question: "What thoughts come to mind when you think about the term "Research Methods?"

Code	N	Example
Statistics	28	"Research Methods makes me think of statistics, numbers. " "Concerns about struggling with the statistical elements"
Mathematics	21	"MATHS!! And formulas that can be difficult to comprehend..." "Mathematics and analysis"
Experiments	17	"Research methods make me think of experimental design." "Methods used for doing an experiment, techniques involved in it"
Conducting research	14	"Conducting psychological research to prove a theory/hypothesis" "Ways in which studies are conducted. The types of gathering information"
Ethics	13	"Ethics to be honest I think of the acronym DIP" "Ethics and different ways research should and can be conducted in".
Data collection	12	"Data collection followed by interpretation." "Learning how to collect research and understand the collected data"
Different methods	11	"The different methods used to conduct research for example, Independent measures designs, repeated measures designs etc." "The first thing on my mind was correlation, surveys, interviews. "
Data analysis	10	"The process of obtaining and analysing data." "Data analysing"
Obtaining Information	8	"Collecting information about specific psychological traits" "In my opinion it is about the ways in which information can be gathered"
Report(s)	5	"Writing reports" "...Consequently, writing a report on all the findings.
Types of Data	3	"I also think about keywords such as qualitative and quantitative data." "Qualitative and quantitative data"
Unsure/no thoughts	3	"Not sure" "Have no thoughts."
Other	15	I'm interested but at the same time worried." "I think about the more analytical, scientific side of psychology." "Useful to know, as it is the basis for being a psychologist."

Note: Some of the students had thoughts that were coded into multiple categories; thus, this table represents the frequency distribution of all thoughts.

4.4.3 Students' Feelings Towards Research Methods – Baseline Survey

The students reported both positive and mixed feelings towards research methods (see Table 4.5, for the full list of emotions). The top five emotions that students expressed were Boredom, Anxiety, Interest, Difficulty*[2] and Excitement. On the basis of these responses, the students were then grouped into three categories, negative, positive and mixed feelings.

Table 4.5.

Frequency table of the range of feelings expressed by students coded into negative and positive emotions

Negative Emotions	N	Positive Emotions	N
Boring	15	Interesting	12
Anxious	13	Excitement	10
Difficulty	11	Curious	5
Fear/scared	5	Enjoyment	3
Nervous	3	Calm/relaxed	2
Intimidating	2	Safety/trust	1
Worry	2	Relief	1
Dislike	2	Joy	1
Lazy	1		
Tentative/ apprehensive	1		
Disgust	1		
Insecure	1		
Shame	1		

A majority (42.5%) of the students reported negative feeling towards research methods but with positive (15%) and mixed (17%) feelings also being present. Likewise, a proportion of students expressed answers that did not indicate any feelings; these were coded as *other* (25.5%).

The students were divided into two groups based on these categories: negative emotions group (N = 45, 42.5%) and positive and mixed emotions group (N = 34, 32%), which were used to explore any differences in difficulty scores between the two groups.

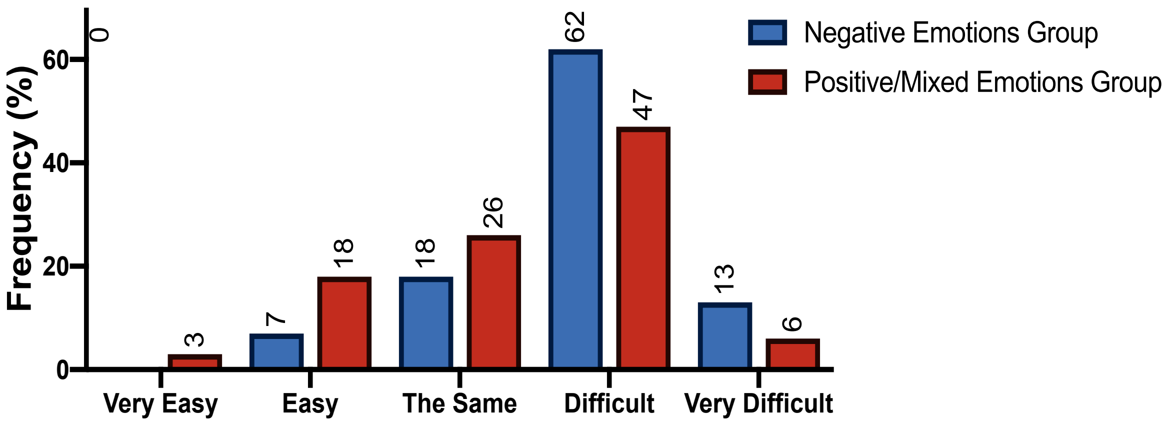
*Difficulty was coded as a negative emotion, as the question specifically asked students to "state any feelings that come to mind when you hear the words research methods", and difficult/hard was one of the most prevalent answer. The Oxford dictionary defines difficulty as "*Characterized by or causing hardships or problems*", which indicates a negative disposition.

The mixed and positive emotions groups were combined to balance group sizes, as negative emotions were over-represented in the study.

A Mann Whitney U test was conducted, showing significant differences in difficulty scores between students with positive or mixed feelings and those with negative feelings (U = 556.00, p = .022). Students with negative feelings expected the module to be more difficult with a mean rank of 44.64 (M= 3.82, SD=.75) than students with positive or mixed feelings, who had a mean rank of 33.85 (M=3.35, SD=.95). See Figure 4.4, for the frequency distribution of module difficulty scores across the emotion groups.

Figure 4.4

Bar chart showing the frequency of expected module difficulty ratings for students in the negative emotions group and the positive/mixed emotions group.



4.4.5 Students' Views of Module Difficulty and Thoughts Towards Research Methods-Post-Module Survey

To explore whether students' views of the module difficulty had changed during the module, the mean score was drawn for the post-module difficulty score. The mean score was 2.91 (SD = 0. 81). A Wilcoxon signed Rank test: Z = -3.035, p = .002 showed that post-module difficulty scores were significantly lower (Mdn = 3) compared to the expected delivery score at the beginning of the term (*Mdn* = 4) for those students who took part in both surveys. This indicated that the students found the module easier than expected. The median rating of 3 (3= the same), also indicated that the students thought the module was at the same level of difficulty as other modules on their course.

Similar to the first survey findings, students' thoughts seemed to revolve around the module's content, with Statistics (42%) and mathematics (21%) being at the top. Conducting research (21%) was also still one of the top things associated with research methods, indicating that students' initial thoughts seemed to match the content of the module (See table 4.6 for full list of thoughts).

Table 4.6

Frequency table showing coded answers for the question: "What thoughts come to mind when you think about the term "Research Methods?" (Survey 2)

Code	N	Example
Statistics	10	*"Statistics, numbers, analysing data on the computer, different methods of carrying out studies."*
Maths	5	*"A very complicated subject, maths, numbers, and calculations."*
Conducting research	5	*"Ways to conduct studies"*
Report(s)	5	*"How to write scientifically reports"*
Data analysis	3	*"Analysing data that has been gathered from psychological research"*
Experiments	3	*"Various forms of experiments to conduct in the psychological setting."*
Different methods used	2	*"The methodology that is used for scientific research in Universities."*
Other	7	*"Intellectually challenging but I enjoy the challenge"*

4.4.6 Students' Feelings Towards Research Methods – Post-Module Survey

Similar to the first survey, the top two emotions students expressed in the post-module survey were boredom and anxiety, followed by fear, enjoyment, and curiosity. The only new emotion not expressed in the original list was "Anger", which was reported by one student. Overall, 42 % of the students reported negative feelings, 30% positive and 28% mixed feeling. (See table 4.7, for a full list of emotions).

Table 4.7

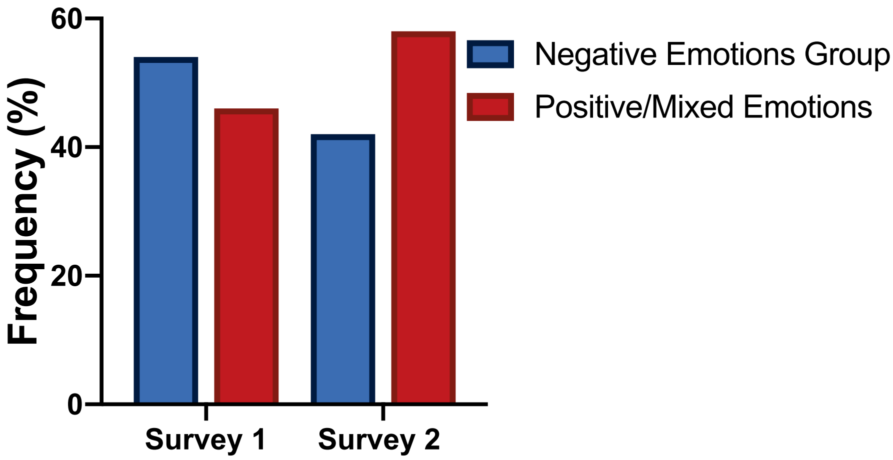
Frequency table showing the range of emotions expressed by students grouped into negative and positive emotions for survey 2.

Negative emotions	N	Positive Emotions	N
Boring	5	Enjoyment	4
Anxious	5	Curious	3
Fear/scared	3	Excitement	2
Difficult	2	Interesting	2
Stress	2	Joy	2
Confusion	2		
Insecure	2		
Anger	1		
Shame	1		

The students were once again divided into two categories: negative emotions group (N=10, 42%) and a positive and mixed emotions group (N=14, 58%). The overall distribution of emotions in the sample of students who participated in both surveys indicates that the students reported more positive and mixed emotions in the post-module survey than in the pre- module survey. However, a McNnemar exact test showed that although there was a trend in the data, no significant differences between pre and post feelings ($p > .05$) could be found (see Figure 4.5).

Figure 4.5

Bar chart showing the students' emotions grouped in to negative and positive/mixed emotions categories for survey 1 and survey 2, for students participating at both time points (N = 24)



4.4.7 Academic Achievement and Expectations of Difficulty.

For the post-module survey, the students were asked to report their grades for the research report and in-class test and their expected module grade. These scores were analysed to see whether any differences between the sample and the whole cohort grades could be found. Firstly, a one-sample t-test was conducted in order to compare the students' scores on the in-class test (M = 65.21, SD = 10.78) to the whole cohort mean (M = 55.68, SD = 19.64), with the results showing a significant difference $t(23) = 4.331$, $p < .001$. Another one-sample t-test was conducted to compare the differences in report scores (M = 62.04, SD = 12.04) to the whole cohort mean (M = 52.79, SD = 15.13), which also showed a significant difference, $t(23) = 3.526$, $p = .002$. These findings indicate that the sample represents students who generally perform better than the average student in the cohort and should be interpreted with that in mind.

A Spearman's rank-order correlation test was conducted to see whether students' expectations of difficulty at the beginning of the module would have any relationship with their expected overall module grade. The students expected module difficulty scores were coded positively, with higher scores indicating a higher level of expected difficulty. The results showed a moderate negative correlation between how difficult the students expected the module to be initially and their self-reported expected final module grade ($r_s(22) = -.48$ $p = .026$). The findings indicate that students' early expectations of the module were linked with their perceived academic achievement later on. Differences in academic achievement between students with negative and positive feelings at the beginning and end of the module were also explored. However, no significant differences between these groups were found $p > .05$.

4.4.8 Mathematics ability

At the beginning of the module (survey 1), many of the students who expected the module to be more difficult than other modules gave mathematics as one of the main reasons ($N = 19$, 20%). However, the post- survey asked participants to report *"How often they had to rely on their mathematic knowledge during the course?"*, with the results indicating that most students felt that they either almost never ($N = 12$, 50%) or only sometimes had to rely on their mathematic skills during the course ($N = 10$, 41.6%). Only 2, (8.3%) of the participants indicated that they had to often rely on their mathematic skills, indicating that students might overestimate how much mathematics is involved in the module.

4.6 Qualitative Phase - Method

4.6.1 Design

Two focus groups were conducted six months after the follow-ups survey to refine and expand on the quantitative results. Focus groups are used to gather knowledge about shared opinions and experiences and the meanings behind these. They are also useful in generating a rich understanding of participants' experiences and beliefs (Gill et al., 2008). Thus, by conducting focus groups the findings of the surveys could be explored further.

The focus groups allowed personal and group feelings, attitudes, and experiences about the research methods modules to be explored in more detail and provide more context. The focus groups also enabled students to elaborate and give more in-depth answers than those put forward in the surveys and answer the questions of *how* and *why.* The focus groups were analysed using a thematic analysis approach (Braun & Clarke, 2006).

4.6.2 Participants

The same cohort of students were invited to participate in one of two focus groups in the following term, in the students' second year of study. An opportunity sampling method was used, with all participants from the 2017/2018 cohort invited to take part. The sample consisted of a total of 7 students, with six female and one male participant, aged 19 between 31. Three of the students were from a white ethnicity background, three from an Asian or mixed Asian ethnicity background and one from a black or mixed black ethnicity background.

4.6.3 Procedure & Materials

Participants were recruited through the RPS scheme and offered 1.5 research credits, as well as through email and Blackboard advertisement. Before taking part in the focus group, participants were given an information sheet explaining the nature of the study and the opportunity to ask questions. The participants were then asked to give their written consent and answer demographic questions (See Appendix 4.5).

During the focus groups, the participants were asked questions related to their experiences, expectations and feelings toward research methods during their first year of university (e.g.," Can you tell me more about how you felt about the research methods module?"), as well as about any challenges faced or learning strategies used (e.g., "How was your experience studying on the Research Methods module? "What sort of learning strategies/techniques did you use to learn in this module?"). (See Appendix 4.6 for full interview schedule). The focus groups were audio-recorded using a Dictaphone and lasted between 28 minutes and 75 minutes. At the conclusion, participants were thanked and debriefed (See Appendix 4.7).

4.6.4 Data analysis

The researcher transcribed the data collected from the two focus groups. The data were then analysed using a reflexive thematic analysis (TA) approach. The goal of thematic analysis is to "identify themes, i.e. patterns in the data that are important or interesting and use these themes to address the research or say something about an issue" (Braun & Clarke, 2006, p.84) Unlike many other qualitative approaches, thematic analysis is seen as a method rather than a methodology, and thus it is not tied to a particular epistemological or theoretical perspective (Maguire & Delahunt, 2017). For this research, the epistemological approach chosen was an essential/realist approach, which allows a straightforward way of theorising experiences and meaning because a unidirectional relationship is assumed between meanings, experience and language (Braun & Clarke, 2006). Realism accepts that there exists an objective and independent reality whilst acknowledging the roles of perception and cognition (Olsen, 2007).

There are many different ways to conduct a thematic analysis (See Zarea, 2016), with one of the most influential ones being Braun & Clarke's (2006) 6-step framework, which was used to analyse the result from this study. First, during the transcription process, the initial thoughts and ideas were noted down, and the transcripts read and re-read several times. Furthermore, to ensure the accuracy of the transcription, the recordings were listened to several times. This process of "repeated reading" leads to data immersion and is referred to as "familiarising with the data" in Braun & Clarke's (2006) guide to performing thematic analysis.

The next step was to create codes based on the insights gained through data immersion and transcription. Following this, inductive thematic analysis was conducted in order to identify “bottom-up' themes (Braun and Clarke, 2006). An advantage of an inductive approach is that it is open to participants' experiences rather than seeking views on topics informed by the evidence base. According to Braun and Clarke, this helps to avoid assumptions and biases and limits the influence of the researcher's pre-existing beliefs. Thus, initially, the transcripts from the two focus groups were "open-coded". Furthermore, the entire transcripts were given equal attention so that recurring trends in the data could be fully considered.

The third stage involved searching for themes. The themes were collated by combining different codes that were similar or considered the same aspect within the data. All codes relevant to the research question were incorporated into one of the themes or sub-themes. As suggested by Braun and Clarke (2006), several thematic maps were also drawn to help the researcher to visualise and considered the relationships between the themes and sub-themes (See Appendix 4.8 for thematic map). At this point, any themes that did not have enough data to support them or were too diverse were either discarded or modified into sub-themes. These themes, sub-themes and codes were then shared with the research team to get feedback, after which further revision of the themes took place.

This refinement of the themes took place on two levels; firstly, the themes were refined this time using a more deductive approach by conceptualising the data, keeping in mind the research questions and the findings from the previous surveys. Further coding also took place to ensure codes fitted into the refined themes and that any non-relevant codes were omitted. Once a coherent pattern had formed, the themes were considered in relation to the study as a whole, taking into consideration the research questions and the theoretical framework. This inductive/deductive approach works well with both a mixed-methods methodology and a realism epistemology underpinning, in which the researcher selects the methods that will better address the research questions (Roberts et al., 2019) This concluded the final phase of coding the data, with 42 codes emerging and three themes (See Appendix 4.9 for coding matrix.).

Once a clear idea of the various themes and how they fitted together emerged, analysis moved to the next phase, defining and naming the themes. Considerations were made to the story told within individual themes and how these related to the overall story that was evident within the study. In addition, it was also important for the theme names to capture the essence of the theme without being too abstract or long. Braun and Clarke's (2006) final stage refers to producing the report, which involves choosing the best examples of the transcript to illustrate the message from the themes. The extract chosen clearly conveyed the overall themes and presented a coherent example of the point being made within each theme.

4.6.5 Quality Criteria

Considerations to the data's trustworthiness were made with reference to the four tenants of trustworthiness established by Lincoln & Guba (1986). The trustworthiness of findings can be assessed by a range of criteria, including credibility, transferability, dependability, and confirmability. Credibility establishes "whether the research findings represent plausible information drawn from the participants' original data and correct interpretation of the participants' original views" (Korstjens & Moser, 2018, p.121.). Credibility and validity of this study's results were established by data triangulation, with the answers from focus groups compared and merged with the quantitative data from the surveys. Furthermore, during the process of coding and theme development, the suggested codes and themes were shared with the wider research team to get input from multiple perspectives and thus establish researcher triangulation. As this was an exploratory study aimed at interrogating the survey findings and informing the future directions of this thesis, the transferability of findings was not a key concern. Dependability refers to the stability of findings over time and the degree to which research procedures are documented with enough detail for someone outside the research to follow them (Guest et al., 2014). To achieve dependability, the research process was documented from the coding stage to the development of themes, with audit trails including data reduction and analysis notes (Coding matrix and Thematic maps and tables) and interview schedule provided in the Appendix. Raw data (audio recordings) and transcripts are also kept on record. Confirmability refers to the degree that findings are clearly derived from the data, with a clear demonstration of how conclusions and interpretations have been reached (Tobin & Begley, 2004). Similar to dependability, confirmability can also be ensured by providing audit trails and keeping a reflexive journal. A statement of reflexivity can be found in Chapter 3.

4.7 Qualitative Method - Results

The thematic analysis process that was applied to the transcripts produced three key themes. Themes were chosen not only because of their prevalence across participants but also because they captured important aspects of the data related to the research questions and the survey findings. These themes have been labelled as "Emotional Shift" "Fluctuating learning approaches" and "Value Perceptions of Research Methods". There are some aspects of the data that overlap across these categories. This reflects the nature of students' thoughts and attitudes, which are not isolated from each other and often occur simultaneously. An overview of the themes and sub-themes are presented in table 4.8.

Table 4.8

Themes, Sub-themes and Description of each theme.

Theme	Description	Sub-themes
Emotional Shift	Feelings and emotions that the students conveyed both explicitly and implicitly in relation to the module and learning in general.	• Influence of Expectations • Influence of Self-efficacy and Academic Achievement
Fluctuating Learning Approaches	Any learning strategies or learning dispositions students conveyed both in relation to the RM module and other modules.	• Deep approach to learning • Surface Approach to Learning
Value Perceptions of Research methods	Students' views on the value and importance of learning research methods, both for their degree and career.	

4.7.1 Theme 1: Emotional Shift

The participants expressed a wide range of emotions, with anxiety, stress, boredom and enjoyment being especially common. It became evident that many of the participants had gone through a shift in their emotions during the module, with most starting with negative expectations for the module and moving towards more positive emotions. Sub-themes of 'Influence of Expectations" and "Influence of Self-efficacy & Academic achievement" were identified as key factors influencing students' emotions.

4.7.1.1 The Influence of Expectations

Initially, participants' emotions were linked with their expectations of the module, which were based on their previous experiences of research methods, or the lack thereof. Three out of seven participants had studied psychology A-levels before, and it was also these participants who expressed negative experiences of research methods. More specifically, the participants reported finding research methods both boring and challenging. One participant noted:

> I did psychology A-levels and as a part of that we had to do a module on RM for both years, and from that, I did not like it at all. Erm, I just thought it was quite dull and difficult to get your head around some point of it. *P3.*

This suggests that some of the students started their research methods "journey" with pre-existing negative attitudes. However, some of the students without previous research methods experience also displayed negative expectations, which largely originated from their previous "bad experiences" with mathematics.

Furthermore, some participants did not know that research methods were a part of the psychology curriculum and were faced with uncertainty when starting, which also triggered negative feelings, as noted by P5: "I just didn't know we were going to use stats and tables and all that. My attitude was negative because that is not what I was expecting". For some, the concept of research methods did not fit their views of psychology leading to a mismatch between their expectations and reality. As noted by one of the participants:

> Also including generally starting psychology… and I was just like I thought we were going to sit down and talk about feelings and suddenly you have this numbers erm names of test and it was just like a huge shock. P1.

These views were echoed by other participants, with one explaining that most students go into psychology because of the "mental health side", and do not consider the research side. Thus, it is interesting to note that regardless of the participants' previous experiences of research methods, mathematics, or the lack thereof, most started the course with negative perceptions and expectations. However, it also became evident that these negative expectations did not match their actual experiences on the module, leading to a shift in emotions:

> And then we started it last year with (module leader) and then it was fine…. And I was very happy after that, and I see that we don't have to calculate a lot so… that was it was erm made me feel better. P1.

Consequently, the participants also reported positive emotions towards the seminars and labs in general, with many of them saying they "enjoyed" the "interactive" nature of the computer sessions. Thus, this shift in emotions could also be due to the use of SPSS, with most of the students describing SPSS as "interesting" and "enjoyable" as well as "easier" than expected.

4.7.1.2 Influence of Self-efficacy and Academic Achievement

It was evident that the participants' emotions were influenced by how well or how "bad" they did on the module. Most participants reported that the module was both "easier" and more "straightforward" than expected. This seemed to induce a shift in their emotions, which had previously been influenced by their negative expectations of the module as being difficult, boring and irrelevant: "Easy to understand, and like if you grasp the main concepts, you can do well. So yeah, I think my attitude changed." P6.

This shift also translated to their grades, with some of the participants indicating that overall, they were surprised at how well they were doing, exceeding their expectations. Many of the participants also reported lacking in confidence in their abilities at the beginning of the module. However, positive reinforcement in the form of “understanding” and better-than-expected grades led to an increase in the students’ self-efficacy beliefs. For example, as one participant noted:

> Before I was as I mentioned very stressed and negative and anxious and everything. And then when we started it and we were going through the material I started to get it, so I felt like positive afterwards like I finally achieved something good in mathematics. P1.

Thus, with experience, the subject matter became more manageable, and students’ confidence and sense of achievement grew. Another participant noted that their interest increased when they began to see the value of research methods, which positively impacted their emotions and motivation:

> And I felt like I am actually doing something. Maybe it’s just fake, she (the lecturer) made it up, like I actually still can find out something. Like, give me tools to use in the future to do it. So yeah, that was really helpful. P5

However, interestingly despite this shift from research methods seen as something stressful and anxiety-inducing to something easy and in some cases interesting, the students still indicated that the subject of research methods was “inherently boring”. As noted by one participant: “I also want to add that erm like 80% of the students are very bored studying this, they hate it.” P2. The majority of participants agreed with this sentiment, thus, indicating that although the shift in emotions seemed to move towards a more positive view, there was still underlying negative feelings involved. When asked to expand on this, the participants indicated that the reason being that the subject is too “mathematical” and “analytical” and that there are too many “rules”.

One aspect of the module seemed to introduce the most substantial number of negative emotions than any other, this being the research report. Most of the participants indicated that the research report coursework was the part of the module they “hated” the most. Although there could be several reasons why the students found this part of the course the most negative, the main reason highlighted by the students was the grades they received for it, with one participant noting: “Coursework? Forget it. It was just a catastrophe. It was, I got 40%, and I cried” P4. However, another reason for these negative feelings towards the research report could be that it required students to use more independent analytical skills and required a deeper learning approach

4.7.2 Theme 2: Fluctuating Learning Approaches

When describing their approach to learning in preparation for assessments, as well as throughout the module and other modules, participants referred to the use of different learning strategies. The participants reported their use of less effective learning strategies throughout the module. These include rote-memorising of facts and surface learning when deeper learning might have been more appropriate. The majority of the participants seemed to alternate between deep and surface learning approaches, both within the module and between modules. These were identified as sub-themes.

4.7.2.1 Deep approach to learning

Most of the participants reported engaging in what could be associated with “Deep Learning” during the module. Deep learning can be defined as “students’ intention to understand material for oneself” (Beattie et al., 1997) and is associated with an intrinsic interest in the task. For the most part, participants seemed to engage in “deeper learning” during the computer labs and seminar, but less so during lectures. The participants reported that SPSS in particular required a certain level of understanding and referred to a point when it “finally clicks”.

> For SPSS, I don’t think I needed any outside help, because as much as it is hard at first, there seems to be a moment where it all clicks. You got to try and understand what you are doing and why doing it, and what the numbers it spits out means. P3

This could be one of the reasons why the participants also reported more positive views towards the labs and seminars, as they were more interactive with the students carrying out statistical analysis. One participant pointed out: *“*I like the seminars much more than I like the lectures because I thought they were much more interactive, and they used to go quicker than the lectures” P7. Several other participants agreed, describing the seminars and computer labs as more “practical” and “interesting”. The course’s practical nature was also evident in the module assignments, with one of the assignments being an open-book in-class SPSS test, which most of the students reported to enjoy. One participant noted: “I really like the in-class test as well. The open book one because it wasn’t just about remembering things it was applying it to situations you were given. P3.

This further indicates that students engaged at least partly in deeper learning, as applying knowledge is generally related to the deep learning approach (Entwistle & Ramsden, 2015). It was also evident that compared to other modules, the research methods modules were reported to be easier, with participants saying that they had to “put less effort in” and that they “revised less” and in “less detail”. This could partly be due to the structure of the module and assessments and the use of active learning during the seminars and labs, which increased the use of the deeper learning approach and thus led to more lasting understanding*: “*Yeah I would say the same it was simpler, but only once you get it once you understand it. But if you do not understand some concepts, you won’t be able to answer” P1. Other participants indicated that they understood a lot by just attending the seminars and computer labs, indicating a general appreciation for the “linearity” and “straightforwardness” of the module.

4.7.2.2 Surface approach to learning

When talking about the use of different learning strategies, many of the participants mentioned the use of “memorising”. Memorising is generally associated with a surface approach to learning; however, deep learning to a certain aspect also involves memorising, as all learning assumes some process of remembering. In a deep approach, different forms of memorisation are a means to an end, leading to understanding. Whereas in a surface approach, memorisation is an end in itself (Beattie, Collins & Mcinnes, 1997). It appears that in the research methods module, the students switched between these types of memorising:

> “I think memorising was mainly the structure but similarly like she said it was like going to the lecture and seminars really had built quite a good understanding working through the examples and the self-test and the in-class test you kind of understood the main principles.” P5.

This highlights that although the students adopted a deep learning approach to a certain degree, it applied only to the basics. When it came to the research report, most participants reported that it was the aspect of the module that they most struggled with, with some even reporting that it was their “worst” assignment for the first year. The reason for this seemed to be the perceived lack of guidelines.

This could be interpreted as that although the students recognised the need to engage in deep learning when it came to SPSS and statistics, they resorted to more surface learning strategies when it came to the report. The participants also expressed a need for more concrete examples of research reports: “They don’t give you a report that is first-class standard, which is what I want to know. What is a first-class standard research report?" *P7.* This further emphasises the lack of use of the deep learning approach, as the students wanted to have set templates which they could work from without engaging in any independent thinking themselves. This could be related back to students' self-efficacy beliefs and learning approaches, as the research report was reported to be "new" and "unfamiliar" which could have triggered a fear of failure.

This switch between the deep and surface learning approach could be compared to a strategic learning approach, in which students combine both deep and surface approaches to achieve their goals depending on the requirement and conditions under which they are learning (Entwistle & Ramsden, 2015). However, as is evident from the students' dissatisfaction with the research report, they did not seem to employ the most appropriate learning approach when it came to the research report.

4.7.3 Theme 3: Value Perceptions of Research Methods

Differences in students' perceptions of the value of research methods also became evident from the focus groups. The participants had different views on how relevant the learning of research methods was for their module, degree and career with some students not seeing the use or relevance of research method at all: "I think similarly I kind of did not understand the use of it or the reason why we are studying it" P4. However, these perceptions refer primarily to the beginning of the module, and as the semester progressed, many participants appeared to see at least some value to studying research methods:

> I would say that it is definitely important for our degree yeah because in every single semester we have to do it in some form or the other. Yes, it is important, it will be the most useful for our dissertation next year. P7

Furthermore, half of the participants also mentioned how they believed research methods would be helpful in the third year when they have to conduct their own research projects. However, although the participants recognise the value in relation to their degree, most of the participants did not see any of it beyond that: *"*Other than that, I don't think research methods is that valuable for me because I am not going to that direction" P2.

This suggests that participants did not see the relevance of research methods for their career, with most of the students reporting that it will not be something they plan to use after finishing their degree. "I think a lot of fields would not actually require and I think similarly I would probably refrain from those that did require because it's just a lot of effort." *P6.* This quote highlights how some of the students lacked the motivation to study research methods and were actively choosing to avoid research methods in their future careers.

4.8. Integration of findings

The integration of the quantitative and qualitative data was approached by the "Elaboration" method, which is one of the four ways mixed-methods data can be analysed as suggested by (Brannen, 2005). The elaboration method uses the qualitative data to ask further questions of the trends surfacing from the quantitative data. Integrating data from each method allowed the exploration of a range of students' emotions and whether they were associated with the module's difficulty while using qualitative data themes to elaborate on what contributed to these emotions. Furthermore, the integration of findings facilitated the examination of the initial relationships between students' previous experiences and expectations of research methods, while giving a more in-depth knowledge of these. By directly comparing and contrasting the statistical results with the findings of the focus groups, considerable overlap between the codes derived from the content analysis and the qualitative themes were found. The qualitative data supported the general finding from the quantitative data, with additional details about the nature of students' experiences.

More specifically, the qualitative findings gave more insights on when, how and why students experience certain emotions, thoughts and expectations.

In this section, all the quantitative and qualitative portions of the study will be brought into a closer integrated analysis to answer the research questions. By revisiting, integrating and interpreting results from both the statistical and the qualitative analysis, the findings were explored to provide a comprehensive understanding of students' experiences on the research methods module and the feelings, perceptions, and expectations that foster their progress and learning.

4.9 Discussion

4.9.1 Students' perceptions, expectations and feelings towards research methods

This study aimed to explore undergraduate psychology students' initial perceptions, expectations and feelings towards research methods and how their previous experiences influence these. Regarding the students' expectations, most of the students expected to learn or gain knowledge from the module. The rest had either no expectations, expectations regarding the module's content or expectations to pass the module or get a "good grade". The category of "knowledge gain" can loosely be compared to students holding "mastery goal" orientation, as central for this concept is the intrinsic value of learning and the desire to gain knowledge or skills.

Importantly, the findings also indicate that the students reported a broad range of emotions, with boredom and enjoyment/interest as prevalent as anxiety. In particular, it was evident that students seemed to find research methods an inheritably "boring" subject, with boredom being the top emotion expressed both in the pre module and post-module surveys. These findings indicate that the students experienced both positive and negative emotions. These findings align with previous research findings conducted within the control-value framework (Pekrun et al., 2002) and corroborate the need to move beyond the exploration of only anxiety in research method learning.

The focus groups provided further insights into these findings. They indicated that the students' feelings and expectations towards research methods were influenced by their negative experiences during A-level psychology, lack of experience with mathematics/statistics and students not being aware of research methods as a part of psychology. This led them to start their research methods "journey" with negative feelings such as boredom and anxiety. This is consistent with previous research, which indicates that students generally find research methods uninteresting (Ball & Pelco, 2006) and that they are typically anxious or nervous about the course and its difficulty (Braguglia & Jackson, 2012). However, it is interesting to note that even the students without any previous experience of research methods or statistics seemed to start the module with negative expectations. This was supported by the survey findings, as there were no significant differences regarding expected difficulty ratings between students who had done A-level psychology and those who had not.

In the focus groups, it was found that students reported an "emotional shift" arising from a miss-match between expectations and reality, self-efficacy and academic achievement. One of the reasons for this emotional shift could be that students overestimate how much mathematics was involved in the module, as indicated in both findings from the surveys and focus groups. These findings support previous research, which indicates that students often equated statistics with mathematics and assume that their negative experiences of mathematics carry over to statistics and research methods (Murtonen, 2005). However, the relationship between mathematics ability and performance in psychology research methods modules has only been shown to be significant for few aspects of mathematics (Bourne, 2018b). Overall, it seems that research methods modules involve less mathematics than students expect, with students' previous experience of mathematics not playing a major role in their learning.

Furthermore, the first survey findings also showed that students' expectations and emotions were correlated, with students with expectations towards "knowledge gain" having more positive feelings towards research methods than students with "Other Expectations", further highlighting the importance of feelings in learning. These findings can be compared to previous literature, which has shown correlations between mastery goal approaches, and positive emotions (Schweder, 2020).

4.9.2 The influence and relations between emotions, learning approaches and motivations on the learning of research methods

The focus group also provided richer data about the specific aspects of the module that students had negative feelings about, which seemed to mainly be the research report. Students' difficulties with the research report could be due to their lack of self-efficacy beliefs as it was reported as "new" and "unfamiliar" to all the students, which could have triggered a fear of failure. This goes hand in hand with self-efficacy beliefs and is one of the main motivations behind adopting a surface approach (Biggs, 1987). Consequently, the students reported more positive feelings towards the use of SPSS and statistics. It is also this aspect of research methods learning that previous research has mainly been concerned with, with previous research suggesting that statistics anxiety is widespread amongst psychology students (e.g., Field, 2014; Macher et al., 2015; Paechter et al., 2017).

Overall, the findings showed that in contrast to previous research (Ball & Pelco, 2006; Barry, 2012), the students did not struggle particularly more with the research methods module compared to other modules on their course. These findings could partly be due to how the module was organised, as the students expressed that there was more support available for the module than other modules on their course.

A reason for students not struggling with the SPSS and statistical part of the module could be due to their interactive nature. The use of SPSS can be seen to involve more "active learning", with the students being more involved in their learning process than, for example, attending lectures. Active learning has been associated with promoting higher-order thinking skills, such as deep learning (e.g., Dolmans et al., 2016; Prince, 2004), positive attitudes, and academic achievement (Akinoğlu & Tandoğan, 2007) and with increased learning in a research method setting (Allen & Baughman, 2016a). However, due to the large attrition rate of the surveys and the small sample of the focus groups, these findings should be interpreted with caution as it is possible that only those students who were more engaged in their learning participated.

Another possible explanation of these findings could be the use of different learning approaches, with the students at least partly adopting a deep approach to learning the basics of statistics and SPSS. However, when faced with tasks requiring more independent learning and analysis, such as the research report, students seemed to resort to a more surface approach, leading to a discrepancy between students' learning approach and the task's requirements. Previous research further supports that essays and reports generally require students to use deeper levels of processing than other forms of assessments, such as multiple-choice exams. (Scouller, 1998).

The deep approach has been positively correlated with academic achievement (e.g., Diseth, 2007; Fenollar et al., 2007; Zeegers, 2001), positive emotions (Postareff et al., 2016) and self-efficacy (Richardson et al., 2012). In contrast, the surface approach to learning has been associated with lower academic achievement, negative emotions (Trigwell et al., 2012; Postareff et al., 2016) and lower self-efficacy (Prat-Sala & Redford, 2010).

Furthermore, it also became evident from the focus groups that students did not see the relevance of research methods for their future careers, which could have led them to feel more "bored" by the subject and decreased engagement. These results support the previous findings by Murtonen et al. (2008), who found that students who did not see the value of research methods modules experienced more difficulties learning quantitative methods. However, although students in this study did not see the relevance of research methods in terms of their career, they did recognise its importance for their degree. This seems to reflect a more extrinsic motivation towards the learning of research methods, such as getting a good grade.

4.9.3 Conclusion

This exploratory study has provided a good foundation for exploring a range of emotions in the learning of research methods; one of the key findings of the study was that students experienced both positive and negative emotions towards research methods. As the students in this study reported both deactivating negative (boredom) and activating negative emotions (anxiety) and positive ones (enjoyment), with possible links between learning approaches and emotions found, the proposed usefulness of the control-value theory to study research methods learning is further strengthened.

This study did not find any significant differences regarding students' expectations or feelings when it came to their previous experiences of research methods, with most students expressing negative expectations and feelings towards the module. However, although the students expressed initial negative feelings towards the module, the students did not "struggle" more than with other modules on the course. In contrast, students found the module easier than expected and experienced more positive feelings at the end of the module. Interestingly, instead of struggling with the statistical part of research methods, the students described struggling the most with the research report. These findings could be due to the use of different learning approaches, with the students indicating both deep approaches and surface approaches to learning. However, these interpretations were derived from focus groups with only seven people; therefore, more quantitative research is needed to provide reliable and measurable inferences and to develop a fuller picture of the interplay between emotions and learning approaches.

Overall, while preliminary, these findings suggest that both *learning approaches, motivations, self-efficacy,* and a range of *emotions* can have important influences on students' learning processes and support the need to explore these variables together. Therefore, the next study aims to expand on these findings by exploring the learning of research methods quantitively using an integrated framework; the control-value theory of achievement emotions.

Chapter 5: Study 2 -Learning of Research Methods: A Longitudinal Study of the Influence of Affective, Cognitive and Behavioural factors

5.1 Introduction

Following on from Study 1, the main findings indicated that students experience both positive and negative emotions towards research methods. The findings support the need to study emotions in conjunction with other variables such as motivation and learning approaches. This notion is also supported by past research, which has established links between emotions and motivation, self-efficacy, self-regulation and learning approaches (Pekrun, 2011, Mega et al., 2014), with a range of different measurements and theories developed in order to explore these variables and their relation to academic achievement (e.g., Coates, 2016; Entwistle et al., 2000; Pekrun, 2006; Zusho et al., 2003). Previous research also suggests that students' emotions, learning approaches and motivations can change according to students' perception of the task and the learning environment, thus changing across academic courses, days and situations (Lindblom-Ylänne & Lonka, 1998; Vermunt & Minnaert, 2003). Consequently, it is important to understand how these processes develop, interlink and differ between students in the context of research methods learning.

Study 2 uses the control-value theory of achievement emotions framework (Pekrun et al., 2006) to assess the influence of emotions, motivational, and cognitive variables on learning. The theory offers an integrative framework that explores different types of emotions experienced in situations involving learning and achievement and the individual and contextual factors that influence these. Based on this theory, achievement emotions can, directly and indirectly, affect learning and achievement, mediated by attention, self-regulation, and motivation (Pekrun & Linnenbrink-Garcia, 2012). By differentiating academic emotions by their activation dimension (activating /deactivating), the theory offers a more nuanced understanding of how students' emotions influence educational behaviour and outcomes.

Furthermore, with technological advances and the increased availability of Learning Management Systems (LMS), a new and exciting research path has emerged, providing more accurate learning insights. Several learning analytic studies have established correlations between attendance, online engagement, and academic success (e.g., Tempelaar et al., 2015a, 2015b, Morris, 2005; Doyle et al., 2008; Crede et al., 2010, Boulton et al., 2018). However, most of the research to date has been conducted within online or blended learning modules, with less research finding these connections within more traditional face-to-face delivery. VLEs and attendance systems can provide more accurate estimates of students' learning behaviour; the current study also explored data from these to gain more insights into students' research methods learning development.

Moreover, for the past years, the student population applying to and entering university has become more diverse in terms of social, cultural, economic capital, age, and nationality (Morlaix & Suchaut, 2014). However, although participation has become more diverse, data from UCAS and the Office for students (OfS) shows that there are persistent gaps in non-continuation and degree attainment between different groups of students in the UK, with students from BAME ethnicity backgrounds more likely to drop out of their studies and less likely to gain a first or upper second-class degree than students from white ethnicity groups (OFS, 2020). These differences between ethnicity groups have also been related to students' emotions, motivation and cognitive variables. Previous studies have, for example, found that BAME students show higher surface learning compared to white students (Ridley, 2007), have more extrinsic motivations (Cotton et al., 2016), and more negative self-descriptions (Taylor & House, 2010).

In the previously mentioned review by Richardson et al. (2012), students' demographic variables were measured as correlates for academic achievement. The findings showed that BAME students were less likely to obtain a first-class or upper second-class degree than those from white ethnicity backgrounds. This attainment gap persisted even after controlling for other factors such as age, gender, prior qualifications, and engagement (Richardson et al., 2012). Thus, there is much unknown about the causes of these differences between students. To see whether these demographic variables are also influential in students' research methods learning, and to assess whether motivational, cognitive, emotional factors could explain these differences, students' demographic variables were also examined.

Consequently, as can be seen from the previous review, there are large individual bodies of literature on how motivational, cognitive, emotional and behavioural aspects are related to student learning and performance. However, most of these studies were conducted with students' self-reported data and only exploring a few of these aspects together (see Richardson et al., 2012). Limited research has explored both observational behavioural measures and affective, motivational and cognitive variables together, and no studies have explored these win research methods learning.

5.1.1 Study 2 Aims and Research Questions

The current study brings together separate strands of research on learning analytics, emotional, motivational, and cognitive learning research and aims to examine psychology students' academic achievement in research methods modules. The examination of these variables can be useful for establishing a better understanding of students' learning of research methods which could improve the overall learning of psychology students. By drawing on both observational and self-reported data from the same learning experience, this study aimed to examine the influence and relations between emotions, learning approaches, motivations, self-regulation, self-efficacy and VLE activity and attendance on the learning of research methods.

This study provides the core for the PhD project, offering a novel perspective by coupling this interactive approach with a *longitudinal perspective* following students through first- and second-year research methods modules. These years are particularly important, as the students need to build a foundation of research methods in order for them to be able to conduct an independent research project for their third-year dissertation. These objectives resulted in the following set of research questions:

1. *Can research methods performance and learning be explained by individual differences in emotional, motivational and metacognitive factors?*
2. *Does research methods performance and the influence of these individual difference factors change throughout the modules?*
3. *What contributions do behavioral variables make to the learning of research methods?*
4. *Is the effect of students' affective factors on academic achievement mediated by other individual difference factors, such as motivation and learning approaches?*

In addition to these exploratory questions some more general hypotheses were derived. Overall, it was hypothesised that motivational, meta-cognitive, cognitive variables would significantly correlate with students' academic achievement. Furthermore, it was also expected that students' emotions would have an influence on learning and academic achievement (as measured by grades), either directly or indirectly as mediated by motivation, self-efficacy, self-regulation or the use of cognitive and meta-cognitive learning strategies as proposed by the control value theory (Pekrun, 2006). Likewise, based on previous research it was hypothesised that students from BAME backgrounds would have lower academic achievement compared to white ethnicity background students. According to previous studies, up to 30% (Morris, 2005; Tempelaar et al, 2015) of the students' grades variance could be explained by students' learning behaviour as such, it was also expected that attendance and blackboard activity would predict academic achievement. Furthermore, based on the control-value theory framework (Pekrun, 2006) and previous research by Tempelaar, et al., (2012), it was hypothesised that students' emotions would be correlated with students' educational behaviour, as measured by attendance and VLE activity. Parts of the results and arguments described in this chapter have been published in Leino et al. (2021) and has been reproduced here with the permission from the American Psychological Association.

5.2 Method

5.2.1 Design

The study employed a longitudinal quantitative survey design, with three measurement time points for one calendar year. The study measured the students during the beginning of their research methods journey, eight months later at the beginning of the second year, and four months later after their final second-year research methods module. Hence covering their journey through research methods modules. The survey answers were analysed together with data from the university's learning management systems. The longitudinal method was chosen to establish potential causal relationships and to be able to follow students' development over time, thus contributing to a better-rounded picture of students' learning of research methods. Furthermore, as students' demographic factors are known to be influential factors in academic achievement, these variables were also introduced to the analysis.

5.2.2 Educational context

The study was conducted within the psychology unit at the University of Westminster, following a cohort of the first-year undergraduate students for one calendar year, from January 2019 to January 2020. The cohort followed was the 2018/2019 cohort of first-year undergraduate students on the Psychology BSc, Cognitive and Clinical Neuroscience BSc and the Psychology and Counselling BSc courses. Demographic information gathered from the entry cohort indicates that approx. 92% of the cohort was female, and 65% were between 18-19 years old at the start of the study. The cohort's ethnicity distribution was 42.5% Asian students, 30% White students, 15 % Black students, and 12.5 % other ethnicities.

This indicates that a larger part of the cohort was from Black, Asian and Minority Ethnic (BAME) backgrounds when compared with the overall percentage (22%) of students in higher education from BAME backgrounds in the UK (HESA, 2021). Based on the IMD, 29.3% of the students were also from the most deprived areas, and 38% from the second most deprived areas. The mean number of "UCAS" points for this cohort was 111, consistent with entrants achieving the grades BBC at GCE A-level.

All students from the three courses attended the *"Introduction to psychological research methods"* 20 credit module, which ran on the second term of the first year of their undergraduate degree and was the first research methods module on their degree. The module ran for 11 teaching weeks, consisting of 1h 30 min lecture, 1h seminar, and a 1h 30-minute computer lab, 44h of teaching time in total. The assessments on the module consisted of a formative research report (feedback from module leader), summative report (50% weighting), In-Class SPSS test (open book, 20% weighting) and an 1h exam consisting of short and multiple-choice questions (30% weighting). The research methods covered included: controlled experiments, correlational research, observational studies, questionnaires, surveys, and interview (see chapter 4.2.1 for more detailed description of topics covered).

During the Autumn term of 2019, the students attended their second-year research methods module. The Psychology BSc students and Psychology with Counselling BSc students took a 20-credit module called *"Data analysis for psychology",* which ran in the first term of the students the second year. The Cognitive and Clinical Neuroscience students, on the other hand, took the module "*Cognitive & clinical research methods*", which ran in the first and second term of the second year. The "*Data analysis for psychology*" module ran for 11 teaching weeks, consisting of a 1h lecture, 1h 30 minutes seminar and a 1h 30 min computer lab, as well as a 30-minute drop-in session, with 45 teaching hours in total. The module's assessment consisted of a Learning Journal course work (40% weighting) and a 2-hour exam (60% weighting). The module expanded on the topics covered in the first-year module, covering more complex research methodologies and designs as well as data-analytic techniques. Students were taught how to evaluate qualitative and quantitative research's strengths and weaknesses with reference to the conceptual and theoretical framework. Students were also taught how to use data analytic skills to analyse data from factorial experimental designs, surveys and qualitative designs and how to report these in an APA manner. In overview, the module covered three types of research methodology, Experimental design and ANOVA, Survey Design and multiple regression and interviewing and qualitative analysis.

The "*Cognitive & clinical research methods*" module ran for 11 weeks for the first semester and 11 weeks for the 2nd semester with a 2h lecture and a 2h practical, resulting in 88 teaching hours. As the current study only ran until the beginning of the spring term 2020, only the first semester of the module was included. The assessments for the module included an empirical report (30% weighting), two in-class tests (20% weighting each) and a group poster presentation (30% weighting). Like the "*Data analysis for psychology"* module, the module also extended and developed on the first-year module's knowledge. The students were taught how to design, carry out, analyse and report a cognitive experiment using a range of methodologies relevant to cognitive neuroscience. In the first term, the module covered ANOVAs and experimental designs, correlation and regression, as well as qualitative research techniques.

All of these modules employed the University's VLE software Blackboard, alongside face-to-face teaching. Blackboard was used as a repository of materials and as a tool to communicate updates to students, with some extra voluntary materials and activities also made available. The Blackboard pages for the modules differed slightly, but with all providing students access to materials used in lectures and practical (*Study Materials*) as well as assessments details *(Coursework information)*. Assignment submissions also took place via the Blackboard plugin Turnitin. No teaching was delivered via Blackboard. However, students were asked to access material via Blackboard during the practical sessions. As such, Blackboard was seen as a supplement to teaching.

5.2.3 Participants

This research examines a dynamic cohort of psychology undergraduate students at the University of Westminster. Accessible records of all of the 2018/2019 cohort students' educational behaviours and grades were obtained from the university's LMS for the academic years 2018/2019 and 2019/2020. No behavioural observations or data not normally recorded by the university was obtained. In total, complete Blackboard, attendance and module grade data for 239 students were gathered from Blackboard for the *"Introduction to research methods in psychology*". 179 of these students continued to second-year, indicating a progression rate of 75%. Attrition was attributable to student withdrawal, exclusion from the course or failure to gain sufficient credits to progress. The majority of these students continued to the second-year module "*Data analysis for psychology"* with Blackboard activity data, attendance data and module grades available for 152 students. A subgroup of students continued on to the "*Cognitive and clinical research methods*" module, with Blackboard activity data, attendance data and module grades available for 27 students.

These data were matched and investigated with students' self-reported data. A purposive sampling design was used with the whole cohort of 2018/2019 first-year Psychology BSc, Cognitive & Clinical neuropsychology BSc and Psychology & Counselling BSc students invited to participate. One hundred and twenty-six students participated in the first part of the survey (T1) of which 14 (12%) were males and 112 (88%) females, with age ranging from 18 to 40 (M = 20.66 SD = 4.50). There were 46 (37%) students from white ethnicity backgrounds, 14 (11%) from black or mixed black backgrounds, 56 (44%) from Asian or mixed Asian backgrounds, 10 (8%) from other ethnic backgrounds. 85 (67%) students reported A-level as their highest previous qualification, with the majority (81%) reporting Psychology as one of their A-levels.

Students' socio-economic background variables were also measured by self-report, with a large proportion (47%) of first-generation university students. Furthermore, 33 % of the students were from working-class backgrounds. These demographics indicate that a large part of the sample population was from widening participation backgrounds, including students from lower-class backgrounds, first-generation students and BAME students (See table 5.1 for full participant demographic factors for all time-points).

The second point of data collection (T2) took place eight months later in September and October of the academic year 2019/2020. The entire cohort of now second-year undergraduate students were invited to take part in the survey. The sampling was kept open for all the students to encourage more of the cohort to participate. This resulted in a dynamic sample of 97 students with some starting the study in the first point of measurement and some in the second. 65 of these students had taken part in the previous survey, and 32 had not, resulting in a 52% retention rate. Some of these follow-up losses can be attributed to non-retention between first and second year, as at least 58 students from the cohort withdrew, retrieved the module, or were excluded from their studies. Follow-up losses from the first point of measurement were not significant for sex, age, ethnicity, or socio-economic background variables (Chi-square Test; $p > .05$)

The third point of measurement (T3) took place four months later in February of the academic year 2019/2020. This time only those students who had taken part in at least one of the previous surveys were invited to participate in the final survey and offered a £5 amazon voucher for their time. The sample for T3 consisted of 80 students. 46 participants took part in all three surveys, indicating a retention rate of 37 %. However, several students (n = 20) from the original sample who did not participate in the 2nd survey completed the 3rd survey. When considering these students, the sample size was 66, with a retention rate of 52%. Follow-up losses from the first point of measurement were not significant for sex, age, ethnicity, or socio-economic background variables (Chi-Square Test; $p > .05$). Furthermore, there were also students (n = 14) who only took part in T2 and T3 and students (n = 19) who only took part in survey T1 and T2. The data from these students were kept in the sample to get a more accurate picture of the whole cohort. Taken together there was a total sample size of 158 students, with 99 students taking part in at least two of the surveys, and 99 students permitting to cross-reference their self-reported data with behavioural data from VLEs. (See figure 5.1 for a flow diagram of the sample)

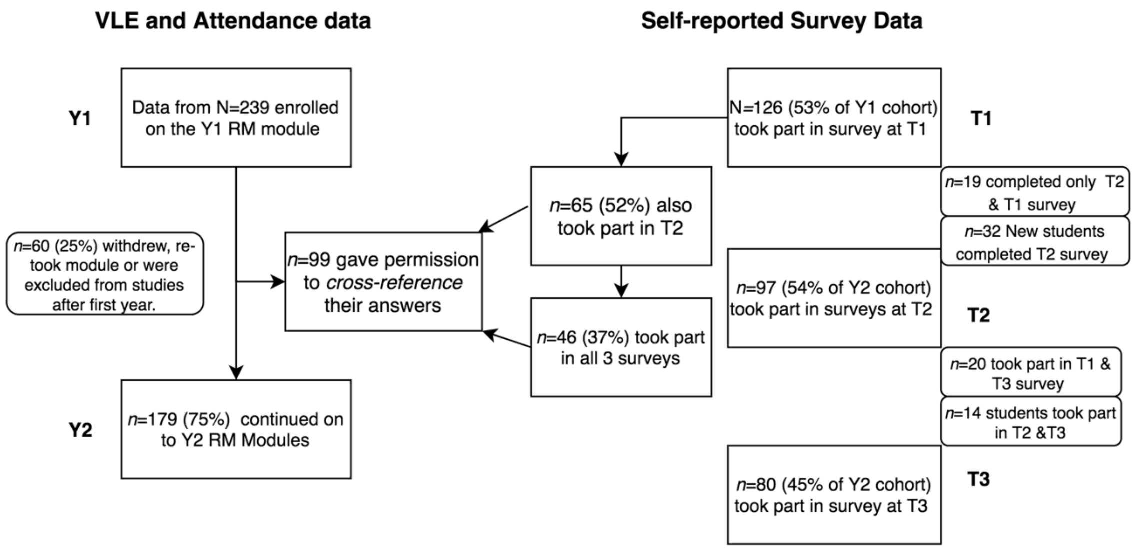
Table 5.1.

Demographic variables for all survey time-point subsamples & retention rates

	Time point 1 – Sub sample		Time point 2 -Sub sample		Time Point 3- Sub Sample 3	
	N	%	N	%	N	%
Gender						
Female	112	88	91	94	73	91
Male	14	12	6	6	7	9
Student status						
Home	96	76	71	73	60	75
EU	24	19	21	22	16	20
International	4	2	5	5	4	5
Missing	3	3				
Ethnicity						
White	46	37	45	46	32	40
Black or mixed black	14	11	9	9	7	9
Asian or mixed Asian	56	44	37	38	34	42
Other ethnic backgrounds	10	8	6	6	7	9
Highest qualification						
A-level:	85	67	67	68	60	75
Other	9	7	9	9	9	11
International baccalaureate	7	6	7	7	2	3
Btec	13	10	10	10	4	5
HE access course	6	5	5	5	4	5
Foundation degree	5	4	1	1	0	0
Previous BSc	1	1	1	1	1	1
Student-generation						
First generation	59	47	34	35	31	39
Continuing generation	43	34	48	49.5	33	41
Missing	24	19	15	15.5	16	20
Economic class						
Working class	42	33	29	30	25	31
Middle class	20	16	14	19	16	20
Upper/upper-middle	14	11	21	16	9	11
Other	25	20	10	10	13	16
Missing	25	20	24	25	17	21
Total	126	100	97	100	80	100
No of participants from baseline sample/retention rate	126	100%	65	51%	66	52%**

Figure 5.1

Flow diagram of sample consisting of observational behavioural data for year 1 and 2 & Self-reported survey data for T1, T2 & T3



5.2.4 Materials & Measures

5.2.4.1 Pilot study

Prior to the study, a pilot study was conducted to shorten and pilot the measurements used in the study. The pilot involved 33 participants, with 6 males and 27 females and an age range from 19-38, all current psychology undergraduate, master or PhD students. The scales employed in this study included the Motivated Strategies for Learning Questionnaire (MSLQ), The Statistics Course Anxiety scale (SCAS), Approaches to Learning Inventory (ASSIST) -short-version and the Achievement Emotions Questionnaire (AEQ). More details of these scales can be found in the next sections.

From the Motivated Strategies for Learning Questionnaire (MSLQ) four of the motivation scales were selected: The Intrinsic Motivation scale, Extrinsic Motivation scale, Task Value scale and the Self-Efficacy for Learning Performance scale, as well as one of the learning strategy scales: The Meta-cognitive Self-regulation scale. The Meta-cognitive Self-regulation scale was shortened from 12-items to 10-items, The Task Value scale from 6-items to 5-items and the Self-Efficacy scale from 8-items to 7-items, based on the internal reliability scores. Furthermore, all of the AEQ-items were shortened from 10-12 items to 5-7 items, using items with the highest item-total correlations while preserving spread across the emotion components. This method of revising the scale was proposed by Pekrun (17.09.2018) when contacting him for advice. Thus, in total, the measures were revised from 136 Items into a 103-item survey. The Cronbach's alpha of all scales was drawn to establish the scales' internal reliability with all the revised scales showing good internal consistency (See table 5.2).

Table 5.2

Internal reliability (Cronbach Alpha coefficient) for piloted measures and revised measures.

Factor:	*Pilot Scale*	*Cronbach's α*	*Revised Scale*	*Cronbach's α*
MSLQ:	**34-items**		**30-items**	
Intrinsic Motivation	4- items	.75	4- items	.75
Extrinsic motivation	4-items	.82	4-items	.82
Task Value	6-items	.89	5-items	.89
Self-Efficacy	8-items	.96	7-items	.96
Meta-cognitive Self-regulation	12-items	.81	10-items	.86
ASSIST	**18-Items**		**18-Items**	
Deep	6-items	.59	6-items	.59
Surface	6-items	.74	6-items	.74
Strategic	6-items	.83	6-items	.83
SCAS	**4-Items**	.82	**4-items**	.82
AEQ	**80**		**51-Items**	
Enjoyment	10-items	.88	7-items	.87
Pride	9-items	.90	6-items	.90
Anger	9-items	.89	6-items	.91
Hope	8-items	.90	5-items	.82
Anxiety	12-items	.88	7-items	.86
Shame	11-items	.93	7-items	.93
Hopelessness	10-items	.90	7-items	.87
Boredom	11-items	.94	6-items	.95
Total:	**136-Items**		**103-Items**	

5.2.4.2 Sociodemographic Factors

The surveys' socio-demographic variables included age, gender, ethnicity, highest qualification obtained by students, and the students' parents' highest qualification. Students who indicated A-level as their highest qualification to date were also asked whether or not they studied A-level psychology. The participants were also asked to report their fee status (Home, EU or International). The socio-economic class was measured by the households' chief income earner occupation, with the options: Higher managerial administrative or professional, Intermediate managerial administrative or professional, Supervisory or clerical and junior managerial, administrative or professional, Skilled manual workers, Semi-skilled and unskilled manual workers and other. These were further divided into Upper/Upper-Middle class & Middle Class and Working in accordance with the National Readership Survey (NRS) social grade system (Ipsos MediaCT, 2009).

5.2.4.3 Motivated Strategies for Learning Questionnaire (MSLQ)

The MSLQ (Pintrich et al., 1991) is a self-report instrument designed to measure university students' motivational orientations and their use of different learning strategies during their degree. The MSLQ is based on a broad cognitive understanding of motivation and learning strategies (Pintrich et al., 1991). The MSLQ is divided into two sections: a motivation section and a learning strategies section. Students' expectations and goal values, self-efficacy beliefs and test-anxiety are all assessed in the motivation portion. The learning strategy section includes items regarding students' use of different cognitive and metacognitive strategies. (Pintrich et al., 1991). In this study five of the scales were used: The Intrinsic Motivation scale, Extrinsic Motivation scale, Task Value scale and the Self-Efficacy for learning Performance Scale, and The Meta-cognitive self-regulation scale. Students rated themselves on a 7-point Likert scale, from 1 (not at all true of me) to 7 (very true of me). Scores for the individual subscales were computed by taking the mean of the items within that subscale, with a possible score range between 1-7.

The MSLQ manual presents the internal consistency of the scales as α = .62 (extrinsic), .74 (intrinsic), .90 (task value), .88 self-efficacy and. 79 (meta-cognitive self-regulation), with these results based on a sample of 380 college students within 37 classrooms covering 14 subject domains and 5 disciplines (Pintrich et al., 1991). Since the development of the scale, the MSLQ, either in its entirety or its subscales, has been used frequently to address the nature of motivation and use of learning strategies with undergraduates studying statistics (Bandalos et al., 2003), chemistry (Zusho et al., 2003), and psychology (Balloo et al., 2016). Furthermore, past reviews have identified over 50 empirical studies employing either the entire MSLQ, or parts of it (Credé & Phillips, 2011; Duncan & Mckeachie, 2002). The MSLQ also shows reasonable predictive and factor validity (Pintrich, et al., 1991). In the current study, the internal consistency coefficient ranged between α = .68-.93.

5.2.4.4 Statistics Course Anxiety scale (Hong & Karstensson, 2002)

Four items measuring students' anxiety about the statistics part of the course were included. Two items concerned anxiety caused by not understanding the content of statistics course materials well (e.g., 'I am anxious about not being able to understand statistical concepts in this course."), Two items concerned anxiety about the course in general (e.g., "I am concerned that I may fail this course"). Participants were asked to rate their anxiety level for the statistics course on a 5-point scale: 1 (strongly disagree) to 5 (strongly agree), the mean of the scores were then calculated with possible scores between 1-5. The scale was developed by Hong and Karstensson (2002), in their model of the antecedents of university students' state anxiety, with 298 university students. The scale was chosen because of its short-nature, and high internal consistency, with the internal consistency of this scale being .93 as reported by

Hong and Karstensson (2002). In the current study the internal consistency ranged between α = .85-.88.

5.2.4.5 Approaches to Learning Inventory (ASSIST) -short-version (Entwistle et al., 1997, updated 2013)

The ASSIST (Entwistle et al., 2013) consists of a total of 18-items self-reported questionnaire with six questions measuring each of the three domains of approaches to studying. 4 sub-domains measure the Deep Approach (e.g., "Often I find myself questioning things I hear in lectures or read in books"): meaning seeking, relating to ideas, use of evidence and interest in ideas. The Surface Approach (e.g., there's not much of the work here that I find interesting or relevant") is also measured by four subscales: unrelated memorising, lack of purpose, syllabus-boundedness and fear of failure. The Strategic Approach (e.g., "I organise my study time carefully to make the best use of it"), has five subscales including: organised studying, time management, monitoring effectiveness, achievement motivation and alertness to assessment demands (Entwistle et al., 2000). The instructions used in this study were: *"This questionnaire has been designed to allow you to describe how you go about learning and studying at university. Please respond truthfully, so that your answers accurately describe your actual ways of studying, and work your way through the questionnaire, making sure that you give a response to every item"***.** Responses were recorded on a 5-point scale ranging from 1 (disagree) to 5 (agree). The scores for each scale were calculated by summing each sub-scale items, with a possible range of scores between 6-30.

Internal and external evaluations suggest satisfactory reliability and internal consistency of the ASSIST. For example, a study of 817 first-year students from 10 departments in six British universities found the following coefficients of internal reliability: deep approach (.84); strategic approach (.80) and surface apathetic approach (.87). Similar results were found in another large-scale study involving 1,969 first-year students across

British and South African students, with high coefficients of reliability for sub-scales of a deep approach (.84), an surface approach (.80) and a strategic approach (.87) (Entwistle et al., 2000) Furthermore, in studies with psychology students the internal reliability of the ASSIST has shown Cronbach Alphas between 0.71 and 0.85 (Diseth et al., 2006) between 0.68 and 0.81 (Diseth, 2010), and between 0.81 and 0.88 (Huws et al., 2009). In a review of the 13 most influential models of learning style/approach instruments, Coffield et al. (2004) also identified the ASSIST as promising for measuring learning in higher education. In terms of predictive validity, previous research with psychology students using the ASSIST indicates small to moderate correlations between the learning approaches and academic achievement (r = 0.16 to r = 0.45). In the current study, the internal consistency coefficient ranged between α = .65 - .80

5.2.4.6 Achievement emotions questionnaire AEQ, -Class-related emotions scale (Pekrun & Perry, 2005)

The AEQ (Pekrun et al., 2005) is a multidimensional self-report instrument designed to assess university students' achievement emotions. There are three sections to the AEQ, containing the class-related, learning-related, and test-related emotion scales. The AEQ can be used to measure nine distinct class-related emotions, eight learning-related emotions, and eight test emotions in its current version. The AEQ's three parts may be used together or separately. Within each section, the different emotion scales can also be used separately. Previous studies have also combined the emotions scales based on the control-value theory's assumptions into three sub-scales of activating positive, activating negative and deactivating negative emotions (Mouratidis et al., 2009a; Paoloni et al., 2017). In this study, only the class-related emotions scale was used, as the aim was to address students' emotions only in the specific research methods modules.

The class-related emotion scales include 80 items and measure the following eight emotions: class-related enjoyment, hope, pride, anger, anxiety, shame, hopelessness, and boredom. In this study, a shortened-scale was used with 51-items assessing the 8 emotions, following the instructions from Pekrun.

The original version of the AEQ was used to assess students' habitual, typical achievement emotions experienced at university (trait achievement emotions). However, by altering the instructions preceding each section in the questionnaire, the AEQ can also assess students' emotions typically experienced in a specific, single course. In this study the AEQ was used to assess course-specific state achievements with the instructions: *"Attending classes at university can induce different feelings. This part of the questionnaire refers to emotions you may experience in this research methods class"*. Students were asked to rate their answers on a five-point Likert scale from "strongly disagree" (1) to "strongly agree" (5). Scales were then computed by calculating the mean, with the possible range of scores being between 1-5.

The AEQ has been used in many different educational contexts, culture and languages, (e.g., Frenzel, Thrash, Pekrun, & Goetz, 2007; Jang & Liu, 2012; Tempelaar, Niculescu, Rienties, Gijselaers, & Giesbers, 2012; Lüftenegger et al., 2016). Internal reliabilities for the emotion's subscales have been reported to be high, ranging from $\alpha = 0.84 - 0.94$ (Pekrun et al., 2002). Internal reliabilities of the aggregated sub-scales of activating positive, activating negative and deactivating negative emotions also show good internal consistence $\alpha = .84 - .94$. Considerable validity evidence has also been collected, with the AEQ showing strong evidence of construct and predictive validity (Pekrun et al., 2005). In the current study, the internal consistency coefficient ranged between $\alpha = .75 - .93$ for discrete emotions and $\alpha = .70 - .89$ for aggregated emotions groups. See table 5.3 for Cronbach Alpha coefficients for all scales.

Table. 5.3.

Internal reliability (Cronbach Alpha Coefficient) for all survey measures.

Factor:	No of items	Cronbach α T1	Cronbach α T2	Cronbach α T3
MSLQ:				
Intrinsic Motivation	4	.68	.77	.78
Extrinsic Motivation	4	.79	.77	.80
Task Value	5	.87	.77	.87
Self-Efficacy	7	.93	.93	.94
Meta-Cognitive Self-regulation	10	.86	.85	.87
ASSIST:				
Deep	6	.65	.68	.66
Surface	6	.74	.80	.79
Strategic	6	.74	.76	.80
SACS	4	.88	.87	.85
AEQ:				
Enjoyment	7	.84	.83	.85
Pride	6	.77	.75	.87
Anger	6	.81	.84	.85
Hope	5	.78	.82	.80
Anxiety	7	.88	.89	.91
Shame	7	.88	.88	.90
Hopelessness	7	.90	.89	.93
Boredom	6	.87	.83	.93
Total	103-items			

5.2.4.7 Academic achievement

Students' academic achievement was chosen as a measure of learning progress, with students' module and assignment grades accessed from Blackboard. Students' academic achievement was chosen as a measure of learning because it is the most widely employed measure of learning. Furthermore, by accessing students' grades from the university's VLE grades are also free from self-reported biases. Grades also allow a direct comparison of research finding with other studies' results, with standardised assessments' results allowing direct comparison between students (e.g., Bowman, 2010; Gonyea, 2005). For the first-year module, students' learning progress was evaluated by their overall module grade, summative report grade, In-class SPSS test grade and exam grade. Students' overall module grade, learning journal grade and exam grade were used as a tool to evaluate students' progress on the second year *Data Analysis for psychology"* module. For the second year "*Cognitive & clinical research methods*" module students' learning progress was evaluated by their grades on the first in-class test and report, as well as an "overall" module grade. As the current study only ran until the beginning of the spring term 2020, only the first semester module grades were included in the analysis. The "overall" grade was calculated by the combination of the in-class test (40% weighting) and report (60% weighting) grade, with possible range of grade between 0-100%.

5.2.4.8 Behavioural variables

Accessible records of all of the 2018/2019 cohort students' educational behaviours and grades were obtained from the universities LMS. No behavioural observations or data not normally recorded by the university was obtained. The behavioural data that was obtained included: Attendance, Grades and Blackboard activity. Attendance records were accessed through the "Seats" electronic attendance monitoring system, which records attendance to all learning sessions, with students required to tap their ID card against a reader at the beginning of every teaching session. Previous entrance grades were accessed from the student record system (SRS) and were converted into UCAS points, using the online UCAS tariff calculator. Assignment submissions and grades were accessed from the university's VLE platform Blackboard, as was Blackboard activity.

Blackboard activity logs retrieved for the first-year research methods module included the number of times students had accessed: Coursework Information, Module Information, Study Materials and total number of clicks and hours spent on the module Blackboard page.

The number of weekly online progress test completed by students was also measured. These tests were voluntary and intended as a tool for students to test their knowledge of the materials covered each week. There were ten tests in total, each consisting of 20 questions, with students receiving scores at the end and unlimited retakes allowed. The current study measured how many of the weekly tests students had attempted at least once, with scores ranging from 0-10. Blackboard activity retrieved for the second year "*Data analysis for Psychology"* module included the number of times students had accessed: Study Materials, Module Handbook, Assessment details, as well as the number of clicks and hours spent on Blackboard. Students' use of lecture recordings was assessed via lecture capture log files (Panopto video analytics), with the total number of times students had accessed recordings measured.

The Blackboard activity accessed for the *"Cognitive and clinical research methods'* module included number of times students had accessed: Learning Outcomes, Study Materials, Module information, Assessment details and the number of hours spent on the Blackboard course page and number of clicks.

5.2.5 Procedure

The first part (T1) of the longitudinal study data was collected using the online survey tool "Qualtrics" throughout the first 4 weeks of students' introduction to psychological research methods module in January and February 2019. The first part of data collecting took place during the 2nd "*Introduction psychological Research methods"* module computer lab. The students were approached by their seminar leaders and asked to participate in a PhD project regarding students' attitudes towards research methods. The students were asked to access the study through the Psychology Departments Research Participation Scheme (RPS) and were offered 0.5 credits for taking part. The students were made aware that participation was entirely voluntary and that if they did not wish to take part, they could explore the module Blackboard page during this time instead. The survey was kept open for another 4 weeks after the seminar to encourage more students to participate, with the study being advertised via email.

Upon accessing the survey the participants were first asked to create a unique ID code, by combining the first four numbers of their student ID, and the first two letters of their first name. These unique codes were only known to the participants and were used to cross-reference their survey and behavioural data results. The students were then asked to complete a survey with demographic information (gender, age, ethnicity and socio-economic status, educational background of family), the MSLQ, the Statistics Course Anxiety scale, the ASSIST and the AEQ (See Appendix 5.1 for full survey including consent form, information sheet, questionnaires and debrief)

The second (T2) data collection took place 8- months later during the first 5 weeks of the Autumn term of 2019. All students from the 2018/2019 cohort were asked to participate in the survey during their second-year Research methods module seminars (*Data analysis for psychology or Cognitive and Clinical Research Methods').* The students were once again offered 0.5 credits from the RPS scheme and also an opportunity to enter into a prize draw to win 1 of 3 £20 amazon vouchers. The survey was kept open for 4 weeks with the study advertised via leaflets and emails. The survey consisted of the same demographic questions and questionnaires as survey 1. However, at the end of the survey, the students were also asked for their consent to cross-reference their survey answers with their educational, behavioural data already captured by the university by reporting their student ID. The participants were made aware that participation was completely voluntary, and that they did not have to provide their student ID or give access to cross-reference their behavioural data and grades (See Appendix 5.2). The third (T3) data collection point took place 4 months later in late January 2020, after the students had finished their research methods modules and completed their exams. This is for the exception of the Cognitive and Clinical Neuroscience students who were still partaking in the "*Cognitive and Clinical Research Methods'"* module, which runs for two terms. This time only those students who had taken part in at least one of the previous surveys were invited to participate. The students were approached during several modules on their course and via email and leaflets. The survey was kept open for 4 weeks to encourage participation, with students offered a £5 amazon voucher for their time. The students were once again asked for their consent to cross-reference their survey answers with their educational, behavioural data captured by the university. The survey data from all three time points were matched using the Unique IDs provided by the students. The survey data and behavioural data of those students who had given consent were matched and anonymised by a third party without research interest in the study, using the student ID numbers provided by participants. These were analysed in conjunction with accessible records of all of the 2018/2019 cohort students' educational behaviours and grades.

5.2.6 Ethics

The study was conducted in accordance with the British Psychological Society guidelines and the ethical approval provided by the Psychology Department Ethics Committee of the University of Westminster. All participants consented to undertake the surveys and were debriefed upon completion of the surveys. With ethical approval, consent was not obtained when accessing behavioural data, since this part of the study was concerned with unobtrusive observational study of normal learner behaviours. However, students were asked for their consent to cross-reference their self-report and behavioural data. The cross-referencing and anonymisation of the data was conducted by a third party, without a research interest in the study (a member of the psychology department, who was not teaching on either of the modules and had no connection to the research) prior to statistical analysis. Thus, ensuring that the participants were non-identifiable and that any of the personal or outcome data could not be linked with particular individuals (See Appendix 5.3 for Ethics Committee approval letter).

5.3 Results

5.3.1 Changes in academic performance throughout the year

The whole cohort's grades were gathered from the university's LMS, and the mean overall grade for "*Introduction to psychological research methods*" was 52.23 (*SD* = 13.11). The mean grade for *"Data analysis for psychology"* was 57.27 (*SD* = 12.01) and the mean grade for "*Cognitive and clinical research methods"* was *M*= 62.75 (*SD*=5.43) for the whole cohort. Table 5.4 shows the Mean, Standard deviation and range of grades for all assignments for the full student cohort and for the participants in surveys.

The first year *"Introduction to psychological research methods"* module grade positively correlated with both the "*Data analysis for psychology* "module grade ($r(150) = .572$, $p < .001$) and *"The Cognitive and clinical research methods"* module grade ($r(25) = .686$, $p < .001$) (See Table 5.4, for descriptive statistics). To assess whether students' entrance grades (UCAS Points) had any correlation with these module grades three, Spearman's correlations were conducted. However, no significant correlations could be found between students' entrance grades and the module grades ($p > .05$).

Table 5.4

Mean, Standard Deviation and Range for all grades for the whole cohort of students and participants in surveys.

	Whole Cohort of Students				Participants in Surveys			
	N	*Mean*	*SD*	*Range*	*N*	*Mean*	*SD*	*Range*
Intro to RM								
Exam	239	57.56	13.43	20-94	*100*	64.70	11.28	35-94
Report	239	50.78	14.78	5-78	*101*	57.59	12.20	30-78
In-class test	225	52.87	19.76	4-86	*97*	61.20	15.04	20-86
Overall Grade	239	52.23	13.11	19-81	*101*	59.79	10.34	29-81
Data Analysis								
Exam	152	56.18	15.05	17-91	89	60.68	16.05	14-87
Learning Journal	152	59.53	11.07	25-92	89	62.15	10.61	25-92
Overall Grade	152	57.27	12.01	25-85	89	60.68	12.34	24-83
Cognitive & Clinical RM								
In-Class test	27	62.93	7.56	52-74	11	65.69	8.16	52-74
Report	27	62.63	5.82	48-70	11	65.00	4.77	55-70
Overall Grade	27	62.75	5.43	50-71	11	65.27	4.63	59-71

5.3.2 Differences in Academic performance between the whole cohort and survey sample

Several independent t-tests were conducted to see whether there were any differences in academic performance between students who had taken part in the self-reported surveys, and those who had not. The results showed that there was a significant difference, with the students taking part in the surveys having a significantly higher module grade for the first year "*Introduction to Psychological Research methods"* module (M = 59.79, SD = 10.33) than those who did not take part (M = 46.69, SD = 12.12), $t(237) = 8.977$, $p < .001$. Similar results were also found for the second year "*Data analysis for psychology"* module, with students who took part in the surveys having significantly higher grades (M = 60.68, SD = 12.34) than those who did not (M = 52.20, SD = 11.22), $t(151) = 4.673$, $p < .001$. Furthermore, when comparing with the second year "*Cognitive & Clinical Research Methods"* grade, significant differences between students who had taken part in the surveys and those who had not could also be found, $t(27) = 2.301$, $p = .029$. Thus, the results of this study should be interpreted with this in mind.

5.3.3 Relationships between emotional, cognitive, motivational factors and academic achievement.

To test the control-value theory's categorisation of emotions based on valence and the assumptions of a bidirectional relationship with motivational and meta-cognitive factors, the relationships between the emotional, motivational and cognitive and meta/cognitive factors were explored. The emotions were aggregated into activating positive (enjoyment, hope, pride), activating negative (anxiety, anger, shame) and deactivating negative (boredom, anger) as proposed by the control-value theory, with the scales summed and a mean score drawn. Reliability analysis of the scales using Cronbach alpha showed good internal consistency for these three categories ranging from α=.70-.89. (For correlation coefficients between grades and individual emotions, see Appendix 5.4-5.6).

The results showed that, as expected, the activating positive emotions were positively correlated with self-Regulation, self-efficacy, task-value, intrinsic motivation, as well as both the deep and strategic learning approach. Moreover, the activating positive emotions correlated negatively with the surface approach and both the activating negative and deactivating negative emotions (see Tables 5.5, 5.6, 5.7 for correlation coefficients).

Furthermore, the negative activation emotions had moderate to strong positive correlation with Statistics anxiety and Surface approach and negative correlations with, self-efficacy, self-regulation and task- value during all three time-points. Similarly, the deactivating negative emotions were also correlated with all these variables, with the addition of negative correlations with intrinsic and deep approach to learning during all time-points. Statistics anxiety, on the other hand, had moderate negative correlations with intrinsic motivation, self-efficacy, task-value as well as strong positive correlations with surface approach in all three time-points.

Several more correlations were conducted to examine the first research question regarding the influence of emotional, motivational and metacognitive factor on students' academic performance. Firstly, the self-reported variables from T1 were correlated with first year module and assignment grades. However, the only significant relationship that could be found was a negative relationship between statistics-anxiety and the in-class test grade ($r(75)$=.026, p=.026) (See Table 5.5 for T1 correlations)

Furthermore, to examine whether students' second year (T2) was related to their performance in the second year, several correlations were conducted. The results showed that Deactivating negative emotions were negatively correlated with the *Data analysis for psychology* module grade ($r(67) = -.252$, $p = .037$) and the learning journal grade ($r(67) = -.288$, $p = .016$). No other correlations for emotions and *Data analysis for psychology* grade were found. (See table 5.6 for T2 correlation coefficients).

For the cognitive psychology students, several correlations between grades and T2 negative emotions were found. These include deactivating emotions being negatively correlated with module grade $r(9) = -.637$, $p = .048$) and in-class test $r(9) = -.721$, $p = .019$). However, as the sample size for the correlations for the Cognitive and Clinical Neuroscience subset is fairly small, these relationships should be interpreted cautiously. For correlations between *Cognitive and Clinical Research Methods'* grades and T2 and T3 self-reports see Appendix 5.7-5.8).

In terms of correlations between T3 emotions and *Data analysis for psychology* module grade, several correlations were found. Activating positive emotions scores were positively correlated with module grade $r(62) = .260$, $p = .027$, whereas activating ($r(62) = -.253$, $p = .044$), and deactivating negative emotions scores $r(62) = -.264$, $p = .036$) were both negatively correlated with module grade (See table 5.7 for all T3 correlations). As T3 was conducted after the students had finished their second-year research method module, these are best viewed as an indication of the learning process's outcome and retrospective feelings towards their learning on the modules.

Table 5.5

Descriptive statistics and zero order correlations of T1 self-reported variables and year 1 module grades.

Self-reports T1	N	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1.Activating Pos	113	3.37	.63															
2. Activating Neg	111	2.19	.79	$-.53^{***}$	-													
3. Deactivating Neg	115	2.28	.80	$-.58^{***}$	$.70^{***}$	-												
4.Stats-anxiety	126	3.02	1.11	$-.31^{**}$	$.45^{***}$	$.38^{***}$	-											
5.Deep	126	21.78	3.73	$.53^{***}$	-.18	$-.28^{**}$	-.13	-										
6. Surface	126	17.85	4.63	$-.48^{***}$	$.65^{***}$	$.67^{***}$	$.53^{***}$	.03	-									
7. Strategic	126	20.43	4.49	$.44^{***}$	$.29^{**}$	$-.25^{**}$	-.12	$.45^{***}$	$-.21^{*}$	-								
8. Intrinsic	126	4.81	1.05	$.41^{***}$	-.15	$-.32^{***}$	$-.21^{*}$	$.38^{***}$	$-.18^{*}$	$.30^{**}$	-							
9. Extrinsic	126	5.32	1.20	.01	$.25^{*}$	$.38^{**}$	-.02	.16	$.23^{*}$	$.21^{*}$	.10	-						
10.Self-regulation	126	4.78	.92	$.55^{***}$	$-.31^{**}$	$-.46^{***}$	$-.21^{*}$	$.62^{***}$	$-.26^{**}$	$.56^{***}$	$.47^{***}$	$.27^{**}$	-					
11.Task Value	126	5.30	1.07	$.38^{***}$	$-.28^{**}$	$-.47^{***}$	$-.30^{**}$	$.38^{***}$	$-.39^{***}$	-31^{***}	$.44^{***}$	$.25^{**}$	$.62^{***}$	-				
12.Self-efficacy	126	4.62	1.12	$.45^{***}$	$-.31^{**}$	$-.26^{**}$	$-.45^{***}$	$.45^{***}$	$-.34^{**}$	$.46^{***}$	$.45^{***}$	$.38^{***}$	$.54^{***}$	$.57^{***}$	-			
Y1 Grade																		
13.Module Grade	239	52.23	13.11	.07	-.07	-.12	-.07	.13	-.02	-.06	.13	-.16	.02	-.01	.06	-		
14. Exam	239	57.55	13.43	-.11	-.11	-.12	-.03	-.06	-.05	-.21	.07	-.14	.-13	-.02	-.002	$.72^{***}$	.	
15.Report	239	50.78	14.78	-.07	-.08	-.10	-.02	.18	.03	.03	.14	-.07	.12	-.002	.10	$.86^{***}$	$.44^{***}$	-
16.In-class test	225	52.87	19.76	.183	-.08	-.16	$-.26^{*}$	.19	-.07	.11	.16	-.15	.09	.11	.09	$.69^{***}$	$.45^{**}$	$.37^{***}$

Note. Sample varies between correlations as not all participants who took part in surveys gave permission to cross-reference their data with grades.
Correlations between Grades and Cognitive/motivational variables n=77.
Correlations between Grades & emotions n=69-73 (Incomplete data was kept in analyses, as these were later used in Multi-level analysis which uses maximum likelihood to estimate missing values).

Table 5.6

Descriptive statistic and zero order correlations of T2 Self-reported variables and "Data analysis for psychology" module grades

Self-reports T2	N	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.Activating Pos	74	5.07	.99	-			-										
2. Activating Neg	75	2.36	.83	-.62***	-												
3. Deactivating Neg	76	2.38	.81	-.63***	.88***	-											
4.Stats-anxiety	86	3.27	1.08	-.47**	.61***	.53***	-										
5.Deep	86	21.61	3.62	.41***	-.02	-.07	.17	-									
6. Surface	86	18.10	5.13	-.47***	.65***	.67***	.67***	.04	-								
7. Strategic	86	20.96	4.27	.44***	-.18	-.29*	-.06	.54***	-.22*	-							
8.Intrinsic	86	4.72	1.04	.56***	-.32**	-.47***	-.31**	.29***	-.34**	.32**	-						
9. Extrinsic	86	5.30	1.25	.17	.24	.15	.02	.33**	.10	.18	.11	-					
10.Self-regulation	86	4.76	.96	.51***	-.16	-.20*	.04	.54***	-.22**	.36***	.29**	.18	-				
11.Task-Value	86	5.15	.95	.40**	-.23	-.34**	.18	.33**	-.38***	.44***	.40***	.29**	.49***	-			
12.Self-efficacy	86	4.61	1.16	.26*	-.38**	-.34**	-.35**	.27**	-.36**	.35***	.40***	.37***	.42***	.47***	-		
Y2 Data analysis Grade																	
13.Module Grade	152	57.27	12.01	.10	-.11	-.25*	-.19	.20	-.26*	.11	.26*	-.11	.24*	.20	.01	-	
14.Learning Journal	152	59.53	11.07	.20	-.12	-.29*	-.14	.24	-.25*	.16	.27*	-.002	.32**	.16	.14	.76***	
15.Exam	152	56.18	15.05	.06	-.09	-.20	-.18	.13	-.28*	.07	.25*	-.13	.18*	.13	-.04	.94***	.54***

Note. Sample varies between correlations as not all participants who took part in survey gave permission to cross-reference with grades.
Correlations between Grades and Cognitive/motivational variables n=73
Correlations between Grades & emotions n=67-69 (Incomplete data was kept in the analyses, as these were later used in Multi-level analysis which uses maximum likelihood estimating to estimate missing value).

Table 5.7

Descriptive statistic and zero order correlations of T3 Self-reported variables and "Data analysis for psychology" module grades

Self-Reports T3	N	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.Activating Pos	76	3.21	.69	-			-										
2. Activating Neg	76	2.24	.93	-.80***	-												
3. Deactivating Neg	76	2.56	1.03	-.83***	.90***	-											
4.Stats-anxiety	80	3.03	1.11	-.56**	.61***	.62***											
5.Deep	80	21.17	3.67	.28*	.15	-.22*	-.06	-									
6. Surface	80	17.86	5.10	-.64***	.72***	.73***	.74***	-.11	-								
7. Strategic	80	20.77	4.99	.57***	-.58***	-.59***	-.33**	.24*	-.48***	-							
8.Intrinsic	80	4.73	1.10	.37**	-.20	-.37**	-.29*	.45***	-.41***	.33**	-						
9. Extrinsic	80	5.43	1.20	.17	-.15	-.12	-.02	.25*	-.04	.28*	.30*	-					
10.Self-regulation	80	4.83	1.05	.35**	-.35**	-.38**	-.21	.49***	-.38**	.42***	.65**	.32**	-				
11.Task Value	80	4.98	1.15	.59***	-.54***	-.58***	-.39**	.38**	-.49***	.45**	.62***	.43***	.62***	-			
12.Self-efficacy	80	4.66	1.11	.57***	-.58***	-.51***	-.51***	.27*	-.48**	.44***	.49***	.45***	.49***	.57***	-		
Y2 Data analysis Grade																	
13.Module Grade	152	57.27	12.01	.26*	-.25*	-.26*	-.14	.16	.03	.07	.13	-.03	.38**	.16	.06	-	
14.Learning Journal	152	59.53	11.07	.26*	-.29*	-.28*	-.19	.24	-.10	.09	.10	-.02	.30**	.20	.16	.76***	
15.Exam	152	56.18	15.05	.21	-.18	-.20	-.09	.11	.001	.04	.12	-.02	.35**	.11	.02	.94***	.54***

Note. Sample varies between correlations as not all participants who took part in survey gave permission to cross-reference with grades. Correlations between Grades and Cognitive/motivational variables n=66

Correlations between Grades & emotions n=64

5.3.4 Mediating effect of motivation and cognitive variables on the relationship between emotions and academic achievement

To examine the fourth research question of "*Is the effect of students' affective factors and learning behaviours on academic achievement mediated by other individual differences factors, such as motivation and learning approaches?"* several mediations models were tested. A mediator variable is a variable than explains the relationship between a predictor variable and the dependent variable. As T2 deactivating negative emotions were significantly correlated with the second-year module grade, the possible mediation effect self-regulation, intrinsic motivation and surface approach, on the influence of deactivating emotions and the module grade for *"Data analysis for psychology"* was tested.

Firstly, Baron and Kenny's (1986) mediation model was used to test the possible mediation effect of surface approach on deactivating emotions and the second-year module grade. Baron and Kenny's (1986) causal step model is the most commonly used method for mediation (Pardo & Román, 2013). The model proposes two paths to the dependent variable. The independent variable (Emotions) must predict the dependent variable (Grades) and the independent variable must predict the mediator (surface approach). Mediation is tested through three regressions. (See Figure 5.2).

The results of the first bivariate linear regression indicated that deactivating negative emotions score was a positive predictor of surface approach $t(68) = 7.07$, $B = 4.23$, 95% CI [3.04, 5.42], p <.001. The second regression indicated that surface approach was a negative predictor of module grades $t(68) = 2.279$, $B = -0.65$, 95% CI [1.22, -.09], $p = .026$. However, when the surface approach was added as a mediator to the model the deactivating negative emotions $t(68) = 0.748$, $B = -1.86$, 95% CI [-6.83, 3.11], $p = .457$, was no longer a significant predictor of module grade, consistent with full mediation. A Sobel test confirmed these results ($z = -2.17$, $p = .033$).

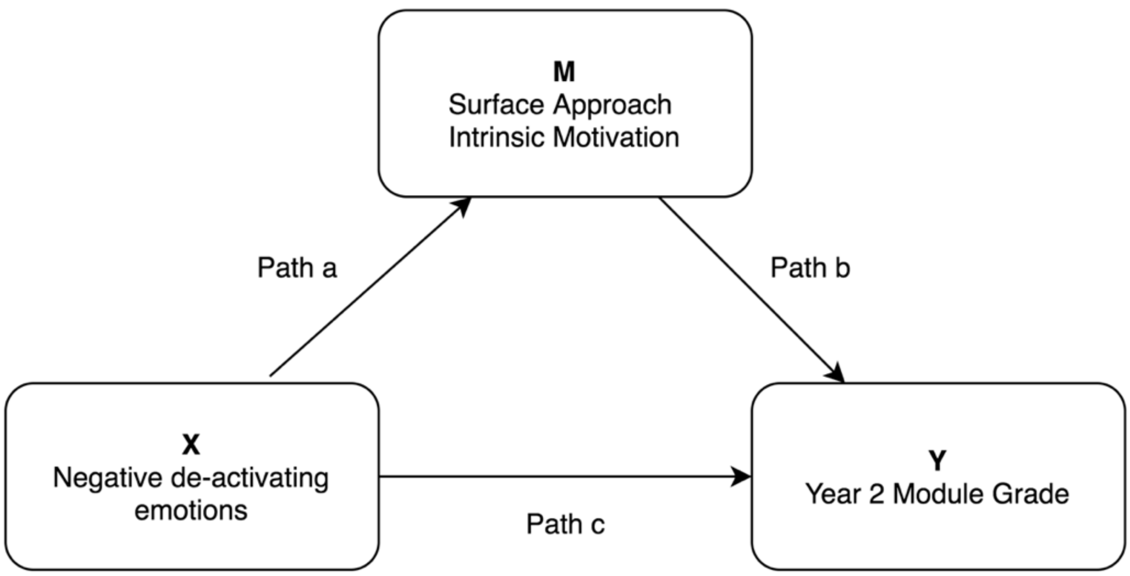
Furthermore, similar findings were found for the mediating effect of intrinsic motivation, with results indicating that deactivating negative emotions score was a negative predictor of intrinsic motivation, $t(68) = 3.19$, B= -.563, 95% CI [-.85,-28], $p < .001$ and that intrinsic motivation was a positive predictor of module grades, $t(68) = 2.33$, B = 3.23, 95% CI[.47, 5.98], $p = .022$. Deactivating negative emotions score was no longer a significant predictor of module grade after controlling for the mediator intrinsic consistent with full mediation, $t(68) = -15$, B= -2.59, 95% CI[-6.72, 1.55], $p = .217$. A Sobel test confirmed these results ($z = -2.01$, $p = .045$).

However, Baron and Kenny's mediation method has been criticized on multiple grounds. Most notably, simulation studies have shown that among the methods for testing intervening variable effects, the causal steps approach is among the lowest in power (MacKinnon et al., 2007; Zhao et al., 2010). Furthermore, the Sobel test requires that the sampling distribution of the indirect effect is normal. However, the distribution of the effect is often only normal at large sample sizes, which means that at smaller sample sizes such as for this study the p-value might not be an accurate estimate.

An increasingly popular method of testing the indirect effect is bootstrapping (Hayes, 2009; Shrout & Bolger, 2002).Bootstrapping is a non-parametric method based on resampling with replacement which is done many times, e.g., 1000 times. As such, the bootstrap method does not violate assumptions of normality and is recommended for small sample sizes. From each of the of bootstrap resamples the indirect effect is computed, and an approximation of the sampling distribution is generated. Hayes (2009) offers a macro called PROCESS that calculates bootstrapping directly within SPSS. This method provides point estimates and confidence intervals by which one can assess the significance of a mediation effect. Point estimates reveal the mean over the number of bootstrapped samples, if the interval does not cross zero the indirect there is a mediation effect. Simulation research has shown that bootstrapping is one of the more valid and powerful methods for testing intervening variable effects (MacKinnon et al., 2004; Williams & MacKinnon, 2008). As such, these mediation effect were also tested using PROCESS 3.4 macro, percentile bootstrap estimation with 1000 samples. No mediation effect was found for surface approach, *B*= -.189, SE = .23, 95% CI [-.642, .278] or intrinsic motivation B= -.1473, SE = .98, 95% CI [-3.640, .2295], as the confidence intervals cross zero. Thus, the earlier mediations effects found with Baron and Kenny's (1986) model should be interpreted with caution.

Figure 5.2

Proposed Mediation Pathways of surface approach and intrinsic motivation, on negative-deactivating emotions and Y2 "Data analysis for psychology" Module grade



5.3.5 Changes in emotional, motivational and cognitive/metacognitive variables

In order to explore the second research questions regarding changes in emotions, motivations and cognitive/metacognitive factors throughout the research methods journey T1, T2 and T3 survey data from students who had taken part in all three questionnaires were examined (See table 5.8 for descriptive statistics for all self-reported measures for students who took part in all three surveys).

Table 5.8

Mean and SD for all self-reported measured as a function of time-point for students who took part in all 3 surveys.

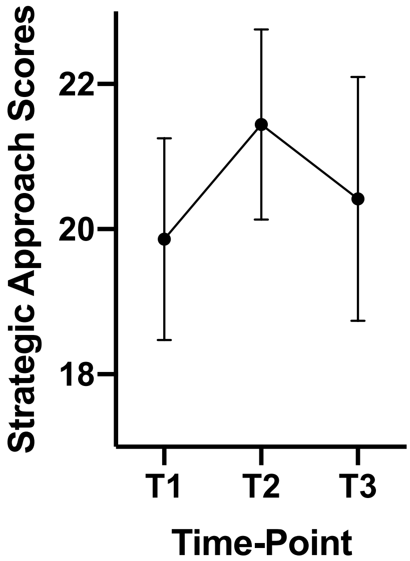
		T1		T2		T3	
Variable	*N*	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*
Deep Approach	46	22.05	3.34	22.05	3.43	21.86	3.67
Surface Approach	46	16.70	4.10	16.37	5.00	16.90	5.38
Strategic Approach	46	19.86	.69	21.41	.65	20.44	.83
Intrinsic Motivation	46	4.63	1.08	4.82	1.07	4.88	0.96
Extrinsic Motivation	46	5.07	1.02	5.24	1.21	5.39	0.98
Task-value	46	5.23	1.16	5.34	1.00	5.22	1.03
Self-efficacy	46	4.48	1.18	4.69	1.12	4.60	1.22
Self-regulation	46	4.68	.88	4.94	.83	5.16	.94
Stats-anxiety	46	2.85	1.08	3.16	0.98	2.93	1.12
Activating Positive	33	3.35	.70	3.53	.64	3.37	.60
Enjoyment	33	3.16	.84	3.20	.80	2.99	.81
Hope	33	3.34	.81	3.49	.80	3.43	.71
Pride	33	3.48	.76	3.65	.69	3.46	.90
Activating Negative	34	2.02	.74	1.97	.76	1.83	.72
Anxiety	34	2.49	1.06	2.39	1.04	2.46	1.19
Anger	34	1.68	.73	1.66	.72	1.72	.73
Shame	34	2.20	.89	2.29	.99	2.35	.99
Deactivating Negative	36	2.13	.79	2.11	.76	2.24	.95
Boredom	36	2.54	.92	2.58	.95	2.72	1.17
Hopelessness	36	1.72	.80	1.77	.68	1.90	1.03

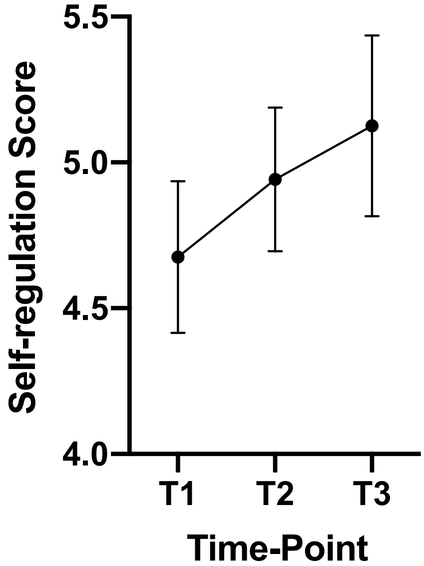
Several one-way repeated measures ANOVA were conducted to compare the effect of time (IV) on emotions (DV) measured during T1, T2 and T3. The emotions were grouped in activating positive, activating negative and deactivating negative. No significant change in the activating positive emotions could be found $F(2,64) = 1.676$, $p < .196$, $\eta^2 = .053$. No significant changes in Activating negative emotions $F(2,66) = 1.395$, $p = .203$, $\eta^2 = .042$ or Deactivating negative emotions $F(2,70) = .674$, $p = .519$, $\eta^2 = .019$ could be found.

In order to see whether any changes in motivation, learning approaches, Self-efficacy and Self-regulation could be found, several more one-way repeated measures ANOVAs were conducted, with Time (T1,T2,T3) as the IV variable and the motivational and meta/cognitive factors as DVs. There was a significant difference for the Strategic learning style $F(2,90) = 3.996$, $p = .022$, $\eta^2 = .087$. A Bonferroni post-hoc test revealed a significant increase in the Strategic learning scores between time point 1 ($M = 19.86$, $SD = 6.90$) and 2 ($M = 21.44$, $SD = 6.49$) $p = .024$ (See figure 5.4). Furthermore, self-regulation scores also changed through the year $F(2,90) = 2.358$ $p = .009$, $\eta^2 = .099$, with a Bonferroni correction showing that self-regulation was significantly higher in T1 ($M = 4.66$, $SD = .14$) compared to T3 ($M = 5.18$, $SD = .14$) $p = .005$. No other significant changes in motivation or cognitive/metacognitive variables could be found indicating that emotions, along with self-efficacy, task-value, extrinsic motivation, as well as deep and surface approach stayed relatively stable. However, these results should be interpreted with some caution due to the inclusion of many DVs which increase the Type 1 error rate. (See figures 5.3-5.4)

Figure 5.3-5.4

Line-graphs showing changes in strategic learning approach and self-regulation scores as a function of time (n = 46)





5.3.6 The influence of learning behaviour on academic performance

To investigate the third research question of *"What contributions do behavioural variables make to the learning of research methods?"* accessible records from the universities' VLE and attendance monitoring system were obtained and cross-referenced. Firstly, to investigate whether these behavioural traces have any relationships with students' academic achievement, correlations were run. Pearson's product moment correlations were run for the attendance and module grades data. However, for the data gathered from Blackboard, Spearman's rank correlations were run, as the data was not normally distributed and with some outliers present.

The results showed that learning behaviour was correlated with academic grades in both first and second year. More specifically, attendance (%) on the first year *"Introduction to psychological research methods*" module were significantly correlated with the module grade

(r(237) = .391, p < .001), as was the number of hours spent on Blackboard (r_s(237) = .521, p < .001) and the number of clicks on Blackboard (r_s(237) = .446, p < .001). Blackboard activity that was significantly correlated with overall grade included: Number of weekly statistics tests (r_s(237) = .424, p < .001), Study material clicks (r_s(237) = .419, p < .001) and to a lesser degree module information clicks (rs(237) = .244, p<.001) and Coursework-information click (r_s(237) = .231, p < .001). Attendance and Blackboard activity also had moderate positive correlations (r_s (237)= .380, p<.001 indicating that students who attended more lectures, were also more active on blackboard.

Multiple regression analyses were run using SPSS 26 to predict performance on the first-year module, with the assumptions of multivariate normality, homoscedasticity, and multicollinearity met, and no influential cases present (Cooks distance <.05). The behavioural variables with significant correlations to module grade were inputted into a multiple regression model summarised in Table 5.9 with no significant variance inflation factors (VIF) presents. The number of clicks on Blackboard was excluded due to multicollinearity with hours on Blackboard. The multiple linear regression results showed that the behavioural variables explained 31.4% of the variance in the module grade F(6,232) = 19.079, p < .001. However, only attendance, number of hours on Blackboard, and the number of weekly tests taken added significantly to the model (Model A). A second regression (Model B) was run, including only the three significant predictors. This model explained 31% of the variance in the grades, with all three variables adding significantly to the model p < .05. To see the unique variance explained by each predictor, the *relaimpo* package and *lmg* metric on the software R version 4.02 were used to calculate decomposed R^2-values for each predictor, with the number of hours on Blackboard activity being the most important predictor and explaining 13% variance (see Table 5.9 for coefficients and R^2 values).

Similar results were found for the second-year module “*Data Analysis for psychology*” module with attendance, $r(150) = .432$, $p < .001$, and the number of hours spent on Blackboard, $r_s(150) = .477$, $p < .001$, significantly correlated with module grade. The specific Blackboard activity that was significantly correlated with the module grade was the number of times students had accessed "*Study Materials*", $r_s(150) = .341$, $p < .001$ and “*Assessment Details*”, $r_s(150) = .176$, $p = .030$. The number of lecture recordings views was also a significant predictor $r_s(150) = .218$, $p = .007$, with 69% (n=105) of the students viewing lecture recordings at least once during the term.

A multiple regression (Table 5.9) showed that these variables explained 35% of the variance in the second-year module grade, $F(5, 146) = 16.799$, $p < .001$ adj r^2=.346, with attendance, Blackboard activity hours and the number of lecture recording views being significant predictors of module grade. To further explore this, a new model was run, including only the significant predictors as well as the first-year research methods grade. The new model explained 50% of the variance in the second-year module grades, $F(4, 147) = 37.086$, $p < .001$, adj r^2=.498, indicating that previous attainment was the best predictor of students’ grades followed by Blackboard activity (see Table 5.9 for coefficients and R^2 values). For the second year “*Cognitive and clinical research methods*” module grade, no significant correlation with overall attendance could be found. Furthermore, no significant correlations ($p>.05$) between blackboard activity and the overall grade could be found, however this could be due to the small sample size.

Table 5.9

*Summary of Multiple Regression Analyses for Variables Predicting Year 1 (N=239) and Year 2 (*Data analysis *for psychology) module grade (N=152)*

	Model A						Model B					
Variables	*B*	*SE B*	*β*	*t*	R^2	*p*	*B*	*SE B*	*β*	*t*	R^2	*p*
Year 1:												
Blackboard Hours	.142	.049	**.238**	3.93	**.10**	.004	.171	.045	.274	3.780	**.13**	<.001
Attendance %	.131	.035	**.222**	3.736	**.08**	<.001	.139	.34	235	4.042	**.09**	<.001
Weekly Tests	.705	.258	**.190**	2.734	**.08**	.007	.760	.254	.207	2,995	**.10**	.003
Study Material	.060	.045	.096	1.335	.05	.183						
Module Info	.185	.174	.067	1.335	.01	.288						
Coursework Info	-.035	.121	-.020	-.292	.01	.771						
Year 2:												
Blackboard Hours	.182	.055	.287	3.318	**.13**	.001	.125	.034	.234	3.950	**.13**	<.001
Attendance %	.167	.037	.313	4.453	**.12**	<.001	.165	.041	.261	4.001	**.11**	<.001
Lecture recordings	.198	.081	.174	3.318	**.05**	.015	.181	.069	.161	2.641	**.05**	.009
Study Materials	.044	.032	.116	1.369	.06	.173						
Assessment Details	-.039	.099	-.031	-.395	.01	.694						
Y1 module grade							.464	.071	.405	6.549	**.22**	<.001

Note: Significant predictors are highlighted in bold.

5.3.7 Changes in learning behaviour between first and second year

In order to examine whether there were any significant changes in students' attendance or blackboard activity between the first and second year, several repeated t-tests were conducted. The results showed that attendance $t(151) = 5.059$, $p < .001$ significantly reduced from the first year to the second year, for students on the "*Data analysis for psychology"* module, however no significant change in blackboard activity could be found $t(151) = 1.459$, $p=.147$. There was no significant change in attendance for students on the "*Cognitive and clinical research methods*", $t(26) = -.574$, $p = .571$; however, there was a significant reduction in blackboard activity, $t(26) = 5.563$, $p = .002$ (see Figure 5.5 and Figure 5.6).

Figure. 5.5

Overall Mean % Attendance for Psychology BSc/ Psychology and Counselling BSc students (Psyhcology/Counselling) N=152 and Cognitive and Clinical Neuroscience BSc students (Cognitive Neuroscience) N=27 across Year 1 and Year 2 Modules.

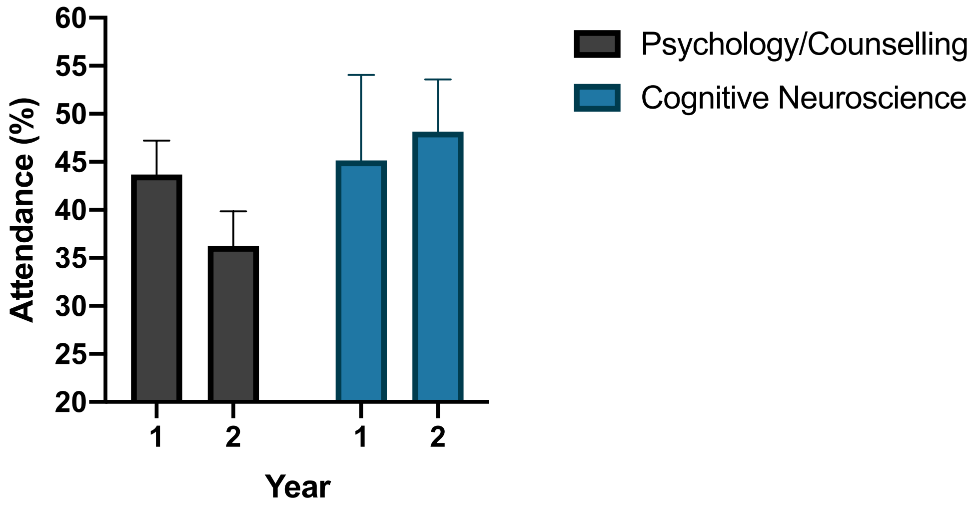
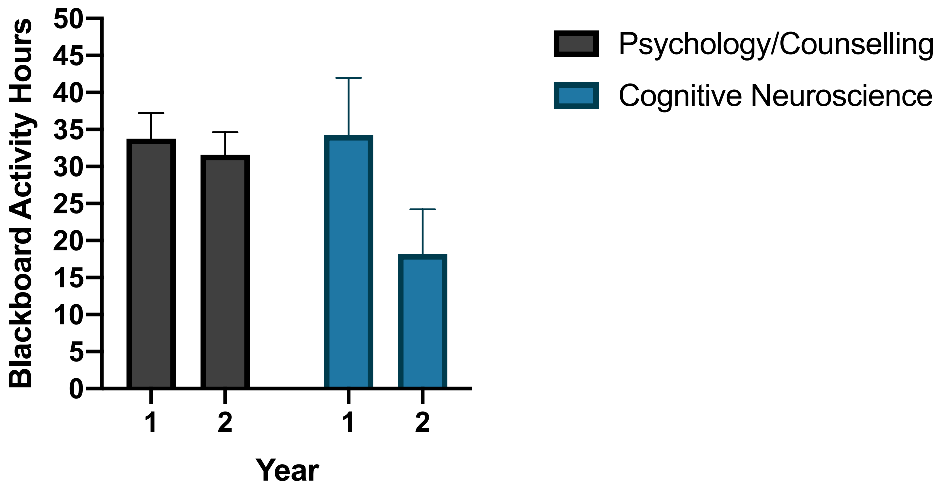


Figure 5.6

Blackboard Activity Mean hours for Psychology BSc/ Psychology and Counselling BSc students (Psyhcology/Counselling) N=152 and Cognitive and Clinical Neuroscience BSc students (Cognitive Neuroscience) N=27 across Year 1 and Year 2 Modules.



5.3.8 Cross- Lagged Models of reciprocal associations between VLE activity and grades

To assess the longitudinal reciprocal associations between Grades and VLE activity, path modelling techniques were used to conduct comparisons between a series of nested cross-lagged path models (Lewis-Beck et al., 2012).Cross-lagged path analysis estimate reciprocal relationships, or directional influence between variables over time. An advantage of the model is that it can take into account variables at two-points in time simultaneously. The models estimate relationships between one variable to another and vice versa, which refers to the "crossed" part. The "lagged" part refers to the models estimating relationships between variables across different time points (Allen, 2017).

In order to take into account the whole cohort of students, module grades and Blackboard activity data from the second-year modules "*Cognitive & clinical research methods"* and *"Data analysis for psychology"* were combined into an overall second-year grade and blackboard activity respectively (See Appendix 5.9 for a separated Cross-lagged model with only the" Data *analysis for psychology*" grades and Blackboard activity). Module grades and total Blackboard activity hours for both year 1 and year 2 were included in the models. The models were analysed using maximum likelihood estimation in the Lavaan package (version 0.6) on the software *R* version 4.0.2 (Rosseel, 2012). The fit for each model was evaluated using several indices and Hu & Bentlers, (1999) cut-off values for close fit. These include the Comparative Fit Index (CFI) with a cut-off point of > .90, the Root Mean Square Error of Approximation (RMSEA) with the cut-off point of < .08 and the model Chi-square value with the cut of point of > .05.

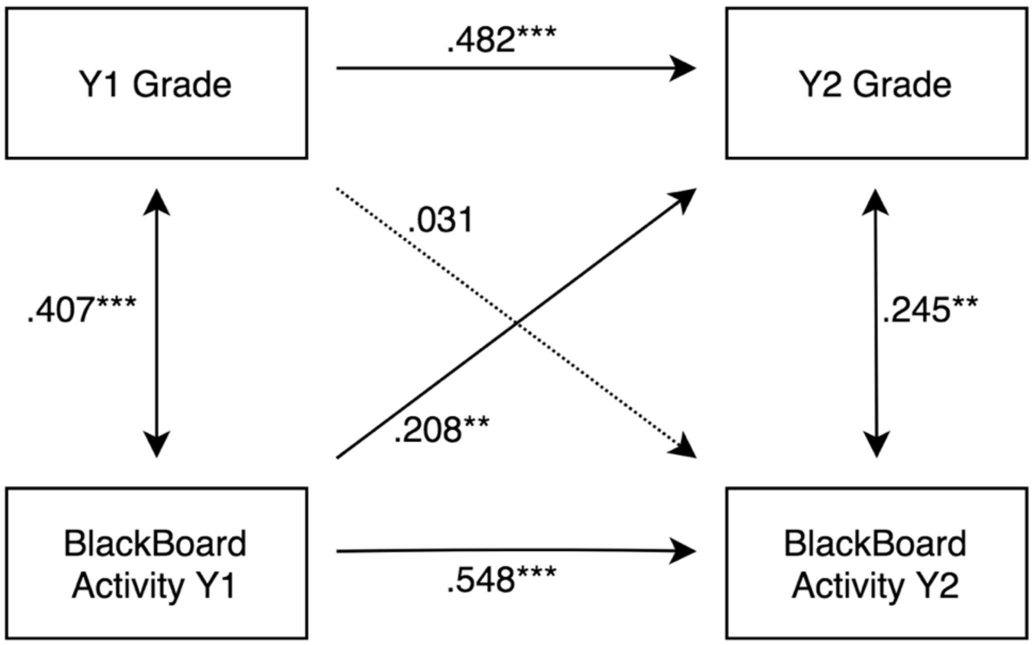
Firstly, the autoregressive model (M1), was conducted, which estimates the constructs' stability over time. The fit index CFI (.96) showed a good fit to the data, whereas Chi-square ($\chi 2(2)= 10.175$, $p < .05$, and RMSEA (.15) showed poor fit. The results indicating that both

Blackboard Activity (standardized coefficients $\beta = 0.53$, $p < .001$) and Grade ($\beta = 0.56$, $p < .001$) exhibited significant stability effects from Time 1 to Time 2. In the second model (M2), the cross-lagged pathway was added from Blackboard Activity Y1 to Y2 Grade. The model (M2) showed appropriate fit to the data ($\chi\ 2$ (1) = .213, p = .645; RMSEA = 0, CFI =1). All parameter estimates in the model were significant ($p < .05$). For the third model (M3), the path leading from Y1 Grade Blackboard activity at Y2 was specified. The model (M3) showed partially appropriate fit ($\chi\ 2$ (1) = 6.245, $p < .05$; CFI = .95, RMSEA = .221). All parameter estimates in the model were significant (p < .001), except for the cross-lagged path from Grade at Time 1 to BB at Time 2 ($\beta = .054$, p=. 437).

Finally, M4 (See Figure 5.7) shows the fully cross-lagged model, which included the autoregressive paths linking the same constructs across time points and the cross-lagged paths between Grades and Blackboard Activity. As expected, the saturated model showed excellent fit to the data, (RMSEA = 0.00, CFI = 1.0). Furthermore, while controlling the stability effects, the path from Blackboard Activity at Year 1 to Module grade at Year 2 was significant (β = .208, p = .001); however, the path from year 1 grade to Blackboard activity at year 2 was non-significant (β = .031, p = .645). The findings provide overall support for a VLE activity being an important and possible causal predictor of module grade.

Figure 5.7

M4- Autoregressive cross-lagged final model of VLE activity and module grades.



Note. Solid black lines indicate standardised coefficients, the (auto)-correlations between factors, and time points.* p < .01, *** p < .00

5.3.9 Relationships between emotional, motivational and cognitive factors and learning behaviour

To test the hypothesis that emotions would be associated with students' learning behaviour (attendance & VLE activity) Spearman's and Pearson's correlations were run. Several significant but small correlations were found, with both activating positive ($r_s(68)$ = .248, p = .038 and deactivating negative ($r_s(71)$ = -.254, p = .030) emotions in time-point 1 significantly correlated with the number of weekly online test conducted in the first-year module. However, no significant correlations with emotions were found for the second-year "Data Analysis for psychology" module behaviour data p>.05. In the third point of measurement, activating positive emotions ($r(64)$ = .34, p = .001) were correlated with attendance in the data-analysis module. As time point 3 was conducted after the students had finished their research methods modules, these emotions are best seen as an indication of the students' feelings towards their learning engagement and outcome of their learning process in the second year. No significant correlations between any of the other self-reported variables and learning behaviour were found (See Appendix 5.10-5.12 for correlation tables).

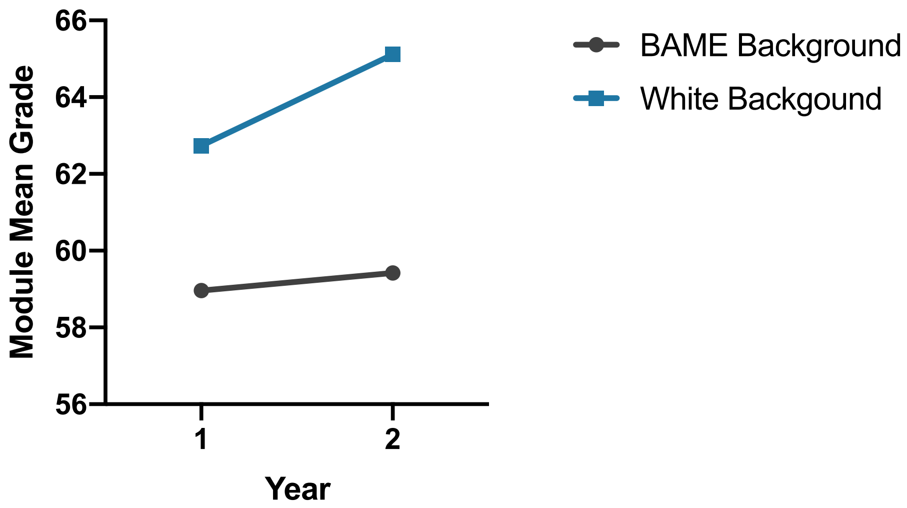
5.3.10 Socio-demographic factor's influence on academic performance and emotions

In order to explore the hypothesis that demographic factors could be influential in the learning of research methods, students were categorised into BAME and white-ethnicity students. The second-year modules "*Cognitive & clinical research method"* and *"Data analysis for psychology*" behavioural data were once again combined, resulting in an overall second-year grade, attendance and Blackboard activity score.

Those students who had given ethnicity information and access to cross-reference their grades were divided into BAME students (n=58) and students from white ethnicity backgrounds (n=39) to explore whether students' ethnicity is associated with their academic performance and academic behaviours. A mixed Two-way ANOVA was conducted to see any differences in grades for these student groups. The within subject IV was Time (Year 1/Year 2), the between subject IV was the Ethnicity group (BAME/White ethnicity) and the DV was Module Grade. The results showed no significant main effect of year $F(1,96) = 1.881$, $p = .173$, $\eta^2 = .019$, nor an interaction effect, $F(1,96) = .608$, $p=.437$, $\eta^2=.006$. However, there was a significant main effect of Ethnicity group, $F(1,96) = 5.531$, $p=.021$, $\eta^2=.054$, with BAME students having significantly lower grades (n=58, M=59.15, SD=10.48) than white students (M=63.60, SD=10.01) (See figure 5.8).

Figure 5.8

Line Graph Showing Changes in Year 1 and Year 2 Module grades (%), by ethnicity group.



3.5.10 Mediating Effect of Emotions on the Relationship Between Ethnicity and Academic Performance

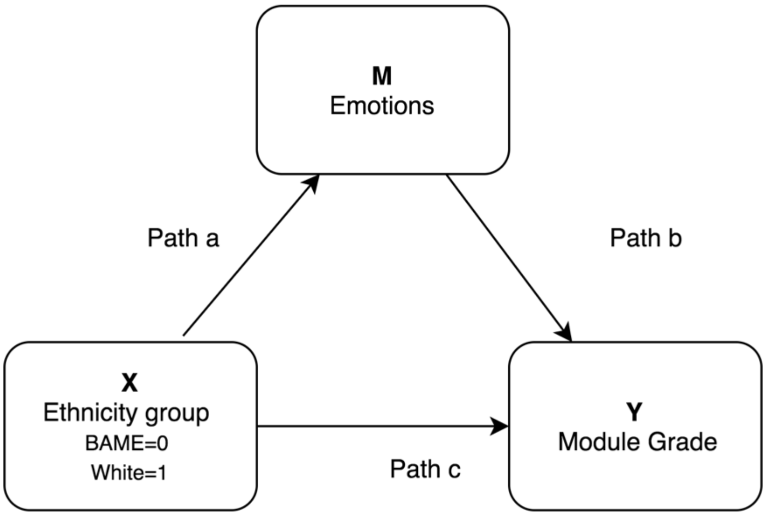
In order to explore whether these difference in grades between ethnicity groups could be explained by the influence of emotions several mediation analyses were run using PROCESS v3.4.1, using a percentile bootstrap estimation approach with 1000 samples (Shrouth & Bolger, 2002). (See figure 5.9 for illustration of mediation effect). This method of mediation was chosen due to the previously mentioned critique of Baron & Kennys (1986) method. Firstly, to examine whether emotions mediated the relationship between student ethnicity group and first-year grade three mediations model were conducted with the three achievement emotions groups (activating positive emotions, deactivating negative emotions, & activating negative-emotions). However, none of the emotion groups were significant predictor of module grade when controlling for student ethnicity group (*p* >. 05).

These mediation analyses were repeated for T2 emotions and the second-year module grade. When running the models with activating positive emotions and activating negative emotions as mediators, no significant mediator effects could be found ($p > .05$). However, when the model was run with deactivating negative emotions as the mediator, the results supported a mediation effect. The results indicated that ethnicity group (BAME=0, White =1) was a significant negative predictor of deactivating emotions, $B = -.580$, $SE = .166$, $p < .001$, with white ethnicity student reporting lower deactivating negative emotions scores than BAME students.

Furthermore, deactivating negative emotions was also a significant negative predictor of module grade, $B = -3.752$, $SE = 1.71$, $p < .05$. Ethnicity group was no longer a significant predictor of module grade after controlling for the mediator, deactivating negative emotions, $B = 2.27$, $SE = 2.265$, consistent with full mediation. Approximately 10% of the variance in module grade was accounted for by the predictors ($R^2 = .098$). These results indicated that the indirect coefficient was significant, $B = 2.174$, SE = 1.11, CI [.262, 4.527], as the confidence intervals do not cross zero. This indicates that differences between BAME and white ethnicity students' year 2 grades could partly be explained by students' deactivating negative emotions (boredom and hopelessness).

Figure 5.9

Proposed Mediation Pathways of Emotions on ethnicity status and module grade.



5.3.11 Stability and change in students' achievement: Multilevel growth modelling

Several multilevel growth models (MLM) were built to further test the second research question (*Does research methods performance and the influence of these individual difference factors change over the course of the degree?*) and to see whether students' achievement was changing or remained stable during the 12-month period. MLM are extensions of linear regression models that include both fixed and random effects and are also commonly known as mixed effect models or hierarchical linear models. MLMs were originally developed to allow for the analysis of clustered data (i.e., individuals within groups), such as children nested within classrooms. However, MLMs can equivalently be applied to multiple repeated measures of the same learning variable nested within each individual, such as grades in different time-points nested within students.

The MLM approach accounts for the fact that individuals are measured repeatedly over time by modelling the intercept and the time coefficients as random effects. This allows us to estimate a mean trajectory for the entire sample and subject-specific deviations from the mean for each person in the data (McNeis & Matta, 2019). The fixed effects represent the mean of the trajectory of all the individuals within the sample. The random effects represent the estimated variance of the individual intercepts and slopes. For instance, for a linear trajectory, the fixed effects are estimates of the mean intercept (i.e., starting point) and mean slope (i.e., rate of change). Together these fixed and random effects capture the general characteristics of growth for both the group as a whole and for the individuals within the group (Curran et al., 2010)

An advantage to using MLM over repeated measures ANOVA is that when data points are missing, the analysis can still be conducted without deleting these individuals. Individuals with multiple missing data points are still included in the analysis because the observed values determine the longitudinal trajectory through random effects and maximum likelihood estimation. Therefore, students with missing values are not excluded from the analysis but contribute less to the results (Raudenbush & Bryk, 2002, pp.339).

The MLM data is hierarchically structured, meaning that each time measurement of a variable is nested within each participant. MLMs consider this hierarchical structure by modelling separate, but related equations at the within (1) - and between-person levels (2). As such, in this study the Level 1 variable is time, nested within each participant and the Level 2 variable is the individuals participating in the study. The outcome variable is students' grades measured at the beginning of their journey (UCAS points), during the middle (first-year module grade) and at the end (overall second-year module grade). As UCAS scores are measured on a different scale to the module grades, these variables were standardised using the proportion of maximum scaling transformation (POMS) method, as suggest by Moeller (2015). This transformation makes each scale range from 0 (=minimal possible) to 1 (=maximum possible) by first making the scale range from 0 to the highest value, and then dividing the scores by the highest value.

$$\text{POMs} = [(\textit{observed} - \textit{minimum}) / (\textit{maximum} - \textit{minimum})$$

POMS-transformed scores have the advantage that they provide one universal metric, so that scores can be compared across variables and samples. This transformation is preferred over z-standardisation as it does not change the multivariate distribution and covariance matrix of the transformed variables (Moeller, 2015). However, for the current study generally similar results were also found when initially running these models with z-scores (See Appendix 5.13 for models run with z-score standardisation).

5.3.11.1 Model Construction & Evaluation

R software version 4.0.2, (2020) and the *NLME* package for linear multilevel growth models (Pinheiro et al. 2020), and the package *performance* (Lüdecke, et al. 2020) for the assessment of regression model performance was used to construct and evaluate the MLM models. Intercept only models without any predictors were firstly constructed to explore the degree of variance in grades attributable to the within- and between-student levels. Intercept-only models split the variance into two parts: variance associated with Level-1 errors (within-student) and variance associated with Level-2 errors (between-student) (Curran et al., 2010). From these models, intraclass correlation coefficients (ICCs) was computed. Hox et al., (2002) interpreted ICC as "*the proportion of the variance explained by the grouping structure in the population*" (p.15). In other words, the ICC tells us the proportion of the variance that "lies" between people (Level 2). The higher the variability between the students (Level 2-students), the lower the variability is *within* the students (Level 1-time). The intercept (null) model is computed initially to determine if MLM is needed in the first place or to give an indication how much variance the cluster can account for (Peugh, 2010).

In step 2, to examine patterns of change over time in the outcome variable, an unconditional growth model was constructed, containing a linear “time” variable and a “quadratic time” variable added as fixed effects. The fixed effects estimate the starting point and the slope of the population change trajectory. In step 3, a conditional growth model was conducted by adding random slopes to the model and allowing the rate of growth to vary across the participants. Because of the limited number of parameters that could be estimated with three-timepoints, the linear slope was allowed to vary across individuals. However, the quadratic slope was not allowed to vary. In each model, the time variable was centred at initial status; therefore, the intercept of the growth model can be interpreted as students’ academic achievement at the start of their journey.

In the final step, after building the growth model, the covariance structure was modelled using a continuous first-order autoregressive covariance structure. AR(1) is one of the commonly used covariance structures when analysing longitudinal data, and it has been widely applied in latent growth models (Kwok & Li, 2008). A first-order autoregressive (AR1) structure was adopted based on tests of covariance parameters and minimising of Akaike information criterion (AIC) and Bayesian Information criteria (BIC). AIC and BIC are widely used in model selection criteria. AIC is a goodness of fit test that is corrected for model complexity – meaning that it takes into account the number of parameters being estimated. BIC is comparable to AIC but slightly more conservative. Smaller values mean better-fitting models for both AIC and BIC (Field et al, 2012, p.868).

Conditional R^2 (1) and marginal R^2 (2) values were also obtained for each dependent variable using the conditional and unconditional growth models. The *marginal R-squared* indicates how much of the model’s variance is explained by the fixed effect’s part only.

The *conditional R-squared* takes both the fixed and random effects into account and indicates how much of the model's variance is explained by the "complete" model (Nakagawa et al., 2017). These values are only an estimate of effect size, as R^2 in MLMs can be defined in a number of ways. Although these versions of R^2 are becoming more common, they are not entirely agreed upon. As such these should be interpreted as "Pseudo R^2" values, which can be used to compare models within the same data.

3.5.10.2 Model Assumptions & Missing Data

To check the statistical assumptions associated with multilevel regression, the standardised level 1 residuals were plotted against their normal scores in the full conditional models. The plots showed a linear relationship indicating relative normality and no extreme outliers (Hox, 2002, pp. 23). Furthermore, plots of the residuals against the predicted scores of the outcome variables showed no major signs of heteroscedasticity (See Appendix 5.14 for normality of residual and outliers plots, as well as homoscedasticity for all the MLM models). As in most longitudinal data, some subjects are unavailable during one or more data collection periods. The data was considered to be missing completely at random (MCAR) when looking at the growth curves for grades for the full-data set. For the sub-set of students who took part in surveys, the data were considered to be missing at random (MAR), as students with higher grades completed more self-reports than students with lower grades. However, as all the students in the analyses still gave access to their module grades (the outcome variable), I could obtain unbiased estimates of the parameter of interest by employing maximum likelihood estimation.

Growth curve models were firstly conducted using the full cohort of students (N=179), excluding those who withdrew or did not pass first-year, with grades as the outcome variable. Separate growth curve models were then conducted for the sub-set of students who took part in at least one survey (N=99) and gave permission to access their grades (excluding withdrawn students). This allowed me to establish whether the self-report survey sample of students' journey was comparable to the whole cohort. I then built on the model for the survey sample with time-variant covariates (emotions) and time-invariant covariates (ethnicity group status) added to the model.

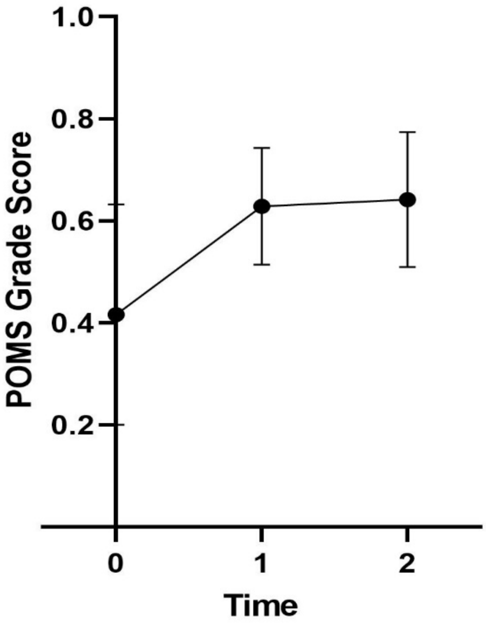
5.3.11.2 Full-cohort Growth Curve Model of Academic achievement

To explore the degree of variance in the study variables attributable to the within- and between-student levels, an intercept-only model was constructed (i.e., no predictor variables were included- Table 5.10). From this model, the intraclass correlation coefficient (ICC) was computed to describe the proportion of variance between students. The ICC is .13, which indicates that around 13% of the variability in grades could be explained by the between-person level (i.e., person-related characteristics). Therefore, around 87% of the variance in the model was attributable to the within-person level. This justifies the use of multilevel modelling. (Heck et al., 2014, p.90). For the intercept-only model the R^2 and ICC are the same since there are no level 1 estimates.

Looking at the summary of the final AR1 model (Table 5.10, Model 1), the fixed effects and the confidence intervals, the results tell us that both the linear intercept $b = .31$, $t = 13.06$, $p < .001$, and the quadratic coefficient of the time were significant $b = -.010$, $t = -9.221$, $p < .001$ This indicates that a quadratic trend best describes the trend in the data, which reflects a faster initial increase from students' initial UCAS grades to the first-year grades and subsequent decrease in the rate of change in grades for the second year (See Figure 5.10).

Figure 5.10

Line graph showing the quadratic growth of the grades (POMS scores) from UCAS scores to Year 2 module grade for the whole sample (n=179)



The model results also show that the random intercept's standard deviation was 0.15, 95% CI [0.12, 0.17]; this indicates the mean variance in grades between individuals at baseline. These 95% confidence intervals do not cross zero suggesting that grades at baseline varied significantly across people.

Furthermore, the slope of time varied significantly across students SD=.08, 95% CI [.07, 0.11]. The confidence intervals do not cross zero, which suggest that the rate of change in grades over the 12-month period varied significantly across students. Finally, the correlation between the slopes and the intercepts was -.86, with confidence intervals not crossing zero: 95% CI [-.92, -.77]. This suggests that as intercepts increased the slope decreased, indicating that students with lower grades at the start had higher growth curves during the 12-month period. The conditional R^2 indicated that the model could explain 63% of the variance in grades. Overall, these results indicate that students research methods performance changed during the 12-month period, but with the rate of change differing between students.

Table 5.10

Parameter estimates for Multilevel Growth Models showing Within- and between-person Variability in students' grades for the whole cohort.

	Intercept Only Model			Model 1		
Fixed Effects	**b**	**SE**	**95% CI**	**b**	**SE**	**95% CI**
Intercept	.46	.01	[0.43 – 0.48]	.41	.07	[.04, 0.5]
Time				$.31^{***}$	.002	[.26 ,.36]
Quadratic time				$-.010^{***}$	.001	[-.11, -.08]
Random Effects						
Intercept	.06		[.04 - .09]	.15		[.12 -.17]
Slope				.08		[.07 .11]
ICC		.13			.48	
R_1^2		.13			.63	
R_2^2		-			.29	
Model fit						
-2LL		204.12			249.36	
AIC		-400.25			-.482.71	
BIC		-383.25			-.448.71	

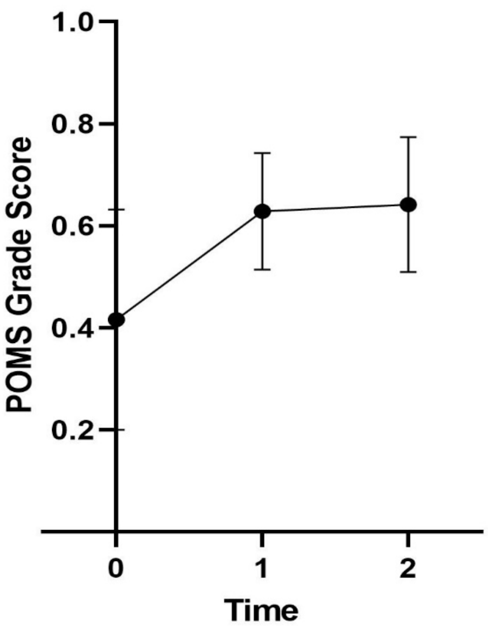
Note. * $p < .05$ ** $p < .01$ *** $p < .001$, N=179

5.3.11.3 Survey-Sample Models of Academic Achievement

The same models were run for the sub-sample of students who took part in at least one of the surveys (n=99) and had permitted to access their grades, with the results being similar to the previous full sample model. The unconditional model's ICC was .31, indicating that around 31% of the variability in grades could be explained by the between-person level (i.e., person-related characteristics). This justifies the use of multilevel modelling. (Heck et al., 2014, p.90). The AR1 covariance structure with time added as a quadratic term provided the best fit for estimating trajectories (Table 5.10. Model 2.A). The results showed that the intercept's fixed effect was 0.42, this is the overall mean grade across all students at the start of their journey. Both the linear coefficient $b = .34$, $t = 9.41$, $p < .001$ and the quadratic coefficient were significant $b = -.10$, $t = -6.40$, $p < .001$, indicating that there were significant changes in grades during the 12-month period and that the quadratic trend best described the change in grades (See figure 5.11)

Figure 5.11

Line graph showing the quadratic growth of the grades (POMS scores) from UCAS scores to Year 2 module grade for the survey sample (n=99)



The model results also show that the random intercept's standard deviation was 0.18, 95% CI [.14, .22], indicating that grades at baseline varied significantly across people. Furthermore, the linear slope of *time* also varied significantly across people, 95% CI [.06, .12], as the confidence intervals do not cross zero. This shows that the rate of change in grades over the 12-month period varied significantly across the students. Finally, the correlation between the slopes and the intercepts was -.83, with confidence intervals not crossing zero, 95% CI [-.92, -.69], indicating that when intercepts increased slopes decrease. In other words, students with higher grades from at the start of their journey had slower growth in grades. The conditional R^2 indicated that the model explained approximately 75% of the variance in grades. (See Table 5.11, for model comparisons). These results are similar to the previous whole-cohort findings, indicating that the learning performance journeys of the survey sample were comparable to the whole cohort.

Table 5.11

Parameter estimates for Multilevel Growth Models showing Within- and Between-Person Variability in students' grades, including the predictors deactivating negative emotions and ethnicity.

	Intercept Only model			**Model 2.A**			**Model 2.B**			**Model 2.C**		
Fixed Effects	**b**	**SE**	**95% CI**	**b**	**SE**	**95% CI**	**b**	**SE**	**95% CI**	**b**	**SE**	**95% CI**
Intercept	.46	.03	[.42 .50]	.42	.02	[.38 .46]	.50	.05	[.42 .59]	.39	.03	[.34 .44]
Time				.34***	.04	[.27 .42]	.34***	.04	[.26, .40]	.34***	.04	[.27 .41]
Quad time				-.10***	.02	[-.14, -.07]	-.10**	.01	[-.13 -.07]	-.10**	.02	[-.13 -.07]
De-Act Neg Between							-.04*	.02	[-.07, -.001]			
De-Act Neg Within							.001	.03	[-.05 .06]			
Ethnicity										.06*	.03	[.02 .11]
Random Effects												
Intercept	.10		[.07 .13]	.18		[.14 .22]	.18		[.14 .22]	.17		[.14 .21]
Slope	-		-	.09		[.06 .12]	.09		[.06 .13]	.08		[.06 .12]
ICC	.31			.64			.65			.63		
R_1^2	.31			.75			.78			.77		
R_2^2	-			.35			.37			.38		
Model Fit												
-2LL	78.70			102.12			105.70			105.37		
AIC	-149.40			-188.24			-191.38			-192.74		
BIC	-138.99			-161.43			-.157.89			-162.58		

Note. * p < .05 ** p < .01 *** p < .001, N=99,

5.3.11.4 Emotions as Predictors of Academic Achievement

In order to further explore the influence of emotions on students' growth trajectories, time-variant predictors were added to the survey sample model. Following the control-value theory's categorisation of emotions, the three types, activating positive, activating negative, and deactivating negative, were used. These variables were added to the model one by one as predictors to see if they influenced students' trajectories. Following Raudenbush and Bryk's (2002) guidelines, I obtained an estimate that reflects only within-person change by group mean centring the emotions scores by including each emotion group averaged over time as a predictor in the level 2 model. This helps to differentiate between-student differences from within-person changes.

Firstly, positive emotions were added to the AR1 model, which showed that neither the within nor between the regression parameter was significant ($p > .05$). This indicates that positive emotions were not a significant predictor of grade trajectories. Next, the activating negative emotions were added to the model, which also showed no significant within or between-person effects ($p > .05$); thus, the activating negative emotions were also not significant predictors of grades.

Finally, the deactivating negative emotions were added to the model (see Table 5.11 Model 2.B) which showed that the within regression parameter for the deactivating emotions was not significant ($b = .001$, $t = .178$, $p = .859$), indicating that changes in deactivating emotions did not predict changes in grades. However, at the between person level, average levels of deactivating negative emotions positively predicted academic achievement ($b = -.035$, $t = -2.245$, $p = .027$). This indicates that students reporting above average deactivating negative emotions also had lower grades at the start of their journey. More specifically, for every 1 standard deviation below the mean in grades, deactivating negative emotions scores were above the average by -.035. The conditional R^2 indicated that the model explained approximately 78% of the variance in grades. Thereby, by adding the predictor deactivating negative emotions about 3% more of the variance in grades could be explained.

However, when a *time x deactivating* interaction term was added to the model, no significant regression parameters of the deactivating negative emotions could be found, b = -.004, t = -0.31, p = .759. As the interaction term is not significant and there are no significant within-person changes, it can be assumed that the association between deactivating negative emotions and grades remained stable throughout the study. Overall, these findings help to answer the first research question (*Can research methods performance and learning be explained by individual differences in emotional, motivational and metacognitive factors?)* and indicate that differences in deactivating negative emotions could partly explain differences in research methods performance.

5.3.11.5 Ethnicity as a Predictor of Academic Achievement

In order to further explore the hypothesis that ethnicity group is influential in students research methods performance and to see whether between-person differences could explain growth trajectories, ethnicity group (0= BAME, 1=White) was added to the model as a time-invariant predictor (See Table 5.11, Model 2.C). The model results showed that ethnicity was a significant predictor of grades (b = 0.06, t = 2.562, p = .0012). White students had grades 0.06 points higher than BAME students, demonstrating that white students started their research methods journey with higher grades than BAME students. The conditional R^2 indicated that the model explained approx. 77% of the variance in grades. Thus, by adding the ethnicity predictor to the model, about 2% more of the variance could be explained than the unconditional model. However, when *Timex ethnicity* group interaction term was added to the model, no significant regression parameters could be found for ethnicity (b = -.001, t = 0.27, p

= .789) indicating that these between-person relationships with grades did not change during the study, and thus further corroborating the earlier Mixed ANOVA findings, while utilising a larger part of the sample.

5.4 Discussion

The present study aimed to explore students' research methods learning through the first year and second year and how the interplay of affective, behavioural, cognitive, and motivational variables influences students' academic achievement. Of 'special significance' was the attempt to consider students' learning more holistically and to take a longitudinal approach by examining learning across two courses and three time-points. Overall, the study's findings point towards students having dissimilarities and changes in their learning achievement, behaviour, and emotions. More specifically, behavioural variables seem to play a particularly important part in students' learning journey, with the influence of deactivating negative emotions, intrinsic motivation and learning approaches also highlighted.

5.4.1 The Influence of emotional, motivational and cognitive variables on learning

Firstly, initial correlations indicate that, as expected, emotional, motivational, and cognitive variables showed possible bi-directional relationships. Activating positive emotions were positively correlated with self-efficacy, self-regulation, task-value, intrinsic motivation, and the deep and strategic approach to learning. Both the negative emotions groups, on the other hand, had positive correlations with statistics anxiety and surface approach, and negative correlations with self-efficacy, task-value, and self-regulation, with negative-deactivating emotions also being negatively correlated with intrinsic motivation and deep approach to learning. In all, the findings of the bivariate correlation analysis are in line with those of previous studies (Mega et al., 2014; Linnenbrink & Pintrich, 2002; Pekrun et al., 2002, Trigwell et al., 2012) as well as the assumptions of control-value theory (Pekrun, 2006).

However, importantly with regard to the first research question (*Can research methods performance and learning be explained by individual differences in emotional, motivational and metacognitive factors?)* only a few of the emotional, motivational and cognitive variables measured were significantly correlated with students' academic achievement. Second-year module grades were negatively correlated with deactivating negative emotions and surface approach and positively to intrinsic motivation and self-regulation, with a possible mediation effect of both intrinsic motivation and surface approach found. These results suggest that as deactivating negative emotions went up, intrinsic motivation went down, which in turn was associated with lower grades, however with the caveat that the results are only suggestive of this causality. In contrast, the deactivating emotions were positively associated with the surface approach, which was a negative predictor of module grade.

These results support the control-value hypothesis that deactivating emotions, such as hopelessness and boredom, are especially detrimental to learning as they both reduce motivation and effort and lead to the adoption of more superficial and less flexible learning strategies (Pekrun, 2002). However, unlike previous research findings (Mega et al., 2014; Pekrun et al., 2017), the current study did not find any direct or mediating effects of positive emotions on learning. Thereby, these findings suggest that perhaps for research methods learning, the influence of deactivating negative emotions is especially crucial. These results contrast with previous literature on research methods learning, which has largely been concerned with examining the influence of anxiety in different forms. This implies that educators responsible for designing and teaching research methods modules should pay more attention to a wider range of emotions including boredom and hopelessness.

This influence of deactivating emotions on students' learning was also found when looking at demographic differences. The results indicated that students from BAME backgrounds had lower achievement throughout their research methods journey than white students, with deactivating emotions mediating the relationship between ethnicity and module grade. More specifically, the findings indicated that a possible explanation for BAME students' lower academic achievement is in relation to a higher prevalence of deactivating negative emotions, which, as previously noted, can have adverse effects on their learning achievement. Although this was not a focus of this thesis, the findings also offer some possible novel explanations for the prevalent awarding gap for BAME groups (OFS, 2018) and should be studied further.

Regarding the second research question, (*Does research methods performance and the influence of these individual difference factors change throughout the modules?)* the results interestingly showed that the affective, motivational, and cognitive factors students experience stayed largely stable through their research methods journey, with the notable exception of strategic approach and self-regulation. The data showed that students' motivation and emotions changed little throughout the study; however, the strategies that students use to meet their learning goals did change, with both the strategic approach to learning and self-regulation increasing during the first year, with self-regulation showing a steady increase in the second year as well. These findings indicate that students are able to adapt and develop their way of learning, at least to some extent.

In this regard, the results of this study are consistent with previous research findings on learning approaches which indicated that students' approach to learning can change based on their perception of the learning environment and that students tend to use those strategies which they perceive are most relevant to the tasks at hand (Zeegers, 2001). These findings also support previous research on self-regulation, which indicates that self-regulation of learning may be difficult, particularly at the beginning of university studies (Donche et al., 2010; Koivuniemi et al., 2017), as students may not be prepared for the amount of independent studying that is required (Christie et al., 2016).

These findings were followed up with multilevel models aimed at looking at both within and between-person changes during students' research methods journey. To the researcher's knowledge, this is the first study in the research methods context that has explored students' learning achievement this way. The results indicated that students who started their journey with lower grades also had a higher growth rate. Growth rates seemed to develop in a quadratic fashion, indicating that students' achievement was characterised by an initial rapid increase from initial UCAS grades to their first-year module grades, followed by a subsequent decrease in the second year's growth rate. The findings should be interpreted with the caveat that this quadratic trend in grades could be an artefact of the grade distribution at university being different from UCAs points. However, these findings are particularly interesting, as correlations also confirmed that students initial UCAS grades did not significantly correlate with first-year research methods grades. Thus, contrary to many other research findings (Cassidy, 2012; Richardson et al., 2012), previous attainment before university does not seem to be as important of a predictor for achievement in research methods modules.

Furthermore, when deactivating negative emotions were added to the model, the results showed that students who reported initial higher- deactivating negative emotions also had significantly lower grades at the start of their journey. This supports the possible harmful effects of deactivating negative emotions on research method learning while utilising more of the study sample.

Importantly the influence of the deactivating emotions was found to be stable during students' research methods journey, with no within-person changes found, highlighting the importance of offering a learning and teaching environment that aims to reduce these negative feelings from the start. Concerning the prevention of these emotions, the present study suggests that specific early measures could promote students' interest in the academic materials, decrease students' deactivating emotions, and increase students' intrinsic motivation for research methods. Previous research indicates some possible ways of doing this, including more student-centred learning (Barraket, 2005)m active learning (Freeman et al., 2014) and the incorporation of real-world examples of research designs and datasets (Neumann et al., 2013).

5.4.2 Behavioural predictors of learning

Another important finding of the study relates to the role of attendance and online VLE activity. In line with previous research findings, the current study found attendance (Credé et al., 2010) to be one of the strongest predictors of module grade. However, importantly, the present study also demonstrated for the first time that VLE activity was just as important, if not slightly more important for academic achievement, as face-to-face attendance. VLE activity explained 13% of the variance in grades, whereas attendance explained between 8-11 % of the variance in grades. Overall observational behavioural data explained between 31% and 35% of the variances in grades, indicating that these effects were stable across the first and second year. The results from the cross-lagged model reinforce these findings, with VLE activity being a significant causal predictor of academic achievement across years.

The finding that Blackboard activity was an important predictor of academic achievement is consistent with previous work conducted in online and distance learning environments (Cerezo et al., 2016; Morris et al., 2005). Nevertheless, the strong correlations reported in these earlier studies were found in environments where the majority of learning takes place via the VLE. Previous studies with face-to-face dominant teaching have generally found either small correlations between VLE activity (Boulton et al., 2018) and academic achievement, or no correlations at all (Agudo-Peregrina et al., 2014), with few studies measuring both attendance and VLE activity simultaneously. A notable exception is a recent study by Summers et al. (2020) conducted at a “Bricks and Mortar” UK university where the first-year undergraduate students’ VLE activity and attendance were analysed together during one academic year. The results indicated that attendance and VLE activity accounted for a significant amount of variance in end of year grades (24%), with attendance being the strongest predictor of grades.

Thus, the present study extends these earlier findings by firstly demonstrating that VLE activity can be a better predictor of academic achievement than attendance. Secondly, the study also demonstrated that the effectiveness of VLE activities and tools can also be established with face-to face-based modules even for cross-lagged structural equation models across two academic years. The longitudinal perspective of the current study also further highlights the importance of students’ online engagement early on in their degree, as the results show that VLE activity in the first year has a possible causal link with attainment in the second year. Thus, these results suggest that research methods learning can be improved by encouraging engagement with online resources from the start.

When looking at the predictiveness of VLE activity on academic achievement, the online tools “Online self-test” for the first year and “Lecture recording views” for the second year, that were the most predictive of module grades outside of total hours spent on Blackboard, attendance and previous module grade. These findings are consistent with previous work (Tempelaar et al., 2015a, 2015b) using formative online test and previous research on “Lecture capture” (Nordmann et al., 2019; Gardner, 2020). The findings extend these results by firstly establishing the effectiveness of the voluntary online test in the specific context of psychological research methods modules. The findings suggest that online self-tests could provide a simple but powerful way of providing students with feedback on their learning progress. This, in turn, can enhance students' learning achievement in research methods modules, as feedback promotes successful learning and achievement (Wisniewski et al., 2020).

Evidence of the effectiveness of lecture capture is less clear. While some researchers have found positive relationships between lecture capture and attainment (Cramer et al., 2007; Gardner, 2020), with evidence of lecture capture supplementing learning from face to face lectures (Bos et al., 2016; Nordmann et al., 2019), others have argued that the impact of these might be at the expense of an overall reduction in attendance (Edwards & Clinton, 2019). The current study provides support for lecture capture being a significant predictor during research methods modules even when other engagement factors such as attendance and overall VLE activity are taken into consideration. Therefore, these findings appear to support the idea of lecture capture providing a supplement to face-to-face teaching; however, more research needs to be carried out in order to fully establish the role of lecture capture in research methods learning.

In terms of the influence of emotional, motivational and cognitive factors, no significant associations with attendance or VLE activity could be found, except when it came to the first year weekly online tests. These were correlated positively with activating positive and negatively to the deactivating negative emotions at the beginning of the term, which further highlights the influence of emotions on students' research methods learning. However, more research needs to be conducted as these results are based only on correlational research, with small to moderate r values (< .03) and several non-significant correlations. A possible area for future research would be to incorporate achievement emotions into a regression with behavioural data to see the simultaneous predictive value of these for academic achievement. However, due to a relatively low sample size for the self-reported surveys, this was not possible for the current study even when multilevel modelling approaches were applied.

5.4.3 Limitations & Conclusion

A novel feature of this study lies in its attempt to combine both observational and self-reported data. However, the study has several limitations, with one being the relatively high attrition rate of the self-reported surveys. As participation in surveys was voluntary, the survey participants represented students with higher mean average grades than the overall group. Thus, these results might be biased and not represent the whole cohort accurately. Nevertheless, even with these relatively small samples, I was able to find some significant effects of deactivating negative emotions. As previous research indicates that these emotions are often correlated with lower academic achievement, these findings would likely persevere with a larger sample of lower-achieving students.

However, these relatively small effect sizes and the non-significant results of the other self-reported measures may also be underestimated due to the low sample size. Thus, further studies with larger sample sizes are needed to fully understand the influence of emotions on research methods learning. Another limitation is that the behavioural data consisted of data gathered from the module-specific Blackboard pages. The design and availability of information on Blackboard are not standardised, with each module containing different tools and activities. As such, these results are hard to compare across modules and other institutions. I was also limited to testing the VLE tools (Online self-test and Lecture recordings) at the module level and could not estimate any longitudinal implications of these separately. Nevertheless, the study's longitudinal design helped to establish a consistent relationship between behaviour and academic achievement at different points in time.

Despite these limitations, the current study contributes to the growing fields of research in learning analytics and emotions in learning by showing that particularly deactivating negative emotions negatively influence students' learning from the start of their research methods journey. Secondly, the usefulness of VLEs as a learning tool has also been demonstrated with early measures of online engagement predictive of both future behaviour and future outcomes. Psychology educators should design their research methods modules with this in mind, encouraging students to make use of all the VLE material available to them. However, more research needs to be conducted to understand the reasons behind students' learning behaviour, emotions, motivation and how they differ in their influence on students' research methods journeys. The next study, therefore, aimed at exploring students' research methods learning journeys and experiences in more depth.

Chapter 6: Study 3 - Learning Journeys: A Typology Study of Students' Experiences in Research Methods Modules.

6.1 Introduction

The previous study's main findings indicate that students' research methods journey is influenced by affective, behavioural, and cognitive factors. More specifically, the study results suggest that behavioural variables play a crucial role in students' learning journeys, with the influence of deactivating negative emotions, intrinsic motivation and learning approaches also highlighted. However, although the previous study's findings provided some clear patterns regarding students' learning and attainment, more in-depth qualitative research is needed to gain further insights into students' experience of their learning journeys and the development of these learning behaviours, emotions, motivations, and approaches. Therefore, to build on these findings and explore these aspects of students' research methods journey and learning development more in-depth, a subset of participants were invited to take part in follow-up interviews regarding their research methods learning experiences.

As previously mentioned, a growing body of literature (see Chapter 2) reiterates that learning research methodology is complex (e.g., Braguglia and Jackson 2012; Field, 2014). Students are often described as coming to research methods courses, not seeing their relevance, bringing negative attitudes and low motivation, and struggling with research methods modules (Barry, 2012; Field, 2014; Murtonen & Lehtinen, 2005; Ruggeri et al., 2008). Recent studies have attempted to better understand students' research methods learning by qualitatively exploring psychology students conceptions of research (Balloo et al., 2018) and statistical decision making (Allen et al., 2016).

Balloo et al. (2018) utilised Q methodology, combining qualitative and quantitative methods to understand psychology students' shared viewpoints about research methods learning. The study consisted of 93 undergraduate psychology students from different years of study from a London-based post-1992 university. The students completed a task to rank and sort statements reflecting various attitudes and beliefs about research methods learning. These statements were derived from an initial literature review of studies on the concept of research methods and from findings of a focus group (n=7) where students' concepts were analysed using thematic analysis. In the Q-sort, participants gave open-ended comments explaining the reasons for their rankings. Ranks were then factor-analysed and interpreted qualitatively with four distinct perspectives: *research methods as integral to psychology, research methods as a digression from psychology, research methods as disconnected from psychology,* and *research methods as beneficial to psychology.*

The first perspective displayed a clear and deep understanding of the reasons for undertaking research and learning about psychological research methods. The second perspective saw research as separate, secondary, and unimportant to the "real psychology", with students not choosing to study psychology to do research. Instead, they expressed a sceptical attitude towards research methods, learning and teaching. The third perspective was similar to the previous one but with students not recognising the purpose of research methods for psychology at all. This factor also depicts difficulty in the learning of research methods. The fourth perspective perceived research methods as beneficial, both in terms of learning about psychology as a discipline and for becoming a practitioner or researcher. Additionally, the perspective also emphasised that all students are capable of learning if they work hard and have confidence. The authors concluded that these results emphasise the importance of increasing the transparency of research methods for psychology students and suggest that psychology educators need to pay close attention to students with problematic views of research, addressing these beliefs early on.

Although Balloo et al.'s (2018) study attempted to understand the learning of research methods in more depth, focusing on the concept of research, the study had several limitations.

As the Q methodology works with a given set of statements, this method does not allow students to express their thoughts freely. Furthermore, as the study explored learning across different stages of the psychology degree, it is hard to say when and how these conceptions are formed and what experiences influence them, and as such, the study also does not capture students' learning development or journeys. Thus, the exploration is limited, and further research needs to be conducted to explore students' experiences in research methods learning in more detail.

In Allen et al.'s (2016) qualitative study, nine undergraduate students who had recently completed one or more quantitative research methods modules took part in a semi-structured interview. The students were first asked to reflect on the nature of research methods and the modules they had taken. The participants were then presented with brief research vignettes and asked to explain the process they would follow to identify appropriate statistical techniques, with the results analysed using thematic analysis. The results showed that students found statistics overwhelmingly challenging yet important for their academic achievement, future career and critical thinking. The students also found the task particularly difficult even when they had completed several research methods modules, which caused some embarrassment. Many also struggled to explain their strategy for approaching the research in a coherent and non-superficial way.

Thus, the authors (Allen et al., 2016) made recommendations for practitioners to provide students with regular opportunities to engage in the statistical decision-making process in class research projects. It is also widely recognised that immersing students into all aspects of the research process, from participation and data collection to the interpretation and reporting of findings, is beneficial for learning research skills (Earley, 2014; Stoloff et al., 2015). However, although these findings provide some insight into psychology students' learning of research methods, this study, like many others in the field, focused solely on evaluating the learning of quantitative research methods and statistical decision making. It did not explore students' learning experiences and development as a whole, taking into account all aspects of the course. Furthermore, as the sample size was relatively small, consisting of only nine students with varying amounts of university research methods experiences, the results' transferability is limited, and more research needs to be conducted.

Although research in this area within a psychology setting has mainly focused on the learning of quantitative methods, several authors have also explored students qualitative research methods learning in both undergraduate (Mitchell et al., 2007; Povee & Roberts, 2014; Roberts, 2016) and postgraduate settings (Walsh-Bowers, 2002), with the findings indicating that students often also struggle with these aspects of research methods. For example, in a study by Poove and Roberts (2014), 14 students across undergraduate and postgraduate psychology degrees were interviewed about their attitudes towards qualitative research. Using thematic analysis, they found that whilst qualitative research was described as inherent to the psychology profession and useful, the participants did not feel the methodology was considered as respected and as legitimate as quantitative methods. Furthermore, the participants also reflected on barriers to the learning of qualitative methods, such as lack of skills and confidence and qualitative research being time-consuming and subjective. Other studies (Murtonen, 2005) have found similar results, with quantitatively oriented students voicing concerns that qualitative research is arbitrary, unscientific, and especially susceptible to researcher bias.

So far, there has been less research exploring psychology students' research methods learning journeys more holistically, looking at the development of students' feelings/attitudes, engagement and approaches to learning. Undertaking in-depth research is crucial in advancing knowledge in higher education (Cleary et al., 2014). Hence, the current study adopted a qualitative approach, exploring students' attitudes to research methods and their experiences and engagement within modules. Furthermore, as previous research indicates that students differ in their concepts of research and attitudes towards research methods, it seems appropriate to consider commonalities and differences between students to explore in-depth students' viewpoints and experiences. A deeper investigation into this area may allow for more understanding of psychology students' experiences and challenges in their research methods learning. Further qualitative exploration will also shed more light on the previous longitudinal study findings in which emotions, behaviours, motivations, and learning approaches were identified as important in their learning.

6.1.1 Study 3 Aims and Research questions

The overall aim of this study was therefore to explore students' learning experiences during research methods modules and to determine students' learning trajectories and any possible challenges faced. More specifically the aims were firstly to identify different student types based on their learning journeys. Secondly, the aim was to understand why students vary in their learning of research methods and investigate which contextual and personal factors are associated with students in the same typology. The qualitative interview study explored the learning journey of 15 students who had taken part in the previous longitudinal study. The focus of the interview was on students' experiences, challenges, and adaptions over time.

Research questions:

1. *What learning experiences and factors are present and influential during students' research methods journey? How do such factors compare between student types?*
2. *What kinds of challenges do students experience during their research methods journey? And how can students overcome these?*

6.2 Method

6.2.1 Design

The research adopted a qualitative methodology, using semi-structured interviews to explore students' experiences on the first- and second-year research methods modules. The same cohort of students as the previous longitudinal study was recruited, with the results analysed using a combination of thematic and typology analysis. Semi-structured interviews were chosen since they allow an in-depth exploration of individuals' experiences and perspectives on a given subject within their specific context while allowing for guidance from the researcher (DiCicco-Bloom & Crabtree, 2006). Thus, this methodology is particularly appropriate in addressing the research questions for this study.

6.2.2 Analytical Approach

The epistemological and ontological position underpinning the study is "critical realism". Critical realism has been argued to be: 'a *perspective that combines the realist ambition to gain a better understanding of what is 'really going on in the world with the acknowledgement that the data the researcher gathers may not provide direct access to this reality'* (Willig, 2007, p.13). As such, critical realism does not deny that there is a real social world that we can attempt to understand or access through philosophy and social science (Danermark, 2002) but acknowledges that some knowledge can be closer to reality than other knowledge. This external reality can be accessed and agreed upon whilst also accepting that individuals can subjectively experience 'their own world' that is culturally situated and constructed. Therefore, this study adopts a critical realist position in its exploration of students' own constructions of their experiences and views on their learning journey while considering the impact of wider cultural and structural factors in the creation of these realities.

The data were analysed using a combination of thematic analysis (TA) and typology analysis. This dual approach was selected as TA offers flexibility and focuses on finding rich meanings and patterns across the data (Braun & Clarke, 2019). The typology approach provides a way to identify regularities and common characteristics of the participant and their learning journeys, categorised into distinct but related student types (Given, 2012). More specifically, thematic analysis aims to identify themes, i.e., patterns in the data that are important or interesting and use these themes to address the research question. Thematic analysis is seen as a method rather than a methodology, and thus it is not tied to a particular epistemological or theoretical perspective (Maguire & Delahunt, 2017). In contrast, typology analysis aims to develop a set of related but distinct categories within a phenomenon to capture the perspective of a group of individuals around a particular phenomenon (Hatch, 2002). Typologies are characterised by categorisation, with the categories being related to each other but not in any hierarchical order.

Therefore, thematic analysis was first used to establish initial codes, which were then used to establish different student typologies based on students' learning experiences. Secondly, any themes that could not be categorised into the established typologies were identified. Together, this approach provided a way to explore the interview data inductively (TA), keeping the findings rooted in participants' own experiences of their learning journey and then deductively (Typology) by considering the initial TA findings and the thesis's overall theoretical framework.

6.2.3 Participants

A purposive sample was recruited based on the findings of the previous longitudinal study. Students who had taken part in at least two of the surveys and given consent to cross-reference their behavioural data were contacted via email and offered a £10 amazon voucher for their time. Recruitment was target-based to get a sample representing students across a range of grades, with recruitment kept open for 1.5 months. Data saturation was deemed to be reached when the researcher began to hear the same comments repeatedly in the interviews, with no new information obtained and only students with similar grades signing up. Thus, it should be noted that whilst the sample contained some variation regarding grades, few students with low grades participated.

The sample consisted of 15 students, of which 13 were females and two males, aged between 19-37 years. Ten of these students were Psychology BSc students, two Psychology and Counselling BSc students and three Cognitive and Clinical neuroscience BSc students. There were seven students from white ethnicity backgrounds, five from Asian or mixed Asian backgrounds, two from black or mixed black backgrounds and one from another ethnicity background. Ten students reported A-level as their highest previous qualification, two international baccalaureates, and three Higher Education access courses. See table 6.1 for key characteristics of participants.

Table 6.1
Study 3 Participant demographic variables.

	Age	Gender	Course	Ethnicity	Previous qualification
P1	20	Female	Psychology	Black or mixed black	A-level
P2	20	Female	Psychology	Asian or mixed Asian	A-level
P3	19	Male	Psychology	Asian or mixed Asian	A-level
P4	22	Female	Counselling	Asian or Mixed Asian	A-level
P5	21	Female	Cog-neuro	White	IB
P6	23	Female	Psychology	Other	HE Access course
P7	19	Female	Psychology	Black or mixed black	A-level
P8	37	Male	Cog-neuro	Asian or mixed Asian	HE Access course
P9	20	Female	Psychology	White	A-level
P10	19	Female	Psychology	White	A-level
P11	21	Female	Psychology	White	A-level
P12	26	Female	Counselling	White	He Access course
P13	20	Female	Psychology	Asian or Mixed Asian	A-level
P14	20	Female	Psychology	White	A-level
P15	31	Female	Cog-neuro	White	IB

6.2.4 Procedure

The majority of interviews took place in interview rooms on university premises in spring 2020. The two last interviews were conducted online via Skype due to the restrictions posed by Covid-19. Before taking part, the participants were given an information sheet explaining the nature of the study and the opportunity to ask questions before giving their written consent (See Appendix 6.1 for information sheet and consent form). The participants were then asked to provide their demographic information, consisting of age, gender, and ethnicity. Participants were interviewed using a semi-structured interview schedule (See Appendix 6.2 for full interview schedule) which began with asking participants to think back to when they first started on their degree and the first-year "Introduction to research methods module", and then asking an open-ended question (*"What were your thoughts towards research methods and did you have any experiences of research methods before this course?")*. Students were then asked questions about their experiences, feelings, study habits and motivations on both the first and second-year research methods modules. See Table 6.2 for a summary of topics covered and example questions.

The interviews lasted between 20 and 40 minutes, with an average duration of 28 minutes. This represented around 7 hours of data. The interviews were recorded using two audio-recording devices: namely a Dictaphone and the recording facility on a mobile handset. At the conclusion, participants were thanked and debriefed (See Appendix 6.3 for debrief)

Table 6.2
Summary of topics covered in the interview schedule and example questions.

Topics covered	Example questions
1.Initial thoughts and expectations	What were your thoughts on research methods?
2. Feelings	Can you tell me more about how you felt about research methods?
3.Study approaches	How did you go about studying for the modules?
4. Learning Journey	How would you compare your first-year experiences to your experiences in the second year?
5. Challenges	Were there particular turning points or challenges that you faced during the modules?
6. Motivations	What factors motivate your approach to learning research methods?

6.2.5 Data Analysis

The data collected from the interviews were transcribed verbatim by the researcher. To ensure anonymity, identifying details were redacted. To analyse the data, each interview was coded using the software NVivo. The data were first analysed using the coding techniques specified in Braun and Clarkes (2006) thematic analysis guide, and then moving on to typology analysis. Data analysis was determined by both the research questions (deductive) and the multiple readings and interpretations of the raw interview data (inductive). The primary mode of analysis was the development of categories from the codes into a model that captures key typologies and themes judged to be important by the researcher.

Firstly, the recordings were listened to several times to ensure the accuracy of the transcription. During transcription, initial thoughts and ideas were noted down, and the transcript read several times. In the second stage, detailed inductive coding took place, with keywords and sections of the text noted down. An advantage of an inductive approach is that it is open to participants' experiences rather than seeking views on topics informed by the evidence base. This helps avoid assumptions and biases in the literature being perpetuated

(Braun and Clarke, 2006). Using this analysis allowed the researcher to play an active and reflective role in interpreting the participants' experiences.

Initially, the transcripts were "open-coded", resulting in around 250 initial codes, such as "applying previous knowledge", "surface-level learning", "motivated by interest", "Rollercoaster- journey". This was further refined in the second stage to deductively develop a list of codes that represent both recurrent patterns in the data and some of the theoretical concepts covered in the thesis, such as negative and positive emotions, deep and surface approach to learning, and intrinsic and extrinsic emotions resulting in 53 primary codes. (See Appendix 6.4 for coding book).

The next stage involved searching for typologies within these codes. According to Hatch (2002), typology analysis should only be used if the categories for analysis are evident. Common characteristics in participants' responses quickly emerged in a review of the codes. As these semantic relationships become evident, they revealed patterns and typologies suggested in the research literature, such as deep/surface learning, intrinsic/extrinsic motivation, and positive/negative emotions. The Coding Matrix function on NVivo was used to compare participants and to cluster them into types based on the similarities in these codes, The researcher identified and evaluated aspects of students' learning journeys that were important across all cases in the sample and important to the phenomenon as a whole, with participants with common patterns in their research methods journeys clustered together. The potential typologies were then discussed and refined with the research team, with three typologies identified. The researcher compiled a list of typologies and illustrative quotes relating to participants' experience on the modules (See Appendix 6.5 for detailed table). Students' emotions were identified as especially important for their learning journeys; as such, all codes related to emotions were counted and compared between typology groups, as illustrated in figure 6.1.

Following typology development, some of the codes generated in step 2 of the thematic analysis were further examined and collated according to step 3 of Braun and Clarke's TA guide which refers to the searching of themes. Many of the codes clearly fit together and considered the same aspects of the data, relating to the challenges students faced. Thus, these codes were collated into a broader theme called "Learning challenges". As no clear differences between participants and typologies could be found for this theme, it was kept in as an overreaching theme across all participants. Finally, the suggested typologies and additional theme were shared with the wider research team and agreed upon. Considerations were made to the story told within individual typology and the overarching theme and how they related to the thesis's overall framework.

Furthermore, the typology findings were also cross-referenced with the previous longitudinal study's data by comparing the interview participants' self-reported survey scores, module grades, attendance, and blackboard activity and their assigned typologies. To further support the typologies, several cluster analyses were conducted using the data from the previous longitudinal study to determine whether similar student types (clusters) could be identified while utilising a larger sample size.

6.2.5 Quality Criteria

Credibility and validity of the results were established by data triangulation and researcher triangulation. To establish data triangulation, the interview data were cross-referenced and compared with the previous longitudinal data to further support the proposed typologies. Furthermore, during the process of typology and theme development, the coding matrices and suggested typologies were shared with the wider research team to provide multiple perspectives, which is a way of establishing researcher triangulation. Transferability refers to the generalizability of inquiry (Tobin & Begley, 2004). The transferability of the findings is examined further in the discussion chapter (Chapter 7). To achieve dependability, the research process was documented from the coding stage to the development of typologies and themes, with audit trails including data reduction and analysis notes (Coding maps and coding matrices) and the interview schedule provided in the appendix. Raw data (audio recordings) and interviews transcripts are also kept on record, and a reflexivity statement can be found in Chapter 5. Confirmability was established by keeping audit trails and by the inclusion of a reflexive statement.

6.2.6 Ethics

The study was conducted in accordance with the British Psychological Society guidelines and the ethical approval provided by the Psychology Department Ethics Committee of the University of Westminster. All participants consented to undertake the study and were debriefed upon completing the interviews. No sensitive or identifying information was recorded during the interviews. The audio data were securely transcribed and stored in compliance with the Data Protection Act 2018 and General Data Protection Regulations (GDPR) 2018. Once the research is fully complete, the digital recording will be securely destroyed. (See Appendix 6.6 for Ethics Committee approval letter).

6.3 Results

The typology analysis process that was applied to the transcripts produced three key student typologies/profiles. Three distinct student types were identified (see Table 6.3) and one general theme, “Learning Challenges”, that was evident across all student types. All codes related to emotions were also counted and compared between typology groups, as illustrated in figure 6.1. The results will start with describing the three student types, followed by a description of the "Learning Challenges" theme. The last part of the results will cross-reference and compare the findings with the previous longitudinal study data.

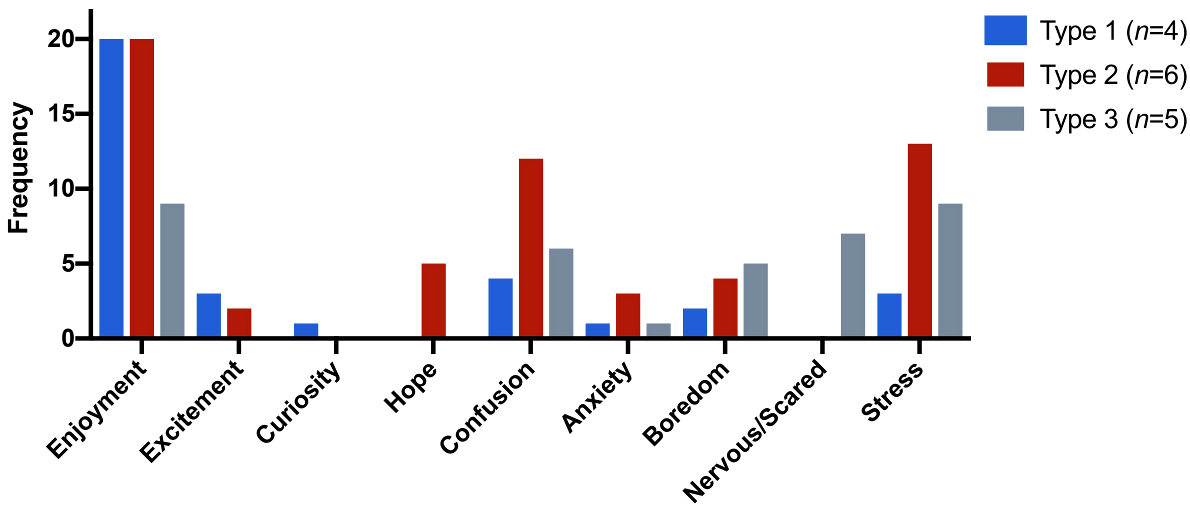
Table 6.3

Overview of the typologies and corresponding participants.

Typology	Participants	Typology characteristics
1. Positive learning attitude- Learning through interest and understanding	P8 P9 P10 P14	• Positive learning mindset • High-self-efficacy & self-regulation • Motivated by interest & understanding • Overall positive feelings and experiences. • Less influenced by the learning environment • Engagement generally good, unless due to personal issues
2. Positive learning attitude - Learning through guidelines and practice	P1 P5 P7 P11 P12 P15	• Positive learning mindset, • Preference for step-by-step guidelines and clear instructions • Motivated by grades and usefulness • Mixed feelings but positive experiences • Influenced positively by the teaching environment • Engagement changing throughout the modules
3.Apprehensive learning attitude - Intimidated by new content and challenges	P2 P3 P4 P6 P13	• Apprehensive learning mindset • Familiar with research methods • Intimidated by new content • Influenced negatively by the teaching environment • Less interest and negative feelings • Motivated mainly by grades. • Engagement changing through the modules.

Figure 6.1

Bar Chart showing the number of times emotions were mentioned by each typology group.



6.3.1 Type 1: Positive Learning attitude: Learning through interest and understanding

Four students fell into this student type. These students expressed a positive mindset towards learning. A positive learning mindset was characterised by students having an optimistic outlook for their learning journey and showing trust in the learning process. More specifically these students reported high-self-efficacy beliefs, meaning that even if the students did not understand everything covered in the classes, they still had the confidence and belief that they would pass their course, and were not discouraged by challenges:

> So, I needed to just put extra effort into research methods more so than the other modules. I found them okay, I could deal with them. But research methods I put a lot of extra time and effort into (P.14).

Instead, these students engaged fully in the module, in order to understand the materials and requirements and to be successful in their learning. The students also reported high intrinsic motivation towards the subject and showed interest in research methods and goals of improving their understanding of it:

> And that kind of motivates me to read more, to understand more, because like that's my interest. And I quite want to get into depth and be more knowledgeable of that perspective of doing research in my field, the field of my interest. (P.8)

Students' interest was related to them viewing research methods as important for psychology as a whole and useful for their future.

> I think how important it is and how it's used in every bit of psychology and also because at A-level I did not like it that much and didn't really understand it, so I wanted to actually put some work into it and try and understand what I did. (P.10)

This is characteristic of students who hold a deep approach to learning. The students in this typology enjoyed the applied side of research methods, developing their knowledge by linking the learning material to other modules on their course and thus seeing the wider benefits of research methods learning, as illustrated in the following quote:

> I would say it has definitely had to do with like combining with other modules. When we are learning, like the research, the research paper or the research findings from our papers, that's related to, for example, like cognitive behaviour and contents related to other modules in the semester. (P.8)

The learning engagement of type 1 students also appeared to be high. The students reported high attendance in lectures and seminars throughout the two modules, only missing occasional sessions for personal reasons. The students also described spending time studying outside of the classroom every week and not just during the exam or near assignment deadlines. These students experienced relatively smooth learning journeys, with students reporting their learning journey to be favourable and "useful":

> And I feel a lot more knowledgeable on it now. I feel like I can apply it to things, whereas like coming into first year I had some knowledge of like very basic stuff from my A- level, but no idea how it applied to things or anything like that. So definitely, um, very useful. (P.9)

During their learning journey, the students in this group expressed fewer emotions than the other two groups, but with enjoyment being the most expressed emotions across participants (See Figure 6.1 for comparison between emotions and typologies). In relation to negative feelings, the students' expectations were often negative or apprehensive; however, these quickly changed when starting on the module. The students in this group also reflected on their journeys more critically than the other groups, recognising the importance of the learning environment and their role in their learning achievement.:

> And not really, not being very resourceful. I think I could have done more. I could have read more around it, gotten different textbooks. But I didn’t. I didn't put as much effort into first year. (P.14)

In this regard, the type 1 students talked about the quality of education, classes and the infrastructure of the study environment, with a clear preference for the second-year module. The reason for this was partly because the first-year module was seen repetition from A-level, and because the students enjoyed the more applied and challenging aspects of the second-year modules.

> So, second-year modules is sort of like this layered on top of each other. Whereas first-year module felt very segregated each week and different. It just sort of like building up your knowledge on its week by week kind of made more sense. And you ended the module with a very complete picture of what we had covered rather than lots of little bits *(P.9)*

In general, these students expressed satisfaction with their learning; however, some made the distinction between being satisfied with their learning, but not with their grades, indicating high academic aspirations. Although this seems like the most favourable typology of students in terms of their experiences and journey, the students were comparable to the second group in terms of grades. In summary, the first typology was characterised by students with highly positive beliefs and attitudes, well-informed reasons for studying and their emotional experiences were mostly positive.

6.3.2 Type 2: Positive learning attitude – Learning through guidelines and practice

The second student typology was the largest and included six (out of 15) students. Similar to the previous typology, the students also had a positive learning mindset. However, the underlying difference between the two profiles was the reason for these positive learning mindsets and the way they process and regulated their learning. Unlike the first group who expressed an intrinsic interest in the subject, this group seemed to enjoy research methods because of the way it was taught, with students expressing a preference for instructions and step by step guidelines, as well as the practical sessions.

> It was quite good that the seminar leaders went through it with us step by step and then they told us we can have a go at it by ourselves, like using another data set. So, I do feel like practising it a few times did help. And then they also create these step-by-step documents that they put on blackboard every seminar, (P.12).

The students appreciated the clear guidelines and instructions regarding study progression and especially requirements for assessments. These helped the students to plan their learning and made their learning more convenient and efficient. Furthermore, the participants in this typology also mentioned that research methods did not require as much deeper or independent learning as other modules on their course, as all the instructions and materials they needed were already given to them. This was highlighted as a positive aspect of the course:

> It's like you have set rules and I've always preferred like set structure, set rules because you see if you are doing it right or I'm doing it wrong, and I don't really need to do any deeper thinking. I feel like its technique (P.7)

However, although research methods were seen as something straightforward and easy, the students still put in effort to be successful in the module by practising the tasks, instructions and guidelines until they understood them. As such, their objective was the same as for the first type, but their learning process different:

> I think we were given step by step, I think I said it before, like how to do something step by step so then you go home, and you can use SPSS home and then you just open it and then you can follow up and make sure you can understand it because sometimes you miss making notes or don't really know if that matters or not. (P.5)

Thus, the typology 2 students focused more on the practical skills side of "research methods", compared to type 1 students. The students also seemed to switch between a strategic and deep approach to learning, by putting steady effort into to their studying, knowing the requirements and what was expected of them, and by trying to understand at least parts of what they were learning.

Another way the type 2 students differed from the previous student type was in terms of their overall motivation. The students reported mainly extrinsic motivations, with all of the students mentioning overall module grade as a motivator. However, some of the students also mentioned the usefulness of research methods for their final year thesis, future educational studies, and their future careers.

> I think, it's a bit of everything. What motivates me more is marks because I get them at this time or in the moment. But looking in the future I would also like to have good qualifications, yeah, it's more about the qualification than marks. If I get a good mark now, it guarantees me to be in a good place in the future. It's useful for my future. *(P.1)*

Many of the students also mentioned being motivated by how research methods made them feel, with students feeling "intelligent" and "smart" when they understood research methods, with some making connections between grades and happiness:

I feel like grades cause when my grades are good everything's just better, I feel happy. I feel confident. I'll go home and tell my parents. And then I have like a great couple of days because it's like I just feel on top of the world, you know*? (P.7)*

Thus, these students were characterised by having mainly positive feelings towards research methods. Consistent with the first typology, the most commonly expressed emotion for this group was enjoyment. However, in contrast to typology one, the students in this group also mentioned a wide range of negative emotions, such as confusion and stress; confusion being especially prevalent at the beginning of their journey and stress during the second year. The second year was perceived as more stressful due to the pace and amount of information students were required to learn, with students expressing content overload:

I think second year because there were so many more analyses introduced. It was quite hard to keep up every week; it was a different one. And I guess it was good they made us record it, but you couldn't really catch up. (P.11)

However, although the students reported the second year to be more challenging in terms of content, they managed to deal with the challenges by aligning their efforts and by receiving more support, with several of the students especially mentioning the support provided as a positive aspect of the second year:

Second year was definitely more positive, it was a lot more stressful and because the data analysis like SPSS got more difficult, but then the team like the seminar leaders and module leader was always there to help. So, they went through everything like step by step. It was just very detailed. And I really enjoyed the second year even though it was more difficult (P.12)

In general, students' learning journey was characterised by up and downs, with several of the participants describing their journey as a "roller coaster". Most of the students' engagement changed both within and between the two modules. The reason for these changes varied, with some stating personal reasons, some just not always bothering to attend and some choosing to stay at home to focus on coursework. However, at the end of their journey, all of the students understood the subject matter and felt that they had learned it well, which was also evident in their grades:*" I feel that the journey was useful for me in the future, and I enjoyed it." (P.15)*

In summary, students in the second typology were characterised by more externally regulated learning processes, with overall positive learning experiences and extrinsic motivation. These students were positively influenced by the academic learning environment and teaching methods, with clear guidelines and step-by-step instructions and support from the teachers easing the students' learning journey.

6.3.3 Type 3: Apprehensive learning attitude – Intimidated by new content and challenges.

The third student group consisted of five students who were more apprehensive towards learning and had more negative learning experiences than the former two student-types. This type was characterised by students who reported having little or no intrinsic interest in the research methods courses, often finding the subject boring, and whose main aim was to pass the course with high grades without necessarily acquiring a deeper understanding of research. During the interviews, the students' descriptions of their journey primarily stayed at a descriptive level and focused on aspects of the learning environment, such as teaching and assessment, with the students reflecting less on their own contributions to their learning.

These students appeared to be quite lost and did not have a clear goal and were relatively unfocused regarding their study process. This group generally had a more negative learning journey with many challenges in their experiences and engagement. The students reported missing lectures and seminars or being mentally disengaged when attending, as demonstrated by the following quote from participant 4:

> Like I attended everything for the second year, but it felt like mentally I was disengaging, just because I think obviously there was personal stuff going on as well…But also, because it felt so frustrating and because I did not like being in the class so that definitely, like even when I

> was sitting in the class I was listening, but I wasn't really listening I was kind of just there like "I don't want to be here" (P.4)

The reason these students struggled with their study process was partly due to their perceptions of teaching and administration of the modules. Students in this typology reported insufficient self-regulating and studying skills, leading them to resort to rote memorising strategies and surface-level learning techniques:

> Ehm, I think that was a difficult thing for me because I was able to follow. ...but I went into the lectures or the seminars, and we discussed things, and I would do it right, and it would make sense to me, but it felt very surface level. (P.4)

Similarly, to the typology 2 students, the students in this category also preferred guidelines and instructions, however in contrast they did not feel that the guidelines were clear enough and would have preferred more guides and examples:

> So, I would like a little bit more like templates of like example reports of it, and I think that would help. (P.2)

Thus, unlike the previous two typologies, these students found it harder to adapt their study strategies to match the course requirements. In general, these students were the most influenced by the learning environment, with students mentioning that the quality of teaching could be improved and that more support was needed especially in the second year:

> I was more apprehensive about that the content of the module because of how new it was and how we had to structure everything, so I think that was the difficulty of the whole module, in my opinion. So maybe more help with that. (P.3)

While the participants tended to be more confused and overwhelmed by the complexity of studying research methods, these students still had high aspirations for their degree. All the students mentioned being motivated by getting a good grade. When pressing for reasons they wanted these good grades, often they mentioned the overall contribution of the grade to their degree and that high grades would be favourable for their future studies and career but did not mention research methods specifically as important for their career*:* "I think like if I was doing research, it would be valuable, but I don't think it will be that valuable in teaching*."(P.6),* with the students seemingly believing that research methods skills would only be useful for professions related specifically to data analysis and research.

It is noteworthy to mention that all the students in this group had experience of research methods from A-level and were confident in their abilities at the start of their journey and during the beginning of the first-year module. However, as soon as new content was introduced, the students reported their experiences to be more daunting:

> I think for the second year my feelings did change because we were introduced to even more statistical analysis and test that we had not heard of so like ANOVA for example and all these assumptions. So, it was difficult to get my head around that initially. (P.3.)

Therefore, it was especially at the end of the first year and start of second year when the students reported experiencing negative emotions such as anxiety and stress. The reason for these negative emotions was partly due to the newness, but also due to the increased workload and by being exposed to assessments where more independent research and analysis was needed, which these students found challenging:

> So, I really struggled with that bit. And I remember asking seminar leaders all the time like is this okay if I put down this and this would that be okay. And they would be just like yeah just mention the relevant bits of the study and what I did not know was what the relevant bit were in terms of... (P.2)

Another emotional challenge was lack of self-confidence, with some participants seeing themselves as incompetent and lacking in understanding. A possible reason for this was their inability to engage more deeply and adapt to a more independent style of working. In the end, the students felt less satisfied with their learning compared to the other two student types, with the students especially mentioning more support and clearer guidelines with assessments as an area for improvement:

> … because obviously I was given information, and I did follow it and then when I got my grade back, I just felt like... me and other people who kind of just had looked up our feedback and there was like things in common that like we were told to do, but then it was actually wrong when feedback was received. (P.13)

This quote also reflects that, unlike students in the previous typologies, these students did not take responsibility for their own learning, and instead blamed their grades on external factors. These negative experiences on the module were also reflected in the students' academic achievement, with all students expressing dissatisfaction with at least one of their research methods module grades. In sum, the students in this type had a more negative learning journey due to problems related to perceptions of university teaching and support, along with their negative-self-efficacy beliefs and lack of self-regulated learning.

6.3.4 Theme: Learning Challenges

In addition to the typologies an overarching theme of "Learning Challenges "was identified. This theme encapsulates factors which were considered as obstacles in students' learning across all participants/typologies. Students explicitly expressed challenges related to different learning areas and assessments during the interviews, with few students mentioning individual or personal factors outside the teaching environment. Across the typologies, two main challenges were mentioned "*Qualitative research methods*" and "*Mathematics and Statistics",* which were identified as sub-themes.

6.3.4.1 Challenges with Qualitative Research methods

Qualitative research methods were seen as a challenge by eight participants. Many of the participants indicated that they had limited exposure to qualitative research throughout the research methods modules. In particular, the participants felt that there was a much more emphasis on quantitative methods, which made it harder to learn qualitative methods:

> Um, I just can't seem to wrap my head around it, and I feel like we do a lot less on it. So, it's harder to; I don't have the time in class to get it. If that makes sense, like first year, I think we did only one week on it and then data analysis we did maybe two. (P.9)

This emphasis on quantitative research teaching could also have led to students viewing quantitative research methods as the "correct" or typical way for conducting research in psychology, with qualitative research seen as a less important alternative. Some students reported their lack of knowledge and confidence with qualitative research methodologies as overwhelming and intimidating. Other participants mentioned the ambiguous nature of qualitative research as confusing, with students mentioning a preference for quantitative research in general:

> But the qualitative analysis I did not know what to write, I knew we were supposed to write like two quotes, but most of mine was just quotes because I did not know how to like to speak about it. And there was not much guidelines as the other stuff (P.6)

Thus, students' feelings about qualitative research methods were also based on comparisons made with quantitative methods, with students seeing qualitative methods as demanding a way of working with which they were unfamiliar. This led to negative perceptions, with many students finding qualitative research too "subjective" and "time-consuming".

> I think quantitative is just like is what you say like, so you have the output, and you just interpret from that. But qualitative, you have to like to do it yourself kind of thing. Interpret yourself in your own way. There's not a specific way to do it, so that's why (P.11)

Thus, it seems that students also found qualitative research difficult because they perceived it to require more independent and analytical thinking compared to quantitative research methods, which were seen as more straightforward. As such students challenges with qualitative research could also be attributed to them struggling with adapting to more analytical learning approach, such as the deep approach to learning.

6.4.1.2 Challenges with Mathematics and Statistics

The second main challenge expressed by a subset of seven participants across all typologies was their struggle with the mathematical and statistical side of research methods. The learning of statistics was mentioned by many as intimidating and anxiety-inducing, with students mentioning their struggle to keep up with and remember the different statistical tests and their intended application:

> Trying to remember, you know what you need to know to do different tests and everything, it was quite confusing at times, and I was a bit like am I going to have to remember all of this, for exams and stuff. So, it was a bit worrying sometimes. (P.10)

The use of SPSS was especially mentioned as a difficulty, with many participates struggling with the interpreting the output from SPSS. Whereas for others, anxiety stemmed from concerns over the consequences of making mistakes:

> It's like if you make a small error, you've got to like to go back and look for it and it can be quite long. And sometimes, like if you make a rogue space somewhere. It sends me into such a frenzy of irritation and frustration, where I'm ready to like to put the whole thing down because I'm just like can't do it (P.7)

Moreover, many of the students mentioned not being good at maths as an obstacle for their learning of statistics, and lacking in confidence in their "maths' abilities. (P.8). For example, one student explained:

> I was like this is maths, this a maths topic. That was a bit weird cause I remember like I'm more of an essay writing person. So, like I like writing a lot of stuff rather than working stuff out with a like definite answer. Psychology is quite broad, but with research methods, it's like the mean is the mean, there is not working around with it (P.12)

Thus, indicating that students' previous mathematics experiences led the students to have "perceptual blocks" towards their learning of statistics. However, although students mentioned struggling with maths as an obstacle in their learning, it is important to mention that the participants seemed to base their attitudes on their previous maths experiences. Once the students started on the research methods courses, many noted that the mathematical side was not as demanding or complex as they thought it would be:

> I did not like statistics at all, but ehm I don't know like I think it's a bit different when it comes to psychology because we don't have to like... we use SPSS, and we don't have to like do calculations its more about interpreting the data, it's more kind of useful and practical (P.5)

Thus, it seems that students' struggles with the mathematical side of research methods were an initial issue and had more to do with their perceptions of mathematics and statistic as something complex, than their actual experience. The students' confidence also grew with experience, becoming more manageable once they become more familiar with the software.

In conclusion, 14 of the 15 students reported struggling with either or both qualitative research methods and Maths/statistics, although reasons for these challenges somewhat differed between students. Only one participant (P4) reported challenges that were not specifically related to either one of these; instead, she reported the main challenge to be lack of understanding of what was expected for the second-year learning journal assignment.

6.3.5 Triangulation with previous longitudinal study findings

In order to increase the credibility of the findings, a form of data triangulation was conducted. The interview participants' answers were cross-referenced with the behavioural data from the previous longitudinal study. Overall, the results showed that most of the students (n=13) had higher than average module grades. The students who achieved lower than average grades did so only in second year and belonged to the third typology group. The descriptive statistics (see Table 6.4) showed that type 1 students achieved slightly higher grades in the first-year module than type 2 and 3, whereas, for the second-year module, type 3 students had lower average grades than the other two student typologies.

In terms of attendance, the longitudinal data indicated that type 2 students had lower attendance than both group 1 and 3 in the first year. However, in the second-year, type 2 students had the highest attendance, indicating variable levels in their engagement, whereas type 1 students' engagement was more stable and relatively high throughout their journey. Moreover, comparisons of blackboard activity between clusters showed that surprisingly type 1 students had the lowest activity levels during both first and second year. However, this could be an indication of students mainly doing independent studying offline, for example, by reading journal articles or practising the use of SPSS, which was also evident in the interviews with students mentioning studying outside of the classroom. Type 2 students had the highest blackboard activity during both modules, which could be seen to reflect their positive view towards instruction and guidelines, as all the lecture and coursework material was made available online.

Furthermore, participants previous self-reported survey data was also cross-referenced with the proposed typologies with the descriptive statistics compared between the three typologies. As expected, students in typology 1 had the highest score in Deep-approach to learning at all three time-points. In contrast, students in the typology 3 reported the highest score in surface approach. In terms of emotional data, all three typologies experienced some fluctuations in their emotions, with all typologies reporting the highest positive emotions at the beginning of the second year (T2). The descriptive statistics indicate relatively low scores for all groups in terms of negative emotions, but with students in typology 3 reporting highest negative-deactivating and activating scores across all time-points. Thus, providing further support for the typology findings.

Table 6.4

Mean and Standard deviations module grade, behavioural data and self-reported data for the participants (n=15) in the three typologies.

	Type 1		Type 2		Type 3	
Year 1	Mean	SD	Mean	SD	Mean	SD
Module Grade %	70.3	3.9	66.0	11.3	66.0	6.4
Attendance %	62.9	15.0	44.1	28.1	65.8	17.8
Blackboard Activity Hours	42.9	22.8	51.9	27.8	49.3	21.8
Deep Approach T1	24.3	2.6	23.5	3.4	21.5	2.1
Surface Approach T1	14.8	4.1	18.0	6.2	22.0	1.4
Strategic Approach T1	21.0	3.6	18.0	4.2	19.5	0.7
Intrinsic Motivation T1	5.3	0.4	5.0	0.7	4.7	1.5
Extrinsic Motivation T1	5.2	1.5	6.5	0.2	6.5	0.7
Positive Emotions T1	3.5	0.4	3.7	0.8	3.5	0.3
Negative-Deactivating T1	1.5	0.5	2.1	1.1	3.0	0.2
Negative-Activating Emotions T1	1.5	0.8	2.1	1.0	2.9	0.7
Year 2	Mean	SD	Mean	SD	Mean	SD
Module Grade %	65	6.7	69.1	4.8	57.8	8.7
Attendance %	54.5	8.9	59.6	20.7	50.9	17.7
Blackboard Activity Hours	25.6	8.2	40.0	30.0	38.7	7.6
Deep Approach T2	22.0	1.7	21.7	3.1	19.2	3.1
Surface Approach T2	13.0	6.7	15.3	5.5	19.4	2.9
Strategic Approach T2	24.0	6.2	23	3.0	21.3	7.0
Intrinsic Motivation T2	5.0	1.0	4.7	1.5	4.8	0.7
Extrinsic Motivation T2	3.6	1.5	6.0	0.9	6.1	0.4
Positive Emotions T2	5.8	0.9	5.9	1.1	4.9	1.3
Negative-Deactivating Emotions T2	1.5	0.5	2.0	0.9	2.9	0.8
Negative activating Emotions T2	1.4	0.5	2.0	0.7	2.2	0.6
Deep approach T3	23.5	4.5	21.5	3.9	20.4	4.2
Surface Approach T3	14.5	3.1	16.0	5.1	19.0	2.9
Strategic Approach T3	24.0	6.2	20.7	6.4	20.4	4.0
Intrinsic Motivation T3	5.7	0.7	4.8	0.7	4.9	.97
Extrinsic Motivation T3	5.4	1.3	6.1	0.4	6.1	1.1
Positive Emotions T3	3.9	0.3	3.4	0.6	3.3	.57
Negative-Deactivating Emotions T3	1.4	0.2	2.1	.98	2.9	0.8
Negative activating Emotions T3	1.1	0.1	1.9	1.0	2.6	0.8

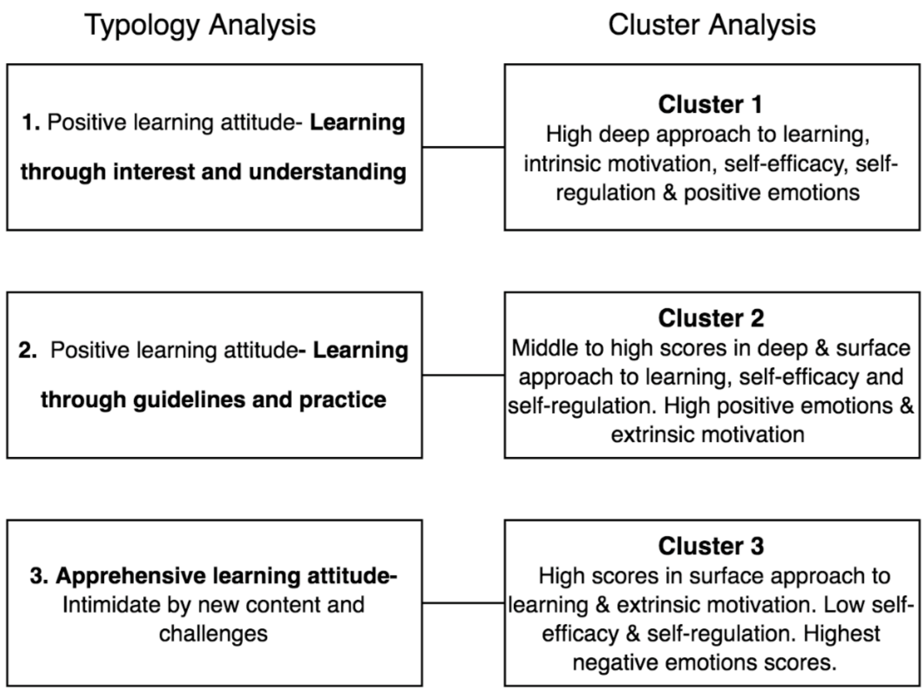
To further support the typologies, several cluster analyses were conducted using the previous self-reported longitudinal survey data, separately for time-point 1 (n=107), time-point 2 (n=78) and time-point 3 (n=72). Cluster analysis is used to form descriptive statistics to ascertain whether or not the data consists of a set distinct subgroup, each group representing objects with substantially different properties. For this study cluster analysis was conducted to see whether similar groupings of participants with distinct profiles of emotions, motivational beliefs, and learning approaches could be found. The clustering variables used were Activating positive, Deactivating negative and Activating negative emotions scores, Deep, Strategic, Surface approach to learning scores, Intrinsic and Extrinsic motivation scores, as well as Self-regulation and Self-efficacy scores. Hierarchical cluster analysis using Ward's method with Euclidean distance as a measure of similarity (Hayenga & Corpus, 2010), and standardised scores was conducted using SPSS version 26. Ward's method was chosen as it aims to join cases into homogenous cluster while minimising the total within-cluster variance (Borgen & Barnett, 1987). It is a widely used form of clustering, as it creates unique and even-sized clusters (Glen, 2018). (For more details regarding the clustering method see Appendix 6.7).

Based on the typology results, the analysis was run with a pre-determined three cluster solution. The three-cluster solution identified similar clusters to those proposed in the typologies, for all three time-points. Cluster one composed of students with the highest intrinsic motivation and deep approach to learning, as well as high scores on self-regulation, task-value and self-efficacy beliefs during all three time-points. This was the largest cluster for both time-point 1 and 2, with between 42-50% of students belonging to this cluster and can be compared with typology one. Cluster two students had middle to high scores in both deep, strategic and surface approach to learning, self-efficacy, self-regulation, and high positive emotions and extrinsic motivation. This cluster was the largest in time-point 2, with 40% of students belonging to this cluster. This cluster is comparable to typology two. In contrast, the third cluster students showed high scores in surface approach to learning, low self-efficacy and self-regulation, as well as the highest scores on negative emotions making it comparable to typology three. (See Figure 6.2 for comparisons between clusters and typologies).

Separate Multivariate analysis of variance (MANOVA) tests were conducted for each time-point to test whether the ten self-reported variables (Activating positive, deactivating negative, activating negative, Deep, Strategic, Surface, Intrinsic, Extrinsic, Self-regulation and Self-efficacy scores) significantly differed across the three clusters. The results showed that there were significant differences between the clusters and the self-reported variables. However, no significant differences between clusters for academic achievement were found (See Appendix 6.7 for MANOVA results, along with univariate test results and post-hoc comparisons). These three clusters can be compared to the three typologies found in the interviews and further strengthen the validity of the typology results.

Figure 6.2

Comparison of interview typologies and suggested longitudinal data clusters.



6.4 Discussion:

Study 3 investigated the learning of research methods within a qualitative context, with the aims of understanding students' learning journey and any challenges faced. By adopting a mix of typology and thematic analysis approach, the findings showed that the study participants could be grouped into three student typologies, each with different learning journeys but with similar challenges. These findings were then cross-referenced with the previous longitudinal study, with cluster analysis finding similar groupings of students with distinct profiles of emotions, motivational beliefs, and learning approaches.

6.4.1 Student Typologies

The students in all of the typologies expressed both positive and negative emotions but varied in the degree to which they experienced them. The results also showed how emotions are intertwined with approaches to learning, motivation and students' engagement with learning across all student typologies. The first typology encompassed students with a positive learning attitude and whose learning was characterised by the used of deep learning strategies and greater self-efficacy, enjoyment, and perceived utility of learning. Like so, students in this typology appear to be the most effective and favourable in terms of learning and studying, but not necessarily when it came to academic achievement.

Participants in the second typology consisted of students who demonstrated quite favourable self-beliefs, motivations and emotions towards research methods but focused on the practical skills related to research methods rather than holistic understanding. Their learning approach was characterised by a preference for guidelines and step-by-step instructions, with the students holding mainly extrinsic motivations. The third typology consisted of students with a more apprehensive learning attitude and more negative emotions and experiences of research methods. This typology of apprehensive students can be considered more maladaptive due to their negative beliefs and lack of interest or value in studying research methods. The perceived lack of clear guidelines and support hinders their engagement.

These findings can be compared to Balloo et al. (2018), who found four different research dimensions among undergraduate psychology students. Their study also found students with different attitudes towards research methods, with a distinction made between students who had a relatively positive attitude towards research methods and those with more negative attitudes, such as not seeing the importance or the relevance of research methods for psychology. The current study expands on these findings by exploring the development and sources of these attitudes and students' experiences during the research methods modules in a holistic way.

The results showed that students with more negative attitudes to research methods (Typology 3) also had more negative learning experiences on the module and were less satisfied with their learning journey. However, these negative attitudes could be attributed to several aspects such as perceived lack of adequate support, poor study skills strategies, and self-efficacy beliefs, as well as students lacking interest in research. Consequently, the students in the two previous typologies mainly held positive attitudes towards learning. The main difference between these group was how they approached learning, with typology 1 students focusing on understanding and typology 2 students enjoying especially the straightforward and practical side of research methods.

As such, a suggestion for practitioners would be to both cater to both students who want to understand and those that are more practical and prefer to follow guidelines because both seem to be just as successful. The importance of good study strategies has been highlighted in previous research (Hattie & Donoghue, 2016). The distinction between deep and surface learning has received a lot of attention, with deep learning thought to improve learning and enjoyment and surface learning associated with lower academic achievement and negative emotions (Trigwell et al., 2012; Postareff et al., 2017). The current study findings offer support for this connection, with students in the apprehensive type adopting more surface learning strategies and negative emotions.

Furthermore, some students seemed to start their research methods journey with positive attitudes and an intrinsic interest in research methods, which could have influenced their motivation to learn, learning strategies and self-regulation. However, students' learning approaches and self-efficacy can also directly influence students' engagement and academic achievement, influencing students' emotions (Artino et al., 2012: Linnenbrink, 2006). As such, it is not possible to draw conclusions on the directions of the relationships between emotions, motivations, approaches to learning and study success based on these results. Nevertheless, although causality cannot be drawn, these results still help enhance awareness of the components that influence students' learning and emphasise the need for consideration of the full range of these elements when designing learning environments for research methods courses.

It also seems that some students in typology 3 adopted a surface approach from the start, which could be due to them holding pre-existing negative feelings or due to low self-efficacy beliefs. Other students developed more negative feelings during their learning journey based on their difficulty with aligning their study strategies successfully, and due to them finding the subject boring. Students in typology 2 also experienced some negative emotions such as stress and anxiety, especially in the second year; however, these students were not discouraged by these feelings and instead worked through them. These findings corroborate the control-value theory's assumption that deactivating negative emotions (such as boredom) are especially detrimental to learning, whereas activating negative emotions can have both positive and negative influences on students' learning (Artino et al., 2012).

Furthermore, it is also necessary to recognise students' motivation for studying research methods. For example, whether a student is studying due to an intrinsic interest in the subject or due to extrinsic motivations such as achieving a high grade does not seem to matter too much when it comes to academic achievement. As a result, in addition to determining students' feelings and attitudes towards research methods, it is also necessary to examine why they are studying, as both extrinsic and intrinsic motives have been associated with learning success (Guay et al., 2010; Jeno et al., 2018; Niemic & Ryan, 2009). For instance, students in Typology 2 did not experience research methods as particularly interesting (or challenging) but still found it important for their academic achievement.

However, those students who do not find research methods interesting and do not see any value in studying struggle with their engagement in the modules. This is in line with the findings of the first study of this thesis (see Chapter 4.9) and previous research findings (Earley, 2014; Murtonen et al., 2008; Ruggeri et al., 2008). Importantly, only a subset of students (Typology 3) reported not seeing the relevance of research methods which may reflect changing attitudes to research methods more widely. Furthermore, the present study suggests that course grades do not necessarily reflect the quality of learning and teaching. Most of the students within the apprehensive student type also achieved moderate to high module grades; yet experienced a great amount of boredom and anxiety during their journey, which could, in the long run, have a negative impact on their overall well-being (e.g., Hagenauer et al., 2018; Kormi-Nouri et al., 2013; Steinmayr et al., 2016).

6.4.2 Learning Challenges

Another key finding of the current study was that students expressed two main challenges in their learning of research methods: *Qualitative research methods and Mathematics and statistics*. Some students reported struggling with qualitative research due to limited exposure and the curriculum heavily favouring quantitative methods. These issues are also echoed in the literature (Forrester & Koutsopoulou, 2008; Gibson & Sullivan, 2012; Povee & Roberts, 2014), with undergraduate psychology degrees being largely focused on teaching statistical techniques for the analysis of quantitative data with less emphasis placed on qualitative research (Breen & Darlaston-Jones, 2010).

In the UK, both the QAA benchmark statement for psychology and the BPS curriculum accreditation specify qualitative research as an area that must be covered. However, a recent review (Gibson & Sullivan, 2018) of qualitative methods teaching in UK psychology states that there is a "*quantitative culture'* in many psychology departments, with the teaching of qualitative methods varying between universities with many offering little engagement with qualitative methods. A reason for this has been suggested to be due to the lack of appropriately trained faculty staff within psychology departments with an understanding of alternative epistemological and methodological approaches (Breen & Darlaston-Jones, 2010) or due to the positivist epistemological tradition focused on hypothesis testing and statistical analysis, that has been dominant within psychology (Gibson & Sullivan, 2018; Gough & Lyons, 2016). A possible additional reason for this perception could also be the timing of the current study, as the students at the University of Westminster have an opportunity to develop their qualitative research skills by designing their own studies; however, this takes place in semester two of the second year in a separate (non-research-methods) module.

Furthermore, the students also perceived qualitative research as more difficult, time-consuming, and more subjective than quantitative research. Since more than half the participants mentioned qualitative research as the main challenge in their research methods journey, an implication for practitioners would be to ensure that qualitative and quantitative epistemology and analysis is taught in an integrated way from the start. More specifically, it is recommended that students be given comparable time in lectures and materials for the qualitative part of the modules as they are for the quantitative methods. Possible resources could include example reports using different qualitative methodologies and direct access to various qualitative research tools, such as online videos and coding/analysis software.

A sub-set of students also reported struggling with the mathematical and statistical side of research methods. This supports previous research findings, which indicate that students often struggle with this part of the curriculum (e.g., Murtonen & Lehtinen, 2005, Ruggeri, 2008, Paecher et al., 2015; Bourne, 2018a). An important connection with students' expectations and self-efficacy beliefs needs to be made, as many of the students held attitudes towards maths and statistics based on their previous negative experiences, which has also been previously highlighted in the literature (Bond et al., 2012; Pang & Tang, 2005). However, students' attitudes and expectations at the beginning of their journey frequently changed with experience and the recognition that research methods did not involve as much mathematics and statistical calculations as previously thought. Previous research indicates that the relationship between mathematics ability and performance in research methods modules is only significant for specific aspects of mathematics (such as inspecting graphs) and that these seem to be most important at the beginning of students' degrees (Bourne, 2018b). The findings also reinforce for the findings from Study 1, which showed that students often overestimate how much mathematics research methods modules contain.

Furthermore, although students reported struggling with this aspect of research methods, they still achieved relatively high grades. This is an important finding as it suggests that students with poorer attitudes towards statistics and mathematics at the beginning do not necessarily perform more poorly on modules with statistical content. This finding is in contrast with previous research, which has typically shown that students with statistics anxiety and negative attitudes to statistics tend to have a poorer academic achievement (e.g., Macher et al., 2012; Ruggeri et al., 2008).

Thus, it seems that students' attitudes to statistics/mathematics are primarily important at the beginning of the students' research methods journey, whereas other elements related to students' learning are more influential later, such as student's motivation and ability to adapt their learning approach as well as feelings of boredom. Nevertheless, a possible intervention aimed at reducing students' negative attitudes to statistics could focus on clearly informing students on which aspects of mathematics are relevant in the psychology degree (and which are not) at the beginning of their research methods journey, providing students with an opportunity to air their concerns and worries. This could increase students' self-efficacy beliefs and decrease their negative emotions, which could, in turn, promote students' academic achievement and well-being.

6.4.3 Limitations and implications

The present study had its limitations. The relatively small number of participants made it difficult to capture all students' learning journey, especially those with lower academic achievement since they were underrepresented in the sample. Thus, the results are limited to students with relatively high academic achievement. However, a strength of this study is its novel approach to triangulation with further support for the typologies found when comparing the interview data with the previous survey findings. The cluster analysis revealed similar patterns as the typologies, indicating that it is likely that low achieving students would best be described by the third apprehensive typology.

Nevertheless, more research needs to be conducted to capture students' learning journey and experiences with low academic achievement and those who drop out of their studies. A possible area of future research would be to see whether the proposed typologies can be found with students in other courses or whether these are specific to the research methods modules. Another limitation is that the interviews in which the participants reflected on their experiences were conducted after the second-year module; thus, there may have been memory distortion regarding the first year and greater emphasis placed on the second year.

In terms of practical implications, it is suggested that greater awareness is placed on the part of both students and teacher on the roles that emotions and motivations play in students' learning. Understanding the negative emotions stemming from low self-efficacy and lack of study-skills strategies suggest the need for greater information, guidance and preparation for research methods students. It would also be valuable to support students' competence beliefs and help students develop their study skills and strategies from the beginning of their studies. Additionally, it has been suggested that encouraging students to reflect and discuss their learning of research methods can highlight the role and relevance of research for their degree and future career (Turner et al., 2018). This may help overcome the challenges many students face struggling to perceive the subject's relevance (Murtonen, 2015).

6.4.4 Conclusion

To summarise, the present study results suggest that there are both differences and similarities in psychology students' learning journey, with students differing in their experiences and attitudes while sharing similar struggles. Looking at students' research methods journey as a whole, this study aimed to capture the complexity of students' experiences, emotions, and motivations and move beyond the tendency to focus on one aspect of the learning journey. These findings demonstrate that individual motivational and emotional factors are important for students' learning engagement during research methods modules. However, other significant factors within the learning context, such as the teaching methods, support provided, and students' ability to adapt their learning approach and strategies, have also been highlighted. These findings provide more insight into understanding the learning of research methods and add to the literature considering the influence of emotional, motivational and cognitive factors on learning engagement and achievement. The following chapter is a general discussion that summarises the previous three empirical chapters and provides theoretical and practical implications of these findings.

Chapter 7: General Discussion

7.1 Introduction

The overarching aim of this thesis was to examine psychology students' learning of research methods. Specifically, this thesis explored the influence of affective, behavioural and cognitive variables on students' research methods learning across three studies. The present thesis suggests that a more comprehensive understanding of students' research methods learning can be attained by exploring all of these aspects and their combination. The findings emphasise the role of behavioural variables and emotions in research methods learning journeys and offer proposals on how the literature on academic emotions and the literature on learning analytics could be combined and applied to both research methods learning and higher education.

This chapter discusses the main findings of this thesis in relation to the research questions, firstly presenting a summary of the three studies. The first study's findings will be discussed with regard to the detection of important affective, cognitive and motivational variables. The discussion of the second study will focus on how these affective, motivational, and cognitive variables are related to students' achievement, while taking into account behavioural variables and their development throughout students' research methods journey. Finally, the third study's findings will be discussed in relation to the identification of specific research methods student typologies, representing more general emotional and learning approach dispositions. The summary and theoretical consideration of these findings will be followed by the educational implications and the limitations and suggestions for future research.

7.2. Summary of the PhD

The first study was an exploratory mixed-method study consisting of two surveys administered at the start and end of the first-year research methods module, and two follow-up focus groups. This study sought to explore students' perceptions, expectations, and feelings towards research methods and whether students found these modules particularly challenging, as suggested by previous research (Barry, 2012: Field, 2014). The results showed that students harboured both negative and positive feelings, perceptions, and expectations towards research methods. The influence of self-efficacy and learning approaches on learning was also highlighted. In accordance with learning approach theories, the impact of both deep and surface learning approaches was identified (Herrmann, 2017; Lindblom-Ylänne & Lonka, 1998), with students seemingly switching between the approaches during different tasks. The students indicated adopting a deep approach to learning during more "active learning" tasks such as using SPSS to conduct statistical analysis but resorted to a more surface approach when faced with a more challenging task such as the research report.

Furthermore, one of the key results of Study 1 was that students experience a wide range of emotions (e.g., enjoyment, boredom, anxiety, excitement, curiosity, fear) towards research methods and that these emotions were associated with students' expectations for learning and studying on the module. Moreover, contrary to previous research (Barry, 2012), the findings also showed that students did not find research methods more challenging than other modules on their course, with high self-efficacy beliefs highlighted as the reason. However, although students did not particularly struggle with research methods, many participants reported research methods to be boring and did not see the relevance for their career. Whilst these initial results were revealing the findings were limited by the sample size and lack of standardised measurements for the affective, motivational and cognitive variables. Nevertheless, this exploratory study still provided good grounds for studying a range of emotions in the learning of research methods in conjunction with learning approaches and motivational beliefs such as self-efficacy.

The second study expanded on these findings and brought together separate lines of learning analytics, affective, and cognitive theories to examine research methods learning, using the control-value framework categorisation of emotions (Pekrun, 2019). This study analysed both behavioural and self-reported data from the same learning experience longitudinally across two academic years, utilising cross-lagged and multi-level modelling techniques. By exploring students' learning longitudinally, the study was able to assess the potential bi-directional relationships between emotions and academic achievement and between students' learning behaviour and academic achievement. The research questions sought to explore whether differences in research methods learning could be explained by individual differences in emotional, motivational, and cognitive factors and whether these factors changed and influenced learning behaviours throughout the degree. The contributions of behavioural variables on research methods learning were also explored.

The behavioural variables VLE activity and attendance were found to be the most important predictors of academic achievement, with the influence of emotions, intrinsic motivation, self-regulation and surface learning approach also identified. These findings contribute to the growing areas of emotions in learning by indicating that particularly deactivating negative emotions are negatively associated with students' learning from the start of their research methods journey providing support for the control-value theory. Intrinsic motivation, surface approach, and self-regulation were also found to be significant correlates of academic achievement. In contrast, the activating negative emotions, strategic and deep approach, self-efficacy, and task-value failed to correlate with measures of academic achievement in all three time-points.

Regarding the second research question, the results showed that the affective, motivational, and cognitive factors students experienced stayed largely stable throughout the research method journey, except for a strategic approach to learning and self-regulation, which both peaked during the beginning of the second year. These findings are consistent with previous research on learning approaches (Biggs, 1987; Entwistle & Tait, 1990) and self-regulation, which indicated that students' approach to learning and self-regulation can change based on their perception of the learning environment (Zeegers, 2001) and add to the literature by exploring these across two academic years.

Study 2 also contributes to the learning analytics literature by highlighting the usefulness of VLEs as a learning tool for research methods, with measures of online engagement predictive of both future online behaviour and future academic achievement. In common with previous research (e.g., Newman-Ford et al., 2008; Boulton et al., 2018; Summers, 2020), students who obtained the highest grades attended more lectures and used the VLE more often during their research methods journey. These findings extended past research findings by firstly demonstrating that VLE activities and tools' effectiveness can be established with face-to face-based modules across two academic years. Secondly, the results also showed for the first time that VLE activity was a stronger predictor than attendance while also making potential causal inferences. The results also showed some potential links between achievement emotions and students' use of the online learning tools; online self-tests. However, due to methodological and sample size limitations, no predictive models including self-reported data and VLE data, could be run; thus, the direct influence of emotions on learning behaviours was harder to establish.

To build on these findings and provide deeper insight into students experiences throughout the modules, Study 3 sought to explore students' research methods journeys and learning development by conducting semi-structured interviews with a subset of the participants from the previous study. The study adopted a mix of typology and a thematic analysis approach. This provided a novel way for exploring the interview data first inductively, keeping the findings rooted in participants' own experiences and then deductively by considering the thesis's overall theoretical frameworks and aims.

The third study’s research questions were first to explore the learning experiences and factors present and influential during students’ research methods journey and how these compared between student-types. The second research questions addressed any challenges students faced during their research methods journey. The findings showed that the study’s participants could be grouped into three student typologies. Consistent with prior literature examining student profiles or groups in a higher education context (Heikkila et al., 2012; Ketonen & Lonka, 2013), an exceptionally well-functioning student typology was found, with students in typology 1 (*Learning by interest and understanding*) having a positive learning attitude, intrinsic motivation, deep approach to learning and high academic attainment. This group demonstrated no difficulties in regulating learning and displayed high self-efficacy beliefs and academic achievement.

The second typology (*Learning by guidelines and practice*) consisted of students who also had a positive mindset and similar levels of engagement to the previous typology. However, they differed in their interest, motivation and approach to studying – characterised by a preference for guidelines and step-by-step instructions as well as the motivation to achieve high grades. Despite the lack of intrinsic interest and motivation in the subject, these students did not display any major difficulties in their learning and, as such, also showed high academic achievement.

The final typology (*Apprehensive Learning Attitude*) consisted of students who displayed maladaptive approaches to their studying. These students had a more apprehensive learning attitude, were extrinsically motivated and had more negative emotions and experiences of research methods in general. This group also had the lowest belief in their abilities and showed a lack of self-regulation and low study engagement. However, surprisingly, although these students expressed dissatisfaction with their learning experiences and the support offered, most of them still showed above average academic achievement when comparing with the whole cohort. A possible reason for this could be that, although the students were not particularly interested in research methods, finding it boring and lacking the interest to reflect on it, they were still extrinsically motivated to achieve high grades.

These three student typologies shared dissimilarities and similarities, with all typologies reporting similar struggles during their journeys, relating to "Qualitative research" and "Mathematics and Statistics". This study provided further support for some of the control-value theory's (Pekrun et al., 2007) assumptions and highlighted the importance of emotions, learning approaches, self-efficacy, and motivation. Moreover, by investigating whether the typologies differed in their emotional, motivational and learning- approach dimensions, the combined effect on academic achievement could be studied. The results especially emphasised the positive influence of both intrinsic and extrinsic motivation on learning and the benefits of study strategies based on acquiring knowledge and understanding and study strategies based on following rules and practical skill development.

Overall, although these three studies employed different methods and measures, the results of these original studies were consistent both content-wise and in terms of the theoretical and empirical implications. This thesis significantly contributes to the literature in at least two major respects. Firstly, the influence of a range of emotions, especially deactivating negative emotions, was highlighted as important throughout students' research methods learning with links to students' engagement, motivation, and learning approaches made, supporting the control-value theory. The second important finding was the surprisingly high impact of VLE activity on research methods learning achievement, providing novel contributions to the literature by exploring these longitudinally across two academic years. The findings will next be discussed in relation to the previous research discussed in chapter 1, particularly considering the theoretical framework of the control-value theory of achievement emotions and the literature on learning analytics.

7.3 Theoretical Implications

The findings discussed in the previous section have significant theoretical implications. The thesis adds a unique contribution to our understanding of behavioural, affective, and cognitive variables on students' learning in research methods modules. The thesis' findings broadly support the control-value theory, which offers an integrative framework that incorporates *"cognitive, motivational, expressive, and peripheral physiological processes"* (Pekrun, 2006, p.316) to analyse emotions, achievement, and learning.

The findings corroborate the control-value theory's main assumptions of achievement emotions having influences on learning achievement, with possible bi-directional relationships between emotions, motivation, learning approaches and self-regulation found in all three studies. More specifically, the control-value theory states that emotions can influence students' cognitive resources, motivation to learn, learning strategies and self-regulation; however, students' learning approaches and self-efficacy can also directly influence students' engagement and academic achievement, which in turn influences students' emotions (Artino et al., 2012: Linnenbrink, 2007; Pekrun, 2019).

Overall, the findings show that students who hold positive emotions towards learning are also more likely to be interested in studying (deep approach), have well-planned learning goals (self-regulation) and have high motivation and beliefs in their abilities. However, although these traits are generally believed to be associated with better learning and facilitating academic performance (e.g., Mega et al, 2014; Richardson et al., 2012; Pekrun, 2006) it is important to note that only some of these variables were associated with students' academic performance in the current research.

Interestingly, no significant correlations between any of the self-reported values in T1 and first-year grades could be found (Study 2). A possible explanation for this is that the first surveys were administered too early before students had fully formed thoughts and feelings towards research methods. In contrast, in Study 2, T2 deactivating negative emotions (boredom & hopelessness), self-regulation, surface approach and intrinsic motivation were significantly correlated with subsequent academic achievement. The deactivating negative emotions especially emerged as key factors with the emotions (boredom & hopelessness) reported at the beginning of the second year having small but significant negative correlations with both the portfolio and overall module grade in the second year.

Boredom is considered an *activity focused achievement emotion*; and, as such, refers to the boredom students experience during the research methods modules. Boredom is thought to occur when students perceive a lack of control over academic activities beyond or below their capabilities and when they perceive that there is little value in these learning tasks (e.g., Goetz et al., 2006). On the other hand, hopelessness is thought to arise from students' expectations of failure and, as such, is considered a *prospective outcome emotion.* Students' feelings of hopelessness can lead to a failure cycle of "learned hopelessness" (Au et al., 2010), with poor results confirming and reinforcing students' earlier thoughts of hopelessness. Therefore, academic performance and deactivating negative emotions and performance are believed to be reciprocally linked.

A potential mediating effect of surface approach and intrinsic motivation on deactivating negative emotions and achievement was also found in Study 2. However, these findings should be interpreted with the caveat that the results show only correlation, not causality, in this relationship. These results support the control-value theory’s hypothesis that deactivating negative emotions (boredom & hopelessness) may be more harmful to learning and success than activating emotions due to deactivating emotions' proclivity for fostering disengagement from a learning activity (Trigwell et al., 2012; Postareff et al., 2016). More specifically, negative views of research methods might make students more inclined to adopt a more passive form of learning, such as the surface approach leading to poorer academic outcomes.

The disadvantageous influence of the surface approach, which focuses on memorisation and is characterised by a lack of understanding, on academic achievement has also been established in previous research (e.g., Diseth & Kobbeltvedt, 2010; Diseth, 2007; Herrmann et al., 2017), with the approach associated with negative perceptions of the learning environment. It is noteworthy that the surface approach's negative impact was significant even though the positive impact of a deep approach and strategic approach was not. These findings seemingly echo the conclusions made by Diseth and colleagues (2003, 2007, 2010, 2011), who indicated that it is more important to prevent the surface approach to studying than promote the deep approach to studying.

These findings are in line with the review of the literature, which showed that the deep approach had the most inconsistent relationship with academic achievement, with studies finding either no significant correlations (Diseth & Martinsen 2003; Gjibels et al., 2005) or small correlations (Trigwell et al., 2013; Cassidy, 2004) with academic achievement. Other researchers (e.g., Asikainen et al. 2013, Herrman et al., 2017) have suggested that the lack of a substantial association between the deep approach and academic achievement may be due to difficulty in evaluating all facets of academic achievement. As a result, grades might not always reflect the quality of students' learning. As such, deep learning adopted by participants may not have been reflected in their grades. For example, in the current research, the exams employed in the modules might not have captured students' deep learning strategies as they partly consisted of multiple-choice questions (Year 1) and short-answers questions (Year 2), which require less deep learning than longer exam questions (Scouller, 1998).

Furthermore, unlike the surface approach, which is characterised by strong and clear lack of understanding, the deep and strategic approach are more nuanced and associated with many different study strategies. Such a conclusion is also supported by the qualitative findings of the thesis, with both Study 1 and Study 3 highlighting the deep approach as influential for students' learning processes, but without clear links with academic achievement. For example, findings from Study 3's typologies indicated that some students preferred learning by understanding whereas others preferred more guidelines and a learning-by-doing approach, but with both strategies appearing to be equally successful. As such, perhaps a better way of exploring students' learning is by moving away from the broad concept of learning approaches and instead focusing more on students' use of specific study strategies, or lack thereof and their appropriateness in specific learning contexts.

The possible mediating role of motivation is also suggested within the control-value theory, with deactivating negative emotions posited to uniformly reduce motivation and the effortful processing of information, implying negative effects on performance (Pekrun et al., 2019). Similarly, previous research also supports the relationship between intrinsic motivation and academic achievement, with intrinsic motivation included in most theories of motivation (e.g., Ryan & Deci 2000; Wigfield & Eccles 2000) and linked with a drive to learn and higher academic achievement (Guay et al., 2010; Jeno et al., 2018; Richards, 2012). In contrast, extrinsic motivation can have both positive and negative effects on learning (Pekrun, 2006). Support for this two-fold effect of extrinsic motivation can be found in the Study 3 typologies, with the students in both typology 2 (*Learning by guidelines & practice*) and 3 *(Apprehensive learning attitude*) expressing extrinsic motivations, but differences in both their feelings and learning engagement.

Furthermore, the finding of self-regulation being a significant correlate of academic achievement is expected and in line with previous research, with self-regulated learning positively associated with academic performance in a myriad of studies (Asikainen et al., 2018; Broadbent & Poon, 2015; Richardson, 2012), with self-regulated students being successful in their learning as they can "control" their learning environment, by being more actively engaged in their learning processes.

The lack of significant quantitative relationships between self-efficacy and academic achievement is more unexpected, as self-efficacy has consistently been shown to positively correlate with academic performance in various settings, with meta-analytic studies reporting moderate effect sizes (Richardson et al., 2012; Robbins et al., 2004). A possible explanation for the failure of self-efficacy to directly correlate with academic performance is that it moderately correlated with both self-regulation and intrinsic motivation. Self-efficacy might have indirectly influenced academic achievement through intrinsic motivation and self-regulation, as these were highly correlated. Another possible explanation is the relatively low sample size of the self-reported surveys. Although no significant quantitative findings were found, self-efficacy was still identified as important for students' learning in both qualitative studies (Study 1 and 3), with low self-efficacy beliefs especially prominent during unfamiliar and difficult tasks.

Furthermore, unexpectedly, and contrary to previous research findings (Mega et al., 2014; Pekrun et al., 2011) no significant correlations between activating positive emotions (enjoyment, pride & hope) and subsequent academic achievement were found (Study 1 & Study 2). Most of the students in Study 3 typologies also showed above average academic achievement, regardless of their feelings towards research methods. These findings indicate that contrary to the control-value theory (Pekrun, 2006) positive emotions did not seem to be critical antecedents for academic achievement in the research methods modules.

Although no significant correlations with subsequent academic achievement were found, the positive emotions measured *after* the students had finished their research methods modules positively correlated with academic achievement in the second year. Thus, a possible explanation for these findings could be that instead of being both antecedents and results of learning, positive emotions, in this case, were a reflection of students' feelings towards the outcome of their learning. This distinction between outcome-focused and activity-focused emotions is also made within the control-value theory (Pekrun, 2006). Most of the activating positive emotions (pride & hope) are classified as outcome emotions. Enjoyment is instead seen as an activity emotion. According to Pekrun's model, enjoyment should trigger intrinsic motivation, facilitating flexible learning strategies and self-regulation, leading to higher performance under most task conditions. However, no significant relationships between enjoyment and academic achievement were found in the current thesis.

Similarly, no significant correlations between activating negative emotions such as anxiety, anger, shame, and module grade were found (Study 2). A possible reason for these findings could be that activating negative emotions can exert variable effects on students' learning (Pekrun et al., 2012) by both undermining intrinsic motivation and by inducing extrinsic motivation to invest the effort to avoid failure, potentially cancelling each other out. Thereby, research on students' emotions should move on from just studying the influence of anxiety and include a broader range of emotions experienced in academic settings. These results contrast with previous literature on research methods learning, which has largely been focused on examining the influence of anxiety in different forms (e.g., Bourne., 2018a; Macher et al., 2012; Paechter et al., 2017), neglecting other emotions.

Nevertheless, although no quantitative support for detrimental effects of statistics anxiety could be found, results from Study 3 interviews indicated that students were worried and anxious about statistics (and mathematics) at the beginning of their research methods journeys. However, these anxieties were more related to students' expectations of the course rather than their actual experiences. It is also possible that any anxiety felt at the beginning of the module could have positively affected students by increasing extrinsic motivation to study due to fear of failure (Macher et al., 2012; Rodarte-Luna & Sherry, 2008). Possible support for this can be seen from the typologies (Study 3), with students in typology 2 (*Learning by guidelines & practice*) expressing the most anxiety but still being engaged in the learning process and achieving high grades. The other two studies in this thesis offer further support for the importance of deactivating emotions in research methods learning, with boredom being the most expressed emotions in the surveys in Study 1 and the students in typology 3 (*Apprehensive learning attitude*) in Study 3 expressing highest feelings of boredom.

Thus, overall, the findings support the control-value theory's assumption that deactivating negative emotions, specifically hopelessness and boredom, are more detrimental to learning and performance than other emotions. The detrimental effects of deactivating emotions have also been found in other studies (e.g., Pekrun et al., 2017; Sharp et al., 2017; Tze et al., 2014), but with former studies being cross-sectional or only following students across one academic year. Thus, this research contributes to the literature by exploring the influence of a broad range of emotions longitudinally across two academic years.

For a more in-depth exploration of this effect, students' affect in learning was also considered in relation to the development of their academic performance by comparing students' intra-individual differences and inter-individual differences with growth models in Study 2. This approach allowed for an investigation of individual differences in emotions and an exploration of how stable these emotional patterns were simultaneously (McNeish & Matta, 2020). Furthermore, the exploration of students' current emotions and prior academic performance (UCAS scores at the entry to university) enabled a more accurate estimation of their learning progress and academic performance standards. Interestingly, students with lower grades at the beginning of their journey also had higher growth rates in grades during their university studies, indicating that students' attainment before university was not the driving force between students' academic development, with no significant relationships between UCAS grades and first-year module grade. This is an unexpected result given the large body of work finding strong correlations between prior academic achievement and achievement at university (e.g., Richardson et al., 2012)

Furthermore, the results also confirmed between-person differences in deactivating negative emotions. These differences stayed stable throughout the students' research methods journey, with the negative association with emotions being evident from the very start. The results also confirmed that no significant between or within-person differences for activating positive or negative emotions could be found, indicating that these emotions stayed relatively stable throughout the study and did not significantly predict module grades.

The multicultural context of the University of Westminster and the high rate of BAME students participating in study 2 also offered novel insights into the possible influence of deactivating negative emotions in learning. The results indicated that students from BAME backgrounds had lower achievement throughout their research methods journey than white students, with deactivating negative emotions mediating the relationship between ethnicity and module grade. These findings provide possible explanations for the achievement gap between white ethnicity and BAME students. There are several possible reasons for the differences between deactivating negative emotions in BAME and white ethnicity students, such as BAME students not feeling as integrated with the institutional culture due to lack of representation and diversity in staff and the lack of academic role-models (NUS & Universities UK, 2019). Other reasons for BAME students feeling less satisfied with their experience of Higher Education include the teaching practices and curriculum being seen as “colonial” and being taught from a white perspective and thus lacking in inclusivity (Smith, 2017). These factors can heighten

BAME students’ sense of isolation, leading to the students feeling like they do not belong at university. Such feelings of non-belonging and isolation could also lead to a decrease in the students control beliefs and self-efficacy increasing students’ feelings of hopelessness and boredom. Another possible reason for the difference in deactivating negative emotions could be that BAME students see less value in studying research methods, which could be due to them having less clear career ambitions or holding more extrinsic values such as studying in order to gain recognition from parents. This could once again lead to an increase in students' deactivating negative emotions, as specified in the control-value theory (Pekrun, 2006).

Overall, these findings are novel and contribute to the literature by analysing the pattern of change in students' academic achievement and emotions longitudinally across two academic years. The results especially highlight the need for research to move beyond only exploring cognitive and motivational constructs related to learning. The research findings show that the newer construct "achievement emotions"' can be just as influential in learning, if not more so. More specifically, this thesis has identified deactivating negative emotions as the clearest psychological correlate of academic achievement, along with the surface approach, intrinsic motivation and self-regulated learning.

The influence of deactivating negative emotions was crucial throughout students’ research methods journey, highlighting the importance of providing students with a learning environment that aims to combat the feelings of boredom and hopelessness from the start. Concerning the influence of motivational and learning approaches for research method learning, the findings both replicate and expand those reported in earlier studies by providing support for the relationships between the variables and by establishing the role of intrinsic motivation and surface approach as possible mediators between deactivating negative emotions and academic achievement in a research-methods setting.

Thus, despite the complex nature of the evidence, it emerged that many different affective, cognitive, and motivational mechanisms come together to contribute to the effects of emotions on academic achievement in research methods modules. These results offer further insight into those components that make up the learning experience for students and draw attention to the need to consider the full range of these elements when designing learning environments for research methods courses.

7.4 Theoretical Contribution to the Learning Analytic Literature

The other important theoretical implication of this PhD research relates to a separate and relatively new line of research in the literature on "Learning analytics" and the influence of behavioural variables on students' academic achievement.

In line with previous research findings, the current thesis found that both attendance (Credé et al., 2001, New-man & Ford, 2008) and VLE activity (Morris, 2005; Boulton et al., 2018) were important predictors of academic achievement. More specifically, Study 2's findings showed that up to 31-35% of the variance in grades was explained by the observational behavioural data, with the effect being stable across the two years. The findings are in line with the literature on blended learning (Tempelaar et al., 2015a, 2015b, 2018a, 2018b) and fully online courses (Cerezo et al., 2016; Agudo-Peregrina et al., 2014), but effects are notably stronger than the limited previous studies that have been conducted in face-to-face learning settings (Boulton, 2018; Summers, 2020), with very few studies measuring VLE activity and attendance simultaneously (Summers, 2020).

The current research expands these findings by demonstrating that the value of VLE engagement extends beyond the first year of undergraduate study. VLE activity positively predicted students' academic achievement in both the first and second year, with the results persisting when attendance was included in the regression models. The longitudinal perspective of the study also offered a more nuanced understanding of the influence of VLE activity and tools, with the cross-lagged results showing that VLE activity in the first year had a potential causal link with attainment in the second year. This procedure represents a particular strength of the study and sets it apart from previous studies in the field (e.g., Summers 2020).

Overall, these findings advance the learning analytics literature by demonstrating for the first time that VLE activity can be a better predictor of academic achievement than attendance in face-to-face-based modules, which may have important implications for the practice of learning analytics. These results are somewhat surprising as the interactive nature of the research methods modules would lend to the belief that face-to-face attendance is crucial. A possible explanation for these finding could be the unique advantages offered by VLEs: with the help of VLEs, students can access learning materials at any time and place of their choosing, making VLEs both more accessible and flexible for students with other commitments outside of their studies, such as part-time jobs or caring responsibilities. An alternative explanation could be that the measurement of attendance is less accurate than VLE data, with students forgetting to or deliberatively avoiding tapping into classes. This could make attendance monitoring a more unreliable measure of engagement than VLE activity.

However, overall time spent in a VLE is only a proxy of students' time investment in learning. To further unpack what students are doing while logged in to Blackboard, Study 2 also investigated specific VLE activity and tool usage data. The tools that emerged as particularly useful for students' learning were "Online self-tests" and "Lecture Recording views," which significantly predicted students' academic achievement. These findings support previous literature and the idea that lecture capture supplements face-to-face teaching (Nordmann et al., 2019; Gardner, 2020).

The results also demonstrate the benefits of online formative testing even when examining merely the *number* of tests conducted. Previous research found similar relationships with the analysis of students' specific scores/grades on online formative tests (Tempelaar et al., 2015a, 2015b). These findings extend the literature by showing the advantage of engaging with formative assessment rather than merely using the outcome of a formative assessment as a proxy for achievement/ability.

"Online self-tests" can also be seen to reflect more active learning tools and might be a better measure of engagement within courses than more passive tasks such as the number of hours spent on blackboard pages. As such, these results also complement the findings of Agudo-Peregrina et al. (2014), who found that interactions involving active participation were the best predictor of academic achievement. This research expands earlier research by demonstrating the usefulness of online active learning tools in the face-to face-based learning setting. Given that previous research has shown that active learning activities have been associated with promoting higher-order thinking skills and deep learning (Prince, 2004) and better attainment in research methods (Ball & Pelco, 2006), the present study provides further evidence for employing such tools. Study 1 interviews also provide further support for applying more active learning tasks, with students reporting that they associated generally positive feelings and high engagement with these types of activities.

The findings also provide insights into the combination of the literature on self-reported individual difference factors and the literature on learning analytics, which is often referred to as 'Dispositional learning analytics' (Buckingham Shum &Deakin Crick 2012). Learning dispositions represent individual difference characteristics that affect learning processes and can include both affective, behavioural, and cognitive variables (Rienties et al., 2017; Tempelaar et al., 2018). Only a few studies have been conducted in this relatively new field, with the studies taking place in fully blended learning settings (Tempelaar et al., 2015a, 2015b; Tempelaar et al., 2018a, 2018b; Ellis et al., 2017).

The findings from the current research (Study 2) add to the literature by demonstrating that activating positive emotions and deactivating negative emotions at the beginning of term were correlated with the number of weekly online tests conducted by students in the first year. However, no significant relationships between overall VLE activity or attendance and emotions could be found. A possible reason for why first-year emotions were only correlated to the weekly online self-test and not directly to the module grade could be due to the perceived control and value of these activities, which are the primary antecedents for achievement emotions in the control-value theory. The modules' assignments and exams were obligatory within the courses and could have reduced the students' perceived level of control over the task. In contrast, the online self-tests were voluntary, and as such, students might have seen less value in participating in these, as they do not contribute to their grades. In comparison, other students might have felt more value due to the previously mentioned benefits of active learning tasks and instant feedback.

In contrast to the online formative assignments, students' attendance in face-to-face lectures appears to be independent of learning emotions and their antecedents, as visible from the absence of any correlational paths. Thus, these findings indicate that positive learning emotions are a required condition for engagement with VLE tools, which are predictive of overall academic achievement but are not necessarily influential in students' face-to-face engagement. Overall, the findings suggest that these two separate fields of emotions in learning and learning analytics could benefit from further joint exploration.

Taken together, the results of this PhD research strongly indicate that many different affective, behavioural, and motivational mechanisms come together to contribute to students' research methods learning. The thesis findings offer original contributions to the literature by demonstrating the usefulness of VLE activity and tools and the possible detrimental effect of deactivating negative emotions for research methods performance. This research has both important theoretical implications and offers interesting future research directions. Based on these findings, it seems useful to start now more actively combining the research on learning analytics with the research on academic emotions to evaluate students learning more fully. Until now, these have only been marginally addressed (e.g., Tempelaar et al., 2015a, 2015b, 2018a, 2018b).

7.5 Limitations and Future Research Recommendations

This PhD research has several limitations that should be considered when evaluating the findings and planning future studies. The first key limitation common to all three studies concerns the student samples. All participants were from the same post-92 London University and studied the same subject (psychology). Several features of the university, such as the large proportion of students from lower-socio-economic and BAME backgrounds, may mean that these findings could be different in other higher education settings and other countries.

However, the sample in each study was heterogeneous in terms of age, ethnicity and nationality, but with females being over presented, as is common across psychology degrees in the UK. The University of Westminster also shares many similarities with other higher education settings, such as the psychology courses being BPS accredited and following a prescribed structure and content consistent with other BPS accredited psychology courses. Furthermore, research methods are also a key subject in the vast majority of psychology degrees worldwide, which increases the generalisability of the findings.

Second, response rate is often a problem with student surveys, and especially in longitudinal research. This was also evident in the current thesis, with both Study 1 and Study 2 having a high attrition rate for the self-reported surveys with a large amount of missing data, making it difficult to analyse the data using the methods originally planned. Furthermore, although an attempt was made to reach all students, with students offered incentives for participating in the studies, it should be acknowledged that perhaps only the more active students took part in all of the studies, with the thesis lacking the perspective of less engaged students. As the survey samples were skewed towards more high achieving students the results might not capture the whole cohort accurately. Therefore, caution is advised when interpretation these results, with more research needed to understand the learning emotions, motivations, approaches and overall journeys of low achieving students along with those who drop out of their studies. Questionnaire fatigue, resulting in students more prone to academic boredom or hopelessness being absent from participating during repeated data collection phases, could have skewed the data. Nevertheless, even with the skew towards higher achieving students the results still showed associations between de-activating negative emotions and module grades. As previous research indicates that these emotions are often correlated with lower academic achievement, the findings would likely persevere with a larger sample of lower-achieving students.

There are also some specific limitations to Study 2. The repeated measures ANOVA conducted in the study only represented the small minority of students that took part in all three studies; as such, the inferences may have low power due to the reduction in sample size and because potentially useful information is being ignored (Newman, 2014). An attempt was made to rectify the dynamic sample's issues by conducting MLM with maximum likelihood estimation for missing data. However, even with MLM, the small sample limited the examination of more complex growth curve models, (e.g., exploring the combined effects of different motivational, emotional and learning approaches on student academic achievement in the same model). Thus, there are still many unanswered questions about how these factors work together and influence students learning. Future studies are therefore recommended to recruit a larger and more representative sample in order to evaluate the potential simultaneous influence of these variables. Nonetheless, full cohort data was gathered for the behavioural learning analytics data along with module grades providing more precise estimates.

Furthermore, despite the longitudinal design, only in a few cases did the dataset allow inferences about the causality between the constructs, where reverse or reciprocal links were also possible. The self-reported data at T1 and T2 were measured before students received their grades for the first and second year, respectively; thus, some suggestive causal relationships for academic achievement can be made. However, bi-directional relationships are also possible, to infer, with previous grades influencing emotions. Future research should consider experimental studies to evaluate causal relationships. The self-reported results could also have been contaminated by response biases or common methods variance. However, as objective measures of academic achievement and behavioural variables were included, these problems were less serious for these outcome variables.

For the behavioural data, some possible causal relationships with academic achievement could be established by utilising cross-lagged models, although experimental manipulation, which was not included in the present study, would have further strengthened causality assumptions. Furthermore, although Study 2 attempted to combine self-reported emotion data and observational behavioural data, the small sample size of the self-reported surveys made it difficult to examine their combined influence. Therefore, these results were only based on correlational research, with small *r* values and several non-significant correlations. Further work is required to establish the viability of these relationships and to understand better the direction of effects and any potential mediating effects between these factors.

There are also some additional promising areas of future research arising from these findings. Firstly, as both emotions and online learning behaviour emerged as the clearest correlates of learning, these aspects could be combined further. For example, future research could consider incorporating behavioural indicators of emotions such as facial expressions, heart rate monitoring and eye-tracking to get more ecologically valid measures of emotions and further our understanding of the interaction of affective experiences, behavioural engagement, and academic outcomes over time. There are also other forms of learning engagement that were left unobserved and could confound these results, and as such future studies would benefit from investigating a wider variety of sources, combining not just VLE usage and attendance data but also students' use of support services and learning networks such as friends and parents, as well as the amount of studying done "offline" outside of the classroom.

Another possible area for future research relates to the typologies in Study 3. As the participants in this study had relatively high academic achievement, the learning experiences of students from lower academic students were missing. Thus, more qualitative research needs to be conducted to capture students' learning journey and experiences with low academic achievement and those who dropped out of their studies. However, as similar groupings were found in subsequent cluster analyses, a possible area of future research would be to see whether these groups can be found with students in other courses or whether these are specific to the research methods modules. It would also be interesting to see how these typologies/ clusters develop throughout the whole degree and see which groups succeed best in the long run, comparing overall degree and dissertation marks.

7.6 Educational implications

This PhD thesis has strong potential for application in higher education practice. The findings highlight that the influence of students' emotions, motivation, learning approaches, and behavioural engagement are connected and exist from the early stages of their research methods journey.

The research has identified that emotions are key to learning and that the distinction between activating and deactivating emotions is particularly important. As such, these results reinforce the premise that research of students' emotions should develop beyond only exploring the influence of anxiety and towards including a broader range of emotions experienced in academic settings. More specifically, the findings show that deactivating negative emotions are especially crucial as they are associated with the adoption of more passive learning strategies, such as the surface approach, and with students being less intrinsically motivated to participate and be active in their learning. The behavioural data also support this connection with "active learning", with online active learning tools associated with more positive emotion and academic achievement. VLEs also offer innovative ways to implement these active learning tools and monitor students‘ activity in general. Therefore, there would be value in designing interventions and courses especially directed towards decreasing students' deactivating negative emotions and increasing students' active learning.

Firstly, given that deactivating negative emotions are relatively stable across students' research methods journey, it is worthwhile to encourage students to actively cope with and reduce these feelings of hopelessness and boredom, especially as boring and difficult activities are not always avoidable. One way of doing this would be for students to first identify the cause of these feelings. For example, as mentioned, students' feelings of boredom can be related to an un-stimulating or overstimulating learning environment, whereas hopelessness can stem from low self-efficacy beliefs and expectations of failure. By recognising the causes of their negative feelings, students can attempt to combat them, for example, through adaptive coping strategies (Tze et al., 2014), which refer to cognitive and behavioural efforts to manage stressful conditions or associated emotional distress. Previous studies have shown that a way to cope with boredom would be to look for positive 'aspects 'of being bored, such as considering it an opportunity for reflection (Vodanovich & Watt, 2016) and to develop new skills (Nett et al., 2010; Tze et al., 2016). Students could try to change their perceptions of the task and think of different ways to make studying research methods more fun and interesting, leading to more active participation.

Another way for students to combat these negative feelings could be via volitional self-efficacy enhancement strategies (Pintrich, 2000) and the implementation of techniques that reduce tension when students are faced with obstacles during the learning process. For example, students could be encouraged to think about their strengths and capabilities and think to themselves, "I can do this" when faced with difficult tasks. Self-efficacy enhancement strategies like this have been linked with higher levels of perceived control and value (Buric & Soric, 2012), which could minimise feelings of boredom and hopelessness (Asikainen et al., 2017). Therefore, students should be taught how to control and cope with their feelings in various learning environments, such as research methods.

However, to consider that students' research methods performance could be improved by simply changing students' thinking is overly simplistic, especially as students themselves do not always recognise their own emotions (Kahu et al., 2018; Asikainen et al., 2017). The overall learning environment also plays a major part in shaping students learning and engagement. The bigger question that needs to be asked is what educators can do to design learning environments and pedagogical practices that are more engaging for students.

Firstly, research methods educators should be made aware of the dangers of boredom and hopelessness so that they can design courses and provide a learning environment that minimises these deactivating negative emotions from the start. Appraisal theories like the control-value theory suggest that educators can alter students' feelings by targeting the appraisals that underpin them. Cognitive appraisals are likely to be influenced by learning experiences that do not foster students' sense of autonomy (Pekrun, 2006). More specifically, students may perceive that they do not have control over their learning in a learning environment with few options and choices. A way to combat these feelings would be to design courses where students have more choices regarding the learning activities. For example, a possible implementation could be that students are provided with more flexible assignments with different topics and formats, which could better match task demands and individual competencies to strengthen achievement-related control. However, this could be both time-consuming and complex to implement for educators.

As such, it might instead be more useful for teachers to support autonomy and students' feelings of control by promoting students' self-regulation of learning tasks (Nett et al., 2011). Teachers could emphasise the learning process instead of achievement outcomes, encouraging students' active participation in classes and online and identifying the value of learning research methods, as specified by the self-determination theory (Deci & Ryan, 2012). Teachers should support students in being reflexive about their learning achievement and to see their knowledge as 'works in progress', rather than finite entities (Christie et al., 2016), as the findings of this thesis indicate that students seem to be able to adapt and develop their way of learning. In particular, there needs to be encouragement to challenge first their own negative preconceptions about themselves and secondly their initial preconceptions of research methods as boring and difficult.

As the qualitative findings of the current thesis and previous research (Ball & Pelco, 2006; Braguglia & Jackson, 2008) indicates that many psychology students do not see the relevance of research methods for their degree and career, a possible way to increase students' value and interest in research methods would be to emphasise the transferable and career-specific skills gained from these modules. A recommended way of doing this could be by inviting psychology alumni working in well-paid and interesting jobs to come to talk to the students about how they are employing research methods in their careers. Research methods courses could also be re-designed to help students see the connections with other courses and possible career paths. For example, the inclusion of more active learning with practical and real-world examples of designs and datasets has been suggested to increase students' engagement (Pan & Tang, 2004; Neumann et al., 2013). By encouraging students to understand research holistically and see its importance in the real world, students might become more actively engaged with the course materials and make further efforts to comprehend what is being taught.

Furthermore, since the overall findings of this thesis indicate that it does not matter too much whether students are intrinsically or extrinsically motivated, by linking research methods to prospective careers and showing their usefulness to other courses, students' overall motivation might also be strengthened. Similarly, teachers should also be mindful of different study strategies, with the findings from Study 3 indicating that both those who seek to understand and those who are more practical and prefer to follow guidelines progress successfully in their learning. As such, research methods educators should try to cater for both. Possible ways of introducing more practical and real-world examples are through problem-based and active learning. Previous research has shown successful interventions with both types of teaching interventions in a research method setting (e.g., Allen, 2016; Carlisle & Ibbotson 2005; Wiggins & Burns, 2009).

Conversely, perhaps the most direct and simplest way for research methods educators to improve students' learning is by utilising VLEs more. The present research provides evidence supporting the usefulness of VLE activities and tools in the learning of research methods, with VLEs also providing innovative ways for educators to monitor students' behaviour and activities. VLEs could help educators make research methods more engaging for students by implementing more active learning tools such as online self-tests (Davies, 2020; Tempelaar et al., 2015a). Furthermore, by providing students with flexible access to learning materials and lecture recording, student sense of autonomy can be strengthened by allowing them to take control of their learning, by deciding both where and when they study, with learning analytics helping students to make more informed choices about where to concentrate their efforts, via instant feedback. Indeed, one of the main ways VLEs can help students with their learning is by giving them a way to test their knowledge and gain feedback on their learning progress. Research has clearly shown that feedback promotes learning and achievement, with feedback being one of the most powerful factors in improving learning experiences (Wisnieski et al., 2020).

As such, the use of more active learning tools such as online tests could also address some of the potential challenges that students encounter when studying research methods, given that previous research has indicated that students' anxiety can be reduced by formative assessments (Cassady & Gridley, 2005), and that feedback is associated with both control and value appraisals which in turn influence students' hopelessness and boredom (Pekrun, 2006). Where traditional feedback suffers from being time-consuming for lecturer and is difficult to implement if there are too many students in the class, learning analytics-based feedback can be automated, taking the burden off the lecturers. Learning analytics can also offer instantaneous and more actionable feedback than normal assessments, offering students the opportunity to take tests repeatedly.

Furthermore, Kennedy et al. (2015) and Wood & Henderson (2010) pointed out that teachers must also be mindful of the design of VLE environments with learning outcomes and assessment criteria well thought out in advance to encourage usage of VLEs. Students are more likely to use tools if they are perceived as useful and are related to their assignments. Thus, research methods modules could also benefit from greater use of the range of VLE tools available. As the findings indicate that especially "active" learning is helpful and favoured by students, learning instructors could implement more opportunities for students to participate in learning activities outside the classroom. For example, previous research has shown that online discussion boards can be useful tools for improving collaboration and academic achievement (Lee & Rofe, 2016; Macfadyen & Dawson, 2010). Instructors can utilise online discussion boards to extend participation opportunities to students who are more withdrawn in the classrooms, with students getting the opportunity for more guidance from their peers and lecturers in a less intimidating way, and thus be more active in their learning. This could address some of the challenges students experienced when working on unfamiliar topics and assignments, such as the research report (Study 1) and qualitative research (Study 3). Past research has also shown that online settings may encourage more in-depth discussion and increase learning quality (Smith & Hardaker, 2000).

However, it is not enough to implement more VLE tools into the research methods curriculum; students need to also be made aware of the usefulness of these tools for their learning. For example, previous work by Cassidy (2016) demonstrated increased satisfaction with an undergraduate psychology research methods module after the implementation of VLEs, with the results suggesting improved communication with students and increased variety of teaching and learning methods, increased enjoyment, interest, and confidence building. Psychology educators should design their research methods modules with this in mind, promoting VLEs more widely and encouraging students to make use of all the VLE material and tools available to them.

It is also clear from this thesis that technology alone is not the only answer. Although VLE activity explained more of the variance in grades, attendance still emerged as an important predictor, and as such, VLEs should be seen as an adjunct to classes and not a replacement. Nevertheless, these findings reinforce the point that if students miss lectures or seminars, they can also catch up online – providing more flexibility and options for students with other responsibilities outside of the university. These findings are also encouraging for universities world-wide which have had to switch their teaching either fully or partly online due to the COVID-19 pandemic.

7.7 Conclusion

The objective of this thesis was to explore students' learning of research methods by exploring the role of affective, behavioural, and cognitive variables in students' learning journey and their effect on learning outcomes. The main findings of this research have demonstrated that emotions are key to learning, with deactivating negative emotions (boredom and hopelessness) appearing especially detrimental to students' learning throughout their research methods journey. These findings expand current research by highlighting the role of these underexplored emotions and exploring the pattern of change in students' academic achievement and emotions longitudinally across two academic years. The thesis supports the application of the control-value theory of achievement emotions, with the findings demonstrating relationships between motivation, self-regulation, self-efficacy, learning approaches, emotions and academic achievement in a research-methods setting. These results offer further insight into the components that make up the learning experience for students and draws awareness to the need to consider the full range of these elements when designing learning environments for research methods courses.

A second key and novel finding of this thesis showed that VLE activity and tools are useful predictors of academic achievement in research methods modules at a face-to-face dominant university. Thereby, these results also extend earlier research by establishing the possible causal influence of VLE activity on students' academic achievement across two academic years. The findings also suggest that self-reported emotional data can offer some insight into evaluating the effectiveness of these, with active learning tools emerging as particularly favourable by students. Recent trends suggest that online learning will continue to be an important part of higher education, with the challenges posed by the COVID-19 pandemic accelerating the rise in technology-mediated learning, and institutions increasingly relying on VLEs. As such, this study provides timely and important suggestions for the design of VLEs and the curriculum in general. The usefulness of VLEs as a learning tool has been highlighted with early measures of online engagement, predictive of both future behaviour and future outcomes. The present results suggest that online engagement is a stronger predictor for academic success than class attendance in research methods modules, offering an optimistic outlook for the capacity of higher education to adapt to the challenges of pandemics.

Appendices

Chapter 4 Appendices:

Appendix 4.1: University of Westminster Ethics Committee Approval Letter for Study 1

4.1.1 Quantitative Phase – Online Surveys

UNIVERSITY OF
FORWARD
THINKING
WESTMINSTER

Dear Rosa
I am writing to inform you that your application was considered by the Psychology Ethics Committee. The proposal was approved.
Yours,
Coral Dando
Psychology Ethics Committee
I am advised by the Committee to remind you of the following points:

Your responsibility to notify the Research Ethics Committee immediately of any information received by you, or of which you become aware, which would cast doubt upon, or alter, any information contained in the original application, or a later amendment, submitted to the Research Ethics Committee and/or which would raise questions about the safety and/or continued conduct of the research.

The need to comply with the Data Protection Act 1998.
The need to comply, throughout the conduct of the study, with good research practice standards.

The need to refer proposed amendments to the protocol to the Research Ethics Committee for further review and to obtain Research Ethics Committee approval thereto prior to implementation (except only in cases of emergency when the welfare of the subject is paramount).

The desirability of including full details of the consent form in an appendix to your research, and of addressing specifically ethical issues in your methodological discussion.

The requirement to furnish the Research Ethics Committee with details of the conclusion and outcome of the project, and to inform the Research Ethics Committee should the research be discontinued. The Committee would prefer a concise summary of the conclusion and outcome of the project, which would fit no more than one side of A4 paper, please.

4.1.2 Qualitative phased- Focus Groups

UNIVERSITY OF
FORWARD
THINKING
WESTMINSTER

Project title: Doctoral research project Application ID: ETH1819-0337
Date: 21 Nov 2018
Dear Rosa

I am writing to inform you that your application was considered by the Psychology Ethics Committee. The proposal was approved.
Yours,
Prof. Coral Dando

Psychology Ethics Committee

I am advised by the Committee to remind you of the following points:

Your responsibility to notify the Research Ethics Committee immediately of any information received by you, or of which you become aware, which would cast doubt upon, or alter, any information contained in the original application, or a later amendment, submitted to the Research Ethics Committee and/or which would raise questions about the safety and/or continued conduct of the research.

The need to comply with the Data Protection Act 2018 and General Data Protection Regulation (GDPR) 2018.
The need to comply, throughout the conduct of the study, with good research practice standards.

The need to refer proposed amendments to the protocol to the Research Ethics Committee for further review and to obtain Research Ethics Committee approval thereto prior to implementation (except only in cases of emergency when the welfare of the subject is paramount).

The desirability of including full details of the consent form in an appendix to your research, and of addressing specifically ethical issues in your methodological discussion.

The requirement to furnish the Research Ethics Committee with details of the conclusion and outcome of the project, and to inform the Research Ethics Committee should the research be discontinued. The Committee would prefer a concise summary of the conclusion and outcome of the project, which would fit no more than one side of A4 paper, please.

Appendix 4.2: Study 1-Survey 1: Information sheet, Consent form, Full Survey and Debrief sheet

4.2.1 Information sheet & Consent form

Students' attitudes to Research Methods in Psychology

You are being invited to take part in study which is concerned with students' experiences and attitudes towards research methods. The study is conducted by Rosa Leino, as a part of my PhD project at Westminster University supervised by Dr Anna Doering, Dr Mark Gardner and Dr Tina Cartwright.

You will be asked to complete a short survey with some questions about your demographics, as well as some open-ended questions regarding your attitudes and previous experiences of research methods in psychology. The survey should take around 10 minutes to complete. The aim of this research is to get a better understanding and insight of first year psychology students' experiences, feelings and initial attitudes towards research methods. This study will contribute to a larger PhD project, looking at psychology students' learning in research methods modules.

As a part of the PhD project, you might also be invited to take part in subsequent research and the investigator will need to link your responses. To do this, you will create your own unique code. This will not allow the investigators to determine your identity. It is only to facilitate linking your responses.

Please note:

- **Participation is entirely voluntary.**
- **You have the right to withdraw at any time without giving a reason.**
- **You have the right to ask for your data to be withdrawn as long as this is practical, and for personal information to be destroyed.**
- **You do not have to answer particular questions if you do not wish to.**
- **Your privacy will be assured by coded gathering and analysis of the data.**
- **The data will only be available to members of the research team, and not be transmitted to a third party. No identifiable data will be published.**
- **If you wish you can receive information on the results of the research. The researcher can be contacted by emailing Rosa.leino@my.westminster.ac.uk**

4.2.2 Survey 1 Questions:

Please create a unique code by combining your month of birth, the last two letters of your name and the two first letters of your mother's name. Your code will be 6 characters long.

For example if you name is James, and you were born in January and your mother's name is Kate. Your unique code would be: 01ESKA

UNIQUE CODE: ______________

Age: _______________

Gender:

☐ Male ☐ Female ☐ Other

What is your highest qualification of education that you currently own to date?

A/AS level ☐

International Baccalaureate (IB) Diploma ☐

BTEC ☐

Higher education (HE) access course ☐

Foundation degree ☐

Previous bachelor's degree ☐

Mature student admitted on basis of previous experience and/or admissions test ☐

Other qualification ☐

What is your ethnic group?
Choose one option that best describes your ethnic group or background

White
English / Welsh / Scottish / Northern Irish / British ☐
Irish ☐
Gypsy or Irish Traveller ☐
Any other White background, please describe ☐

Mixed / Multiple ethnic groups
White and Black Caribbean ☐
White and Black African ☐
White and Asian ☐
Any other Mixed / Multiple ethnic background, please describe ☐

Asian / Asian British
Indian ☐
Pakistani ☐☐
Bangladeshi ☐
Chinese ☐
Any other Asian background, please describe ☐

Black / African / Caribbean / Black British

African ☐
Caribbean ☐

Are you an International, EU or home student?

Home ☐
EU ☐
International ☐

Please select the option that best describes your household's Chief income earner's occupation.

Higher managerial, administrative or professional ☐
Intermediate managerial, administrative or professional ☐
Supervisory or clerical and junior managerial, administrative or professional ☐
Skilled manual workers ☐
Semi-skilled and unskilled manual workers ☐
Other ☐

What is the highest qualification obtained by your Mother?

GCSE ☐
High School Graduate/A-levels/BTEC National Diploma ☐
First Degree ☐
Master's Degree or other postgraduate degree ☐
Doctorate ☐
N/A ☐

What is the highest qualification obtained by your Father?
GCSE ☐
High School Graduate/Alevels/BTEC National Diploma ☐
First Degree ☐
Master's Degree or other postgraduate degree ☐
Doctorate ☐
N/A ☐

Do you have any previous experience or knowledge of research methods? If so, in what capacity:

What thoughts come to mind when you think about the term "Research Methods"?

What feelings come to mind when you hear the term “Research Methods”?

Compared to other subjects on your course, how difficult do you think this module will be? Please indicate on the scale below:

Very Easy	Easy	The Same	Difficult	Very difficult
1	2	3	4	5

Why do you think that? Please expand on your answer:

4.2.3 Debrief for Survey 1

Thank you for your participation!

The aim of this study is to get a deeper insight and understanding of psychology students' attitudes and experiences of research methods. This survey is a part of a larger PhD project, looking at learning in research methods modules and the challenges that psychology students' may face.

These survey findings will both contribute to the overall PhD project, as well influence subsequent measurements to be used in the project. You might also be invited to take part in these subsequent studies but are not required to do so. Your participation is entirely voluntary.

If you have any questions or concerns regarding this survey or about the project, please contact me at Rosa.Leino@my.westminster.ac.uk

Thank you again!

Appendix 4.3: Study 1- Survey 2: Information sheet, Consent form, Full Survey and Debrief sheet

4.3.1 Information sheet & Consent Form

Students' attitudes to Research Methods in Psychology- Part 2

You are being invited to take part in a study which is concerned with students' experiences and attitudes towards research methods. The study is conducted by Rosa Leino, as a part of my PhD project at Westminster University supervised by Dr Anna Doering, Dr Mark Gardner and Dr Tina Cartwright.

In this second part of the study, you will once again be asked to complete a short survey with some questions about your demographics, as well as some open ended questions regarding your attitudes and previous experiences of research methods in psychology. The survey should take around 10 minutes to complete. The aim of this research is to get a better understanding and insight of first year psychology students' experiences, feelings and initial attitudes towards research methods. This study will contribute to a larger PhD project, looking at psychology students' learning in research methods modules.

In order to link your previous survey responses, you will be asked to create the same unique code you created in the last survey. This will not allow the investigators to determine your identity. It is only to facilitate linking your responses.

Please note:

- **Participation is entirely voluntary.**
- **You have the right to withdraw at any time without giving a reason.**
- **You have the right to ask for your data to be withdrawn as long as this is practical, and for personal information to be destroyed.**
- **You do not have to answer particular questions if you do not wish to.**
- **Your privacy will be assured by coded gathering and analysis of the data.**
- **The data will only be available to members of the research team, and not be transmitted to a third party. No identifiable data will be published.**
- **If you wish you can receive information on the results of the research. The researcher can be contacted by emailing Rosa.leino@my.westminster.ac.uk**

4.3.2 Survey 2 Questions

Please create a unique code by combining your month of birth, the last two letters of your name and the two first letters of your mother's name. Your code will be 6 characters long.

For example if you name is James, and you were born in January and your mother's name is Kate. Your unique code would be: 01ESKA

UNIQUE CODE: ______________

Age: ______________

Gender:

Male ☐ **Female** ☐ **Other** ☐

What is your ethnic group?
Choose one option that best describes your ethnic group or background

White
English / Welsh / Scottish / Northern Irish / British ☐
Irish ☐
Gypsy or Irish Traveller ☐
Any other White background, please describe ☐

Mixed / Multiple ethnic groups
White and Black Caribbean ☐
White and Black African ☐
White and Asian ☐
Any other Mixed / Multiple ethnic background, please describe ☐

Asian / Asian British
Indian ☐
Pakistani ☐
Bangladeshi ☐
Chinese ☐
Any other Asian background, please describe ☐

Black / African / Caribbean / Black British
African ☐
Caribbean ☐
Any other Black / African / Caribbean background, please describe ☐

Other ethnic group
Arab ☐
Any other ethnic group, please describe

What thoughts come to mind when you think about the term "Research Methods"?

What feelings come to mind when you hear the term "Research Methods"?

Compared to other subjects on your course, how difficult do you think this module has been? Please indicate on the scale below:

Very Easy	Easy	The Same	Difficult	Very difficult
1	2	3	4	5

Why do you think that? Please expand on your answer:

Thank you for participation. If you have any questions, please email:
Rosa.leino@my.westminster.ac.uk

4.3.3 Debrief for Survey 2

Thank you for your participation!

The aim of this study is to get a deeper insight and understanding of psychology students' attitudes and experiences of research methods. This survey is a part of a larger PhD project, looking at learning in research methods modules and the challenges that psychology students' may face.

These survey findings will both contribute to the overall PhD project, as well influence subsequent measurements to be used in the project. You might also be invited to take part in these subsequent studies but are not required to do so. Your participation is entirely voluntary.

If you have any questions or concerns regarding this survey or about the project, please contact me at Rosa.Leino@my.westminster.ac.uk
Thank you again!

Appendix 4.4: Study 1 Coding Frameworks

4.4.1 Coding Matrix for Reason of difficulty rating

Reason for difficulty rating	**Coding rule:**	**Examples:**
Requires maths/Numbers	Any mentioning of mathematics – including numbers and calculations	"it includes working with numbers" "because it involves maths in which I am weak"
Previous RM knowledge	Any mention of research methods teaching, or knowledge from before	"I have previous experience and enjoy it" "I have experience with both research methods and other modules."
More effort	If the student mentioned that more effort was required from them in anyway	"I need to push more from me to learn more from this subject" "This module requires a lot more effort "
Involves Statistics	Any mention of statistic	"statistics seem difficult" "it requires a lot of statistical work and knowledge"
Heard from others	If the student had heard from others, such as friends or psychology graduates that RM was difficult.	"Because people have told me it is." "I heard from psychology graduates that this topic is tedious and a bit confusing."
New content and programs	Any mention of learning a completely new subject or learning new programs	"I have never studied this before" "I have to understand how certain programs work "
Straightforward	If the module was described or implied as straightforward , black or white , right or wrong-	"Research methods is very black and white " "If you know what you are doing and what is required of you at each turn you can't go wrong."
Not enough Info to say	If the student said it was too early to now, or they did not have enough context to know	"it's early to decide if it is easier or harder." "Not enough knowledge regarding this course to determine whether or not it will be difficult or easy"
Other	Any other answers that could not fit into the codes	"I think that there are certain areas in each module that will be easy and others that will be hard" " I don't see any difference. it has a different aim compared to other subjects " "My research methods are not great"

4.4.2 Coding Matrix for Students thoughts

Students' thoughts	Coding rule:	Examples:
Statistics	Any mention of Statistic- including statistical analysis	"statistical testing" I think about statistics and numbers"
Mathematics	Any mentioning of mathematics – including numbers and calculations	"Mathematics and analysis " "Maths and research doing."
Experiments	Any mention of the word experiment	"Surveys, questionnaires, experiments, etc." "the methods used to conduct research experiments interviews reports"
Conducting Research	Any mention of conducting/doing/ carrying out research/studies	"conducting psychological research to prove a theory/hypothesis" "Different methods which can be used to carry out your research"
Ethics	Any mention of ethics in anyway, such as ethical considerations or ethics board	"Ethics to be honest I think of the acronym DIP" "There is a guideline that should be followed such as ethics and confidentiality making participants aware of their rights."
Data Collection	Any mention of collection of data/	"Data collection followed by interpretation." "Learning how to collect researches and understand the collected data "
Different Methods	Mentioning of using different methods, or listing different methods use in research	"Methods in which psychologists gather data " "The different methods that are used in scientific research "
Data Analysis	Mention or implying data analysis/ analysing data – not including statistical analysis	"Along with how to analyse results" "They are used to measure a certain variable and either show a relationship or the validity/result of an assessment"
Report	Any mention of the word report	"Consequently writing a report on all the findings." "research report"
Obtaining Information	Any mention of obtaining/gathering/gaining information/knowledge	"The types of gathering information" "Collecting information about specific psychological traits."
Types of Data	Explicitly mentioning different types of data such as qual and quant	"I think about the different types of data" "The type of data such as qualitative and quantitative."
Unsure/no Thoughts	If the students especially said they had no thoughts or where not sure	Did not have any thoughts, I have no idea

Other	Includes any other thoughts that could fit into these codes	"Kinda boring, but useful to know." "Concise ,Precise and Accurate ways of understanding a topic by delving into the deeper research"

4.4.3 Coding Matrix for Emotions

Feelings:	Category
anxiety, fear, curiosity	mix
when the term research methods are heard, i feel like the module itself would be quite hard and perhaps something that would be more difficult to grasp at first.	neg
Complicated Difficult	neg
it sounds interesting	pos
A feeling of curiosity and interest to learn.	pos
Fear of computing large amount of data.	neg
anxious	neg
anxious as there is a higher risk that things can go wrong and then consequently ruin the rest of the experiment	neg
No feelings	no feelings
sounds as a "dry" topic. a bit boring	neg
As it is something new for me, I am slightly scared but mostly, I am excited to learn new things about this.	mix
stresses me out	neg
a small amount of anxiety comes to mind.	no feelings
Mixed feelings as it is a difficult subject but once you practice the content it becomes easier to understand.	mix
Apprehensive	neg
Excited, stress?	mix
I don't have any particular feelings toward any aspect of science. This is the reason I wish to enter into a career in science, as it does not require emotions or feelings to be considered salient.	no feelings
Personally, I feel both good and bad feelings for Research Methods. The subject has also been something I have perceived as quite boring, especially compared to other topics in psychology, however I also find it quite interesting in a way because I enjoy evaluating studies and assessing whether they used the correct research methods.	mix
hard	neg
Overwhelming sensation that you are about to go through something that involves a lot of brain activity.	neg
Excited	pos
Worry and boring	neg
Interesting	pos
Feelings of insecurity	neg
I feel challenged when it comes to research methods, it makes me feel like it will be tricky and have difficult concepts to grasp.	neg

i get intimidated as i am not too confident in my statistical skills, there's less theory based knowledge in this area compared to other fields in psychology that i enjoy. however i also understand the importance of research methods and how necessary it is in the psychology, therefore i try to	neg
A bit of intimidation, since I've come to know that there is statistics involved and that is not my strength, But after reading the book and attending the first lecture that has been replaced with excitement.	mix
Difficult with involvement of maths, something that scares me. Feel as though as I progress further I will struggle.	neg
I have mixed feelings as it seems quite difficult however, with practice become easier once understood. I also know that it is crucial to research.	mix
NA	no feelings
Quite negative because it reminds me of maths and I have never liked maths	neg
Long, boring yet beneficial for the future	neg
Tired	neg
Personally I feel research methods is a little boring, but this is based on my A-level knoweldge.	neg
When I hear research methods, I often feel relaxed as I enjoy the maths involved and learning how to complete different statistical tests.	pos
Sometimes I enjoy it as I find it to be quite simple and generally enjoyable, however, other times I feel it can drag out, plus I'm more interested in applying the findings of studies rather than conducting the research to find it, so at times i tend to find research methods a bit laborious.	mix
I feel slightly anxious because I am not confident in my maths abilities. However I also feel excitement as I think it will be a challenge for me to prove to myself that I can achieve a high grade.	mix
It is exciting , in the sense that we have the ability to understand anything we would like to via scientific research and literature writing skills.	pos
excited, nervous, willing to challenge myself, interesting.	mix
I am relieved as I am familiar with the subject and so will reiterate and expand on my knowledge although i am slightly apprehensive as i am aware it can be really boring.	mix
Hangry.	neg
joy	pos
I'm not really a big fan	neg
The boring mathematical part.	neg
Sometimes feel unmotivated to learn about the topic as it is quite boring and not engaging in certain areas for me but and most of the times feel self motivated as it is a very important topic that is essential in psychology and part of my course and I intend to do well.	mix
My initial feelings are that it is boring, daunting and complicated. I also felt as though it would invold surveys, which i am not a fan of.	neg
None	no feelings
Feelings of interest and excitement come to my mind. I am curious to learn about it.	pos

Mixed feelings. It can be interesting to interpret data and see what it means, on the other hand statistics are really not my cup of tea.	mix
I feel anxious and stressed because I struggle with maths and statistics A LOT!	neg
Fear	neg
no relevant feelings	no feelings
Tedious subject but necessary.	neg
Lazyness	neg
Anxiety	neg
boring statistical and lab work	neg
long boring effort too much information	neg
Stressed, anxious	neg
I don't enjoy it	neg
Interest	pos
No feelings	no feelings
Disgust, boredom , nervous, tired	neg
I feel a bit anxious as I don't know what to expect and what is expected of me.	neg
Anxious about the exams that will follow. Confusion about the wide range of data that have to deal with.	neg
Research methods makes me feel stressed, and anxious. Research methods also makes me feel uneasy.	neg
Objectivity. Righteousness. Morality. Feeling of safety, trust, professionalism.	pos
That it is quite hard to understand at first but quite logical when you do and know how to do it.	mix
It is a difficult topic because I find it complex and difficult to understand. There are so many things to bare in mind.	neg
It sounds straightforward but at the same time very extensive, involving long hours of work an precision.	mix
potentially challenging	neg
I feel like research methods are useful to know, but at the same time there is a lot of procedures that needs to be followed and sometimes it becomes boring.	neg
No feelings	no feelings
Stress, not understanding	neg
Excited Nervous	pos
Curiousity	pos
interesting, depth of information	pos
Worry, anxiety, slight stress but also motivated to succeed.	mix
A bit tentative but I'm sure it'll be fine	neg
complexity	neg
Mostly curiosity to learn new things or to further explorate the research.	pos
mundane time consuming	neg
A feeling of calmness	pos

I feel slight anxiety and stress as I know how difficult research Methods can be. Stress because I know that it will be a big workload and whether I will be able to grasp all the concepts in the level that is necessary.	neg
The topic itself is interesting and not too difficult however I do feel it can be a little boring at times.	mixed
I feel interested and challenged.	pos
I feel like it will be more difficult than other topics, as I know it is maths based and a lot of calculations will be need to be done. Therefore, I feel anxious/nervous as I don't know how well I will do or if it will be a lot more difficult than A-levels. I felt stressed and anxious before it started.	neg
None.	no feelings
Fear	neg
It sounds really interesting but difficult. Excitement and anxiety at the same time.	mixed

4.4.4 Coding Matrix for Expectations

Comments	Category
I expect to solve mathematical problems as well as write research articles,	other
my expectations are that the lecturers will go through the basics of research methods first and then gradually introduce us to the more complex parts of the module.	other
A lot of analysing and reports	other
I probably need to practice a lot	other
	none
nil	none
Experiencing what is like to conduct researches. proving hypothesis Improving my vocabulary with words that are appropriate to research methods.	knowledge gain
it will be a lot of work and confusing at times but should be able to complete it with an acceptable grade	Knowledge gain
Good grades, easy stuff	other
I expect this module to be quite straight forward, but I will probably won't get few things. But hoping that it will be interesting and useful for the future	Knowledge gain
I hope to learn how to use the SPSS program, how to write good research reports and to learn a lot about the methods of doing the research in general.	knowledge gain
that it is made understandable to us	other
I hope this module become more exciting and more interesting than the others from the 1 semester.	other
it will be challenging	other
My expectations include gaining further knowledge on the topic of research methods as it is an essential part of being a psychologist and applies to every sub-division of psychology.	Knowledge gain
My expectation of this module are that I will do well	other
Hopefully with practice, I will be able to understand the module in complete detail in order to answer questions for the upcoming exam.	Knowledge gain
	other

Not much like its just a course. I hope to gain greater understanding and know what I'm doing.	knowledge gain
To learn spss	knowledge gain
I hope to attain a comprehensive understanding of research methods as well as data collection and analysis methods.	knowledge gain
I expect to expand on the knowledge I already have about research methods but also understand how to actually conduct a study from start to finish as currently, I am only aware of different methods used and things like that.	knowledge gain
Hard	other
to understand SPSS and develop my ability to write professional reports.	Knowledge gain
to learn about research methods, be able to apply research methods to situations identify tests and experimental designs.	knowledge gain
Learn about researchs	knowledge gain
Do not have any expectations so far.	other
I expect to be challenged and learn	Knowledge gain
i expect to be challenged a lot in this module and needing to work and study harder than the other modules.	knowledge gain
i believe it will be challenging, however it will be different to the other modules we are currently taking, so it will be a nice break from the theory heavy fields we also have during the week.	other
I hope the module will teach me step by step how to conduct properly a research, as I wish to be a researcher in the future. I also hope that the module leaders will be open to resolve any ambiguities or question that might come up during the module.	knowledge gain
That it will be difficult, hopefully interesting. That I will struggle and will give me a lot of anxiety but that I will learn a lot.	knowledge gain
I expect that it will be difficult however, I believe that I will have a much broader understanding of research methods	Knowledge gain
stats	other
I expect to have to be precise in writing my reports and learn how to use the SPSS programme by focusing and seeking help when needed from my seminar leader, module leader and others specialised in this field	knowledge gain
to be able to gain more knowledge about research methods and understand how research can be developed using the knowledge learnt	knowledge gain
I hope to learn more about statistical analysis, as well as ways to improve upon scientific-style writing, as is used in lab reports.	knowledge gain
I'm expecting new experiences compared to Semester 1 as the coursework is vasly different and so I will have to be more prepared for this.	other
I expect to learn how to write a report and expand my knowledge of previous research methiods in more detail.	Knowledge gain
To learn about different research methods.	knowledge gain
I feel like I will enjoy the lectures as the information surrounding research methods is interesting and I would like to learn it, however in the seminars, we will be going through a research article and analysing all the different sections and i do not know if i will find that enjoyable as it can be quite boring and repetitive.	knowledge gain
I expect to feel confident enough to carry out a research on my own and to analyse the data collected. I expect to know how to work at lest on a basic level on SPSS.	other
I am expecting to have a high understanding on different research methods and also able to apply this to the rest of my research in life,.	knowledge gain

interpreting and inferring statistics. application of research methods to study's/research understanding what is needed to carry out a suitable research.	knowledge gain
I expect the module to be full of information, and to be slightly boring but the statistical aspect to it will be challenging but in a positive way where i can expand on my knowledge	knowledge gain
It should be fine.	other
i am expecting it to be ok	other
lots of practice of statistical data, understanding how research is conducted and the ethical guidelines and issues faced by researchers.	Knowledge gain
To learn and to understand clearly what all this about.	Knowledge gain
Fairly similar to other modules but slightly harder with complicated mathematics.	other
I expect to have a better understanding of very important aspect of psychology - methods by which we can study the findings.	other
To enhance my knowledge on the module and expect a broader understanding and explanation of it and how to apply research methods.	knowledge gain
I expect to do well, because I have done similar things in the past, with subjects such as history and maths. I expect that i will have difficulty with the maths and methods aspect as i am not use to being detailed and pointing out how i worked things out.	knowledge gain
It will be fine	other
I expect this module to be quite challenging but very useful for a career in Psychology.	other
I think it might be more fun than I think right now. I hope tutors will give us enough support.	other
I expect it to be very challenging for me	other
I'm expecting the module to be very tensed	other
to learn research techniques.	Knowledge gain
I don't expect it to be exciting at all and most likely will be my least favourite module this year. I think it won't be too difficult but I might get confused if the database thing (SS??)that I heard every psych student learns to hate appears in this module.	Other
expecting to be taught about research methods - prepping for second and third year	Knowledge gain
Hard	other
we will conduct a research task	other
none	other
I expect to learn about the strengths and weaknesses of different methods and how we can use different methods for our own research in our last year.	Knowledge gain
I hope we will focus on mathematical analysis of data and I expect to learn the underling structure of how a study research can be framed and analysed in order to produce an understandable paper.	knowledge gain
it will be interesting but difficult	other
I expect to gain a broader sense of knowledge concerning research methods and how to format and apply them to psychology and work placement.	other
I need to gain high level of expertise in research methodology to publish articles.	knowledge gain
To gain an understanding about how a research is conducted and the steps necessary to complete when doing a research or when critiquing a piece of research done previously.	knowledge gain
I expect this to be difficult however I do believe that I will be able to pass	other

I'm expecting to fully understand how do to research and what methods to use and how to interpret and use the collected data.	Knowledge gain
Through this module, I expect to learn how to use and analyse data as well as diagramms. Furthermore, the familiarization with the correlation coefficient is another expection. Finally, the discussion of any data and the improvement of computer use.	knowledge gain
I expect this model to be interesting. I also expect this module to help to enhance my mathematical skills.	knowledge gain
Lots of work. Lots of information to remember. Complicated formulas. Mathematics.	other
That it might be hard at first but when you get the hand of it it is going to become routine.	other
To learn how to use methods of research in order to be able to write/explain a study or write a report	Knowledge gain
learning more about how studies should be conducted and be doing it ourselves	knowledge gain
I expect it to be very structured and straightforward since it involves numerical evaluations.	other
learn how to write a report and evaluate it	Knowledge gain
To develop the great availability to do good researchs	knowledge gain
Boring	other
I expect to pass	other
A lot of practical work in how to carry out methods of research	other
To understand how research is conducted and how to successfully conduct my own research in the future.	Knowledge gain
Not sure	other
Hopefully to understand it by the end of it	Knowledge gain
being able to create and write a fluent research report	knowledge gain
I hope that it will prepare and equip me for using research methods for the rest of the degree. I hope that I will get the support I need if I am having any difficulties I expect it to be interesting and that it will teach me a grounding in research methods that I can develop on.	knowledge gain
To know lots of psychological research methods	knowledge gain
To learn about research methods	knowledge gain
To gain idea how to conduct a research and to be able to use it in future with full guidance of how to use and how it should be structured.	Knowledge gain
I expect this module to be easy	other
Gain wider knowledge relating to research methods	Knowledge gain
I am expecting to widen my knowledge in research methods	knowledge gain
I think it will be a good and informative module with a lot of interesting information about research methods but I do worry that it may get boring	other
I believe i will do good. I will try to do my best.	other
I will learn practical techniques as well as mathematical skills.	Knowledge gain
To obtain a good grade and learn.	knowledge gain
To pass.	other
To pass :D	other

Appendix 4.5: Participant Information Sheet, Consent Form and demographic survey

Focus Group: Psychology Student's Attitudes and Experiences of Research Methods in First Year of University

You are being invited to take part in a focus group discussion which is concerned with psychology students' experiences and attitudes of research methods in their first year of university. The study is conducted by Rosa Leino, as a part of my PhD project at Westminster University supervised by Dr Anna Doering, Dr Mark Gardner and Dr Tina Cartwright.

What is the purpose of the study?

The purpose of the study is to an insight into psychology students' experiences of Research Methods by focusing on your past expectations, feelings and learning strategies, as well as discussing any challenges you might have encountered during first year. The findings from this study will be used to complement my two previous surveys in order to explore whether students find research methods particularly difficult and the potential reasons why and to see if and how students' previous experiences and feelings influence their learning behavior. As research methods modules are a fundamental part in the psychology undergraduate degree and are the basis for several of the transferable skills in psychology, understanding the learning process of students is important in order to both enhance students' academic performance and learning satisfaction. This study is a part of my main PhD project which aims to combine these cognitive, affective and behavioral variables, in order to explore psychology students learning of research methods.

What will I be asked to do?

- Your involvement will be to participate in a focus group discussion with 4-5 other students in your year.
- The main topic of discussion will be of your experiences during the first year "Introduction to psychological Research Methods" module.
- The focus facilitated by a member of the research team and recorder using audio recorder.
- The discussion will last between 60-90 minutes.

What about confidentiality and data protection?
This research is being conducted in accordance with the University of Westminster Code of Ethical Conduct, and the BPS Code of ethics. These documents are available online:
https://www.bps.org.uk/news-and-policy/bps-code-ethics-and-conduct
https://www.westminster.ac.uk/research/research-framework/research-ethics

The audio recording will be stored securely on an encrypted and password protected hard drive/repository at the University of Westminster and will only be seen by the research team. Throughout the interviews you will only be referred to by your first name and your unique participant number. No identifying information will be revealed/asked for during the interview. The audio data will be securely transcribed and stored in compliance with the Data Protection Act 2018 and General Data Protection Regulations (GDPR) 2018. Once transcribed and the research is complete, the digital recording will be securely destroyed.

Any information you give during the focus group will be fully anonymised and combined with the views and experiences of other students who agree to participate. Throughout these processes your data will be labelled with your participation number only and your data will be added to a larger data set. You will not identifiable. The audio data will be transcribed by the researcher (Rosa Leino). Parts of the audio recording may be shared with the rest of the research team (Dr Anna Doering, Dr Mark Gardner and Dr Tina Cartwright), but will only be used for research purposes. The audio data will not be shared to anyone outside of the research team.

Your participation in this research is on an entirely voluntary basis, and you are able to withdraw without providing any reason, at any time up until the research has been published, or submitted in any form of a report (e.g., conference presentation, dissertation, etc.

NOTE: We will not store any personal identifying data, rather once you have participated, we will provide you with a document that provides our contact details, and your personal participation code/number. Should you wish to withdraw at any time (until publication) simply refer to this document and contact us so that we can remove your contribution.

We will not be able to give feedback on individual performance, but we can provide all participants with a summary of the overall findings if requested

---

Thank you!

If you have any questions please contact the researcher Rosa Leino, at Rosa.Leino@westminster.ac.uk or the supervisor Anna Doering at A.doering@westminster.ac.uk

Participants Number: _______________

Consent form:

In signing this consent form I am agreeing to the following, and that my participation has been explained to my satisfaction – please tick each box below, as appropriate:

- My participation in this research is on an entirely voluntary basis. ☐
- I am able to stop at any point during the process without having to provide an explanation. ☐
- Once I have taken part, I am still able to withdraw **my data** at any point until the research has been published/submitted as part of my research project, or has been anonymised. ☐
- I do not have to answer all questions asked, and I can decline to answer any questions as I see fit. ☐
- My data will be anonymised, and all identifying features will be removed so that my contribution will not be identifiable when reporting this research. ☐
- If I provide any personal identity data this will be treated confidentially and in accordance with the University of Westminster ethical guidelines and British Psychological Society code of human research ethics. It will be securely stored and managed in accordance with the General Data Protection Regulation 2018 and the Data Protection Act 2018. ☐
- The duty of confidentiality is **not absolute** and in exceptional circumstances this may be overridden by more compelling duties such as to protect individuals from harm. ☐
- My anonymised contribution to this research may be used for future research, and may undergo secondary analysis. Future research may be related or unrelated to the goals of this study. ☐

Participant Signature:

____

Date

____

Participant number: _______________

Age: ______________

Gender:

☐ **Male** ☐ **Female** ☐ **Other**

What is your ethnic group?
Choose one option that best describes your ethnic group or background

White

- ☐ English / Welsh / Scottish / Northern Irish / British
- ☐ Irish
- ☐ Gypsy or Irish Traveller
- ☐ Any other White background, please describe

Mixed / Multiple ethnic groups

- ☐ White and Black Caribbean
- ☐ White and Black African
- ☐ White and Asian
- ☐ Any other Mixed / Multiple ethnic background, please describe

Asian / Asian British

- ☐ Indian
- ☐ Pakistani
- ☐ Bangladeshi
- ☐ Chinese
- ☐ Any other Asian background, please describe

Black / African / Caribbean / Black British

- ☐ African
- ☐ Caribbean
- ☐ Any other Black / African / Caribbean background, please describe

Other ethnic group

- ☐ Arab
- ☐ Any other ethnic group, please describe

Are you an International, EU or home student?

- ☐ Home
- ☐ EU
- ☐ International

Appendix 4.6: Focus Group Interview Schedule

Thank you for agreeing to participate in a discussion about psychology students experiences of research methods at this university. This study is conducted as a part of PhD focusing on Psychology students learning of Research methods and the components involved. We are interested in the experiences and attitudes of students, not of particular individuals. I am going to ask you some questions about your experiences during your Research methods journey at this university, especially related to your first-year module "Introduction to Psychological research Methods. We would first like to know a bit more about your thoughts and feelings regarding research methods as well as about your previous experience of research methods and statistics. We would also like you to discuss about the importance of research methods for your academic/career goals and about your study strategies and habits. Please throughout the interview think back to your first year of university, focusing on the spring term when you were studying the module "Introduction to psychological Research Methods"

I hope these questions will stimulate a discussion among you, I will not be contributing to the discussion, but am here to moderate the session. You can ask me to repeat a question if needed, but other from that I will contribute as little as possible. I am also going to record the session, so please speak clearly and remember that the recorder will not pick up nonverbal actions just as nodding. Therefore try to voice everything, but also try not to interpret each other or speak over one other. Please do not hesitate to express your real opinions, as they are highly valued. Your opinions expressed will be treated in confidence among project staff and will only be used for the purpose of this research. Your identity will not be disclosed to anyone outside the research team. I will now check that the recorder is working and then we will start the session.

Could you please first just state your participant number?

Okay thank you, let's start then!

Thinking back to your first year…

Q1) Did you have any experiences of research methods or Statistics before this course?
(Prompt: statistics, mathematics a-levels or other equivalent**,** prompt: Did this lead to expectations/presumptions towards RM?)

Q2) How was your experience studying on the first year Research Methods module?
(Prompt: This is about your experience overall, think about the lecture/seminar/lab computer session as well as the coursework)

Q3)Can you tell me more about how you felt during this time? (Prompt: Feelings related to research methods or the module specifically, why do you think you felt this way?)

Q4) Did your experiences on the course differ from your expectations? (Prompt: How? easier, harder than expected, more or less maths, more fun/boring)

Q5) What sort of learning strategies/techniques did you use to learn in this module? (Prompt: memorising what to do, or trying to understand the reasons behind/ spend more time outside of lectures learning, exploring SPSS etc.) **Did this differ from how you normally go about studying?** (Prompt: spend more/less time studying that you normally would? (Used more help from books/internet, worked in groups etc.)

Q6) How would you compare the RM module to other modules on your course during first year? (Prompt: required more or less effort, why do you think that?**)**

Q7) How do you think research methods is important for your degree and career? (Prompt: Reasons for studying psychology, reasons beyond just getting a good degree mark**)**

Q8) What advice would you give to other students about to embark on studying RM?

Q9) Is there anything else you would like to add? (Prompt: Have we missed anything?

Appendix 4.7: Debrief for Study 1 focus groups

Focus Group: Psychology Student's Attitudes and Experiences of Research Methods in First Year of University

Thank you for your participation!

Your participation will help to give us more insight into psychology students' experiences and feelings towards research methods, as well as the kind of challenges students might face. These findings will contribute to my PhD project which aims to explore reasons for difficulties in learning of research methods, as well as the possible reasons behind these difficulties, by looking at cognitive, affective and behavioural factors.

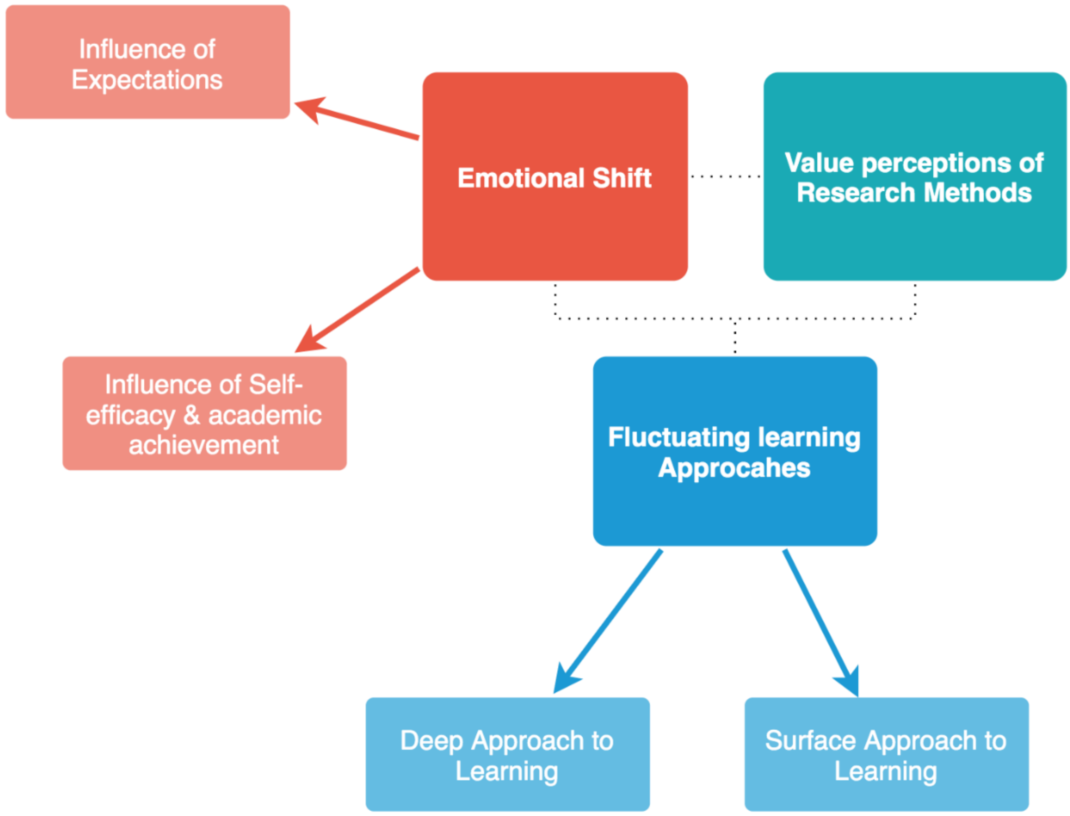
Most research conducted so far has focused on evaluating the outcomes of Research methods learning, with few studies addressing the *processes* underpinning learning (Earley, 2014). Individual differences in psychological processes, such as learning approach, motivation, self-regulation metacognition, and self-efficacy may play a significant role in the success of learning (Richardson, et al., 2012). Furthermore, previous research has mainly been focused on statistics and test anxiety (Macher, et al,. 2012), with a few empirical studies focusing on other emotional factors that could influence students' learning of research methods Emotions can, for instance, facilitate the use of different learning strategies and promote self-regulated learning, with positive emotions being positively associated with self-regulation, motivation and the use of deeper learning strategies among university students (Pekrun, et al., 2011). Significant behavioural predictors of learning performances, including time spent on lectures, the number of assignments submitted, and so forth have also been found (Henrie, et al., 2015), as well as positive correlations between attendance and academic achievement (Bevitt, et al,.2010).

The PhD project aims to combine these cognitive, affective and behavioural variables, in order to explore psychology students learning of research methods further.

If you have any further questions or concerns regarding this survey or about the project please contact me at Rosa.Leino@my.westminster.ac.uk

Thank you again!

Appendix 4.8: Thematic Map of Focus group themes



Appendix 4.9: Coding Matrix for the Focus group themes.

Themes	Sub-themes	Codes:	Example quotes
Emotional transition	Influence of Expectation	• Previous negative experience of RM • Use of Mathematics/numbers • Considered inheritably Dull/boring • Following rules –Not for everyone • Hate it • Apprehension & dislike • Shock • Stress & Anxiety • Negative and neutral emotions towards lectures • Barriers to enjoy it more	*"I liked it more than I was expecting to because I didn't know SPSS was going to be a thing and adding that in... The numbers kind of helped me quite a lot." P3.p134* *"I think SPSS made it more interesting and it gave it a new turn from just like reading and memorising…. It made it more interesting than what was expected." P3* *". So in that respective I was a bit apprehensive towards the RM module."* *I didn't really know what to expect and I was very like panicking and stressed because I was very bad at mathematics and I just passed….* *I just didn't know, I just didn't know we were going to have something like this. I mean I guess yeah I just didn't know we were going to use stats and tables and all that.*
	Influence of Self-efficacy/ Academic achievement	• Negative emotions towards research report • Liked more than expected • positive emotions towards qualitative research • Positive emotions toward SPSS and the practical/interactive parts • Enjoyment • Favourite subject • Overall module feelings positive • Positive mind set • Good foundation	*But I think it all changed after because I was really good at SPSS and we had like an in class test and I got a first and I was just like in chock that I did it* *"So I think at first my attitude was quite negative, but also I found that it was very easy to grasp"* *Yeah and with report I did awfully, and with the exam they were the best exams results I got. I enjoyed it overall by the end.* And I was good at spss but like writing the research report it's like… It literally made me throw up...yeah

Fluctuating learning approaches	**Sub-themes** Deep learning Surface learning	• Something clicking/barrier • Memorising/remembering • Understanding • Trouble integrating knowledge • Applying knowledge • unfamiliarity with and difficulty of concepts and content • Desire for concrete examples • Easier than other modules • Less independent thinking required • Less analysis • Less memorising • Too strict	*"You kind of just memorise things, there's not like I would say "waffing" around like in other modules."* *"And I understood the questions and I understood the answer whereas when I looked at past exam papers from other modules I was just like what….Whereas here it was just like give me the information and I was given it and I was getting good marks."* *. The open book one because it wasn't just about remembering things it was applying it to situations you were given.* *You didn't have to remember like who said that or remember any like theories on how it was developed. You just had to remember it, and compared to other modules it was much easier* *So I was taught the context while going to university, so attending lectures and seminars and then I just applied that knowledge to memorise,*
Value perceptions of research methods		• Importance for Degree • Important for grades • Important for Dissertation • Not understanding the use of RM • No value in itself • Not valuable for future • Useful for integration of information • Useful for understanding • Psychology more about mental health than research • Relevant if you want to go into research • Not relevant to career - Counselling - Clinical	*" I think similarly I kind of did not understand the use of it, or the reason why we are studying it"* *I would say that it is definitely important for our degree yeah because in every single semester we have to do it in some form or the other. Yes, it is important, it will be the most useful for our dissertation next year. Other than that, I don't think research methods is that valuable for me because I am not going to that direction…..* Because I want to get into clinical psychology. *I think I agree, important for the degree. But I think moving forward the only thing I can think of is maybe just having an understanding of erm like getting integration for everything. Or just like being able to understand reports, because sometimes you have to read reports. And also just having a different way to present an idea.* *I think a lot field would not actually require and I think similarly I would probably restrain from those that did require because it's just a lot of effort.*

Chapter 5 Appendices:

Appendix 5.1: Study 1-Survey 1: Information sheet, Consent form, Full Survey and Debrief sheet (Online Qualtrics Survey)

5.1.1 Participant Information sheet and consent form

Learning of Research Methods in Psychology: The Influence of Cognitive, Affective and Behavioral Components

You are being invited to take part in study which is concerned with students' experiences and attitudes towards research methods. The study is conducted by Rosa Leino, as a part of my PhD project at Westminster University supervised by Dr Anna Doering, Dr Mark Gardner and Dr Tina Cartwright.

What will I be asked to do?

- You will be asked to complete a short survey with questions about your demographics, as well as some questionnaires regarding your motivation, self-efficacy, self-regulation, learning approaches as well as academic emotions and statistics anxiety.
- The survey should take around 20 minutes to complete.

The aim of this study is to get a deeper insight and understanding of psychology students' learning of research methods and the challenges faced by students. As research methods modules are a fundamental part in the psychology undergraduate degree and are the basis for several of the transferable skills in psychology, understanding the learning process of students is important in order to both enhance students' academic performance and learning satisfaction.

As a part of the PhD project, you might also be invited to take part in subsequent research and the investigator will need to link your responses. To do this, you will create your own unique code. This will not allow the investigators to determine your identity. It is only to facilitate linking your responses.

This research is being conducted in accordance with the University Of Westminster Code Of Ethical Conduct, and the BPS Code of ethics. These documents are available online:
https://www.bps.org.uk/news-and-policy/bps-code-ethics-and-conduct
https://www.westminster.ac.uk/research/research-framework/research-ethics

Please note:

- Participation is entirely voluntary.
- You have the right to withdraw at any time without giving a reason.
- You have the right to ask for your data to be withdrawn as long as this is practical, and for personal information to be destroyed.
- You do not have to answer particular questions if you do not wish to.
- Your privacy will be assured by coded gathering and analysis of the data.
- No identifiable data will be published.

- If you wish you can receive information on the results of the research. The researcher can be contacted by emailing Rosa.leino@my.westminster.ac.uk

In signing this consent form I am agreeing to the following, and that my participation has been explained to my satisfaction - please tick each box below, as appropriate::

- My participation in this research is on an entirely voluntary basis.
- I am able to stop at any point during the process without having to provide an explanation.
- Once I have taken part, I am still able to withdraw **my data** at any point until the research has been published/submitted as part of my research project, or has been anonymised.
- I do not have to answer all questions asked, and I can decline to answer any questions as I see fit.
- My data will be anonymised, and all identifying features will be removed so that my contribution will not be identifiable when reporting this research.
- My data will be securely stored, and destroyed in accordance with the Data Protection Act, 1998.
- My identity, contact details and the information that I provide will be treated confidentially and in accordance with the University of Westminster ethical guidelines and British Psychological Society code of human research ethics.
- The duty of confidentiality is **not absolute** and in exceptional circumstances this may be overridden by more compelling duties such as to protect individuals from harm.
- The data from this study may be used for future research, and may undergo secondary analysis. Future research may be related or unrelated to the goals of this study.
- **I have read the information in the participation sheet, and I am willing to act as a participant in the above research study**

Thank you!

5.1.2 Unique ID and demographic questions

Please create a unique code by combining the last two letters of your name, your month of birth, and the last two letters of your Student ID. Your code will be 6 characters long.

For example if you name is James, and you were born in January and your student ID ends on 99, your unique code would be: ES0199

UNIQUE CODE: ______________

Age: ______________

Gender:

☐ **Male** ☐ **Female** ☐ **Other**

What is your highest qualification of education that you currently own to date?

- ☐ A/AS level
- ☐ International Baccalaureate (IB) Diploma
- ☐ BTEC
- ☐ Higher education (HE) access course
- ☐ Foundation degree
- ☐ Previous Bachelor degree
- ☐ Mature student admitted on basis of previous experience and/or admissions test
- ☐ Other qualification

What is your ethnic group?

Choose one option that best describes your ethnic group or background

White

- ☐ English / Welsh / Scottish / Northern Irish / British
- ☐ Irish
- ☐ Gypsy or Irish Traveller
- ☐ Any other White background, please describe

Mixed / Multiple ethnic groups

- ☐ White and Black Caribbean
- ☐ White and Black African
- ☐ White and Asian
- ☐ Any other Mixed / Multiple ethnic background, please describe

Asian / Asian British

- ☐ Indian
- ☐ Pakistani
- ☐ Bangladeshi
- ☐ Chinese
- ☐ Any other Asian background, please describe

Black / African / Caribbean / Black British

- ☐ African

☐ Caribbean
☐ Any other Black / African / Caribbean background, please describe

Other ethnic group
☐ Arab
☐ Any other ethnic group, please describe

Are you an International, EU or home student?
☐ Home
☐ EU
☐ International

Please select the option that best describes your household's Chief income earner's occupation.
☐ Higher managerial, administrative or professional
☐ Intermediate managerial, administrative or professional
☐ Supervisory or clerical and junior managerial, administrative or professional
☐ Skilled manual workers
☐ Semi-skilled and unskilled manual workers
☐ Other

What is the highest qualification obtained by your Mother?
☐ GCSE
☐ High School Graduate/Alevels/BTEC National Diploma
☐ First Degree
☐ Master's Degree or other postgraduate degree
☐ Doctorate
☐ N/A

What is the highest qualification obtained by your Father?
☐ GCSE
☐ High School Graduate/Alevels/BTEC National Diploma
☐ First Degree
☐ Master's Degree or other postgraduate degree
☐ Doctorate
☐ N/A

5.1.3 MSLQ -Motivated strategies for learning questionnaire

The following questions ask about your motivation, attitudes and learning strategies for this class. There are no right or wrong answers, just answer as accurately as possible. Use the scale below to answer the questions. If you think the statement is very true of you, circle 7; if a statement is not at all true of you, circle 1. If the statement is more or less true of you, find the number between 1 and 7 that best describes you.

	1 Not at all true of me					7 Very true of me
1. In a class, I prefer course material that really challenges me so I can learn new things.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
2.In a class like this, I prefer course material that arouses my curiosity, even if it is difficult to learn.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
3.The most satisfying thing for me in this course is trying to understand the content as thoroughly as possible.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
4. When I have the opportunity in this class, I choose course assignments that I can learn from even if they don't guarantee a good grade.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
5. Getting a good grade in this class is the most satisfying thing for me right now.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
6.The most important thing for me right now is improving my overall course grade, so my main concern in this class is getting a good grade.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
7. If I can, I want to get better grades in this class than most of the other students	**1**	**2**	**3**	**4**	**5**	**6**	**7**
8. I want to do well in this class because it is important to show my ability to my family, friends, employer, or others.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
9. I believe I will receive an excellent grade in this class.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
10. I’m confident I can understand the most complex material presented by the instructor in this course.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
11. I'm confident I can do an excellent job on the assignments and tests in this course.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
12.I expect to do well in this class.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
13. I'm certain I can master the skills being taught in this class.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
14.I'm confident I can understand the basic concepts taught in this course v	**1**	**2**	**3**	**4**	**5**	**6**	**7**

15.Considering the difficulty of this course, the teacher, and my skills, I think I will do well in this class. 15	**1**	**2**	**3**	**4**	**5**	**6**	**7**
16.I think I will be able to use what I learn in this course in other courses.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
17.I think the course material in this class is useful for me to learn.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
18.I like the subject matter of this course.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
19.Understanding the subject matter of this course is very important to me.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
20.I am very interested in the content area of this course	**1**	**2**	**3**	**4**	**5**	**6**	**7**
21.If course materials are difficult to understand, I change the way I read the material.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
22.I ask myself questions to make sure I understand the material I have been studying in this class.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
23.I try to think through a topic and decide what I am supposed to learn from it rather than just reading it over when studying.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
24.When studying for this course I try to determine which concepts I don't understand well.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
25.When I study for this class, I set goals for myself in order to direct my activities in each study period	**1**	**2**	**3**	**4**	**5**	**6**	**7**
26.If I get confused taking notes in class, I make sure I sort it out afterwards.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
27. When reading for this course, I make up questions to help focus my reading	**1**	**2**	**3**	**4**	**5**	**6**	**7**
28.When I become confused about something I'm reading for this class; I go back and try to figure it out.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
29. Before I study new course material thoroughly, I often skim it to see how it is organized.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
30. I try to change the way I study in order to fit the course requirements and instructor's teaching style.	**1**	**2**	**3**	**4**	**5**	**6**	**7**

5.1.4 ASSIST Short Version

Approaches and Study Skills Inventory for Students

This questionnaire has been designed to allow you to describe, how you go about learning and studying. Please respond truthfully, so that your answers accurately describe your **actual** ways of studying, and work your way through the questionnaire, making sure that you give a response to **every item.** In deciding your answers, think in terms of **this particular lecture course,** using the scale below:

5 = Agree 4 = Agree somewhat 2 = Disagree somewhat 1 = Disagree

Try not to use 3 = unsure, unless you really have to

	1 Disagree				**5 Agree**
I often have trouble in making sense of the things I have to remember	1	2	3	4	**5**
When I'm reading an article or book, I try to find out for myself exactly what the author	1	2	3	4	**5**
I organise my study time carefully to make the best use of it.	1	2	3	4	**5**
There's not much of the work here that I find interesting or relevant.	1	2	3	4	**5**
I work steadily through the term or semester, rather than leave it all until the last minute.	1	2	3	4	**5**
Before tackling a problem or assignment, I first try to work out what lies behind it	1	2	3	4	**5**
I'm pretty good at getting down to work whenever I need to.	1	2	3	4	**5**
Much of what I'm studying makes little sense: it's like unrelated bits and pieces.	1	2	3	4	**5**
I put a lot of effort into studying because I'm determined to do well.	1	2	3	4	**5**
When I'm working on a new topic, I try to see in my own mind how all the ideas fit together.	1	2	3	4	**5**
I don't find it at all difficult to motivate myself.	1	2	3	4	**5**
Often I find myself questioning things I hear in lectures or read in books.	1	2	3	4	**5**
I think I'm quite systematic and organised when it comes to revising for exams.	1	2	3	4	**5**
Often I feel I'm drowning in the sheer amount of material we're having to cope with..	1	2	3	4	**5**
Ideas in course books or articles often set me off on long chains of thought of my own.	1	2	3	4	**5**
I'm not really sure what's important in lectures, so I try to get down all I can.	1	2	3	4	**5**
When I read, I examine the details carefully to see how they fit in with what's being said.	1	2	3	4	**5**
I often worry about whether I'll ever be able to cope with the work properly.	**1**	**2**	**3**	**4**	**5**

5.1.5 Statistics Anxiety Questionnaire

The following statements asks about anxiety towards statistics. Please think about each of the situations and indicate how much you agree with each statement.
Use the scale below to answer the questions. If you strongly agree with the statement circle 5, if you strongly disagree with the statement please circle 1.

	1 Strongly disagree	**2**	**3**	**4**	**5 Strongly agree**
I am anxious about not being able to understand statistical concepts in this course.	1	2	3	4	**5**
Statistical symbols and formulas will confuse me.	1	2	3	4	**5**
I am concerned that I may fail the statistics part of this course.	1	2	3	4	**5**
My anxiety level for the Statistics part of this course is extremely high.	1	2	3	4	**5**
I am anxious about not being able to understand statistical concepts in this course	1	2	3	4	**5**
Statistical symbols and formulas will confuse me.	**1**	**2**	**3**	**4**	**5**

5.1.6 Achievement Emotions Questionnaire- Class Related Emotions

Attending classes at university can induce different feelings. This questionnaire refers to emotions you may experience in this class today. Please indicate how you currently feel in this class. There are no right or wrong answers - we are simply trying to find out how you feel and think about your university experience. We are interested in your personal opinions, so please be candid in your responses. Read each item carefully and respond using the scale provided.

	1 Disagree				**5 Agree**
1. I get excited about going to class.	1	2	3	4	**5**
2. It's pointless to prepare for class since I don't understand the material anyway.	1	2	3	4	**5**
3. Even before class, I worry whether I will be able to understand the material.	1	2	3	4	**5**
4. Being confident that I will understand the material motivates me.	1	2	3	4	**5**
5. I am looking forward to learning a lot in this class.	1	2	3	4	**5**
6. Because I'm so nervous I would rather skip the class.	1	2	3	4	**5**
7. I am confident when I go to class.	1	2	3	4	**5**
8. I wish I didn't have to attend class because it makes me angry.	1	2	3	4	**5**
9. I am full of hope.	1	2	3	4	**5**
10. Even before class, I am resigned to the fact that I won't understand the material.	1	2	3	4	**5**
11. I am motivated to go to this class because it's exciting.	1	2	3	4	**5**
12. I worry whether I'm sufficiently prepared for the lesson.	1	2	3	4	**5**
13. My confidence motivates me to prepare for class.	1	2	3	4	**5**
14. The thought of this class makes me feel hopeless.	1	2	3	4	**5**
15. I worry whether the demands might be too great.	1	2	3	4	**5**
16. My hopes that I will be successful motivate me to invest a lot of effort.	1	2	3	4	**5**
17. Thinking about class makes me feel uneasy.	1	2	3	4	**5**
18. Because I've given up, I don't have energy to go to class.	1	2	3	4	**5**
19. When I think about class, I get queasy.	1	2	3	4	**5**
20. I am optimistic that I will be able to keep up with the material.	1	2	3	4	**5**
21. I feel scared.	1	2	3	4	**5**
22. I'd rather not go to class since there is no hope of understanding the material anyway.	1	2	3	4	**5**
23. I am hopeful that I will make good contributions in class.	1	2	3	4	**5**
24. I enjoy being in class.	1	2	3	4	**5**
25. I worry the others will understand more than me.	1	2	3	4	**5**

26. I'm tempted to walk out of the lecture because it is so boring.	1	2	3	4	**5**
27. When I say something in class I feel like I turn red.	1	2	3	4	**5**
28. I feel frustrated in class.	1	2	3	4	**5**
29. Because the time drags I frequently look at my watch.	1	2	3	4	**5**
30. I take pride in being able to keep up with the material.	1	2	3	4	**5**
31. Because I don't understand the material I look disconnected and resigned.	1	2	3	4	**5**
32. My enjoyment of this class makes me want to participate.	1	2	3	4	**5**
33. I get restless because I can't wait for the class to end.	1	2	3	4	**5**
34. When I say anything in class I feel like I am making a fool of myself.	1	2	3	4	**5**
35. I get tense in class.	1	2	3	4	**5**
36. I get bored.	1	2	3	4	**5**
37. I am confident because I understand the material.	1	2	3	4	**5**
38. After I have said something in class I wish I could crawl into a hole and hide.	1	2	3	4	**5**
39. I feel anger welling up in me.	1	2	3	4	**5**
40. I am proud that I do better than the others in this course.	1	2	3	4	**5**
41. It's so exciting that I could sit in class for hours listening to the professor.	1	2	3	4	**5**
42. I get so bored I have problems staying alert.	1	2	3	4	**5**
43. I get embarrassed.	1	2	3	4	**5**
44. Thinking about the poor quality of the course makes me angry.	1	2	3	4	**5**
45. I start yawning in class because I'm so bored.	1	2	3	4	**5**
46. When I make good contributions in class, I get even more motivated.	1	2	3	4	**5**
47. I'm embarrassed that I can't express myself well.	1	2	3	4	**5**
48. I feel hopeless.	1	2	3	4	**5**
49. I enjoy participating so much that I get energized.	1	2	3	4	**5**
50. I feel nervous in class.	**1**	**2**	**3**	**4**	**5**
51. The lecture bores me.					

5.1.7 Debrief for Study 2 Survey

Learning of Research Methods in Psychology: The Influence of Cognitive, Affective and Behavioural Components

Thank you for your participation!

The aim of this study is to get a deeper insight and understanding of psychology students' learning of research methods and the challenges faced by students.

This project aims to explore reasons for difficulties in learning of research methods, as well as the possible reasons behind these difficulties, by looking at cognitive, affective and behavioural factors.

As research methods modules are a fundamental part in the psychology undergraduate degree and are the basis for several of the transferable skills in psychology, understanding the learning process of students is important in order to both enhance students' academic performance and learning satisfaction. There is limited empirical research conducted on the learning of research methods specifically and the numerous factors that could be involved in the learning process.

These survey findings will contribute to the overall PhD project. You will also be invited to take part in subsequent surveys, but are not required to do so. Your participation is entirely voluntary.

If you have any questions or concerns regarding this survey or about the project please contact me at Rosa.Leino@my.westminster.ac.uk

Thank you again!

Appendix 5.2: Consent for the use of Behavioural data- Survey 2 & 3

The use of your educational behavioural data consent form

As you know this study is looking at psychology students learning of research methods and the challenges that psychology students face. The research aims to understand the relations between students' motivation, cognitive–metacognitive strategies, affective variables, behaviour, as well as learning performance and satisfaction by looking at the process and developmental trends.

In order to get a wider understanding of the learning processes of students we will need to access and your behavioural data from blackboard, (Including: assignment submissions time and marks, materials accessed, weekly online quiz participation, time spent on Blackboard overall) and attendance data from SEAtS. This data will help to improve how we approach research methods in the future and will only be used for research purposes.

What will be asked to do?

- We ask that if you are happy with your behavioural data being used for this study, please give us the Unique ID you previously created again, as well as your student ID number.
- These will be used to link and cross-reference your previous responses with the behavioural data by a trusted third party. Any identifiable information will not be known or shared to the researcher.
- Trusted third party details: **Amy Edwards, Doctoral Researcher at the University of Westminster, Contact: Amy.edwards@my.westminster.ac.uk**
- If you chose not to give access to your behavioural data, your self-reported data may still be used for the purpose of this research unless you choose to withdraw from the study.

Pease note:

- Participation for this part of the study is entirely voluntary.
- A trusted third party will cross-reference and anonymize your self-reported and behavioral data, after which all personal data will be deleted.
- Your privacy will be assured by coded analysis of the data.
- The anonymized data will only be available to members of the research team,
- No identifiable data will be known to the researcher or published.

In signing this consent form I am agreeing to the following, and that my participation has been explained to my satisfaction – please tick each box below, as appropriate:

- My participation in this research is on an entirely voluntary basis. ☐
- Once I have taken part, I am still able to withdraw **my data** at any point until the research has been published/submitted as part of my research project, or has been anonymized. ☐
- My data will be anonymised, and all identifying features will be removed so that my contribution will not be identifiable when reporting this research. ☐
- My data will be securely stored, and destroyed in accordance with the Data Protection Act, 1998. ☐
- My identity, contact details and the information that I provide will be treated confidentially and in accordance with the University of Westminster ethical guidelines and British Psychological Society code of human research ethics. ☐
- The duty of confidentiality is **not absolute** and in exceptional circumstances this may be overridden by more compelling duties such as to protect individuals from harm. ☐
- The data from this study may be used for future research, and may undergo secondary analysis. Future research may be related or unrelated to the goals of this study. ☐

	Yes	No
I have read the information in the participation sheet, and I am willing to give access to my behavioural data from black board, and SEAtS, for the purpose of this research.	☐	☐

If yes please give your :

Unique ID __________

Student ID_________

Appendix 5.3: University of Westminster Ethics Committee Approval Letter(s) for Study 2

5.3.1 Original study approval

UNIVERSITY OF
FORWARD
THINKING
WESTMINSTER

Project title: Doctoral research project Application ID: ETH1819-0083
Date: 12 Oct 2018
Dear Rosa

I am writing to inform you that your application was considered by the Psychology Ethics Committee. The proposal was approved.
Yours,
Prof Coral Dando

Psychology Ethics Committee

I am advised by the Committee to remind you of the following points:

Your responsibility to notify the Research Ethics Committee immediately of any information received by you, or of which you become aware, which would cast doubt upon, or alter, any information contained in the original application, or a later amendment, submitted to the Research Ethics Committee and/or which would raise questions about the safety and/or continued conduct of the research.

The need to comply with the Data Protection Act 2018 and General Data Protection Regulation (GDPR) 2018.
The need to comply, throughout the conduct of the study, with good research practice standards.

The need to refer proposed amendments to the protocol to the Research Ethics Committee for further review and to obtain Research Ethics Committee approval thereto prior to implementation (except only in cases of emergency when the welfare of the subject is paramount).

The desirability of including full details of the consent form in an appendix to your research, and of addressing specifically ethical issues in your methodological discussion.

The requirement to furnish the Research Ethics Committee with details of the conclusion and outcome of the project, and to inform the Research Ethics Committee should the research be discontinued. The Committee would prefer a concise summary of the conclusion and outcome of the project, which would fit no more than one side of A4 paper, please.

5.3.2 Significant amendments to study approval (Request for access to full cohort behavioural data).

UNIVERSITY OF FORWARD THINKING WESTMINSTER

Project title: Learning of Research Methods in Psychology: The Influence of Cognitive, Affective and Behavioural Components

Application ID: ETH1920-0189

Date: 16 Oct 2019

Dear Rosa

I am writing to inform you that your significant amendments to protocol were considered by the Psychology Ethics Committee.

The proposal was approved with conditions. Yours,
Coral Dando
Psychology Ethics Committee

I am advised by the Committee to remind you of the following points:

Your responsibility to notify the Research Ethics Committee immediately of any information received by you, or of which you become aware, which would cast doubt upon, or alter, any information contained in the original application, or a later amendment, submitted to the Research Ethics Committee and/or which would raise questions about the safety and/or continued conduct of the research.

The need to comply with the Data Protection Act 2018 and General Data Protection Regulation (GDPR) 2018.
The need to comply, throughout the conduct of the study, with good research practice standards.

The need to refer proposed amendments to the protocol to the Research Ethics Committee for further review and to obtain Research Ethics Committee approval thereto prior to implementation (except only in cases of emergency when the welfare of the subject is paramount).

The desirability of including full details of the consent form in an appendix to your research, and of addressing specifically ethical issues in your methodological discussion.

The requirement to furnish the Research Ethics Committee with details of the conclusion and outcome of the project, and to inform the Research Ethics Committee should the research be discontinued. The Committee would prefer a concise summary of the conclusion and outcome of the project, which would fit no more than one side of A4 paper, please.

Appendix 5.4: Correlation coefficients between T1 individual emotions & Y1 grades.

Emotions T1	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12
1.Enjoyment	3.20	.76	-											
2. Hope	3.43	.75	.68***	-										
3. Pride	3.46	.67	.56***	.69***	-									
4 Anxiety	2.56	1.03	-.36***	-.56***	-.48***	-								
5. Anger	1.80	.82	-.41***	-.33***	-.39**	.68***	-							
6.Shame	2.30	.96	-.27***	-.49***	-.42***	.84***	.59***	-						
7.Boredom	2.67	.96	-.63***	-.31***	-.24***	.44***	.49***	.28**	-					
8. Hopelessness	1.90	.86	-.41***	-.52**	-.55***	.63***	.62***	.54***	.63***	-				
9.Stats-anxiety	3.02	.111	-.24***	-.33***	-.26***	.47***	.23*	.48***	.22*	.47***	-			
Y1 Grade														
10.Module Grade	52.23	13.11	.002	.04	.12	-.03	-.11	.002	-.09	-.13	-.07	-		
11. Exam	57.55	13.43	-.11	-.06	-.06	-.13	-.02	.-.2	-.06	-.16	-.03	.72***	-	
12.Report	50.78	14.78	.40	.50	.126	-.008	-.15	-.007	-.09	-.07	.23	.86***	.44***	-
13.In-class test	52.87	19.76	.07	.09	.26*	-.05	-11	-.05	-.10	-.19	-.26*	.69**	.45***	.37***

Appendix 5.5: Correlation coefficients between T2 individual emotions and Y2 "Data Analysis for Psychology" grades.

Emotions T2	Mean	SD	1	2	3	4	5	6	7	8	9	10	11
1.Enjoyment	3.14	.75	-										
2. Hope	3.40	.81	$.70^{***}$	-									
3. Pride	3.52	.67	$.71^{***}$	$.71^{***}$	-								
4 Anxiety	2.75	1.07	$-.50^{***}$	$-.53^{***}$	$-.52^{***}$	-							
5. Anger	1.85	.82	$-.42^{***}$	$-.35^{***}$	$-.46^{**}$	$.67^{***}$	-						
6.Shame	2.53	1.01	$-.38^{***}$	$-.55^{***}$	$-.56^{***}$	$.79^{***}$	$.70^{***}$	-					
7.Boredom	2.71	.93	$-.48^{***}$	$-.40^{***}$	$-.42^{***}$	$.54^{***}$	$.64^{***}$	$.60^{**}$	-				
8. Hopelessness	2.07	.90	$-.55^{***}$	$-.59^{**}$	$-.65^{***}$	$.68^{***}$	$.61^{***}$	$.61^{***}$	$.59^{***}$	-			
9.Stats-anxiety	3.27	1.08	$-.40^{***}$	$-.47^{***}$	$-.43^{***}$	$.60^{***}$	$.38^{*}$	$.56^{***}$	$.38^{*}$	$.60^{***}$	-		
Y2 Grade													
10.Module Grade	56.77	12.71	.22	.13	.12	-.02	-.21	-.05	$-.23^{*}$	$-.24^{*}$	-.22	-	
11. Learning Journal	58.95	11.47	.23	.16	.16	-.04	-.23	.-.3	$-.30^{**}$	$-.22^{*}$	-.16	$.76^{***}$	-
12.Exam	55.70	15.82	.15	.10	.09	-.01	-.24	-.05	-.17	-.18	.21	$.94^{**}$	$.54^{***}$

__Appendix 5.6: Correlation coefficients betweenT3 individual emotions and Y2 "Data Analysis for Psychology" grades.__

Emotions T3	Mean	SD	1	2	3	4	5	6	7	8	9	10	11
1.Enjoyment	2.94	.77	-										
2. Hope	3.35	.70	$.66^{***}$	-									
3. Pride	3.29	.89	$.68^{***}$	$.68^{***}$	-								
4 Anxiety	2.67	1.15	$-.62^{***}$	$-.65^{***}$	$-.66^{***}$	-							
5. Anger	1.95	.85	$-.68^{***}$	$-.59^{***}$	$-.58^{**}$	$.68^{***}$	-						
6.Shame	2.44	1.06	$-.49^{***}$	$-.62^{***}$	$-.49^{***}$	$.81^{***}$	$.67^{***}$	-					
7.Boredom	2.92	1.16	$-.76^{***}$	$-.47^{***}$	$-.55^{***}$	$.55^{***}$	$.64^{***}$	$.57^{**}$	-				
8. Hopelessness	2.14	1.00	$-.69^{***}$	$-.59^{**}$	$-.68^{**}$	$.69^{***}$	$.66^{***}$	$.54^{***}$	$.69^{***}$	-			
9.Stats-anxiety	3.01	1.08	$-.39^{***}$	$-.47^{***}$	$-.51^{***}$	$.75^{***}$	$.46^{*}$	$.58^{***}$	$.45^{*}$	$.64^{***}$	-		
Y2 Grade													
10.Module Grade	56.77	12.71	$.27^{*}$	.17	.16	-.11	$-.27^{*}$	-.10	-.14	$-.30^{*}$	-.14	-	
11. Learning Journal	58.95	11.47	$.28^{*}$	.16	.19	-.15	$-.31^{*}$	.-16	-.19	$-.31^{*}$	-.19	$.76^{***}$	-
12.Exam	55.70	15.82	.19	.15	.12	-.08	-.21	-.05	-.09	$-.25^{*}$	-.09	$.94^{**}$	$.54^{***}$

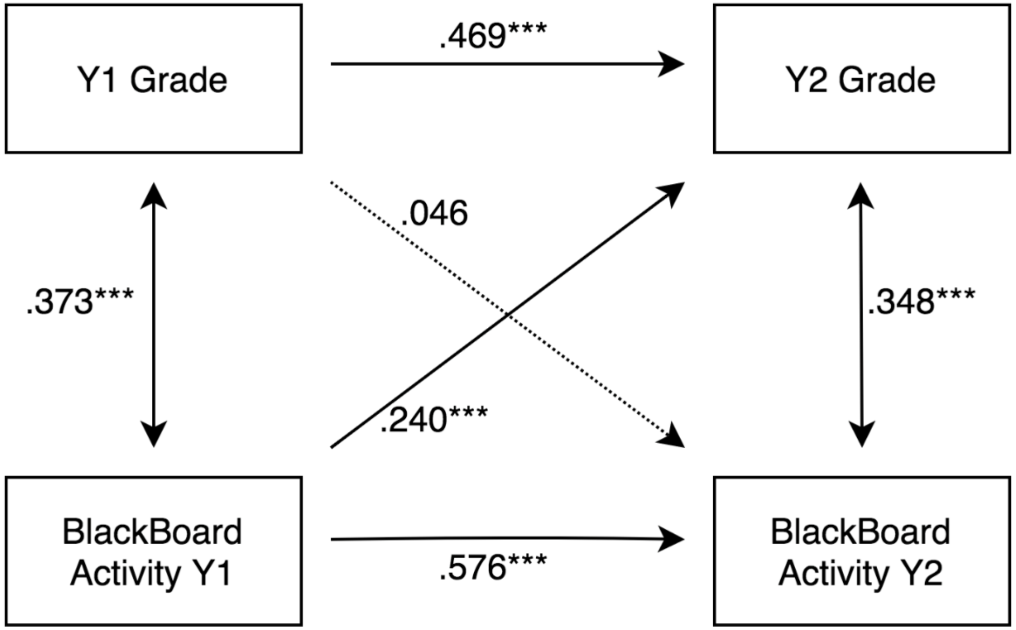
Appendix 5.7: Correlation coefficients between T2 self-reported variables and Y2 "Cognitive & Clinical RM" grades.

Self-reports T2	N	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.Activating Pos	11	5.22	.93														
2. Activating Neg	11	2.13	.77	$-.74^{*}$	-												
3. Deactivating Neg	11	2.15	.75	$-.70^{*}$	$.92^{***}$	-											
4.Stats-anxiety	11	2.82	1.27	$-.81^{*}$	.64	.68	-										
5.Deep	11	21.90	2.47	$.69^{*}$	-.50	-.62	-.37	-									
6. Surface	11	18.40	4.17	$-.74^{*}$	.49	$.73^{*}$	.68	-.54	-								
7. Strategic	11	21.20	2.90	$.80^{*}$	-.36	-.46	$-.88^{*}$	.59	$-.65^{*}$	-							
8. Intrinsic	11	4.75	1.10	.47	$-.67^{*}$	-.58	-.50	.25	-.30	.22	-						
9. Extrinsic	11	4.70	1.21	$.78^{*}$	$-.64^{*}$	-.58	-.66	$.75^{*}$	-.31	$.69^{*}$	.29	-					
10.Self-regulation	11	4.78	1.00	$.74^{*}$	-.40	-.47	-.12	$.93^{***}$	-.42	.55	.37	.52	-				
11.Task Value	11	5.11	1.00	$.81^{*}$	$-.92^{*}$	$-.90^{***}$	-.60	$.69^{*}$	-.61	.56	$.70^{*}$	.59	$.64^{*}$	-			
12.Self-efficacy	11	4.61	1.24	$.80^{*}$	$-.84^{*}$	$-.71^{*}$	-.66	.53	-.30	.61	.52	$.81^{*}$	.44	$.82^{**}$	-		
Y1 Grade																	
13.Module Grade	27	62.75	5.43	.45	-.63	-.55	-.13	.34	-.15	.46	.02	$.70^{*}$	.18	.40	$.79^{*}$	-	
14.Report	27	62.63	5.82	.26	-.27	-.20	-.08	.28	.02	.52	.05	.48	.30	.32	$.67^{*}$	$.85^{***}$	-
15. In-class test	27	62.93	7.56	.44	$-.72^{*}$	$-.65^{*}$	-.23	.27	-.24	.25	-.01	$.63^{*}$	.03	.32	$.61^{*}$	$.80^{***}$	.36

Appendix 5.8: Correlation coefficients between T3 self-reported variables and Y2 “Cognitive & Clinical RM” grades.

Self-reports T3	N	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.Activating Pos	27	3.37	.63														
2. Activating Neg	27	2.19	.79	-.52	-												
3. Deactivating Neg	27	2.28	.80	-.26	.85***	-											
4.Stats-anxiety	27	3.02	1.11	.23	-.20	-.05	-										
5.Deep	126	21.78	3.73	.58	-.48	-.23	.44	-									
6. Surface	126	17.85	4.63	-.21	.34	.64*	.55	.12	-								
7. Strategic	126	20.43	4.49	.41	.30	.50	-.16	.25	.19	-							
8. Intrinsic	126	4.81	1.05	.24	-.46	-.54	.20	.45	-.30	-.48	-						
9. Extrinsic	126	5.32	1.20	.03	.18	.04	-.39	.03	-.46	-.12	.21	-					
10.Self-regulation	126	4.78	.92	-.35	.14	-.11	-.28	-.13	-.47	-.39	.20	.47	-				
11.Task Value	126	5.30	1.07	.09	-.43	-.71*	.03	.30	-.48	-.30	.53	.34	.07	-			
12.Self-efficacy	126	4.62	1.12	.30	-.35	-.54	-.35	-.25	-.72**	-.27	.19	.46	-.06	.44	-		
Y1 Grade																	
13.Module Grade	27	62.75	5.43	.45	-.55	-.64	-.13	.34	-.15	.46	.02	.70*	.18	.40	.79*	-	
14.Report	27	62.63	5.82	.26	-.27	-.20	-.08	.28	.02	.52	.05	.48	.30	.32	.67*	.85***	-
15.In-class test	27	62.93	7.56	.44	-.65*	-.72*	-.23	.27	-.24	.25	-.01	.63*	.03	.32	.61*	.80***	.36

Appendix 5.9: Autoregressive cross-lagged model with "Data analysis for psychology" grades and BB activity



****p<.001*

__Appendix 5.10: Correlations of T1 self-reported variables and Y1 behavioural data.__

Self-reports T1	N	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.Activating Pos	113	3.37	.63														
2. Activating Neg	111	2.19	.79	-.53***	-												
3. Deactivating Neg	115	2.28	.80	-.58***	.70***	-											
4.Stats-anxiety	126	3.02	1.11	-.31**	.45***	.38***	-										
5.Deep	126	21.78	3.73	.53***	-.18	-.28**	-.13	-									
6. Surface	126	17.85	4.63	-.48***	.65***	.67***	.53***	.03	-								
7. Strategic	126	20.43	4.49	.44***	.29**	-.25**	-.12	.45***	-.21*	-							
8. Intrinsic	126	4.81	1.05	.41***	-.15	-.32***	-.21*	.38***	-.18*	.30**	-						
9. Extrinsic	126	5.32	1.20	.01	.25*	.38**	-.02	.16	.23*	.21*	.10	-					
10.Self-regulation	126	4.78	.92	.55***	-.31**	-.46***	-.21*	.62***	-.26**	.56***	.47***	.27**	-				
11.Task Value	126	5.30	1.07	.38***	-.28**	-.47***	-.30**	.38***	-.39***	-31***	.44***	.25**	.62***	-			
12.Self-efficacy	126	4.62	1.12	.45***	-.31**	-.26**	-.45***	.45***	-.34**	.46***	.45***	.38***	.54***	.57***	-		
Y1 Behavioural Data																	
13.Blackboard Hours	239	30.63	21.05	.50	.001	-.10	-.04	.14	-.06	.05	.18	-.12	.07	-.12	-.02	-	
14.Attendance %	239	41.03	22.22	-.22	.02	-.03	.09	-.02	.06	-.06	-.12	-.13	-.07	-.05	-.21	.38**	.
15.No of Weekly Tests	239	2.70	3.53	.25*	-.16	-.25*	-.07	.13	-.12	.20	.12	-.18	.16	.04	-.14	.57***	.24***

Note. Sample varies between correlations as not all participants who took part in survey gave permission to cross-reference with grades.
Correlations between Behavioural data and Cognitive/motivational variables n=77
Correlations between Behavioural data & emotions n=69-73
Correlations between self-reported data n=111-115.

__Appendix 5.11: Correlations of T2 Self-reported variables and "Data analysis for psychology" behavioural data.__

Self-reports T2	N	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.Activating Pos	74	5.07	.99	-			-										
2. Activating Neg	75	2.36	.83	-.62***	-												
3. Deactivating Neg	76	2.38	.81	-.63***	.88***	-											
4.Stats-anxiety	86	3.27	1.08	-.47**	.61***	.53***	-										
5.Deep	86	21.61	3.62	.41***	-.02	-.07	.17	-									
6. Surface	86	18.10	5.13	-.47***	.65***	.67***	.67***	.04	-								
7. Strategic	86	20.96	4.27	.44***	-.18	-.29*	-.06	.54***	-.22*	-							
8.Intrinsic	86	4.72	1.04	.56***	-.32**	-.47***	-.31**	.29***	-.34**	.32**	-						
9. Extrinsic	86	5.30	1.25	.17	.24	.15	.02	.33**	.10	.18	.11	-					
10.Self-regulation	86	4.76	.96	.51***	-.16	-.20*	.04	.54***	-.22**	.36***	.29**	.18	-				
11.Task-Value	86	5.15	.95	.40**	-.23	-.34**	.18	.33**	-.38***	.44***	.40***	.29**	.49***	-			
12.Self-efficacy	86	4.61	1.16	.26*	-.38**	-.34**	-.35**	.27**	-.36**	.35***	.40***	.37***	.42***	.47***	-		
Y2 Behavioural Data																	
13.Blackboard Hours	152	31.62	19.00	-.14	.17	.11	-.08	-.11	-.14	-.11	-.10	.001	-.03	-.08	-.01	-	
14.Attendance %	152	36.23	22.55	.001	.11	-.14	-.10	-.01	-.12	.20	-.03	.03	-.01	.01	-.06	.35***	-
15.Lecture Recording Views	152	7.80	10.61	.07	-.11	-.23	-.07	.14	-.06	.12	.22	-.07	.16	.12	.04	.38**	.01

Note. Sample varies between correlations as not all participants who took part in survey gave permission to cross-reference with grades.
Correlations between Grades and Cognitive/motivational variables n=73
Correlations between Grades & emotions n=67-69 (Incomplete data was kept in the analyses, as these were later used in Multi-level analysis which uses maximum likelihood estimating to estimate missing value).
Correlations between self-reported data n=74-76

Appendix 5.12: Correlations of T3 Self-reported variables and "Data analysis for psychology" behavioural data.

Self-Reports T3	N	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.Activating Pos	76	3.21	.69	-			-										
2. Activating Neg	76	2.24	.93	-.80***	-												
3. Deactivating Neg	76	2.56	1.03	-.83***	.90***	-											
4.Stats-anxiety	80	3.03	1.11	-.56**	.61***	.62***											
5.Deep	80	21.17	3.67	.28*	.15	-.22*	-.06	-									
6. Surface	80	17.86	5.10	-.64***	.72***	.73***	.74***	-.11	-								
7. Strategic	80	20.77	4.99	.57***	-.58***	-.59***	-.33**	.24*	-.48***	-							
8.Intrinsic	80	4.73	1.10	.37**	-.20	-.37**	-.29*	.45***	-.41***	.33**	-						
9. Extrinsic	80	5.43	1.20	.17	-.15	-.12	-.02	.25*	-.04	.28*	.30*	-					
10.Self-regulation	80	4.83	1.05	.35**	-.35**	-.38**	-.21	.49***	-.38**	.42***	.65**	.32**	-				
11.Task Value	80	4.98	1.15	.59***	-.54***	-.58***	-.39**	.38**	-.49***	·45**	.62***	.43***	.62***	-			
12.Self-efficacy	80	4.66	1.11	.57***	-.58***	-.51***	-.51***	.27*	-.48**	.44***	.49***	.45***	.49***	.57***	-		
Y2 Behavioural Data																	
13.Blackboard Hours	152	31.62	19.00	-.18	.12	.14	.14	-.06	.23	.01	-.10	.12	.16	-.05	.04	-	
14.Attendance %	152	36.23	22.55	·34*	-.15	-.19	-.18	.08	-.11	.07	.12	-.04	.14	.19	.10	.35***	-
15.Lecture Recording Views	152	7.80	10.61	-.06	.11	.03	.20	.07	.21	.06	.04	-.01	.18	.09	-.12	.38**	.01

Note. Sample varies between correlations as not all participants who took part in survey gave permission to cross-reference with grades. Correlations between Grades and Cognitive/motivational variables n=66

Correlations between behavioural data & emotions n=64

Appendix 5.13: Multilevel Growth Models run with z scores.

5.13.1 Parameter estimates for Multilevel Growth Models showing Within- and between-person Variability in students grades for the whole cohort using Z scores.

		ICC Model.1			Model 1.A	
Fixed Effects	**b**	**SE**	**95% CI**	**b**	**SE**	**95% CI**
Intercept	.13	.05	[.04 .23]	-.08	.07	[-.22 -.05]
Time				$.74^{***}$	.13	[.48 .99]
Quadratic time				$-.32^{***}$	.06	[-.43 -.20]
Random Effects						
Intercept	.43		[.34 .54]	.65		[.47 .91]
Slope				.25		[.29 .69]
ICC		.24			.58	
R_1^2		.24			.62	
R_2^2		-			.04	
Model fit						
-2LL		-648.70			-629.86	
AIC		1303.38			1275.72	
BIC		1316.12			1309.69	

Note. * p < .05 ** p < .01 *** p < .001, N=179

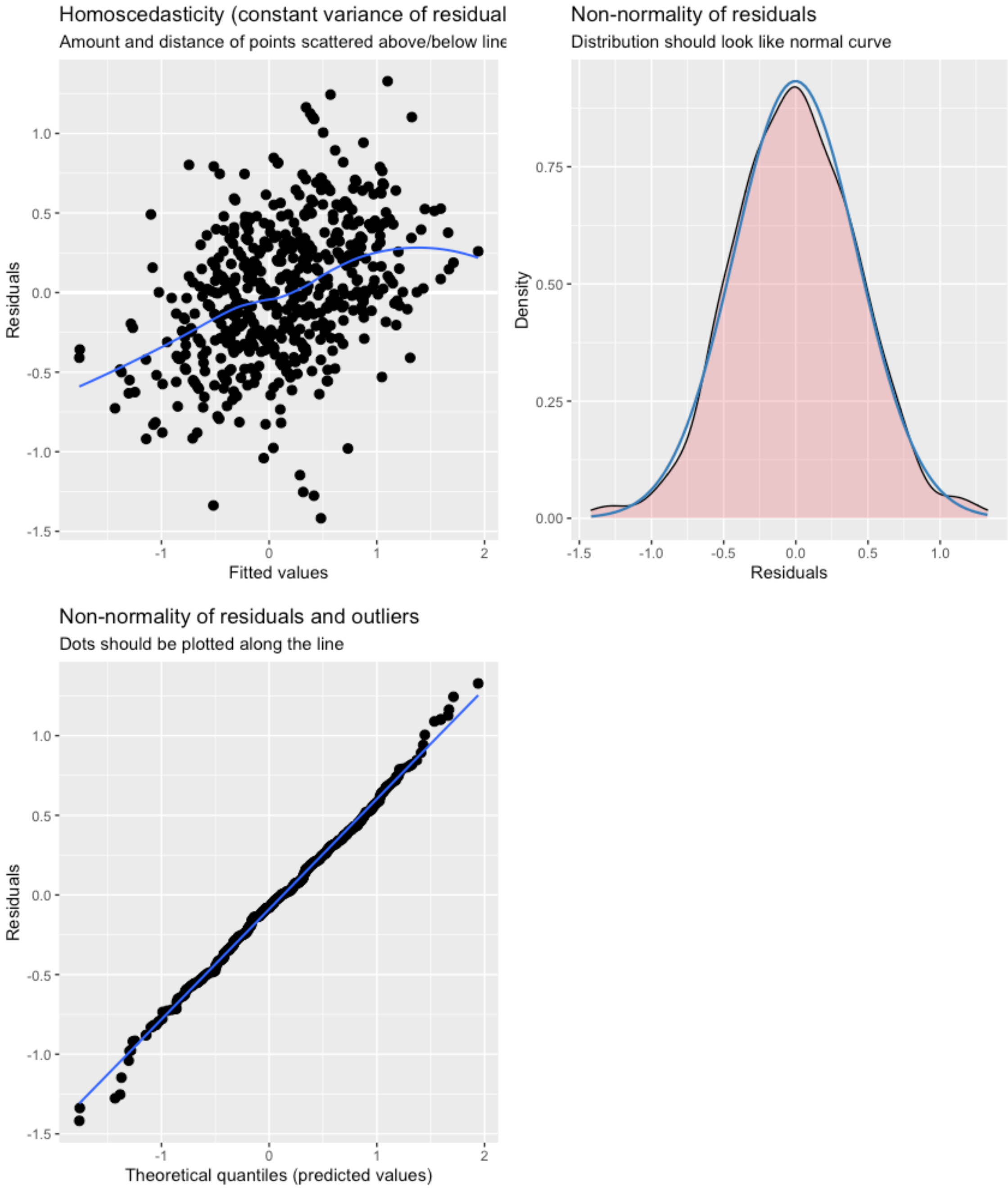
5.13.2 Parameter estimates for Multilevel Growth Models showing Within- and Between-Person Variability in students grades, including the predictors deactivating negative emotions and ethnicity run with Z scores.

Note. * p < .05 ** p < .01 *** p < .001 , N=99.

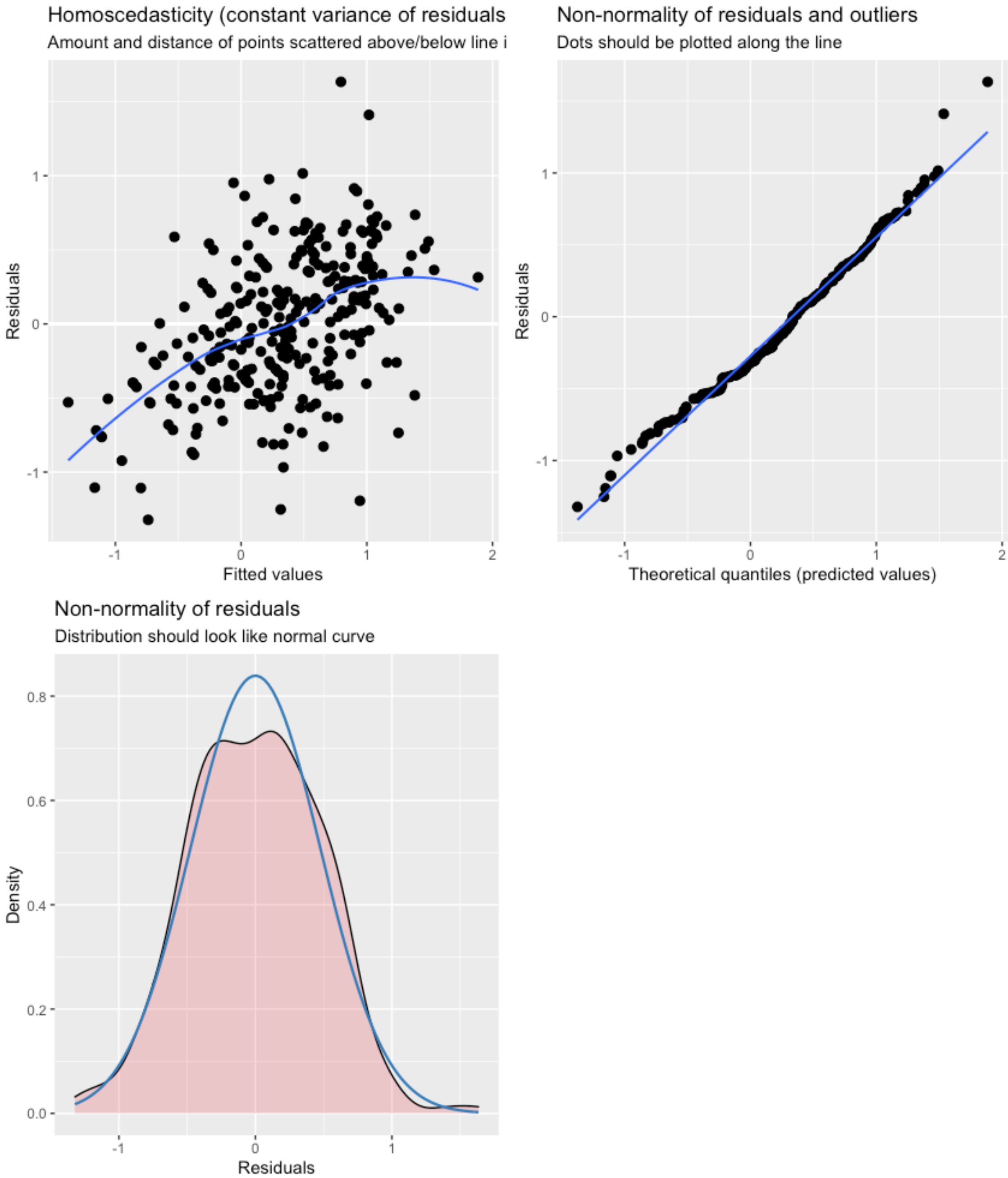
	ICC Model.2			Model 2.A			Model 2.B			Model 2.C		
Fixed Effects	**b**	**SE**	**95% CI**	**b**	**SE**	**95% CI**	**b**	**SE**	**95% CI**	**b**	**SE**	**95% CI**
Intercept	.35	.07	[.22 .45]	-.021**	.01	-[.20 .16]	.45	.24	[-.03 .92]	-.16	.10	[-.36 .04]
Time				1.06***	.16	[.74 1.37]	.95***	.19	[.58 1.32]	1.05***	.16	[.74 1.34]
Quad time				-.42***	.01	[-.06 -.28]	-.33***	.09	[-.50 -.16]	-.42**	.07	[-.57 -.27]
De-Act Neg Between							-.21*	.09	[-.39 -.04]			
De-Act Neg Within							.14	.15	[-.14 .43]			
Ethnicity										.35**	.13	[.10 .60]
Random Effects												
Intercept	.48		[.37 .63]	.65		[.50 .85]	.75		[.58 .97]	.64		[.48 -.84]
Slope	-		-	.32		[.19 .53]	.34		[.20 .57]	.31		[.19 .552]
ICC		.30				.46		.52			.41	
R_1^2		.30				.55		.65			.54	
R_2^2		-				.09		.13			.13	
Model Fit												
-2LL		-358.03				-336.00		-242.20			-332.35	
AIC		722.06				688.01		504.41			682.70	
BIC		733.03				717.26		537.93			715.60	

Appendix 5.14: Homoscedasticity of residuals, On-normality of residuals and outliers for MLM models

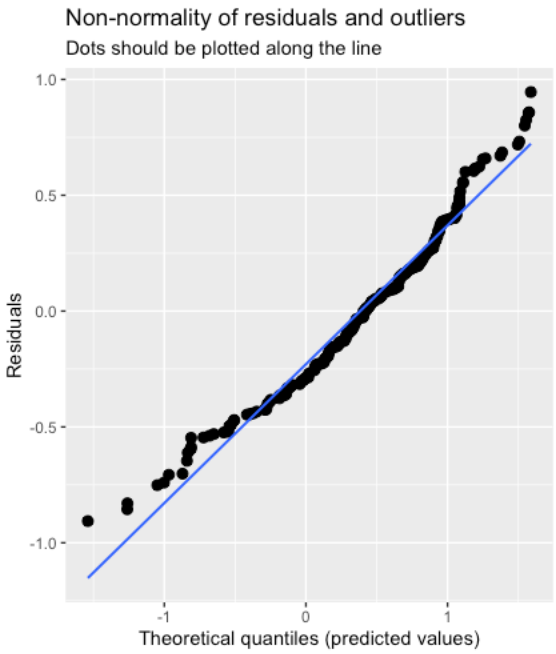
5.14.1 Model 1: Whole Cohort AR1 Model

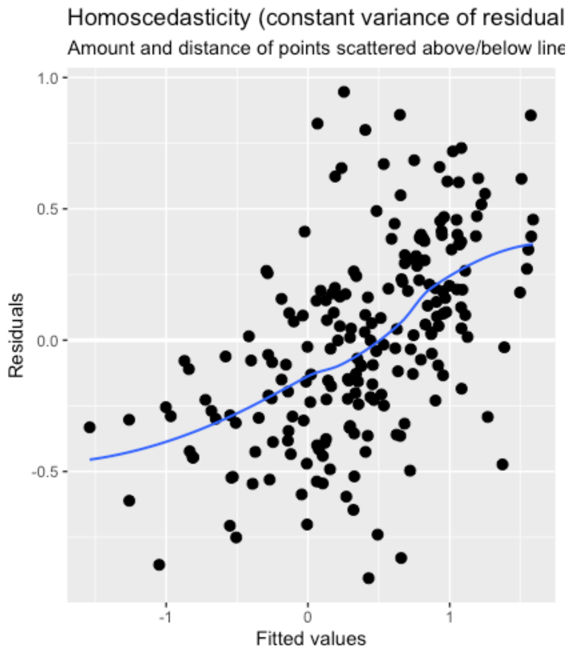


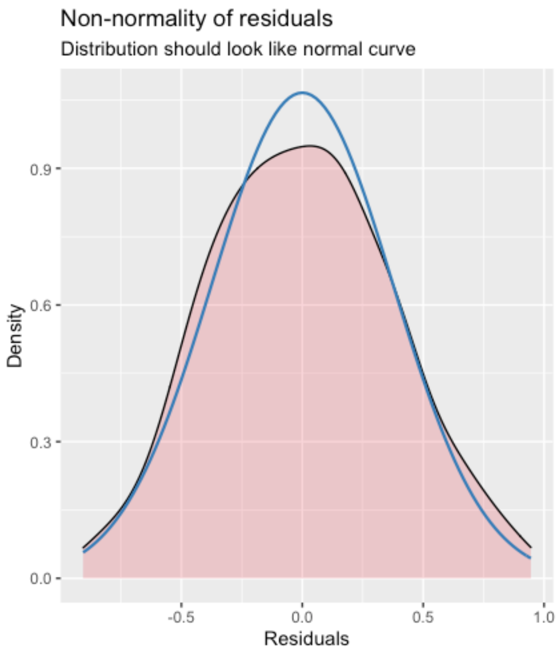
5.14.2 Model 2: Survey AR1 Model



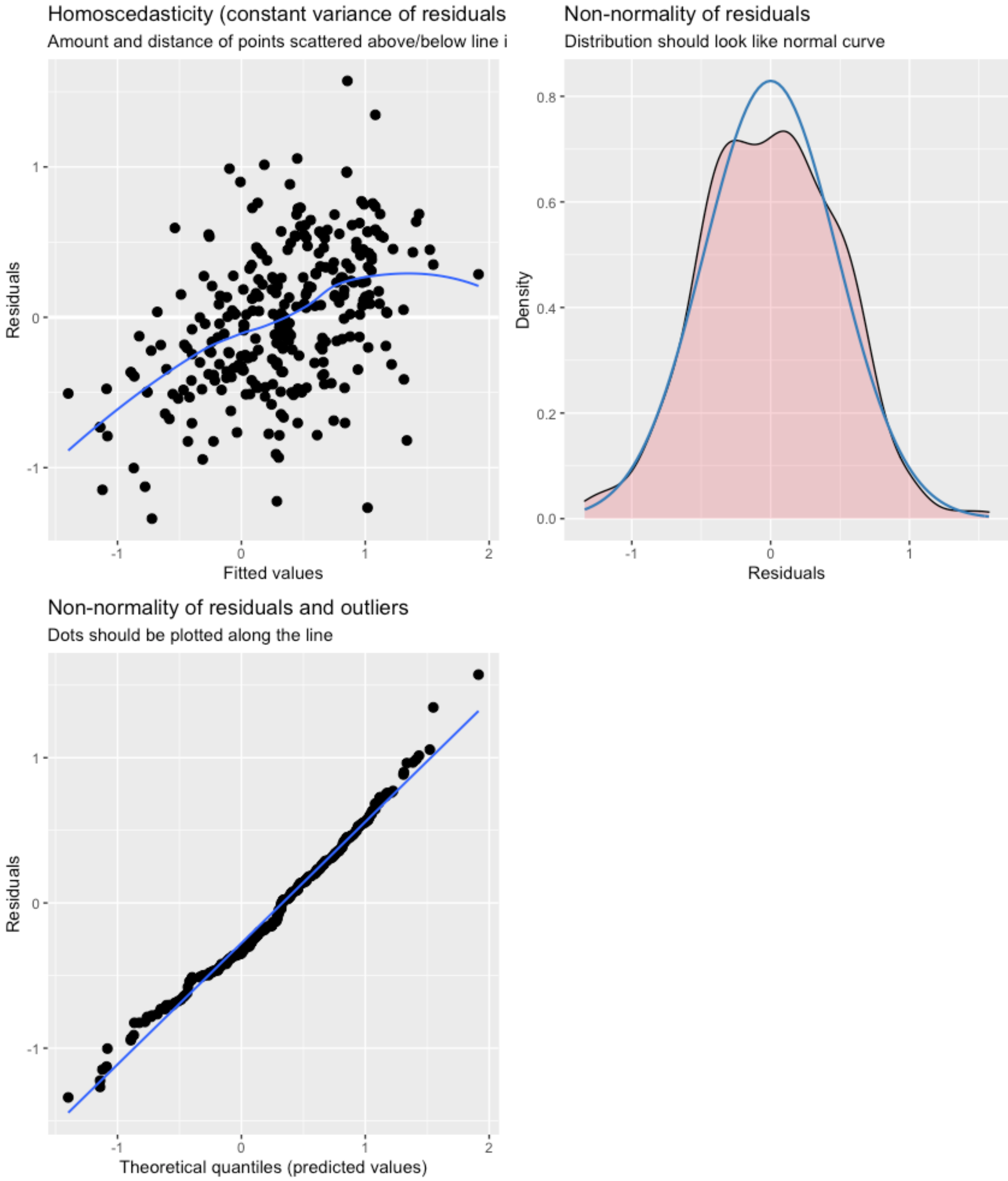
5.14.3 Model 3:AR1 model with Deactivating Negative emotions as time variant predictor







5.14.4 Model 4: AR1 model with Ethnicity group (White/BAME) as a time invariant predictor



Chapter 6 Appendices:

Appendix 6.1: Study 3 Information Sheet and consent form

Psychology Students' Research Methods Journey: An Interview Study

You are being invited to take part in an interview study which is concerned with psychology students' learning experiences on the research methods modules. The study is conducted by Rosa Leino, as a part of my PhD project at University of Westminster supervised by Dr Anna Doering, Dr Mark Gardner and Dr Tina Cartwright.

What is the purpose of the study?

The purpose of the study is to get an insight in to psychology students' experiences of Research Methods by focusing on your experiences, feelings and learning strategies, as well as discussing any challenges you might have encountered during your first- and second-year modules. The findings from this study will be used to complement a previous longitudinal study, in order to get a deeper understanding of psychology students' research methods learning journey over the course of their degree. As research methods modules are a fundamental part in the psychology undergraduate degree and are the basis for several of the transferable skills in psychology, understanding the learning process of students is important to both enhance students' academic performance and learning satisfaction. This study is a part of a PhD project which aims to combine cognitive, affective and behavioural variables, to explore psychology students learning of research methods.

What will I be asked to do?

- You will be asked to participate in a semi-structure interview which will last between 40-60 minutes
- The main topic of discussion will be of your experiences during the first year "Introduction to psychological Research Methods" module and the second year "Data Analysis for psychology" module.
- More specifically the interview will consist of questions regarding your overall experiences, feelings, study techniques used and motivation for studying.
- The interview will be conducted by the researcher Rosa Leino and recorder using audio recorder.

What about confidentiality and data protection?

This research is being conducted in accordance with the University of Westminster Code of Ethical Conduct, and the BPS Code of ethics. These documents are available online:
https://www.bps.org.uk/news-and-policy/bps-code-ethics-and-conduct
https://www.westminster.ac.uk/research/research-framework/research-ethics

The audio recording will be stored securely on an encrypted and password protected hard drive/repository at the University of Westminster and will only be seen by the research team. No identifying information will be revealed/asked for during the interview. The audio data will be securely transcribed and subsequently deleted. These transcriptions will be coded and analysed by the researcher Rosa Leino. Any information you give during the interview will be fully anonymised and combined with the views and experiences of other students who agree to participate. Throughout these processes your data will be labelled with your participation number only and your data will be added to a larger data set. You will not identifiable. The audio data will be transcribed by the researcher (Rosa Leino). Parts of the audio recording may be shared with the rest of the research team (Dr Anna Doering, Dr Mark Gardner and Dr Tina Cartwright), but will only be used for research purposes. The audio data will not be shared to anyone outside of the research team.

Your participation in this research is on an entirely voluntary basis, and you are able to withdraw without providing any reason, at any time up until the research has been published, or submitted in any form of a report (e.g., conference presentation, dissertation, etc.

NOTE: We will not store any personal identifying data, rather once you have participated we will provide you with a document that provides our contact details, and your personal participation code/number. Should you wish to withdraw at any time (until publication) simply refer to this document and contact us so that we can remove your contribution.

We will not be able to give feedback on individual performance, but we can provide all participants with a summary of the overall findings if requested

---

Thank you!

If you have any questions please contact the researcher Rosa Leino, at Rosa.Leino@westminster.ac.uk **or the supervisor Mark Gardner at** M.Gardner@westminster.ac.uk

Participation number: _____________

Consent form:

In signing this consent form I am agreeing to the following, and that my participation has been explained to my satisfaction – please tick each box below, as appropriate:

- My participation in this research is on an entirely voluntary basis. ☐
- I am able to stop at any point during the process without having to provide an explanation. ☐
- Once I have taken part, I am still able to withdraw **my data** at any point until the research has been published/submitted as part of my research project, or has been anonymised. ☐
- I do not have to answer all questions asked, and I can decline to answer any questions as I see fit. ☐
- My data will be anonymised, and all identifying features will be removed so that my contribution will not be identifiable when reporting this research. ☐
- If I provide any personal identity data this will be treated confidentially and in accordance with the University of Westminster ethical guidelines and British Psychological Society code of human research ethics. It will be securely stored and managed in accordance with the General Data Protection Regulation 2018 and the Data Protection Act 2018. ☐
- The duty of confidentiality is **not absolute** and in exceptional circumstances this may be overridden by more compelling duties such as to protect individuals from harm. ☐
- My anonymised contribution to this research may be used for future research, and may undergo secondary analysis. Future research may be related or unrelated to the goals of this study. ☐

Participant Signature:

____

Date:

____

DEMOGRAPHIC INFORMATION SHEET:

PARTICIPANT NUMBER:
Unique ID:

GENDER: ☐ **male** ☐ **Female** ☐ **Other**

Age:

FEE GROUP: ☐ **Home** ☐ **EU** ☐ **International**

Appendix 6.2: Study 3- Interview Schedule

Interview Schedule:

Thank you for agreeing to participate in this interview about your experiences of research methods at this university. This study is conducted as a part of PhD focusing on Psychology students learning of Research methods and the components involved. We are interested in your individual experiences and attitudes towards research methods. I am going to ask you some questions about your experiences during your Research methods journey at this university, elated to both your first year and second year modules. Please throughout the interview think back to your research methods modules, focusing on your first year the spring term when you were studying the module "Introduction to psychological Research Methods" and last term when you were studying "Data Analysis for psychology".
You can ask me to repeat a question if needed, but other from that I will contribute as little as possible. I am also going to record the session, so please speak clearly and remember that the recorder will not pick up nonverbal actions just as nodding. Therefore, try to voice everything. Please do not hesitate to express your real opinions, as they are highly valued. Your opinions expressed will be treated in confidence among project staff and will only be used for the purpose of this research. Your identity will not be disclosed to anyone outside the research team. I will now check that the recorder is working and then we will start the session. Could you please first just state your participant number?
Thinking back to your research methods journey and the beginning when you started on your degree and on the first year "Introduction to research methods module":

1. **What were your thoughts towards research methods and did you have any experiences of research methods or statistics before this course?** (Prompt: General thoughts towards RM, any previous experience of statistics, mathematics a-levels or other equivalent) **Did this lead to expectations/presumptions towards RM?** (prompt: negative or positive)
2. **Can you tell me more about how you felt about research methods in the beginning?** *Prompt: Why? Any reasons for these emotions?*
3. **Did your feelings change during the year?** *Prompt: For example, From first to second year. Why? How did you overcome the disengagement/ negative feelings? What helped you to maintain engagement/positivity?*
4. **How did you go about studying for the modules?** *Prompt: Was it, studying outside of class/during class, online learning, memorising what to do, or trying to understand the reasons behind.* **Did this differ from how you normally go about studying?** *Prompt: Spend more/less time studying that you normally would? (Used more help from books/internet, worked in groups etc.*

5. **How would you compare your first-year module experiences to your experiences on the second-year module?** *(Prompt: where they similar or different)*
6. **Did your approach to studying and engagement towards the research methods modules change during the year?** *Prompt: for example, from first to second year, Why? Changes in attendance or engagement with modules? How did you cope with this?*
7. **Where there particular turning points or any challenges that you faced during the year?** *Prompt; when did it start becoming easier/harder, attendance improved or dropped etc.?*
8. **What factors motivate your approach to learning research methods?** *Prompt: Getting good grade, importance of subject for degree, career, interest in subjects*
9. **Overall how would you summarise your learning experiences on the research methods modules?** (Prompt*: General thoughts about the modules and your learning experiences on them, Satisfaction with your learning, any challenges faced)***.**
10. **L**astly, I wanted to ask a question related to my research. I had some problems recruiting participants for my previous study (which consisted of three surveys). **I wanted to ask if you have any thoughts on why students did not complete the questionnaire? And what did you think of it?**
11. **Is there anything else you would like to add about your experiences on the research methods modules?**

Appendix 6.3: Study 3 debrief

Psychology Students' Research Methods Journey: Challenges and Accomplishments

Thank you for your participation!

Your participation will help to give us more insight into psychology students' experiences and feelings towards research methods, as well as the kind of challenges students might face. These findings will contribute to my PhD project which aims to explore reasons for difficulties in learning of research methods, as well as the possible reasons behind these difficulties, by looking at cognitive, affective and behavioural factors.

Most research conducted so far has focused on evaluating the outcomes of research methods learning, with few studies addressing the *processes* underpinning learning (Earley, 2014). Individual differences in psychological processes, such as learning approach, motivation, self-regulation metacognition, and self-efficacy may play a significant role in the success of learning (Richardson, et al., 2012). Furthermore, previous research has mainly been focused on statistics and test anxiety (Macher, et al,. 2012), with a few empirical studies focusing on other emotional factors that could influence students' learning of research methods Emotions can, for instance, facilitate the use of different learning strategies and promote self-regulated learning, with positive emotions being positively associated with self-regulation, motivation and the use of deeper learning strategies among university students (Pekrun, et al., 2011). Significant behavioural predictors of learning performances, including time spent on lectures, the number of assignments submitted, and so forth have also been found (Henrie, et al., 2015), as well as positive correlations between attendance and academic achievement (Bevitt, et al,.2010).

The PhD project aims to combine these cognitive, affective and behavioural variables, in order to explore psychology students learning of research methods further.

If you have any further questions or concerns regarding this survey or about the project please contact me at Rosa.Leino@my.westminster.ac.uk

Thank you again!

Appendix 6.4: Study 3 final codebook

Name	Description	References
Anxiety	Feelings of Anxiety	5
Apprehensive-new	Intimidated by new content	10
Asking for help when pushed to limit	Only asking for help as a last resort	2
Boredom	Feeling bored	11
Changing engagement	Learning engagement changed throughout modules	13
Classroom environment important	Influenced by classroom environment (teachers, other students, classroom)	3
Confident in abilities	Confident in abilities	8
Confidence growing	Confidence growing throughout the modules	8
Not confident	Not confident in abilities	3
Confusing	Feeling confused	22
Curious	Feeling curious	1
Enjoyment	Feelings of enjoyment	49
Excited	Feeling excited	5
Stupid/dumb	Seeing oneself as less intelligent	3
Following steps-instructions	Preference for steps and guidelines	18
Good engagement	Good engagement throughout the modules	9
Good grades - happiness	High grades lead to happiness	7
Hope	Feelings of hope	5
Journey -negative	Overall learning journey has been negative	2
Journey- rollercoaster	Learning journey has been a rollercoaster (ups and downs)	4
Procrastination	Leaving learning/assignments to the last minute	5
Mentally disengaged	Attending but not mentally engaging	5
Motivated by mark and usefulness	Motivated by mark and usefulness	9
Motivated by interest and understanding	Motivated by interest and understanding	7
Motivated by marks	Motivated by marks	5
Negative past experiences	Past experiences of RM have been negative	4
Nervous	Feeling nervous	2
New-positive	Unfamiliar content seen as something good/challenging	4
Overall negative feelings	Overall feelings of the modules are negative	14
Overall positive feelings	Overall feelings of the modules are positive	20

Name	Description	References
Positive learning mindset	Positive feelings towards the learning process	15
Practice makes perfect	Students realize the importance of practice/ studying	4
Preference for applied & transferable	Preferences for applied and transferable content	5
Preference for practical	Preference for practical	13
Previous RM experience- good	Previous experiences of RM have been positive	7
No experience	No previous experience of RM	3
RM - more practical based	RM seen as more practical	8
RM important & useful	RM seen as important and useful either for degree or career	8
RM more difficult	RM seen as more difficult than other modules	4
RM not as interesting	RM seems as less interesting compared to other modules	5
RM- interesting	RM seen as interesting	9
RM-less time	RM seen as taking less time to learn compared to other modules	6
Scared	Feelings of scaredness	5
Self-efficacy	High self-efficacy	11
Self-reflection	Able to reflect on their learning	4
SPSS hardest part	SPSS seen as the hardest part of module	6
Stress	Feelings stressed	25
Struggle when not set answers	Struggling with independent thinking/choices	6
Struggle with Maths/Stats	Struggling with the mathematical and stats side	10
Struggle with qualitative	Struggled with qualitative research	12
Trust in learning process	Students trust that they are able to learn eventually	9
Understanding and applying	Learning methods characterized by understanding	14
Useful or Good learning journey	Overall learning journey has been positive	14

Appendix 6.5 List of typologies and illustrative quotes

Typology	Participants	Illustrative quotes:
1. Positive learning attitude- Learning through interest and understanding	*P8* *P9* *P10* *P14*	*"Discuss the different methods on different topics we learnt from the module and we kind of like consolidate some of the learnings and the theories during like through the discussions with other people in the course, which I feel like I've got more kind off like a little bit more confidence on talking about statistics and research methods."* *"Like I always have this mind-set that even when I don't understand something like fully right now after some time those bits will have to like to get together"* *"But I feel more, I feel myself more interested in it. Like I have more interest in it and I want to go and do better."* *"Knowing that I can use it in the real world makes it more interesting and motivating, I think, because you can apply it to whatever you're thinking about that day or what you're learning in another module. I think that just makes it very interesting. "*
2. Positive learning attitude - Learning through guidelines and practice	P1 P5 P7 P11 P12 P15	*"I mean, it was a journey, as I said. I felt like the first semester was a bit dead. So, I felt like I really started enjoying it in the second semester. But I did enjoy it. You know, the first year and I am enjoying it again now. So, it's good. it's... I'm learning stuff"* *"Yeah so like grades yes obviously, but also the fact that whenever I am reading a paper I go to the results section and I'm like ok now I know what they say and why they wanted to calculate effect size or any other things yeah. And I want to do masters as well as soon as I graduate so I know this would be useful."* *" Yeah, I think following the steps helped. Like everything its straightforward. Just doing it, giving the time to do it and I was just following the instructions."* *"And but like I still do want to get a good grade out of it. So even though, because I'm not really entirely sure what I would like to do in the future. So even though I might not use it in the future, I would still like to learn about it. Because it is important for psychology"*
3.Apprehensive learning attitude - Intimidated by new content and challenges	P2 P3 P4 P6 P13	*"Ehm my main motivation is to get a good mark, which will overall contribute to my degree. And I think I am interested in the module, but the greater incentive and the price is the degree overall and any little thing that contributes to that will act as my driving force."* *"I think it's mainly the grades. I want to get a good grade."* *"think because I had done it so many times it was for me slightly tedious. I was kind of like ugh"* *"I think it was just something new, like I think we had to do like a correlation and write a quantitative report on it and I didn't do that before, so I was stressed about that."* *'Ehm not really, I'm interested in psychology but not like research"*

Appendix 6.6 University of Westminster Ethics Committee Approval Letter for Study 3

Project title: Learning of Research Methods in Psychology: The Influence of Cognitive, Affective and Behavioural Components

Application ID: ETH1920-0706
Date: 02 Feb 2020
Dear Rosa
I am writing to inform you that your application was considered by the Psychology Ethics Committee. The proposal was approved.

Yours,
Coral Dando
Psychology Ethics Committee
I am advised by the Committee to remind you of the following points:

Your responsibility to notify the Research Ethics Committee immediately of any information received by you, or of which you become aware, which would cast doubt upon, or alter, any information contained in the original application, or a later amendment, submitted to the Research Ethics Committee and/or which would raise questions about the safety and/or continued conduct of the research.

The need to comply with the Data Protection Act 2018 and General Data Protection Regulation (GDPR) 2018.
The need to comply, throughout the conduct of the study, with good research practice standards.

The need to refer proposed amendments to the protocol to the Research Ethics Committee for further review and to obtain Research Ethics Committee approval thereto prior to implementation (except only in cases of emergency when the welfare of the subject is paramount).

The desirability of including full details of the consent form in an appendix to your research, and of addressing specifically ethical issues in your methodological discussion.

The requirement to furnish the Research Ethics Committee with details of the conclusion and outcome of the project, and to inform the Research Ethics Committee should the research be discontinued. The Committee would prefer a concise summary of the conclusion and outcome of the project, which would fit no more than one side of A4 paper, please.

Appendix 6.7 Cluster analysis: Ward's Method, MANOVA and Univariate test results

Hierarchical cluster analysis using Ward's method with Euclidean distance as a measure of similarity (Hayenga & Corpus, 2010), and standardised scores was conducted using SPSS version 26. For most common hierarchical clustering software, the default distance measure is the Euclidean distance. This is the square root of the sum of the square difference. Ward's method was chosen as it aims to join cases into homogenous cluster while minimising the total within-cluster variance(Borgen & Barnett, 1987). Each case begins as its own cluster with Euclidean distance to the cluster means calculated. These distances are summed for all of the cases. Clusters are then merged in such a way as to reduce the variability within a cluster. That is, this method minimizes the increase in the overall sum of the squared within-cluster distances. The sum of squared deviations is used as a measure of error within a cluster. A case is selected to enter the cluster if it minimises the error within the cluster, meaning it minimises the overall sum of square deviations (Field, 2000. P.5-6).

Based on the typology results, the analysis was run with a pre-determined three cluster solution. The three-cluster solution identified similar clusters to those proposed in the typologies, for all three time-points. Cluster one was the largest composed of students with the highest intrinsic motivation and deep approach to learning, as well as high scores on self-regulation, task-value and self-efficacy beliefs during all three time-points. Cluster two students had middle to high scores in both deep, strategic and surface approach to learning, self-efficacy, self-regulation, and high positive emotions and extrinsic motivation. In contrast, the third cluster showed high scores in surface approach to learning, low self-efficacy and self-regulation, as well as the highest scores on negative emotions.

Separate Multivariate analysis of variance (MANOVA) tests were conducted for each time-point to test whether the ten self-reported variables significantly differed across the three clusters. The population means for the three clusters were judged to be equal; however, there were violations of multivariate normality. Thus, all multivariate F values were reported based on Pillai's Trace value as it is more robust to violations of normality assumptions (Tang & Neber, 2008). A Bonferroni correction for multiple comparisons was applied to prevent alpha inflation, with an adjusted p-value of .005. Finally, a separate ANOVA was conducted to examine differences in academic achievement (i.e. grade) across the 3 cluster, during 1^{st} and 2^{nd} year.

The results showed that the three clusters differed significantly in the self-reported variables, during T1 (Pillai's Trace = .98, $F(20,192) = 9.278$, $p < .001$, $\eta p^2 = .49$), T2 (Pillai's Trace = 1.19, $F(20,134) = 9,82$, $p < .001$, $\eta p^2 = .60$) and T3 (Pillai's Trace = 1.17, $F(20,122) = 8.56$, $p < .001$, $\eta p^2 = .58$). There were significant differences between all of the self-reported variables, expected for Deep-approach to learning in T2, and extrinsic motivation in T1 and T2. However, no significant differences between clusters for academic achievement could be found ($p > .05$) (See Table 1- for all univariate test results and post-hoc comparisons). Thus, these three clusters can be compared to the three typologies found in the interviews .

Table 1. Univariate F, Effect Size, and Cluster Means, Standard Deviations, and Standardised Scores for all cluster variables.

		Cluster 1		Cluster 2		Cluster 3	
T1 Variables	F (ηp^2)	Mean (SD)	*n*	Mean(SD)	*n*	Mean(SD)	*n*
Deep approach	18.59^{***} (.26)	25.45^{a} (2.14)	20	21.56^{b} (2.76)	57	20.43 $(3.66)^{b}$	30
Surface approach	50.03^{***} (.49)	12.80 $(2.74)^{a}$	20	17.36 $(3.11)^{b}$	57	22.03 $(3.74)^{c}$	30
Strategic approach	21.36^{***}(.29)	24.65 (3.78)	20	20.40 (3.26)	57	18.00 (3.85)	30
Positive Emotions	49.06^{***} (.49)	4.15 $(.41)^{a}$	20	3.39 $(.40)^{b}$	57	2.82 $(.59)^{c}$	30
Negative-deactivating	49.83^{***} (.49)	1.55 $(.41)^{a}$	20	2.08 $(.55)^{b}$	57	3.39 $(.79)^{c}$	30
Negative activating	$26.54^{** *}$(.34)	1.59 $(.50)^{a}$	20	2.05 $(.63)^{b}$	57	3.08 $(.68)^{c}$	30
Intrinsic Motivation	9.04^{***} (.15)	$5.41(.85)^{a}$	20	4.82 $(.92)^{b}$	57	$4.02(1.11)^{c}$	30
Extrinsic Motivation	1.33 (.03)	5.00 (1.20)	20	5.43(1.17)	57	5.19 (1.25)	30
Self-regulation	35.62^{***} (.41)	5.70 $(.65)^{a}$	20	4.87 $(.61)^{b}$	57	4.02 $(.88)^{c}$	30
Self-efficacy	27.53^{***} (.49)	5.5 $(.72)^{a}$	20	4.79 $(.85)^{b}$	57	3.71 $(1.05)^{b}$	30
Y1 Module grade	.33 (.01)	60.77 (10.58)	13	62.00 (10.59)	35	59.55 (10.19)	18
T2							
Deep approach	4.93 (.12)	22.21 $(2.96)^{a}$	29	22.39 $(2.79)^{a}$	28	19.43 $(5.05)^{b}$	21
Surface approach	43.56^{***} (.54)	13.34 $(3.12)^{a}$	29	20.04 $(3.10)^{b}$	28	22.09 $(4.54)^{b}$	21
Strategic Approach	$13.82(.27)^{***}$	21.71 $(2.69)^{a}$	29	22.41 $(3.70)^{a}$	28	17.19 $(4.63)^{b}$	21
Positive Emotions	49.06^{***} (.49)	5.89 $(.65)^{a}$	29	4.92 $(.62)^{b}$	28	4.27 $(.97)^{c}$	21
Negative-deactivating	49.83^{***} (.49)	1.58 $(.39)^{a}$	29	2.52 $(.36)^{b}$	28	3.23 $(.66)^{c}$	21
Negative activating	$26.54^{** *}$(.34)	1.55 $(.44)^{a}$	29	2.57 (.54)b	28	3.08 $(.67)^{c}$	21
Intrinsic Motivation	13.54^{***} (.26)	5.39 $(.77)^{a}$	29	4.27 $(88)^{b}$	28	4.13 $(.89)^{b}$	21
Extrinsic Motivation	1.18 (.03)	5.02 (1.72	29	5.58 (.77)	28	5.37 (1.25)	21
Self-regulation	13.51^{***} (.27)	5.07 $(.82)^{a}$	29	5.01 $(.79)^{a}$	28	3.94 $(.89)^{b}$	21
Self-efficacy	26.68^{***} (.42)	5.17 $(.97)^{a}$	29	5.04 $(.92)^{a}$	28	3.43 $(.77)^{b}$	21
Y2 Module grade	2.51 (.07)	65.65 (9.48)	26	61.45 (11.01)	25	58.29 (12.63)	18
T3 Variables							
Deep approach	9.91^{**}(.22)	22.58 $(2.93)^{a}$	24	21.28 $(3.75)^{a}$	29	18.16 $(2.95)^{b}$	19
Surface approach	39.60^{***} (.54)	13.00 $(2.62)^{a}$	24	19.06 $(3.28)^{b}$	29	21.16 $(3.70)^{b}$	19
Strategic approach	21.14^{***}(.38)	$24.12(3.78)^{a}$	24	20.41 $(3.76)^{b}$	29	16.52 $(3.93)^{c}$	19
Positive Emotions	49.06^{***} (.49)	3.81 $(.38)^{a}$	24	3.14 $(.52)^{b}$	29	2.57 $(.53)^{c}$	19
Negative-deactivating	49.83^{***} (.49)	1.57 $(.43)^{a}$	24	2.64 $(.67)^{b}$	29	3.37 $(.81)^{c}$	19
Negative activating	$26.54^{** *}$(.34)	1.26 $(.29)^{a}$	24	2.21 $(.69)^{b}$	29	2.94 $(.63)^{c}$	19
Intrinsic Motivation	20.69^{***} (.38)	5.38 $(.79)^{a}$	24	4.76 $(.92)^{b}$	29	3.68 $(.86)^{c}$	19
Extrinsic Motivation	8.95^{***} (.21)	4.69 $(1.27)^{a}$	24	5.92 $(.73)^{a}$	29	5.70 $(1.07)^{b}$	19
Self-regulation	13.51^{***} (.27)	5.35 $(.78)^{a}$	24	5.26 $(.66)^{a}$	29	3.63 $(.80)^{b}$	19
Self-efficacy	24.20^{***} (.41)	5.49 $(.79)^{a}$	24	4.79 $(.86)^{b}$	29	3.66 $(.95)^{c}$	19
Y2 Module grade	3.90 (.10)	65.16 (10.06)	23	65.54 (8.46)	29	57.39 (13.50)	18

Means in the same row with different superscript letters differ significantly at $p < .05$ in the Tukey's HSD comparison

Note: $^{**}p < .005$ $^{***}p<.001$

References:

Agudo-Peregrina, Á. F., Iglesias-Pradas, S., Conde-González, M. Á., & Hernández-García, Á. (2014). Can we predict success from log data in VLEs? Classification of interactions for learning analytics and their relation with performance in VLE-supported F2F and online learning. *Computers in Human Behavior*, *31*(1), 542–550. https://doi.org/10.1016/j.chb.2013.05.031

Akinoğlu, O., & Tandoğan, R. Ö. (2007). The effects of problem-based active learning in science education on students' academic achievement, attitude and concept learning. *Eurasia Journal of Mathematics, Science and Technology Education*, *3*(1), 71–81. https://doi.org/10.12973/ejmste/75375

Alam, M. M. (2014). A Study of Test Anxiety, Self-Esteem and Academic Performance Among Adolescents. *IUP Journal of Organizational Behavior*, *12*(4).

Alhadabi, A., & Karpinski, A. C. (2020). Grit, self-efficacy, achievement orientation goals, and academic performance in University students. *International Journal of Adolescence and Youth*, *25*(1), 519–535. https://doi.org/10.1080/02673843.2019.1679202

Allen, M. (2017). The SAGE Encyclopedia of Communication Research Methods. In *The SAGE Encyclopedia of Communication Research Methods*. SAGE Publications, Inc. https://doi.org/10.4135/9781483381411

Allen, P. J., & Baughman, F. D. (2016). Active Learning in Research Methods Classes Is Associated with Higher Knowledge and Confidence, Though not Evaluations or Satisfaction. *Frontiers in Psychology*, *7*(MAR), 279. https://doi.org/10.3389/fpsyg.2016.00279

Allen, P. J., Dorozenko, K. P., & Roberts, L. D. (2016). Difficult Decisions: A Qualitative Exploration of the Statistical Decision Making Process from the Perspectives of Psychology Students and Academics. *Frontiers in Psychology*, *7*, 188. https://doi.org/10.3389/fpsyg.2016.00188

Appleton, J. J., Christenson, S. L., & Furlong, M. J. (2008). Student engagement with school: Critical conceptual and methodological issues of the construct. *Psychology in the Schools*, *45*(5), 369–386. https://doi.org/10.1002/pits.20303

Artino, A. R. (2012). Academic self-efficacy: from educational theory to instructional practice. *Perspectives on Medical Education*, *1*(2), 76–85. https://doi.org/10.1007/s40037-012-0012-5

Artino, A. R., Holmboe, E. S., & Durning, S. J. (2012). Control-value theory: Using achievement emotions to improve understanding of motivation, learning, and performance in medical education: AMEE Guide No. 64. *Medical Teacher*, *34*(3), e148–e160. https://doi.org/10.3109/0142159X.2012.651515

Artino, A. R., & Jones, K. D. (2012). Exploring the complex relations between achievement emotions and self-regulated learning behaviors in online learning. *Internet and Higher Education*, *15*(3), 170–175. https://doi.org/10.1016/j.iheduc.2012.01.006

Artino, A. R., La Rochelle, J. S., & Durning, S. J. (2010). Second-year medical students' motivational beliefs, emotions, and achievement. *Medical Education*, *44*(12), 1203–1212. https://doi.org/10.1111/j.1365-2923.2010.03712.x

Artino, A. R., & Stephens, J. M. (2009). Beyond grades in online learning: Adaptive profiles of academic self-regulation among naval academy undergraduates. *Journal of Advanced Academics*, *20*(4), 568-601.

Asikainen, H., & Gijbels, D. (2017). Do Students Develop Towards More Deep Approaches to Learning During Studies? A Systematic Review on the Development of Students'

Deep and Surface Approaches to Learning in Higher Education. *Educational Psychology Review*, *29*(2), 205–234. https://doi.org/10.1007/s10648-017-9406-6

Asikainen, H., Hailikari, T., & Mattsson, M. (2018). The interplay between academic emotions, psychological flexibility and self-regulation as predictors of academic achievement. *Journal of Further and Higher Education*, *42*(4), 439–453. https://doi.org/10.1080/0309877X.2017.1281889

Asikainen, H., Parpala, A., Virtanen, V., & Lindblom-Ylänne, S. (2013). The relationship between student learning process, study success and the nature of assessment: A qualitative study. *Studies in Educational Evaluation*, *39*(4), 211–217. https://doi.org/10.1016/j.stueduc.2013.10.008

Atkinson, J. W. (1957). Motivational determinants of risk-taking behavior. *Psychological Review*, *64*(6, Pt.1), 359–372. https://doi.org/10.1037/h0043445

Au, R. C. P., Watkins, D. A., & Hattie, J. A. C. (2010). Academic risk factors and deficits of learned hopelessness: A longitudinal study of Hong Kong secondary school students. *Educational Psychology*, *30*(2), 125–138. https://doi.org/10.1080/01443410903476400

Bailey, T. H., & Phillips, L. J. (2016). The influence of motivation and adaptation on students’ subjective well-being, meaning in life and academic performance. *Higher Education Research and Development*, *35*(2), 201–216. https://doi.org/10.1080/07294360.2015.1087474

Ball, C. T., & Pelco, L. E. (2006). Teaching Research Methods to Undergraduate Psychology Students Using an Active Cooperative Learning Approach. *International Journal of Teaching and Learning in Higher Education*, *17*(2), 147–154.

Balloo, K., Pauli, R., & Worrell, M. (2016). Individual Differences in Psychology Undergraduates’ Development of Research Methods Knowledge and Skills. *Procedia*

- *Social and Behavioral Sciences*, *217*, 790–800. https://doi.org/10.1016/j.sbspro.2016.02.147

Balloo, K., Pauli, R., & Worrell, M. (2018). Conceptions of Research Methods Learning Among Psychology Undergraduates: A Q Methodology Study *. *Cognition and Instruction*, *36*(4), 279–296. https://doi.org/10.1080/07370008.2018.1494180

Baloğlu, M. (2003). Individual differences in statistics anxiety among college students. *Personality and Individual Differences*, *34*(5), 855–865. https://doi.org/10.1016/S0191-8869(02)00076-4

Bandalos, D. L., Finney, S. J., & Geske, J. A. (2003). A model of statistics performance based on achievement goal theory. *Journal of Educational Psychology*, *95*(3), 604–616. https://doi.org/10.1037/0022-0663.95.3.604

Bandura, A., Freeman, W. H., & Lightsey, R. (1999). Self-Efficacy: The Exercise of Control. *Journal of Cognitive Psychotherapy*, *13*(2), 158–166. https://doi.org/10.1891/0889-8391.13.2.158

Barlow, D. H. (2000). Unraveling the mysteries of anxiety and its disorders from the perspective of emotion theory. *The American Psychologist*, *55*(11), 1247–1263. http://www.ncbi.nlm.nih.gov/pubmed/11280938

Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, *51*(6), 1173–1182. https://doi.org/10.1037//0022-3514.51.6.1173

Barraket, J. (2005). Teaching Research Method Using a Student-Centred Approach? Critical Reflections on Practice. *Journal of University Teaching and Learning Practice*, *2*(2).

Barry, J. (2012). Do Students Who Get Low Grades Only in Research Methods Need the Same Help as Students Who Get Low Grades in All Topics in Psychology?,

Psychology Teaching Review, 2012. *Psychology Teaching Review*, *18*(2), 116–125. https://eric.ed.gov/?id=EJ991415

Bartimote-Aufflick, K., Bridgeman, A., Walker, R., Sharma, M., & Smith, L. (2016). The study, evaluation, and improvement of university student self-efficacy. In *Studies in Higher Education* (Vol. 41, Issue 11, pp. 1918–1942). Routledge. https://doi.org/10.1080/03075079.2014.999319

Baumeister, R. F., & Leary, M. R. (1995). The need to belong: Desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin*, *117*(3), 497–529. https://doi.org/10.1037/0033-2909.117.3.497

Beattie, V., Collins, B., & McInnes, B. (1997). Deep and surface learning: A simple or simplistic dichotomy? *International Journal of Phytoremediation*, *21*(1), 1–12. https://doi.org/10.1080/096392897331587

Ben-Eliyahu, A., Moore, D., Dorph, R., & Schunn, C. D. (2018). *Investigating the multidimensionality of engagement: Affective, behavioral, and cognitive engagement across science activities and contexts A R T I C L E I N F O*. https://doi.org/10.1016/j.cedpsych.2018.01.002

Bevitt, D., Baldwin, C., & Calvert, J. (2010a). Intervening Early: Attendance and Performance Monitoring as a Trigger for First Year Support in the Biosciences. *Bioscience Education*, *15*(1), 1–14. https://doi.org/10.3108/beej.15.4

Bevitt, D., Baldwin, C., & Calvert, J. (2010b). Intervening Early: Attendance and Performance Monitoring as a Trigger for First Year Support in the Biosciences. *Bioscience Education*, *15*(1), 1–14. https://doi.org/10.3108/beej.15.4

Biggs, J. B. (1987). *Student Approaches to Learning and Studying. Research Monograph.* Australian Council for Educational Research, Hawthorn. https://eric.ed.gov/?id=eD308201

Bijsmans, P., & Schakel, A. H. (2018). The impact of attendance on first-year study success in problem-based learning. *Higher Education*, *76*(5), 865–881. https://doi.org/10.1007/s10734-018-0243-4

Birenbaum, M., & Eylath, S. (1994). Who is afraid of statistics? Correlates of statistics anxiety among students of educational sciences. *Educational Research*, *36*(1), 93–98. https://doi.org/10.1080/0013188940360110

Black, A. E., & Deci, E. L. (2000). The Effects of Instructors' Autonomy Support and Students' Autonomous Motivation on Learning Organic Chemistry: A Self-Determination Theory Perspective. In *John Wiley & Sons, Inc. Sci Ed* (Vol. 84). https://selfdeterminationtheory.org/SDT/documents/2000_BlackDeci.pdf

Bodas, J., & Ollendick, T. H. (2005). Test Anxiety: A Cross-Cultural Perspective. *Clinical Child and Family Psychology Review*, *8*(1), 65–88. https://doi.org/10.1007/s10567-005-2342-x

Boekaerts, M., & Cascallar, E. (2006). How Far Have We Moved Toward the Integration of Theory and Practice in Self-Regulation? *Educational Psychology Review*, *18*(3), 199–210. https://doi.org/10.1007/s10648-006-9013-4

Bond, M. ., Perkins, S. ., & Ramirez, C. (2012). Students' perceptions of statistics: An exploration of attitudes, conceptulizations, and content knowledge of statistics. - PsycNET. *Statistics Education Research Journal*, *11*(2), 6–25. https://psycnet.apa.org/record/2012-33955-001

Borgen, F. H., & Barnett, D. C. (1987). Applying Cluster Analysis in Counseling Psychology Research. *Journal of Counseling Psychology*, *34*(4), 456–468. https://doi.org/10.1037/0022-0167.34.4.456

Bos, N., Groeneveld, C., van Bruggen, J., & Brand-Gruwel, S. (2016). The use of recorded lectures in education and the impact on lecture attendance and exam performance.

British Journal of Educational Technology, *47*(5), 906–917. https://doi.org/10.1111/bjet.12300

Boulton, C. A., Kent, C., & Williams, H. T. P. (2018). Virtual learning environment engagement and learning outcomes at a ‘bricks-and-mortar’ university. *Computers and Education*, *126*, 129–142. https://doi.org/10.1016/j.compedu.2018.06.031

Bourne, V. J. (2018a). Exploring statistics anxiety: Contrasting mathematical, academic performance and trait psychological predictors. In *Psychology Teaching Review* (Vol. 24, Issue 1).

Bourne, V. J. (2018b). Does mathematical ability predict performance in the research components of an undergraduate psychology degree? Only a little bit, for a little while, and in specific ways. *Scholarship of Teaching and Learning in Psychology*, *4*(3), 181.

Bowen, E., Price, T., Lloyd, S., & Thomas, S. (2005). Improving the quantity and quality of attendance data to enhance student retention. *Journal of Further and Higher Education*, *29*(4), 375–385. https://doi.org/10.1080/03098770500353714

Bowman, N. A. (2010). Can 1st-year college students accurately report their learning and development? *American Educational Research Journal*, *47*(2), 466–496. https://doi.org/10.3102/0002831209353595

Boyd, D., & Crawford, K. (2012). Critical questions for big data: Provocations for a cultural, technological, and scholarly phenomenon. *Information Communication and Society*, *15*(5), 662–679. https://doi.org/10.1080/1369118X.2012.678878

Braguglia, K. H., & Jackson, K. A. (2012). Project-Based Three Course Sequence. *American Journal of Business Education*, *5*(3), 347–352. https://doi.org/10.19030/ajbe.v5i3.7007

Brannen, J. (2005). Mixing Methods: The Entry of Qualitative and Quantitative Approaches into the Research Process. *International Journal of Social Research Methodology*, *8*(3), 173–184. https://doi.org/10.1080/13645570500154642

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2), 77–101. https://doi.org/10.1191/1478088706qp063oa

Braun, V., & Clarke, V. (2019). Reflecting on reflexive thematic analysis. In *Qualitative Research in Sport, Exercise and Health* (Vol. 11, Issue 4, pp. 589–597). Routledge. https://doi.org/10.1080/2159676X.2019.1628806

Breen, L. J., & Darlaston-Jones, D. (2010). Moving beyond the enduring dominance of positivism in psychological research: Implications for psychology in Australia. *Australian Psychologist*, *45*(1), 67–76. https://doi.org/10.1080/00050060903127481

Broadbent, J., & Poon, W. L. (2015). Self-regulated learning strategies & academic achievement in online higher education learning environments: A systematic review. In *Internet and Higher Education* (Vol. 27, pp. 1–13). Elsevier Ltd. https://doi.org/10.1016/j.iheduc.2015.04.007

Büchele, S. (2021). Evaluating the link between attendance and performance in higher education: the role of classroom engagement dimensions. *Assessment and Evaluation in Higher Education*, *46*(1), 132–150. https://doi.org/10.1080/02602938.2020.1754330

Buckingham Shum, S., & Deakin Crick, R. (2012). *Learning dispositions and transferable competencies: pedagogy, modelling and learning analytics*. http://oro.open.ac.uk/32823/

Buckley, C. A., Pitt, E., Norton, B., & Owens, T. (2010). Students' approaches to study, conceptions of learning and judgements about the value of networked technologies.

Active Learning in Higher Education, *11*(1), 55–65. https://doi.org/10.1177/1469787409355875

Bui, N. H., & Alfaro, M. A. (2011). Statistics anxiety and science attitudes: Age, gender, and ethnicity factors. *College Student Journal*, *45*, 573–585.

Burd, E., Hodgson, B., Rd, S., & LizBurd, D. (2006). *Innovation in Teaching and Learning in Information and Attendance and Attainment: a five year study Attendance and Attainment: a five year study*. https://doi.org/10.11120/ital.2006.05020004

Butz, N. T., Stupnisky, R. H., & Pekrun, R. (2015). Students' emotions for achievement and technology use in synchronous hybrid graduate programmes: A control-value approach. *Research in Learning Technology*, *23*. https://doi.org/10.3402/rlt.v23.26097

The British Psychological Society. (2017, October). *Standards for the accreditation of undergraduate, conversion and integrated Masters programmes in psychology*. BPS.

Camacho-Morles, J., Slemp, G. R., Pekrun, R., Loderer, K., Hou, H., & Oades, L. G. (2021). Activity Achievement Emotions and Academic Performance: A Meta-analysis. *Educational Psychology Review*, 1–45. https://doi.org/10.1007/s10648-020-09585-3

Carmona–Halty, M., Salanova, M., Llorens, S., & Schaufeli, W. B. (2018). How Psychological Capital Mediates Between Study–Related Positive Emotions and Academic Performance. *Journal of Happiness Studies*, 1–13. https://doi.org/10.1007/s10902-018-9963-5

Cassady, J. C., & Gridley, B. E. (2005). The Effects of Online Formative and Summative Assessment on Test Anxiety and Performance. In *The Journal of Technology, Learning, and Assessment* ,4, (1). www.jtla.org

Cassady, J. C., & Johnson, R. E. (2002). Cognitive Test Anxiety and Academic Performance. *Contemporary Educational Psychology*, *27*, 270–295. https://doi.org/10.1006

Cassidy, S. (2004). Learning styles: An overview of theories, models, and measures. In *Educational Psychology*. https://doi.org/10.1080/0144341042000228834

Cassidy, S. (2012). Exploring individual differences as determining factors in student academic achievement in higher education. *Studies in Higher Education*, *37*(7), 793–810. https://doi.org/10.1080/03075079.2010.545948

Cassidy, S. (2016). Virtual Learning Environments as Mediating Factors in Student Satisfaction with Teaching and Learning in Higher Education. *Journal of Curriculum and Teaching*, *5*(1), 113. https://doi.org/10.5430/jct.v5n1p113

Cassidy, S., & Eachus, P. (2000). Learning style, academic belief systems, self-report student proficiency and academic achievement in higher education. *Educational Psychology*, *20*(3), 307–322. https://doi.org/10.1080/713663740

Cerezo, R., Sánchez-Santillán, M., Paule-Ruiz, M. P., & Núñez, J. C. (2016). Students' LMS interaction patterns and their relationship with achievement: A case study in higher education. *Computers and Education*, *96*, 42–54. https://doi.org/10.1016/j.compedu.2016.02.006

Chamorro-Premuzic, T., & Furnham, A. (2009). Mainly Openness: The relationship between the Big Five personality traits and learning approaches. *Learning and Individual Differences*, *19*(4), 524–529. https://doi.org/10.1016/j.lindif.2009.06.004

Chapell, M. S., Benjamin Blanding, Z., Takahashi, M., Silverstein, M. E., Newman, B., Gubi, A., & McCann, N. (2005). Test anxiety and academic performance in undergraduate and graduate students. *Journal of Educational Psychology*, *97*(2), 268–274. https://doi.org/10.1037/0022-0663.97.2.268

Chiesi, F., & Primi, C. (2010). Cognitive and non-cognitive factors related to students' statistics achievement. *Statistics Education Research Journal*, *9*(1), 6-26.

Chiesi, F., Primi, C., & Carmona, J. (2011). Measuring Statistics Anxiety: Cross-Country Validity of the Statistical Anxiety Scale (SAS). *Journal of Psychoeducational Assessment*, *29*(6), 559–569. https://doi.org/10.1177/0734282911404985

Creswell, J. W., Klassen, A. C., Plano Clark, V. L., & Smith, K. C. (2011). Best practices for mixed methods research in the health sciences. *Bethesda (Maryland): National Institutes of Health*, *2013*, 541-545.

Christenson, S. L., Wylie, C., & Reschly, A. L. (2012). Handbook of Research on Student Engagement. In *Handbook of Research on Student Engagement*. Springer US. https://doi.org/10.1007/978-1-4614-2018-7

Christie, H., Tett, L., Cree, V. E., Hounsell, J., & McCune, V. (2008). 'A real rollercoaster of confidence and emotions': learning to be a university student. *Studies in Higher Education*, *33*(5), 567–581. https://doi.org/10.1080/03075070802373040

Christie, H., Tett, L., Cree, V. E., & McCune, V. (2016). 'It all just clicked': a longitudinal perspective on transitions within university. *Studies in Higher Education*, *41*(3), 478–490. https://doi.org/10.1080/03075079.2014.942271

Clark, G., Gill, N., Walker, M., & Whittle, R. (2011). Attendance and performance: Correlations and motives in lecture-based modules. *Journal of Geography in Higher Education*, *35*(2), 199–215. https://doi.org/10.1080/03098265.2010.524196

Cleary, M., Escott, P., Horsfall, J., Walter, G., & Jackson, D. (2014). Qualitative research: The optimal scholarly means of understanding the patient experience. *Issues in Mental Health Nursing*, *35*(11), 902–904. https://doi.org/10.3109/01612840.2014.965619

Coates, H. (2016). Assessing student learning outcomes internationally: insights and frontiers. *Assessment and Evaluation in Higher Education*, *41*(5), 662–676. https://doi.org/10.1080/02602938.2016.1160273

Coffield, F., Moseley, D., Hall, E., & Ecclestone, K. (2004). Learning Styles and Pedagogy in post-16 learning: a systematic and critical review - *ePrints - Newcastle University.* https://eprints.ncl.ac.uk/12196

Colby, J. (2005). Attendance and Attainment - a comparative study. *Innovation in Teaching and Learning in Information and Computer Sciences*, *4*(2), 1–13. https://doi.org/10.11120/ital.2005.04020002

Conners, F. A., McCown, S. M., & Roskos-Ewoldsen, B. (1998). Unique Challenges in Teaching Undergraduate Statistics. *Teaching of Psychology*, *25*(1), 40–42. https://doi.org/10.1207/s15328023top2501_12

Conneely, S., & Hughes, B. M. (2010). Test anxiety and sensitivity to social support among college students: Effects on salivary cortisol. *Cognition, Brain, Behavior*, *14*(4), 295.

Conole, G., & Dyke, M. (2004). What are the affordances of information and communication technologies? *ALT-J*, *12*(2), 113–124. https://doi.org/10.1080/0968776042000216183

Cortright, R. N., Lujan, H. L., Cox, J. H., & DiCarlo, S. E. (2011). Does sex (female versus male) influence the impact of class attendance on examination performance? *Advances in Physiology Education*, *35*(4), 416–420. https://doi.org/10.1152/advan.00021.2011

Cotton, D. R. E., Joyner, M., George, R., & Cotton, P. A. (2016). Understanding the gender and ethnicity attainment gap in UK higher education. *Innovations in Education and Teaching International*, *53*(5), 475–486. https://doi.org/10.1080/14703297.2015.1013145

Coutinho, S. A., & Neuman, G. (2008). A model of metacognition, achievement goal orientation, learning style and self-efficacy. *Learning Environments Research*, *11*(2), 131–151. https://doi.org/10.1007/s10984-008-9042-7

Covington, M. V. (2000). Goal Theory, Motivation, and School Achievement: An Integrative Review. *Annual Review of Psychology*, *51*(1), 171–200. https://doi.org/10.1146/annurev.psych.51.1.171

Craik, F. I. M., & Lockhart, R. S. (1972). Levels of Processing: A Framework for Memory Research 1. In *journal of verbal learning and verbal behavior* (vol. 11). http://wixtedlab.ucsd.edu/publications/Psych 218/Craik_Lockhart_1972.pdf

Cramer, K. M., Collins, K. R., Snider, D., & Fawcett, G. (2007). The virtual lecture hall: utilisation, effectiveness and student perceptions. *British Journal of Educational Technology*, *38*(1), 106–115. https://doi.org/10.1111/j.1467-8535.2006.00598.x

Credé, M., & Phillips, L. A. (2011). A meta-analytic review of the Motivated Strategies for Learning Questionnaire. *Learning and Individual Differences*, *21*(4), 337–346. https://doi.org/10.1016/j.lindif.2011.03.002

Credé, M., Roch, S. G., & Kieszczynka, U. M. (2010a). Class attendance in college: A meta-analytic review of the relationship of class attendance with grades and student characteristics. In *Review of Educational Research*, *80*(2), pp. 272–295). https://doi.org/10.3102/0034654310362998

Crumpton, H. E., & Gregory, A. (2011). "I'm Not Learning": The Role of Academic Relevancy for Low-Achieving Students. *The Journal of Educational Research*, *104*(1), 42–53. https://doi.org/10.1080/00220670903567398

Curran, P. J., Obeidat, K., & Losardo, D. (2010). Twelve frequently asked questions about growth curve modeling. *Journal of Cognition and Development*, *11*(2), 121–136. https://doi.org/10.1080/15248371003699969

Danermark, B. (2002). Interdisciplinary Research and Critical Realism The Example of Disability Research. *Alethia*, *5*(1), 56–64. https://doi.org/10.1558/aleth.v5i1.56

Daniels, L. M., Haynes, T. L., Stupnisky, R. H., Perry, R. P., Newall, N. E., & Pekrun, R. (2008). Individual differences in achievement goals: A longitudinal study of cognitive, emotional, and achievement outcomes. *Contemporary Educational Psychology*, *33*(4), 584–608. https://doi.org/10.1016/j.cedpsych.2007.08.002

Daniels, L. M., Stupnisky, R. H., Pekrun, R., Haynes, T. L., Perry, R. P., & Newall, N. E. (2009). A Longitudinal Analysis of Achievement Goals: From Affective Antecedents to Emotional Effects and Achievement Outcomes. *Journal of Educational Psychology*, *101*(4), 948–963. https://doi.org/10.1037/a0016096

Davies, C. P. (2020). Are VLEs still worthwhile? *Journal of Learning Development in Higher Education*, *18*(18), 1759–667. https://doi.org/10.47408/jldhe.vi18.577

Deci, E. L., & Ryan, R. M. (1985). The general causality orientations scale: Self-determination in personality. *Journal of research in personality*, *19*(2), 109-134.

Dempster, M., & Mccorry, N. K. (2009). The Role of Previous Experience and Attitudes Toward Statistics in Statistics Assessment Outcomes among Undergraduate Psychology Students. *Journal of Statistics Education*, *17*(2). https://doi.org/10.1080/10691898.2009.11889515

Desmedt, E., & Valcke, M. (2004). Mapping the learning styles "jungle": An overview of the literature based on citation analysis. *Educational Psychology*, *24*(4), 445–464. https://doi.org/10.1080/0144341042000228843

DiCicco-Bloom, B., & Crabtree, B. F. (2006). The qualitative research interview. In *Medical Education* (Vol. 40, Issue 4, pp. 314–321). John Wiley & Sons, Ltd. https://doi.org/10.1111/j.1365-2929.2006.02418.x

Diener, E. (2000). Subjective well-being: The science of happiness and a proposal for a national index. *American Psychologist*, *55*(1), 34–43. https://doi.org/10.1037/0003-066X.55.1.34

Dignath, C., Buettner, G., & Langfeldt, H.-P. (2008). How can primary school students learn self-regulated learning strategies most effectively?: A meta-analysis on self-regulation training programmes. *Educational Research Review*, *3*(2), 101–129. https://doi.org/10.1016/J.EDUREV.2008.02.003

Diseth, Å. (2003). Personality and Approaches to Learning as Predictors of Academic Achievement. *European Journal of Personality*, *17*(2), 143–155. https://doi.org/10.1002/per.469

Diseth, Å. (2007). Approaches to learning, course experience and examination grade among undergraduate psychology students: Testing of mediator effects and construct validity. *Studies in Higher Education*, *32*(3), 373–388. https://doi.org/10.1080/03075070701346949

Diseth, Å. (2011). Self-efficacy, goal orientations and learning strategies as mediators between preceding and subsequent academic achievement. *Learning and Individual Differences*, *21*(2), 191–195. https://doi.org/10.1016/J.LINDIF.2011.01.003

Diseth, Å., & Kobbeltvedt, T. (2010). A mediation analysis of achievement motives, goals, learning strategies, and academic achievement. *British Journal of Educational Psychology*, *80*(4), 671–687. https://doi.org/10.1348/000709910X492432

Diseth, Å., & Martinsen, Ø. (2003). Approaches to Learning, Cognitive Style, and Motives as Predictors of Academic Achievement. *Educational Psychology*, *23*(2), 195–207. https://doi.org/10.1080/01443410303225

Diseth, Å., Pallesen, S., Brunborg, G. S., & Larsen, S. (2010). Academic achievement among first semester undergraduate psychology students: The role of course experience, effort, motives and learning strategies. *Higher Education*, *59*(3), 335–352. https://doi.org/10.1007/s10734-009-9251-8

Diseth, Å., Pallesen, S., Hovland, A., & Larsen, S. (2006). Course experience, approaches to learning and academic achievement. *Education + Training*, *48*(2/3), 156–169. https://doi.org/10.1108/00400910610651782

Dolmans, D. H. J. M., Loyens, S. M. M., Marcq, H., & Gijbels, D. (2016). Deep and surface learning in problem-based learning: a review of the literature. *Advances in Health Sciences Education : Theory and Practice*, *21*(5), 1087–1112. https://doi.org/10.1007/s10459-015-9645-6

Donche, V., Coertjens, L., & Van Petegem, P. (2010). Learning pattern development throughout higher education: A longitudinal study. *Learning and Individual Differences*, *20*(3), 256–259. https://doi.org/10.1016/j.lindif.2010.02.002

Doyle, L., O'Brien, F., Timmins, F., Tobin, G., O'Rourke, F., & Doherty, L. (2008). An evaluation of an attendance monitoring system for undergraduate nursing students. *Nurse Education in Practice*, *8*(2), 129–139. https://doi.org/10.1016/j.nepr.2007.09.007

Duncan, T. G., & McKeachie, W. J. (2005). The making of the motivated strategies for learning questionnaire. *Educational psychologist*, *40*(2), 117-128.

Durik, A. M., Shechter, O. G., Noh, M., Rozek, C. S., & Harackiewicz, J. M. (2015). What if I can't? Success expectancies moderate the effects of utility value information on situational interest and performance. *Motivation and Emotion*, *39*(1), 104–118. https://doi.org/10.1007/s11031-014-9419-0

Dusek, J. B. (1980). The development of test anxiety in children. *Test anxiety: Theory, research, and applications*, 87-110.

Earley, M. A. (2014). A synthesis of the literature on research methods education. *Teaching in Higher Education*, *19*(3), 242–253. https://doi.org/10.1080/13562517.2013.860105

Edwards, D. F., & Thatcher, J. (2004). A student-centred tutor-led approach to teaching research methods. *Journal of Further and Higher Education*, *28*(2), 195–206. https://doi.org/10.1080/0309877042000206750

Edwards, M. R., & Clinton, M. E. (2019). A study exploring the impact of lecture capture availability and lecture capture usage on student attendance and attainment. *Higher Education*, *77*(3), 403–421. https://doi.org/10.1007/s10734-018-0275-9

Eisen, D. B., Schupp, C. W., Isseroff, R. R., Ibrahimi, O. A., Ledo, L., & Armstrong, A. W. (2015). Does class attendance matter? Results from a second-year medical school dermatology cohort study. *International Journal of Dermatology*, *54*(7), 807–816. https://doi.org/10.1111/ijd.12816

Ekman, P. (1992). An argument for basic emotions. *Cognition and Emotion*, *6*(3–4), 169–200. https://doi.org/10.1080/02699939208411068

Elliot, Andrew J., & Church, M. A. (1997). A hierarchical model of approach and avoidance achievement motivation. *Journal of Personality and Social Psychology*, *72*(1), 218–232. https://doi.org/10.1037/0022-3514.72.1.218

Elliot, Andrew J., & McGregor, H. A. (1999). Test anxiety and the hierarchical model of approach and avoidance achievement motivation. *Journal of Personality and Social Psychology*, *76*(4), 628–644. https://doi.org/10.1037/0022-3514.76.4.628

Elliot, Andrew J, & McGregor, H. A. (2001). A 2x2 achievement goal framework. In *Journal of Personality and Social Psychology*, 80(3), pp. 501–519). https://doi.org/10.1037//0022-3514.80.3.501

Ellis, R. A. |Han. F. A. (2017). Improving Learning Analytics--Combining Observational and Self-Report Data on Student Learning. *Educational Technology & Society*, *20*(3), 158–169.

Emotions Pekrun, A., Reinhard Pekrun, P., Goetz, T., Titz, W., & Perry, R. P. (2002). Academic Emotions in Students' Self-Regulated Learning and Achievement: A Program of Qualitative and Quantitative Research. *Educational Psychologist*, *37*(2), 91–105. http://www.tandfonline.com/doi/pdf/10.1207/S15326985EP3702_4

Entwistle, N. (2003). *Promoting deep learning through teaching and assessment: conceptual frameworks and educational contexts*. Retrieved April 30, 2019, from https://www.etl.tla.ed.ac.uk/docs/entwistle2000.pdf

Entwistle, N., & Mccune, V. (2004). The Conceptual Bases of Study Strategy Inventories. *Educational Psychology Review*, *16*(4). https://link.springer.com/content/pdf/10.1007%2Fs10648-004-0003-0.pdf

Entwistle, N. J., McCune, V., & Tait, H. (2013). The approaches and study skills inventory for students (ASSIST). *Edinburgh: Centre for Research on Learning and Instruction, University of Edinburgh*.

Entwistle, N., & Ramsden, P. (2015). Understanding student learning. In *Understanding Student Learning*. Taylor and Francis. https://doi.org/10.4324/9781315718637

Entwistle, N., & Tait, H. (1990). Approaches to learning, evaluations of teaching, and preferences for contrasting academic environments. *Higher Education*, *19*(2), 169–194. https://doi.org/10.1007/BF00137106

Entwistle, N., Tait, H., & McCune, V. (2000). Patterns of response to an approaches to studying inventory across contrasting groups and contexts. *European Journal of Psychology of Education*, *15*(1), 33–48. https://doi.org/10.1007/BF03173165

Entwistle, N.J. (1991). Approaches to learning and perceptions of the learning environment . *Higher Education*, *22*, 201–204.

Entwistle, N. J., & Peterson, E. R. (2004). Conceptions of learning and knowledge in higher education: Relationships with study behaviour and influences of learning environments. *International Journal of Educational Research*, *41*(6), 407–428. https://doi.org/10.1016/j.ijer.2005.08.009

Eum, K., & Rice, K. G. (2011). Test anxiety, perfectionism, goal orientation, and academic performance. *Anxiety, Stress & Coping*, *24*(2), 167–178. https://doi.org/10.1080/10615806.2010.488723

Evans, L. (2011). The scholarship of researcher development: mapping the terrain and pushing back boundaries. *International Journal for Researcher Development*, *2*(2), 75–98. https://doi.org/10.1108/17597511111212691

Fenollar, P., Román, S., & Cuestas, P. J. (2007). University students' academic performance: An integrative conceptual framework and empirical analysis. *British Journal of Educational Psychology*, *77*(4), 873–891. https://doi.org/10.1348/000709907X189118

Fetters, M. D., Curry, L. A., & Creswell, J. W. (2013). Achieving integration in mixed methods designs-principles and practices. *Health Services Research*, *48*(6 Pt 2), 2134–2156. https://doi.org/10.1111/1475-6773.12117

Field, A., Miles, J., & Field, Z. (2012). *Discovering statistics using R*. Sage publications.

Field, A. P. (2014). *Skills in Mathematics and Statistics in Psychology and tackling transition The Higher Education Academy STEM project series*.

https://www.heacademy.ac.uk/system/files/resources/tt_maths_psychology.pdf.pdf

Finn, J. D., & Zimmer, K. S. (2012). Student engagement: What is it? Why does it matter? In *Handbook of Research on Student Engagement* (pp. 97–131). Springer US. https://doi.org/10.1007/978-1-4614-2018-7_5

Finney, S. J., & Schraw, G. (2003). Self-efficacy beliefs in college statistics courses. *Contemporary Educational Psychology*, *28*(2), 161–186. https://doi.org/10.1016/S0361-476X(02)00015-2

Forester, M., Kahn, J. H., & Hesson-McInnis, M. S. (2004). Factor Structures of Three Measures of Research Self-Efficacy. *Journal of Career Assessment*, *12*(1), 3–16. https://doi.org/10.1177/1069072703257719

Forgas, J. P. (2017). Mood Effects on Cognition: Affective Influences on the Content and Process of Information Processing and Behavior. In *Emotions and Affect in Human Factors and Human-Computer Interaction* (pp. 89–122). Elsevier. https://doi.org/10.1016/B978-0-12-801851-4.00003-3

Forrester, M. A., & Koutsopoulou, G. Z. (2008). Providing resources for enhancing the teaching of qualitative methods at the undergraduate level: Current practices and the work of the HEA psychology network group. *Qualitative Research in Psychology*, *5*(3), 173–178. https://doi.org/10.1080/14780880802314312

Forstenzer, J.I. (2016) The Teaching Excellence Framework: What's the Purpose? Report. The Crick Center - Center for Engaged Philosophy and the University of Sheffield

Fredricks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School Engagement: Potential of the Concept, State of the Evidence. *Review of Educational Research*, *74*(1), 59–109. https://doi.org/10.3102/00346543074001059

Freeman, S., Eddy, S. L., McDonough, M., Smith, M. K., Okoroafor, N., Jordt, H., & Wenderoth, M. P. (2014). Active learning increases student performance in science, engineering, and mathematics. *Proceedings of the National Academy of Sciences of the United States of America*, *111*(23), 8410–8415. https://doi.org/10.1073/pnas.1319030111

Frenzel, A. C., Thrash, T. M., Pekrun, R., & Goetz, T. (2007). Achievement emotions in Germany and China: A cross-cultural validation of the Academic Emotions Questionnaire—Mathematics. *Journal of Cross-Cultural Psychology*, *38*(3), 302-309.

Gardner, M. R. (2020). Lecture capture adds value to attending psychological research methods lectures. *Scholarship of Teaching and Learning in Psychology*. https://doi.org/10.1037/stl0000212

Gibson, S., & Sullivan, C. (2012). Teaching Qualitative Research Methods in Psychology: An Introduction to the Special Issue. *Psychology Learning & Teaching*, *11*(1), 1–5. https://doi.org/10.2304/plat.2012.11.1.1

Gibson, S., & Sullivan, C. (2018). A changing culture? Qualitative methods teaching in U.K. psychology. *Qualitative Psychology*, *5*(2), 197–206. https://doi.org/10.1037/qup0000100

Gill, P., Stewart, K., Treasure, E., & Chadwick, B. (2008). *Methods of data collection in qualitative research: interviews and focus groups*. https://doi.org/10.1038/bdj.2008.192

Given, L. (2012). The SAGE Encyclopedia of Qualitative Research Methods. In *The SAGE Encyclopedia of Qualitative Research Methods*. SAGE Publications, Inc. https://doi.org/10.4135/9781412963909

Glen, S. (2018). *Ward's Method (Minimum variance method)* . StatisticsHowTo.Com. https://www.statisticshowto.com/wards-method/

Goetz, T., Frenzel, A. C., Barchfeld, P., & Perry, R. P. (2011). Measuring emotions in students' learning and performance: The Achievement Emotions Questionnaire (AEQ). *Contemporary Educational Psychology*, *36*(1), 36–48. https://doi.org/10.1016/J.CEDPSYCH.2010.10.002

Gonyea, R. M. (2005). Self-reported data in institutional research: Review and recommendations. *New Directions for Institutional Research*, *2005*(127), 73–89. https://doi.org/10.1002/ir.156

Gough, B., & Lyons, A. (2016). The Future of Qualitative Research in Psychology: Accentuating the Positive. *Integrative Psychological and Behavioral Science*, *50*(2), 234–243. https://doi.org/10.1007/s12124-015-9320-8

Gracia, L., & Jenkins, E. (2003). A quantitative exploration of student performance on an undergraduate accounting programme of study. *Accounting Education*, *12*(1), 15–32. https://doi.org/10.1080/0963928032000049375

Guay, F., Ratelle, C. F., Roy, A., & Litalien, D. (2010). Academic self-concept, autonomous academic motivation, and academic achievement: Mediating and additive effects. *Learning and Individual Differences*, *20*(6), 644–653. https://doi.org/10.1016/j.lindif.2010.08.001

Guest, G., MacQueen, K., & Namey, E. (2014). Applied Thematic Analysis. In *Applied Thematic Analysis*. SAGE Publications, Inc. https://doi.org/10.4135/9781483384436

Gulikers, J. T. M., Bastiaens, T. J., Kirschner, P. A., & Kester, L. (2008). Authenticity is in the eye of the beholder: Student and teacher perceptions of assessment authenticity. *Journal of Vocational Education and Training*, *60*(4), 401–412. https://doi.org/10.1080/13636820802591830

Gump, S. E. (2005). The Cost of Cutting Class: Attendance As A Predictor of Success. *College Teaching*, *53*(1), 21–26. https://doi.org/10.3200/CTCH.53.1.21-26

Hagenauer, G., Gläser-Zikuda, M., & Moschner, B. (2018). Journal of Further and Higher Education University students' emotions, life-satisfaction and study commitment: a self-determination theoretical perspective University students' emotions, life-satisfaction and study commitment: a self-determination theoretical perspective. *Journal of Further and Higher Education*, *42*(6), 808–826. https://doi.org/10.1080/0309877X.2017.1323189

Halpern, N. (2007). The impact of attendance and student characteristics on academic achievement: Findings from an undergraduate business management module. *Journal of Further and Higher Education*, *31*(4), 335–349. https://doi.org/10.1080/03098770701626017

Hanna, D., Shevlin, M., & Dempster, M. (2008). The structure of the statistics anxiety rating scale: A confirmatory factor analysis using UK psychology students. *Personality and individual differences*, *45*(1), 68-74.

Hannon, B. (2012). Test anxiety and performance-avoidance goals explain gender differences in SAT-V, SAT-M, and overall SAT scores. *Personality and Individual Differences*, *53*(7), 816–820. https://doi.org/10.1016/j.paid.2012.06.003

Harackiewicz, J. M., Barron, K. E., Tauer, J. M., Carter, S. M., & Elliot, A. J. (2000). Short-term and long-term consequences of achievement goals: Predicting interest and performance over time. *Journal of Educational Psychology*, *92*(2), 316–330. https://doi.org/10.1037/0022-0663.92.2.316

Harackiewicz, J. M., Durik, A. M., Barron, K. E., Linnenbrink-Garcia, L., & Tauer, J. M. (2008). The Role of Achievement Goals in the Development of Interest: Reciprocal Relations Between Achievement Goals, Interest, and Performance. *Journal of Educational Psychology*, *100*(1), 105–122. https://doi.org/10.1037/0022-0663.100.1.105

Hardcastle, D. A., & Bisman, C. D. (2003). Innovations in teaching social work research. *Social Work Education*, *22*(1), 31–43. https://doi.org/10.1080/02615470309131

Harley, J. M., Pekrun, R., Taxer, J. L., & Gross, J. J. (2019). Emotion Regulation in Achievement Situations: An Integrated Model. *Educational Psychologist*, *54*(2), 106–126. https://doi.org/10.1080/00461520.2019.1587297

Hatch, A. J. (2002). *Doing Qualitative Research in Education Settings*. Suny Press. https://muse.jhu.edu/book/4583

Hattie, J. A. C., & Donoghue, G. M. (2016). Learning strategies: a synthesis and conceptual model. *Npj Science of Learning*, *1*(1), 1. https://doi.org/10.1038/npjscilearn.2016.13

Hayenga, A. O., & Corpus, J. H. (2010). Profiles of intrinsic and extrinsic motivations: A person-centered approach to motivation and achievement in middle school. *Motivation and Emotion*, *34*(4), 371–383. https://doi.org/10.1007/s11031-010-9181-x

Hayes, A. F. (2009). Beyond Baron and Kenny: Statistical mediation analysis in the new millennium. *Communication Monographs*, *76*(4), 408–420. https://doi.org/10.1080/03637750903310360

Heikkilä, A., & Lonka, K. (2006). Studying in higher education: students' approaches to learning, self-regulation, and cognitive strategies. *Studies in Higher Education*, *31*(1), 99–117. https://doi.org/10.1080/03075070500392433

Henrie, C. R., Halverson, L. R., & Graham, C. R. (2015). Measuring student engagement in technology-mediated learning: A review. *Computers & Education*, *90*, 36–53. https://doi.org/10.1016/j.compedu.2015.09.005

Herrmann, K. J., McCune, V., & Bager-Elsborg, A. (2017). Approaches to learning as predictors of academic achievement: Results from a large scale, multi-level analysis. *Högre Utbildning*, *7*(1), 29–42. https://doi.org/10.23865/hu.v7.905

Hewson, E. R. F. (2018). Students' Emotional Engagement, Motivation and Behaviour Over the Life of an Online Course: Reflections on Two Market Research Case Studies. *Journal of Interactive Media in Education*, *2018*(1). https://doi.org/10.5334/jime.472

Heyman, G. D., & Dweck, C. S. (1992). Achievement goals and intrinsic motivation: Their relation and their role in adaptive motivation. *Motivation and Emotion*, *16*(3), 231–247. https://doi.org/10.1007/BF00991653

HESA. (2021, January). *Who's studying in HE?* https://www.hesa.ac.uk/data-and-analysis/students/whos-in-he

Hofer, B. K., & yu, S. L. (2003). Teaching Self-Regulated Learning through a â€œLearning to Learnâ€ Course. *Teaching of Psychology*, *30*(1), 30–33. https://doi.org/10.1207/S15328023TOP3001_05

Hong, E., & Karstensson, L. (2002). Antecedents of state test anxiety. *Contemporary Educational Psychology*, *27*(2), 348–367. https://doi.org/10.1006/ceps.2001.1095

Honicke, T., & Broadbent, J. (2016). The influence of academic self-efficacy on academic performance: A systematic review. In *Educational Research Review* (Vol. 17, pp. 63–84). Elsevier Ltd. https://doi.org/10.1016/j.edurev.2015.11.002

Hoskins, S. L., & Van Hooff, J. C. (2005). Motivation and ability: Which students use online learning and what influence does it have on their achievement? *British Journal of Educational Technology*, *36*(2), 177–192. https://doi.org/10.1111/j.1467-8535.2005.00451.x

Howell, A. J., & Buro, K. (2011). Relations Among Mindfulness, Achievement-Related Self-Regulation, and Achievement Emotions. *Journal of Happiness Studies*, *12*(6), 1007–1022. https://doi.org/10.1007/s10902-010-9241-7

Hox, J. J., & Maas, C. J. (2002). Sample sizes for multilevel modeling.

Hsieh, H. F., & Shannon, S. E. (2005). Three approaches to qualitative content analysis. *Qualitative Health Research*, *15*(9), 1277–1288. https://doi.org/10.1177/1049732305276687

Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, *6*(1), 1–55. https://doi.org/10.1080/10705519909540118

Hughes, J. N., Luo, W., Kwok, O. M., & Loyd, L. K. (2008). Teacher-Student Support, Effortful Engagement, and Achievement: A 3-Year Longitudinal Study. *Journal of Educational Psychology*, *100*(1), 1–14. https://doi.org/10.1037/0022-0663.100.1.1

Hughes, R., & Pace, C. R. (2003). Using NSSE to study student retention and withdrawal. *Assessment Update*, *15*(4), 1-2.

Hulleman, C. S., Schrager, S. M., Bodmann, S. M., & Harackiewicz, J. M. (2010). A Meta-Analytic Review of Achievement Goal Measures: Different Labels for the Same Constructs or Different Constructs With Similar Labels? *Psychological Bulletin*, *136*(3), 422–449. https://doi.org/10.1037/a0018947

Huws, N., Reddy, P. A., & Talcott, J. B. (2009). The effects of faking on non-cognitive predictors of academic performance in University students. *Learning and Individual Differences*, *19*(4), 476–480. https://doi.org/10.1016/j.lindif.2009.04.003

Jang, L. Y., & Liu, W. C. (2012). 2 × 2 Achievement goals and achievement emotions: a cluster analysis of students' motivation. *European Journal of Psychology of Education*, *27*(1), 59–76. https://doi.org/10.1007/s10212-011-0066-5

Johnson, R. B., & Onwuegbuzie, A. J. (2004). Mixed Methods Research: A Research Paradigm Whose Time Has Come. *Educational Researcher*, *33*(7), 14–26. https://doi.org/10.3102/0013189X033007014

Kahu, E. R., & Nelson, K. (2018). Student engagement in the educational interface: understanding the mechanisms of student success. *Higher Education Research and Development*, *37*(1), 58–71. https://doi.org/10.1080/07294360.2017.1344197

Kassarnig, V., Bjerre-Nielsen, A., Mones, E., Lehmann, S., & Lassen, D. D. (2017). Class attendance, peer similarity, and academic performance in a large field study. *PLOS ONE*, *12*(11), e0187078. https://doi.org/10.1371/journal.pone.0187078

Keeley, J., Zayac, R., & Correia, C. (2008). Curvilinear relationships between statistics anxiety and performance among undergraduate students: Evidence for optimal anxiety. *Statistics Education Research Journal*, *7*(1).

Kennedy, E., Laurillard, D., Horan, B., & Charlton, P. (2015). Making meaningful decisions about time, workload and pedagogy in the digital age: the Course Resource Appraisal Model. *Distance Education*, *36*(2), 177–195. https://doi.org/10.1080/01587919.2015.1055920

Knight, J. (2010). Distinguishing the learning approaches adopted by undergraduates in their use of online resources. *Active Learning in Higher Education*, *11*(1), 67–76. https://doi.org/10.1177/1469787409355873

Koivuniemi, M., Panadero, E., Malmberg, J., & Järvelä, S. (2017). Higher education students' learning challenges and regulatory skills in different learning situations / Desafíos de aprendizaje y habilidades de regulación en distintas situaciones de aprendizaje en estudiantes de educación superior. *Infancia y Aprendizaje*, *40*(1), 19–55. https://doi.org/10.1080/02103702.2016.1272874

Komarraju, M., & Nadler, D. (2013). Self-efficacy and academic achievement: Why do implicit beliefs, goals, and effort regulation matter? *Learning and Individual Differences*, *25*, 67–72. https://doi.org/10.1016/j.lindif.2013.01.005

Kormi-Nouri, R., Farahani, M. N., & Trost, K. (2013). The role of positive and negative affect on well-being amongst Swedish and Iranian university students. *Journal of Positive Psychology*, *8*(5), 435–443. https://doi.org/10.1080/17439760.2013.823511

Korstjens, I., & Moser, A. (2018). Series: Practical guidance to qualitative research. Part 4: Trustworthiness and publishing. *European Journal of General Practice*, *24*(1), 120–124. https://doi.org/10.1080/13814788.2017.1375092

Kurt, A. S., Balci, S., & Kose, D. (2014). Test anxiety levels and related factors: students preparing for university exams. *JPMA. The Journal of the Pakistan Medical Association*, *64*(11), 1235–1239. http://www.ncbi.nlm.nih.gov/pubmed/25831637

Kwok, S. M. S., & Li, W. K. (2008). On diagnostic checking of the autoregressive conditional intensity model. *Canadian Journal of Statistics*, *36*(4), 561–576. https://doi.org/10.1002/cjs.5550360405

Ladd, G. W., & Dinella, L. M. (2009). Continuity and Change in Early School Engagement: Predictive of Children's Achievement Trajectories From First to Eighth Grade? *Journal of Educational Psychology*, *101*(1), 190–206. https://doi.org/10.1037/a0013153

Lalonde, R. N., & Gardner, R. C. (1993). Statistics as a second language? A model for predicting performance in psychology students. *Canadian Journal of Behavioural Science/Revue Canadienne Des Sciences Du Comportement*, *25*(1), 108–125. https://doi.org/10.1037/h0078792

Lane, A. M., Whyte, G. P., Terry, P. C., & Nevill, A. M. (2005). Mood, self-set goals and examination performance: the moderating effect of depressed mood. *Personality and Individual Differences*, *39*(1), 143–153. https://doi.org/10.1016/j.paid.2004.12.015

Lange , P. de, & Mavondo, F. (2004). Gender and motivational differences in approaches to learning by a cohort of open learning students. *Accounting Education*, *13*(4), 431–448. https://doi.org/10.1080/0963928042000306765

Lee, Y., & Rofe, J. S. (2016). Paragogy and flipped assessment: experience of designing and running a MOOC on research methods. *Open Learning*, *31*(2), 116–129. https://doi.org/10.1080/02680513.2016.1188690

Lehti, S., & Lehtinen, E. (2005). Computer-supported Problem-based Learning in the Research Methodology Domain. *Scandinavian Journal of Educational Research*, *49*(3), 297–324. https://doi.org/10.1080/00313830500109618

Leino, R. K., Gardner, M. R., Cartwright, T., & Döring, A. K. (2021). Engagement in a virtual learning environment predicts academic achievement in research methods modules: A longitudinal study combining behavioral and self-reported data. *Scholarship of Teaching and Learning in Psychology.* Advance online publication. https://doi.org/10.1037/stl0000281

Lewis-Beck, M., Bryman, A., & Futing Liao, T. (2012). The SAGE Encyclopedia of Social Science Research Methods. In *The SAGE Encyclopedia of Social Science Research Methods*. Sage Publications, Inc. https://doi.org/10.4135/9781412950589

Lewis, P. A., & Critchley, H. D. (2003). Mood-dependent memory. *Trends in Cognitive Sciences*, *7*(10), 431–433. https://doi.org/10.1016/J.TICS.2003.08.005

Li, Y., & Lerner, R. M. (2013). Interrelations of Behavioral, Emotional, and Cognitive School Engagement in High School Students. *Journal of Youth and Adolescence*, *42*(1), 20–32. https://doi.org/10.1007/s10964-012-9857-5

Li, Y., Lerner, J. V., & Lerner, R. M. (2010). Personal and ecological assets and academic competence in early adolescence: The mediating role of school engagement. *Journal of Youth and Adolescence*, *39*(7), 801–815. https://doi.org/10.1007/s10964-010-9535-4

Liem, A. D., Lau, S., & Nie, Y. (2008). The role of self-efficacy, task value, and achievement goals in predicting learning strategies, task disengagement, peer relationship, and achievement outcome. *Contemporary Educational Psychology*, *33*(4), 486–512. https://doi.org/10.1016/j.cedpsych.2007.08.001

Lincoln, Y. S., & Guba, E. G. (1986). But is it rigorous? Trustworthiness and authenticity in naturalistic evaluation. *New Directions for Program Evaluation*, *1986*(30), 73–84. https://doi.org/10.1002/ev.1427

Lindblom-Ylänne, S., & Lonka, K. (1998). Individual ways of interacting with the learning environment - Are they related to study success? *Learning and Instruction*, *9*(1), 1–18. https://doi.org/10.1016/S0959-4752(98)00025-5

Linnenbrink-Garcia, L., Patall, E. A., & Pekrun, R. (2016). Adaptive Motivation and Emotion in Education. *Policy Insights from the Behavioral and Brain Sciences*, *3*(2), 228–236. https://doi.org/10.1177/2372732216644450

Linnenbrink-Garcia, L., & Pekrun, R. (2011). Students' emotions and academic engagement: Introduction to the special issue. *Contemporary Educational Psychology*, *36*(1), 1–3. https://doi.org/10.1016/j.cedpsych.2010.11.004

Linnenbrink, E. A. (2007). The Role of Affect in Student Learning. A Multi-Dimensional Approach to Considering the Interaction of Affect, Motivation, and Engagement. In *Emotion in Education* (pp. 107–124). Elsevier Inc. https://doi.org/10.1016/B978-012372545-5/50008-3

Linnenbrink, E. R., & Pintrich, P. R. (2002). Motivation as an Enabler for Academic Success. *School Psychology Review*, *31*(3), 313–327. http://prof.usb.ve/jjramirez/PREGRADO/CCP114/CCP114 Motivacion Linnenbrink y Pintrich.pdf

Loderer, K., Pekrun, R., & Lester, J. C. (2018). Beyond cold technology: A systematic review and meta-analysis on emotions in technology-based learning environments. *Learning and Instruction*, 101162. https://doi.org/10.1016/j.learninstruc.2018.08.002

Longden, B. (2006). An Institutional Response to Changing Student Expectations and their Impact on Retention Rates. *Journal of Higher Education Policy and Management*, *28*(2), 173–187. https://doi.org/10.1080/13600800600751044

Lonka, K., & Ketonen, E. (2012). How to make a lecture course an engaging learning experience? *Studies for the Learning Society*, *2*(2–3). https://doi.org/10.2478/v10240-012-0006-1

Lüdecke D, Ben-Shachar M, Patil I, Waggoner P, Makowski D (2021). “performance: An R Package for Assessment, Comparison and Testing of Statistical Models.” *Journal of Open Source Software*, 6(60), 3139. doi: 10.21105/joss.03139.

Lüftenegger, M., Klug, J., Harrer, K., Langer, M., Spiel, C., & Schober, B. (2016). Students’ Achievement Goals, Learning-Related Emotions and Academic Achievement. *Frontiers in Psychology*, *7*, 603. https://doi.org/10.3389/fpsyg.2016.00603

Luo, W., Ng, P. T., Lee, K., & Aye, K. M. (2016). Self-efficacy, value, and achievement emotions as mediators between parenting practice and homework behavior: A control-value theory perspective. *Learning and Individual Differences*, *50*, 275–282. https://doi.org/10.1016/j.lindif.2016.07.017

Macfadyen, L. P., & Dawson, S. (2010). Mining LMS data to develop an “early warning system” for educators: A proof of concept. *Computers & Education*, *54*(2), 588–599. https://doi.org/10.1016/j.compedu.2009.09.008

Macher, D., Paechter, M., Papousek, I., & Ruggeri, K. (2012). Statistics anxiety, trait anxiety, learning behavior, and academic performance. In *European Journal of Psychology of Education* (Vol. 27, pp. 483–498). Springer. https://doi.org/10.2307/43551094

Macher, D., Paechter, M., Papousek, I., Ruggeri, K., Freudenthaler, H. H., & Arendasy, M. (2013). Statistics anxiety, state anxiety during an examination, and academic achievement. *British Journal of Educational Psychology*, *83*(4), 535–549. https://doi.org/10.1111/j.2044-8279.2012.02081.x

Macher, D., Papousek, I., Ruggeri, K., & Paechter, M. (2015). Statistics anxiety and performance: blessings in disguise. *Frontiers in Psychology*, *6*, 1116. https://doi.org/10.3389/fpsyg.2015.01116

MacKinnon, D. P., Fairchild, A. J., & Fritz, M. S. (2007). Mediation analysis. *Annual Review of Psychology*, *58*, 593–614. https://doi.org/10.1146/annurev.psych.58.110405.085542

MacKinnon, D. P., Lockwood, C. M., & Williams, J. (2004). Confidence limits for the indirect effect: Distribution of the product and resampling methods. *Multivariate Behavioral Research*, *39*(1), 99–128. https://doi.org/10.1207/s15327906mbr3901_4

Maguire, M., & Delahunt, B. (2017). Doing a thematic analysis: A practical, step-by-step guide for learning and teaching scholars. *All Ireland Journal of Higher Education*, *9*(3). https://ojs.aishe.org/index.php/aishe-j/article/view/335

Mair, C., Taylor, J., & Hulme, J. (2013.). *An introductory guide to psychological literacy and psychologically literate citizenship*. Retrieved April 3, 2018, from https://www.heacademy.ac.uk/system/files/resources/psychological_literacy_and_psychologically_literate_citizenship_0.pdf

Marburger, D. R. (2006). Does mandatory attendance improve student performance? *Journal of Economic Education*, *37*(2), 148–155. https://doi.org/10.3200/JECE.37.2.148-155

Martinez, P. (2001). *Improving Student Retention and Achievement: What Do We Know and What Do We Need To Find out? LSDA Reports*. Learning and Skills Development Agency, Regent Arcade House, 19-25 Argyll Street, London W1F 7LS, United Kingdom, England .

Marton, F., & Säljö, R. (1976). On qualitative differences in learning: i-outcome and process*. *British Journal of Educational Psychology*, *46*(1), 4–11. https://doi.org/10.1111/j.2044-8279.1976.tb02980.x

Marton, F., & Svensson, L. (1979). Conceptions of research in student learning. *Higher Education*, *8*(4), 471–486. https://doi.org/10.1007/BF01680537

Matthews, G., Zeidner, M., & Roberts, R. D. (2006). Models of Personality and Affect for Education: a review and Synthesis. In Alexander. P. A. & P. . Winne (Eds.), *Handbook of educational psychology* (pp. 163–186). Erlbaum Associates Publishers. http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.570.2894&rep=rep1&type=pdf

Mayer, R. (2009). Constructivism as a theory of learning versus constructivism as a prescription for instruction. - PsycNET. In S. Tobias & T. . Duffy (Eds.), *Constructivist instruction: Succes or Failure?* (pp. 184–200). Routledge/Taylor & Francis Group. https://psycnet.apa.org/record/2009-09809-010

McGregor, H. A., & Elliot, A. J. (2002). Achievement goals as predictors of achievement-relevant processes prior to task engagement. *Journal of Educational Psychology*, *94*(2), 381–395. https://doi.org/10.1037/0022-0663.94.2.381

McNeish, D., & Matta, T. H. (2020). Flexible Treatment of Time-Varying Covariates with Time Unstructured Data. *Structural Equation Modeling*, *27*(2), 298–317. https://doi.org/10.1080/10705511.2019.1627213

Meece, J. L., Blumenfeld, P. C., & Hoyle, R. H. (1988). Students' goal orientations and cognitive engagement in classroom activities. *Journal of Educational Psychology*, *80*(4), 514–523. https://doi.org/10.1037/0022-0663.80.4.514

Mega, C., Ronconi, L., & De Beni, R. (2014). What Makes a Good Student? How Emotions, Self-Regulated Learning, and Motivation Contribute to Academic Achievement.

J*ournal of Educational Psychology*, *106*(1), 121–131. https://doi.org/10.1037/a0033546

Meyer, J. H. F., Shanahan, M. P., & Laugksch, R. C. (2005). Students' Conceptions of Research. I: A qualitative and quantitative analysis. *Scandinavian Journal of Educational Research*, *49*(3), 225–244. https://doi.org/10.1080/00313830500109535

Meyer, J. H. F., Shanahan, M. P., & Laugksch, R. C. (2007). Students' Conceptions of Research. 2: An exploration of contrasting patterns of variation. *Scandinavian Journal of Educational Research*, *51*(4), 415–433. https://doi.org/10.1080/00313830701485627

Miquelon, P., Vallerand, R. J., Grouzet, F. M. E., & Cardinal, G. (2005). Perfectionism, Academic Motivation, and Psychological Adjustment: An Integrative Model. *Personality and Social Psychology Bulletin*, *31*(7), 913–924. https://doi.org/10.1177/0146167204272298

Mitchell, T., Friesen, M., Friesen, D., & Rose, R. (2007). Learning against the grain: Reflections on the challenges and revelations of studying qualitative research methods in an undergraduate psychology course. *Qualitative Research in Psychology*, *4*(3), 227–240. https://doi.org/10.1080/14780880701473441

Moeller, J. (2015). A word on standardization in longitudinal studies: don't. *Frontiers in Psychology*, *6*, 1389. https://doi.org/10.3389/fpsyg.2015.01389

Morlaix, S., & Suchaut, B. (2014). The social, educational and cognitive factors of success in the first year of university: A case study. *International Review of Education*, *60*(6), 841–862. https://doi.org/10.1007/s11159-014-9459-4

Morris, L. V., Finnegan, C., & Wu, S. S. (2005). Tracking student behavior, persistence, and achievement in online courses. *Internet and Higher Education*, *8*(3), 221–231. https://doi.org/10.1016/j.iheduc.2005.06.009

Mouratidis, A., Vansteenkiste, M., Lens, W., & Auweele, Y. Vanden. (2009). Beyond positive and negative affect: Achievement goals and discrete emotions in the elementary physical education classroom. *Psychology of Sport and Exercise*, *10*(3), 336–343. https://doi.org/10.1016/j.psychsport.2008.11.004

Multon, K. D., Brown, S. D., & Lent, R. W. (1991). Relation of self-efficacy beliefs to academic outcomes: A meta-analytic investigation. *Journal of Counseling Psychology*, *38*(1), 30–38. https://doi.org/10.1037/0022-0167.38.1.30

Murtonen, M. (2005). University students' research orientations: Do negative attitudes exist toward quantitative methods? *Scandinavian Journal of Educational Research*, *49*(3), 263–280. https://doi.org/10.1080/00313830500109568

Murtonen, M., & Lehtinen, E. (2005). Conceptions of Research and Methodology Learning. *Scandinavian Journal of Educational Research*, *49*(3), 217–224. https://doi.org/10.1080/00313830500109519

Murtonen, M. (2015). University students' understanding of the concepts empirical, theoretical, qualitative and quantitative research. *Teaching in Higher Education*, *20*(7), 684-698.

Murtonen, M., Olkinuora, E., Tynjälä, P., & Lehtinen, E. (2008). "Do I need research skills in working life?": University students' motivation and difficulties in quantitative methods courses. *Higher Education*, *56*(5), 599-612.

Nagengast, B., Marsh, H. W., Scalas, L. F., Xu, M. K., Hau, K.-T., & Trautwein, U. (2011). Who Took the "×" out of Expectancy-Value Theory? *Psychological Science*, *22*(8), 1058–1066. https://doi.org/10.1177/0956797611415540

Nakagawa, S., Johnson, P. C. D., & Schielzeth, H. (2017). The coefficient of determination R2 and intra-class correlation coefficient from generalized linear mixed-effects models revisited and expanded. *Journal of the Royal Society Interface*, *14*(134). https://doi.org/10.1098/rsif.2017.0213

Nett, U. E., Goetz, T., & Daniels, L. M. (2010). What to do when feeling bored?. Students' strategies for coping with boredom. *Learning and Individual Differences*, *20*(6), 626–638. https://doi.org/10.1016/j.lindif.2010.09.004

Nett, U. E., Goetz, T., & Hall, N. C. (2011). Coping with boredom in school: An experience sampling perspective. *Contemporary Educational Psychology*, *36*(1), 49–59. https://doi.org/10.1016/j.cedpsych.2010.10.003

Neumann, D. M., Hood, M., & Neumann, M. M. (2013). Using Real-Life Data When Teaching Statistics: Student Perceptions of this Strategy in an Introductory Statistics Course. *Statistics Education Research Journal*, *12*(2), 59–70. https://eric.ed.gov/?id=EJ1015684

Neuville, S., Frenay, M., & Bourgeois, E. (2007). Task Value, Self-Efficacy and Goal Orientations: Impact on self-regulated learning, choice and performance among university students. *Psychologica Belgica*, *47*(1), 95. https://doi.org/10.5334/pb-47-1-95

Newble, D. I., & Entwistle, N. J. (1986). Learning styles and approaches: implications for medical education. *Medical Education*, *20*(3), 162–175. http://www.ncbi.nlm.nih.gov/pubmed/3724571

Newman-Ford, L., Fitzgibbon, K., Lloyd, S., & Thomas, S. (2008). A large-scale investigation into the relationship between attendance and attainment: A study using an innovative, electronic attendance monitoring system. *Studies in Higher Education*, *33*(6), 699–717. https://doi.org/10.1080/03075070802457066

Newman-Ford, L., Lloyd, S., & Thomas, S. (2009). An investigation in the effects of gender, prior academic achievement, place of residence, age and attendance on first-year undergraduate attainment. In *Journal of Applied Research in Higher Education* (Vol. 1, Issue 1, pp. 14–28). Emerald Group Publishing Ltd. https://doi.org/10.1108/17581184200800002

Newman, D. A. (2014). Missing Data: Five Practical Guidelines. *Organizational Research Methods*, *17*(4), 372–411. https://doi.org/10.1177/1094428114548590

Nguyen, Q., Huptych, M., & Rienties, B. (2018). Linking students' timing of engagement to learning design and academic performance. *ACM International Conference Proceeding Series*, 141–150. https://doi.org/10.1145/3170358.3170398

Nordmann, E., Calder, C., Bishop, P., Irwin, A., & Comber, D. (2019). Turn up, tune in, don't drop out: the relationship between lecture attendance, use of lecture recordings, and achievement at different levels of study. *Higher Education*, *77*(6), 1065–1084. https://doi.org/10.1007/s10734-018-0320-8

NUS, & Universities UK. (2019). *Black, Asian and Minority Ethnic student attainment at UK universities: #closingthegap* (p. 88). Universities UK. https://www.universitiesuk.ac.uk/policy-and-analysis/reports/Pages/bame-student-attainment-uk-universities-closing-the-gap.aspx?fbclid=IwAR1SyhMVElMJURVupBDArtLblh4kyWLCzi8X-p7HBIthFD722obG93bQKds

O'Carroll, P. J., & Fisher, P. (2013). Metacognitions, worry and attentional control in predicting OSCE performance test anxiety. *Medical Education*, *47*(6), 562–568. https://doi.org/10.1111/medu.12125

Office for Students. (2020, July). *Access and participation data dashboard*. https://www.officeforstudents.org.uk/data-and-analysis/access-and-participation-data-dashboard/

O'flaherty, J., & Phillips, C. (2015). The use of flipped classrooms in higher education: A scoping review ☆. *The Internet and Higher Education*, *25*, 85–95. https://doi.org/10.1016/j.iheduc.2015.02.002

Oliver, M., & Trigwell, K. (2005). Can 'Blended Learning' Be Redeemed? *E-Learning and Digital Media*, *2*(1), 17–26. https://doi.org/10.2304/elea.2005.2.1.17

Olsen, W. (2007). Critical Realist Explorations in Methodology. *Methodological Innovation Online*, *2*(2), 1–5. https://doi.org/10.4256/mio.2007.0007

Onwuegbuzie, A. J. (2003). Modelling statistics achievement among graduate students. *Educational and Psychological measurement*, *63*(6), 1020-1038.

Onwuegbuzie, A. J. (1998). Role of Hope in Predicting Anxiety about Statistics. *Psychological Reports*, *82*(3_suppl), 1315–1320. https://doi.org/10.2466/pr0.1998.82.3c.1315

Onwuegbuzie, A. J. (2000). Statistics Anxiety and the Role of Self-Perceptions. *The Journal of Educational Research*, *93*(5), 323–330. https://doi.org/10.1080/00220670009598724

Onwuegbuzie, A. J. (2001). Correlation between Scores on Integration of Scientific Knowledge and Achievement in a Course in Educational Research Methods. *Psychological Reports*, *88*(2), 517–520. https://doi.org/10.2466/pr0.2001.88.2.517

Onwuegbuzie, A. J. (2004). Academic procrastination and statistics anxiety. *Assessment & Evaluation in Higher Education*, *29*(1), 3–19. https://doi.org/10.1080/0260293042000160384

Onwuegbuzie, A. J., & Wilson, V. A. (2003). Statistics Anxiety: Nature, etiology, antecedents, effects, and treatments--a comprehensive review of the literature. *Teaching in Higher Education*, *8*(2), 195–209. https://doi.org/10.1080/1356251032000052447

Paechter, M., Macher, D., Martskvishvili, K., Wimmer, S., & Papousek, I. (2017). Mathematics Anxiety and statistics anxiety. Shared but also unshared components and antagonistic contributions to performance in statistics. *Frontiers in Physiology*, *8*(JUL), 1196. https://doi.org/10.3389/fpsyg.2017.01196

Paisey *, C., & Paisey, N. J. (2004). Student attendance in an accounting module – reasons for non-attendance and the effect on academic performance at a Scottish University. *Accounting Education*, *13*(sup1), 39–53. https://doi.org/10.1080/0963928042000310788

Pan, W., & Tang, M. (2005). Students' Perceptions on Factors of Statistics Anxiety and Instructional Strategies . *Journal of Instructional Psychology*, *32*(3), 205–2014. https://www.proquest.com/docview/213906873?pq-origsite=gscholar&fromopenview=true

Panksepp, J. (1998). The Periconscious Substrates of Consciousness: Affective States and the Evolutionary Origins of the Self. *Journal of Consciousness Studies*, *5*(5–6), 566–582. https://www.researchgate.net/profile/Jaak_Panksepp/publication/233563843_The_periconscious_substrates_of_consciousness_Affective_states_and_the_evolutionary_origins_of_the_SELF/links/553970b90cf2239f4e7d929e/The-periconscious-substrates-of-consciousness-A

Paoloni, P. V., Vaja, A. B., & Muñoz, V. L. (2017). Confiabilidad y Validez del Achievement Emotions Questionnaire. Un Estudio con Alumnado Universitario Argentino. *Electronic Journal of Research in Education Psychology*, *12*(34). https://doi.org/10.25115/ejrep.34.14088

Papanastasiou, E. C., & Zembylas, M. (2008). Anxiety in undergraduate research methods courses: its nature and implications. *International Journal of Research & Method in Education*, *31*(2), 155–167. https://doi.org/10.1080/17437270802124616

Papousek, I., Ruggeri, K., Macher, D., Paechter, M., Heene, M., Weiss, E. M., Schulter, G., & Freudenthaler, H. H. (2012). Psychometric Evaluation and Experimental Validation of the Statistics Anxiety Rating Scale. *Journal of Personality Assessment*, *94*(1), 82–91. https://doi.org/10.1080/00223891.2011.627959

Pardo, A., & Román, M. (2013). Reflections on the Baron and Kenny model of statistical mediation. *Anales de Psicología, 29*(2), 614–623. https://psycnet.apa.org/record/2013-15495-035

Pekrun, R, Goetz, T., & Perry, R. (2005). Achievement emotions questionnaire (AEQ). User's manual. In *Unpublished manuscript, University of Munich, Munich*. http://scholar.google.com/scholar?hl=en&btnG=Search&q=intitle:Achievement+Emotions+Questionnaire+(+AEQ+)+-+User+?+s+Manual+-#0

Pekrun, R. (2006). The Control-Value Theory of Achievement Emotions: Assumptions, Corollaries, and Implications for Educational Research and Practice. *Educational Psychology Review*, *18*(4), 315–341. https://doi.org/10.1007/s10648-006-9029-9

Pekrun, R. (2019). Achievement emotions: A control-value theory perspective. In Reinhard Pekrun (Ed.), *Emotions in Late Modernity* (pp. 142–157). Routledge. https://doi.org/10.4324/9781351133319-13

Pekrun, R, Elliot, A. J., & Maier, M. A. (2006). Achievement goals and discrete achievement emotions: A theoretical model and prospective test. *Journal of Educational Psychology*, *98*(3), 583–597. https://doi.org/10.1037/0022-0663.98.3.583

Pekrun, R, Elliot, A. J., & Maier, M. A. (2009). Achievement Goals and Achievement Emotions: Testing a Model of Their Joint Relations With Academic Performance. *Journal of Educational Psychology* , *101*(1), 115–135. https://doi.org/10.1037/a0013383

Pekrun, R, Frenzel, A. C., Goetz, T., Perry, R. P., Paul Schutz, by A., & Frenzel Thomas Goetz, A. C. (2007). The Control-Value Theory of Achievement Emotions: An Integrative Approach to Emotions in Education. *Konstanzer Online-Publikations-System (KOPS)*, 13–36. http://nbn-resolving.de/urn:nbn:de:bsz:352-opus-99861

Pekrun, R, Goetz, T., Frenzel, A. C., Barchfeld, P., & Perry, R. P. (2011). Measuring emotions in students' learning and performance: The Achievement Emotions Questionnaire (AEQ). *Contemporary Educational Psychology*, *36*(1), 36–48. https://doi.org/10.1016/j.cedpsych.2010.10.002

Pekrun, R, Goetz, T., Titz, W., & Perry, R. P. (2002). Academic Emotions in Students' Self-Regulated Learning and Achievement: A Program of Qualitative and Quantitative Research. *Educational Psychologist*, *37*(2), 91–105. https://doi.org/10.1207/S15326985EP3702_4

Pekrun, R Hall, N., Goetz, T., & Perry, R. (2014). Boredom and academic achievement: Testing a model of reciprocal causation. *Journal of Educational Psychology*, *106*(3), 696–710. https://psycnet.apa.org/buy/2014-06798-001

Pekrun, R, Lichtenfeld, S., Marsh, H. W., Murayama, K., & Goetz, T. (2017). Achievement Emotions and Academic Performance: Longitudinal Models of Reciprocal Effects. *Child Development*, *88*(5), 1653–1670. https://doi.org/10.1111/cdev.12704

Pekrun, R, & Linnenbrink-Garcia, L. (2012). Academic emotions and student engagement. In *Handbook of Research on Student Engagement* (pp. 259–282). Springer US. https://doi.org/10.1007/978-1-4614-2018-7_12

Pekrun, Reinhard, & Stephens, E. J. (2010). Achievement Emotions: A Control-Value Approach. *Social and Personality Psychology Compass*, *4*(4), 238–255. https://doi.org/10.1111/j.1751-9004.2010.00259.x

Pereira, D., Flores, M. A., & Niklasson, L. (2016). Assessment revisited: a review of research in Assessment and Evaluation in Higher Education. *Assessment and Evaluation in Higher Education*, *41*(7), 1008–1032. https://doi.org/10.1080/02602938.2015.1055233

Perepicska, M., Chandler, N., & Becerra, M. (2011). Relationship Between Graduate Students' Statistics Self-Efficacy, Statistics Anxiety, Attitude Toward Statistics, and Social Support. *The Professional Counselor*, *1*(2). https://scholarworks.waldenu.edu/cgi/viewcontent.cgi?referer=https://scholar.google.co.uk/&httpsredir=1&article=1005&context=sc_pubs

Peugh, J. L. (2010). A practical guide to multilevel modeling. *Journal of School Psychology*, *48*(1), 85–112. https://doi.org/10.1016/j.jsp.2009.09.002

Siemens, G. (2013). Learning analytics: The emergence of a discipline. *American Behavioral Scientist*, *57*(10), 1380-1400.

Siemens, G., & Long, P. (2011). Penetrating the fog: Analytics in learning and education. *EDUCAUSE review*, *46*(5), 30.

Pilotti, M., Anderson, S., Hardy, P., Murphy, P., & Vincent, P. (2017). Factors Related to Cognitive, Emotional, and Behavioral Engagement in the Online Asynchronous Classroom. *International Journal of Teaching and Learning in Higher Education*, *29*(1), 145-153.

Pintrich, P. R. (2000). The Role of Goal Orientation in Self-Regulated Learning. In *Handbook of Self-Regulation* (pp. 451–502). Elsevier. https://doi.org/10.1016/b978-012109890-2/50043-3

Pintrich, P. R. (2004). A Conceptual Framework for Assessing Motivation and Self-Regulated Learning in College Students. *Educational Psychology Review*, *16*(4).

https://deepblue.lib.umich.edu/bitstream/handle/2027.42/44454/10648_2004_Article_NY00000604.pdf?sequence=1

Pintrich, P. R., & de Groot, E. V. (1990). Motivational and self-regulated learning components of classroom academic performance. *Journal of Educational Psychology*, *82*(1), 33–40. https://doi.org/10.1037/0022-0663.82.1.33

Pintrich, P. R., Smith, D. A. F., Garcia, T., & Mckeachie, W. J. (1993). Reliability and Predictive Validity of the Motivated Strategies for Learning Questionnaire (Mslq). *Educational and Psychological Measurement*, *53*(3), 801–813. https://doi.org/10.1177/0013164493053003024

Pintrich, P. R., Smith, D. A. F., Garcia, T., & McKeachie, W. J. (1991). *A Manual for the Use of the Motivated Strategies for Learning Questionnare*. *August*, 4–75. https://doi.org/10.13140/RG.2.1.2547.6968

Posner, J., Russell, J. A., & Peterson, B. S. (2005). The circumplex model of affect: an integrative approach to affective neuroscience, cognitive development, and psychopathology. *Development and Psychopathology*, *17*(3), 715–734. https://doi.org/10.1017/S0954579405050340

Postareff, L., Mattsson, M., Lindblom-Ylänne, S., & Hailikari, T. (2017). The complex relationship between emotions, approaches to learning, study success and study progress during the transition to university. *Higher Education*, *73*(3), 441–457. https://doi.org/10.1007/s10734-016-0096-7

Povee, K., & Roberts, L. D. (2014). Qualitative research in psychology: Attitudes of psychology students and academic staff. *Australian Journal of Psychology*, *66*(1), 28–37. https://doi.org/10.1111/ajpy.12031

Prat-Sala, M., & Redford, P. (2010). The interplay between motivation, self-efficacy, and approaches to studying. *British Journal of Educational Psychology*, *80*(2), 283–305. https://doi.org/10.1348/000709909X480563

Preiss, R. W., Gayle, B. M., & Allen, M. (2006). Test anxiety, academic self-efficacy, and study skills: A meta-analytic review. *Classroom Communication and Instructional Processes: Advances Through Meta-Analysis*, *March 2016*, 99–111. https://doi.org/10.4324/9780203933145

Prince, M. (2004). Does Active Learning Work? A Review of the Research. *Journal of Engineering Education*, *93*(3), 223–231. https://doi.org/10.1002/j.2168-9830.2004.tb00809.x

Putwain, D., Sander, P., & Larkin, D. (2013). Academic self-efficacy in study-related skills and behaviours: Relations with learning-related emotions and academic success. *British Journal of Educational Psychology*, *83*(4), 633–650. https://doi.org/10.1111/j.2044-8279.2012.02084.x

Putwain, D. W., & Aveyard, B. (2018). Is perceived control a critical factor in understanding the negative relationship between cognitive test anxiety and examination performance? *School Psychology Quarterly*, *33*(1), 65–74. https://doi.org/10.1037/spq0000183

Putwain, D. W., Becker, S., Symes, W., & Pekrun, R. (2018). Reciprocal relations between students' academic enjoyment, boredom, and achievement over time. *Learning and Instruction*, *54*, 73–81. https://doi.org/10.1016/j.learninstruc.2017.08.004

Putwain, D. W., Daly, A. L., Chamberlain, S., & Sadreddini, S. (2015). Academically buoyant students are less anxious about and perform better in high-stakes examinations. *British Journal of Educational Psychology*, *85*, 247–263. https://doi.org/10.1111/bjep.12068

Putwain, D. W., Sander, P., & Larkin, D. (2013). Using the 2×2 framework of achievement goals to predict achievement emotions and academic performance. *Learning and Individual Differences*, *25*, 80–84. https://doi.org/10.1016/j.lindif.2013.01.006

Ramirez-Arellano, A., Bory-Reyes, J., & Hernández-Simón, L. M. (2018). Emotions, Motivation, Cognitive–Metacognitive Strategies, and Behavior as Predictors of Learning Performance in Blended Learning. *Journal of Educational Computing Research*, 073563311775393. https://doi.org/10.1177/0735633117753935

Ramirez, C., & Bond, M. (2014). Comparing attitudes toward statistics among students enrolled in project-based and hybrid statistics courses. *Sustainability in Statistics Education. Proceedings of the Ninth International Conference on Teaching Statistics (ICOTS9)*. www.evaluationandstatistics.com

Ratelle, C. F., Guay, F., Vallerand, R. J., Larose, S., & Senécal, C. (2007). *Autonomous, Controlled, and Amotivated Types of Academic Motivation: A Person-Oriented Analysis*. https://doi.org/10.1037/0022-0663.99.4.734

Raudenbush, S. W., & Bryk, A. (2002). *Hierarchical linear models: Applications and data analysis methods* (. (ed.); 2nd ed., Vol. 1). Sage Publications. https://us.sagepub.com/en-us/nam/hierarchical-linear-models/book9230

Richardson, J. T. (2007). Motives, attitudes and approaches to studying in distance education. *Higher education*, *54*(3), 385-416.

Richardson, J. T. E. (2005). Students' Approaches to Learning and Teachers' Approaches to Teaching in Higher Education. *Educational Psychology*, *25*(6), 673–680. https://doi.org/10.1080/01443410500344720

Richardson, J. T. E., Alden Rivers, B., & Whitelock, D. (2015). The role of feedback in the under-attainment of ethnic minority students: evidence from distance education.

Assessment and Evaluation in Higher Education, *40*(4), 557–573. https://doi.org/10.1080/02602938.2014.938317

Richardson, M., Abraham, C., & Bond, R. (2012). Psychological correlates of university students' academic performance: A systematic review and meta-analysis. *Psychological Bulletin*, *138*(2), 353–387. https://doi.org/10.1037/a0026838

Ridley. (2007). Approaches to learning, age, ethnicity and assessment. Implications for widening participation. *Psychology Teaching Review*, *13*(1), 3–13.

Rienties, B., & Toetenel, L. (2016). The impact of learning design on student behaviour, satisfaction and performance: A cross-institutional comparison across 151 modules. *Computers in Human Behavior*, *60*, 333–341. https://doi.org/10.1016/j.chb.2016.02.074

Robbins, S. B., Lauver, K., Le, H., Davis, D., Langley, R., & Carlstrom, A. (2004). *Do Psychosocial and Study Skill Factors Predict College Outcomes? A Meta-Analysis*. https://doi.org/10.1037/0033-2909.130.2.261

Roberts, K., Dowell, A., & Nie, J. B. (2019). Attempting rigour and replicability in thematic analysis of qualitative research data; A case study of codebook development. *BMC Medical Research Methodology*, *19*(1), 66. https://doi.org/10.1186/s12874-019-0707-y

Roberts, L. D. (2016). Editorial: Research Methods Pedagogy: Engaging Psychology Students in Research Methods and Statistics. *Frontiers in Psychology*, *7*(SEP), 1430. https://doi.org/10.3389/fpsyg.2016.01430

Rodarte-Luna, B., & Sherry, A. (2008). Sex differences in the relation between statistics anxiety and cognitive/learning strategies. *Contemporary Educational Psychology*, *33*(2), 327–344. https://doi.org/10.1016/J.CEDPSYCH.2007.03.002

Rodgers, J. R. (2001). A Panel-Data Study of the Effect of Student Attendance on University Performance. *Australian Journal of Education*, *45*(3), 284–295. https://doi.org/10.1177/000494410104500306

Rogaten, J., Moneta, G. B., & Spada, M. (2011). *Academic performance as a function of approaches to studying and affect in studying across semester phases*. http://oro.open.ac.uk/47890/

The Quality Assurance Agency for UK Higher Education. (2019, November). *Subject Benchmark Statement Psychology*. QAA.

Román, S., Cuestas, P. J., & Fenollar, P. (2008). An examination of the interrelationships between self-esteem, others' expectations, family support, learning approaches and academic achievement. *Studies in Higher Education*, *33*(2), 127–138. https://doi.org/10.1080/03075070801915882

Romer, D. (1993). Do Students Go to Class? Should They? *Journal of Economic Perspectives*, *7*(3), 167–174. https://doi.org/10.1257/jep.7.3.167

Rowley, M., Hartley, J., & Larkin, D. (2008). Learning from experience: the expectations and experiences of first-year undergraduate psychology students. *Journal of Further and Higher Education*, *32*(4), 399–413. https://doi.org/10.1080/03098770802538129

Ruggeri, K., Dempster, M., Hanna, D., & Cleary, C. (2008). Experiences and expectations: the real reason nobody likes stats. *Psychology Teaching Review*, *14*, 75–83. https://pure.qub.ac.uk/en/publications/experiences-and-expectations-the-real-reason-nobody-likes-stats

Russel, J. A. (1980). A Cicumplex Model of Affect. *Journal of Personality and Social Psychology* , *39*(6), 1161–1178.

Russell, J. A. (2009). Emotion, core affect, and psychological construction. *Cognition and Emotion*, *23*(7), 1259–1283. https://doi.org/10.1080/02699930902809375

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American psychologist*, *55*(1), 68.

Saklofske, D. H., Austin, E. J., Mastoras, S. M., Beaton, L., & Osborne, S. E. (2012). Relationships of personality, affect, emotional intelligence and coping with student stress and academic success: Different patterns of association for stress and success. *Learning and Individual Differences*, *22*, 251–257. https://doi.org/10.1016/j.lindif.2011.02.010

Scheffel, M., Drachsler, H., Stoyanov, S., & Specht, M. (2014). Quality Indicators for Learning Analytics . *Educational Technology & Society* , *17*(4), 117–132. https://www.jstor.org/stable/jeductechsoci.17.4.117?acceptTC=true&coverpage=false&seq=1

Schunk, D. H. (1995). Self-efficacy, motivation, and performance. *Journal of Applied Sport Psychology*, *7*(2), 112–137. https://doi.org/10.1080/10413209508406961

Schunk, D. H., & Ertmer, P. A. (2000). Self-Regulation and Academic Learning. In *Handbook of Self-Regulation* (pp. 631–649). Elsevier. https://doi.org/10.1016/b978-012109890-2/50048-2

Schunk, D. H., & Pajares, F. (2002). The Development of Academic Self-Efficacy. In *Development of Achievement Motivation* (pp. 15–31). Elsevier. https://doi.org/10.1016/b978-012750053-9/50003-6

Schweder, S. (2020). Mastery goals, positive emotions and learning behavior in self-directed vs. teacher-directed learning. *European Journal of Psychology of Education*, *35*(1), 205–223. https://doi.org/10.1007/s10212-019-00421-z

Scouller, K. (1998). The influence of assessment method on students' learning approaches: Multiple choice question examination versus assignment essay. *Higher Education*, *35*(4), 453–472. https://doi.org/10.1023/A:1003196224280

Nijhuis, J. F., Segers, M. S., & Gijselaers, W. H. (2005). Influence of redesigning a learning environment on student perceptions and learning strategies. *Learning environments research*, *8*(1), 67-93.

Seipp, B. (1991). Anxiety and academic performance: A meta-analysis of findings. *Anxiety Research*, *4*(1), 27–41. https://doi.org/10.1080/08917779108248762

Sharp, J. G., Hemmings, B., Kay, R., Murphy, B., & Elliott, S. (2017). Academic boredom among students in higher education: A mixed-methods exploration of characteristics, contributors and consequences. *Journal of Further and Higher Education*, *41*(5), 657–677. https://doi.org/10.1080/0309877X.2016.1159292

Shaw, K., Holbrook, A., & Bourke, S. (2013). Student experience of final-year undergraduate research projects: an exploration of "research preparedness." *Studies in Higher Education*, *38*(5), 711–727. https://doi.org/10.1080/03075079.2011.592937

Shrout, P. E., & Bolger, N. (2002). Mediation in experimental and nonexperimental studies: New procedures and recommendations. *Psychological Methods*, *7*(4), 422–445. https://doi.org/10.1037/1082-989X.7.4.422

Sideridis, G. D. (2005). Goal orientation, academic achievement, and depression: evidence in favor of a revised goal theory framework. *Journal of educational psychology*, *97*(3), 366.

Sizemore, O. J., & Lewandowski, G. W. (2009). Learning Might Not Equal Liking: Research Methods Course Changes Knowledge but Not Attitudes. *Teaching of Psychology*, *36*(2), 90–95. https://doi.org/10.1080/00986280902739727

Skinner, N., & Brewer, N. (1999). Temporal Characteristics of Evaluation Anxiety. *Journal of Anxiety Disorders*, *13*(3), 293–314. https://doi.org/10.1016/S0887-6185(99)00005-5

Smith, S. (2017). Exploring the black and minority ethnic (BME) student attainment gap: what did it tell us? Actions to address home BME undergraduate students' degree attainment. *Journal of Perspectives in Applied Academic Practice*, *5*(1).

Smith, D., & Hardaker, G. (2000). e-Learning Innovation through the Implementation of an Internet Supported Learning Environment . *Educational Technology & Society* , *3*(3), 422–432. https://www.jstor.org/stable/jeductechsoci.3.3.422

Smith, K., & Hopkins, C. (2005). Great Expectations: Sixth-formers' perceptions of teaching and learning in degree-level English. *Arts and Humanities in Higher Education*, *4*(3), 304–318. https://doi.org/10.1177/1474022205056173

Sorić, I., Penezić, Z., & Burić, I. (2013). Big Five Personality Traits, Cognitive Appraisals and Emotion Regulation Strategies as Predictors of Achievement Emotions. *Psychological Topics*, *22*(2), 325–349.

Spada, M. M., Nikcevic, A. V., Moneta, G. B., & Ireson, J. (2006). Metacognition as a Mediator of the Effect of Test Anxiety on a Surface Approach to Studying. *Educational Psychology*, *26*(5), 615–624. https://doi.org/10.1080/01443410500390673

St. Clair, K. L. (1999). A case against compulsory class attendance policies in higher education. *Innovative Higher Education*, *23*(3), 171–180. https://doi.org/10.1023/A:1022942400812

Stajkovic, A. D., & Luthans, F. (1998). Self-efficacy and work-related performance: A meta-analysis. *Psychological Bulletin*, *124*(2), 240–261. https://doi.org/10.1037/0033-2909.124.2.240

Stanca, L. (2006). The effects of attendance on academic performance: Panel data evidence for introductory microeconomics. *Journal of Economic Education*, *37*(3), 251–266. https://doi.org/10.3200/JECE.37.3.251-266

Steinmayr, R., Crede, J., McElvany, N., & Wirthwein, L. (2016). Subjective Well-Being, Test Anxiety, Academic Achievement: Testing for Reciprocal Effects. *Frontiers in Psychology*, *6*(JAN), 1994. https://doi.org/10.3389/fpsyg.2015.01994

Stephan, M., Markus, S., & Gläser-Zikuda, M. (2019). Students' Achievement Emotions and Online Learning in Teacher Education. *Frontiers in Education*, *4*, 109. https://doi.org/10.3389/feduc.2019.00109

Stoloff, M. L., Good, M. R., Smith, K. L., & Brewster, J. (2015). Characteristics of Programs That Maximize Psychology Major Success. *Teaching of Psychology*, *42*(2), 99–108. https://doi.org/10.1177/0098628315569877

Summers, R. J., Higson, H. E., & Moores, E. (2020). Measures of engagement in the first three weeks of higher education predict subsequent activity and attainment in first year undergraduate students: a UK case study. *Assessment & Evaluation in Higher Education*, 1–16. https://doi.org/10.1080/02602938.2020.1822282

Tang, M., & Neber, H. (2008). Motivation and self-regulated science learning in high-achieving students: Differences related to nation, gender, and grade-level. *High Ability Studies*, *19*(2), 103–116. https://doi.org/10.1080/13598130802503959

Taylor, G., Jungert, T., Mageau, G. A., Schattke, K., Dedic, H., Rosenfield, S., & Koestner, R. (2014). A self-determination theory approach to predicting school achievement over time: The unique role of intrinsic motivation. *Contemporary Educational Psychology*, *39*(4), 342–358. https://doi.org/10.1016/j.cedpsych.2014.08.002

Taylor, J., & House, B. (2010). An exploration of identity, motivations and concerns of non-traditional students at different stages of higher education. In *Psychology Teaching Review* (Vol. 16, Issue 1).

Teague, D., & Corney, M. (2011). Is anybody there? Bootstrapping attendance with engagement. *Proceedings of ascilite 2011: Changing Demands, changing direction*, 1239-1243.

Tellegen, A., Watson, D., & Clark, L. A. (1999). On the Dimensional and Hierarchical Structure of Affect. *Psychological Science*, *10*(4), 297–303. https://doi.org/10.1111/1467-9280.00157

Tempelaar, D., Nguyen, Q., & Rienties, B. (2020). *Learning Analytics and the Measurement of Learning Engagement* (pp. 159–176). Springer, Cham. https://doi.org/10.1007/978-3-030-47392-1_9

Tempelaar, D., Rienties, B., Mittelmeier, J., & Nguyen, Q. (2018a). Student profiling in a dispositional learning analytics application using formative assessment. *Computers in Human Behavior*, *78*, 408–420. https://doi.org/10.1016/j.chb.2017.08.010

Tempelaar, D., Rienties, B., & Nguyen, Q. (2021). The Contribution of Dispositional Learning Analytics to Precision Education on JSTOR. *Educational Technology & Society*, *24*(1), 109–122. https://www.jstor.org/stable/26977861

Tempelaar, D., Rienties, B., & Nguyen, Q. (2018b). Investigating learning strategies in a dispositional learning analytics context: The case of worked examples. *ACM International Conference Proceeding Series*, 201–205. https://doi.org/10.1145/3170358.3170385

Tempelaar, D. T., Niculescu, A., Rienties, B., Gijselaers, W. H., & Giesbers, B. (2012). How achievement emotions impact students' decisions for online learning, and what precedes those emotions. *Internet and Higher Education*, *15*(3), 161–169. https://doi.org/10.1016/j.iheduc.2011.10.003

Tempelaar, D. T., Rienties, B., & Giesbers, B. (2015a). In search for the most informative data for feedback generation: Learning analytics in a data-rich context. *Computers in Human Behavior*, *47*, 157–167. https://doi.org/10.1016/j.chb.2014.05.038

Tempelaar, D. T.; Rienties, B. and Giesbers, B. (2015b). Stability and sensitivity of Learning Analytics based prediction models. In: *Proceedings of 7th International conference on Computer Supported Education* (Helfert, Markus; Restivo, Maria Teresa; Zvacek, Susan and Uho, James eds.), 23-25 May 2015, Lisbon, Portugal, CSEDU, pp. 156–166.

Tempelaar, D. T., Rienties, B., & Nguyen, Q. (2017). Towards Actionable Learning Analytics Using Dispositions. *IEEE Transactions on Learning Technologies*, *10*(1), 6–16. https://doi.org/10.1109/TLT.2017.2662679

Thatcher, A., Fridjhon, P., & Cockcroft, K. (2007). The relationship between lecture attendance and academic performance in an undergraduate psychology class. *South African Journal of Psychology*, *37*(3), 656–660. https://doi.org/10.1177/008124630703700316

Tobin, G. A., & Begley, C. M. (2004). Methodological rigour within a qualitative framework. *Journal of Advanced Nursing*, *48*(4), 388–396. https://doi.org/10.1111/j.1365-2648.2004.03207.x

Trapp, A., Banister, P., Ellis, J., Latto, R., Miell, D., & Upton, D. (2011). The future of undergraduate psychology in the United Kingdom. *York: Higher Education Academy Psychology Network*.

Tremblay, P. F., Gardner, R. C., & Heipel, G. (2000). A model of the relationships among measures of affect, aptitude, and performance in introductory statistics. *Canadian Journal of Behavioural Science*, *32*(1), 40–48. https://doi.org/10.1037/h0087099

Trigwell, K., & Ashwin, P. (2006). An exploratory study of situated conceptions of learning and learning environments. *Higher Education*, *51*(2), 243-258.

Trigwell, K., Ellis, R. A., & Han, F. (2012). Relations between students' approaches to learning, experienced emotions and outcomes of learning. *Studies in Higher Education*, *37*(7), 811–824. https://doi.org/10.1080/03075079.2010.549220

Turnbull, D., Chugh, R., & Luck, J. (2020). Learning management systems: a review of the research methodology literature in Australia and China Learning Management Systems in the Workplace: A Literature Review View project Student perceptions of online learning View project. *Article in International Journal of Research & Method in Education*. https://doi.org/10.1080/1743727X.2020.1737002

Turner, J. E., & Schallert, D. L. (2001). Expectancy-value relationships of shame reactions and shame resiliency. *Journal of Educational Psychology*, *93*(2), 320–329. https://doi.org/10.1037//0022-0663.93.2.320

Turner, R., Sutton, C., Muneer, R., Gray, C., Schaefer, N., & Swain, J. (2018). Exploring the potential of using undergraduates' knowledge, skills and experience in research methods as a proxy for capturing learning gain. *Higher Education Pedagogies*, *3*(1), 110–136. https://doi.org/10.1080/23752696.2018.1449127

Tze, V. M. C., Daniels, L. M., & Klassen, R. M. (2016). Evaluating the Relationship Between Boredom and Academic Outcomes: A Meta-Analysis. In *Educational Psychology Review* (Vol. 28, Issue 1, pp. 119–144). Springer New York LLC. https://doi.org/10.1007/s10648-015-9301-y

Tze, V. M. C., Klassen, R. M., & Daniels, L. M. (2014). Patterns of boredom and its relationship with perceived autonomy support and engagement. *Contemporary Educational Psychology*, *39*(3), 175–187. https://doi.org/10.1016/j.cedpsych.2014.05.001

UCAS. (2020, December). *Ucas Undergraduate Sector-Level End Of Cycle Data Resources 2020*. https://www.ucas.com/data-and-analysis/undergraduate-statistics-and-reports/ucas-undergraduate-sector-level-end-cycle-data-resources-2020

Vallerand, R. J., Blais, M. R., Brière, N. M., & Pelletier, L. G. (1989). Construction et validation de l'échelle de motivation en éducation (EME). *Canadian Journal of Behavioural Science/Revue Canadienne Des Sciences Du Comportement*, *21*(3), 323–349. https://doi.org/10.1037/h0079855

Van Blerkom, M. L. (1996). *Academic Perseverance, Class Attendance, and Performance in the College Classroom*.

Van Den Boom, G., Paas, F., Van Merriënboer, J. J. G., & Van Gog, T. (2004). Reflection prompts and tutor feedback in a web-based learning environment: Effects on students' self-regulated learning competence. *Computers in Human Behavior*, *20*(4), 551–567. https://doi.org/10.1016/j.chb.2003.10.001

VandenBos, G. R. (2007). *APA dictionary of psychology*. American Psychological Association.

Van Dinther, M., Dochy, F., & Segers, M. (2011). Factors affecting students' self-efficacy in higher education. In *Educational Research Review* (Vol. 6, Issue 2, pp. 95–108). Elsevier. https://doi.org/10.1016/j.edurev.2010.10.003

Van Yperen, N. W., Blaga, M., & Postmes, T. (2014). A meta-analysis of self-reported achievement goals and nonself-report performance across three achievement domains (work, sports, and education). *PLoS ONE*, *9*(4), e93594. https://doi.org/10.1371/journal.pone.0093594

Vansteenkiste, M., Simons, J., Lens, W., Soenens, B., Matos, L., & Lacante, M. (2004). *Less Is Sometimes More: Goal Content Matters*. https://doi.org/10.1037/0022-0663.96.4.755

Vanthournout, G., Gijbels, D., Coertjens, L., Donche, V., & Van Petegem, P. (2012). Students' Persistence and Academic Success in a First-Year Professional Bachelor Program: The Influence of Students' Learning Strategies and Academic Motivation. *Education Research International*, *2012*, 1–10. https://doi.org/10.1155/2012/152747

Vermunt, J. D., & Donche, V. (2017). A Learning Patterns Perspective on Student Learning in Higher Education: State of the Art and Moving Forward. *Educational Psychology Review*, *29*(2), 269–299. https://doi.org/10.1007/s10648-017-9414-6

Vermunt, J., & Minnaert, A. (2003). Dissonance in student learning patterns: When to revise theory? *Studies in Higher Education*, *28*(1), 49–61. https://doi.org/10.1080/03075070309301

Villavicencio, F. T., & Bernardo, A. B. I. (2013). Negative Emotions Moderate the Relationship Between Self-Efficacy and Achievement of Filipino Students. *Psychological Studies*. https://doi.org/10.1007/s12646-013-0193-y

Vittengl, J. R., Bosley, C. Y., Brescia, S. A., Eckardt, E. A., Neidig, J. M., Shelver, K. S., & Sapenoff, L. A. (2004). Why are Some Undergraduates More (and others Less) Interested in Psychological Research? *Teaching of Psychology*, *31*(2), 91–97. https://doi.org/10.1207/s15328023top3102_3

Vodanovich, S. J., & Watt, J. D. (2016). Self-report measures of boredom: An updated review of the literature. In *Journal of Psychology: Interdisciplinary and Applied* (Vol. 150, Issue 2, pp. 194–226). Routledge. https://doi.org/10.1080/00223980.2015.1074531

Vogt, B. A., Berger, G. R., & Derbyshire, S. W. G. (2003). Structural and functional dichotomy of human midcingulate cortex. *European Journal of Neuroscience*, *18*(11), 3134–3144. https://doi.org/10.1111/j.1460-9568.2003.03034.x von der Embse, N., Jester, D., Roy, D., & Post, J. (2018). Test anxiety effects, predictors, and correlates: A 30-year meta-analytic review. In *Journal of Affective Disorders* (Vol. 227, pp. 483–493). Elsevier B.V. https://doi.org/10.1016/j.jad.2017.11.048

Walls, T. A., & Little, T. D. (2005). *Relations Among Personal Agency, Motivation, and School Adjustment in Early Adolescence*. https://doi.org/10.1037/0022-0663.97.1.23

Walsh-Bowers, R. (2002). Constructing qualitative knowledge in psychology: Students and faculty negotiate the social context of inquiry. *Canadian Psychology*, *43*(3), 163–178. https://doi.org/10.1037/h0086913

Watkins, D. (2014). Correlates of approaches to learning: A cross-cultural meta-analysis. In *Perspectives on Thinking, Learning, and Cognitive Styles* (pp. 165–195). Taylor and Francis. https://doi.org/10.4324/9781410605986-7

Weiner, B. (1985). An Attributional Theory of Achievement Motivation and Emotion. *Psychological Review*, *92*(4), 548–573. https://doi.org/10.1037/0033-295X.92.4.548

White, S. C., Gaines, S. O., & Jha, S. (2012). Beyond Subjective Well-Being: A Critical Review Of The Stiglitz Report Approach To Subjective Perspectives On Quality Of Life. *Journal of International Development*, *24*(6), 763–776. https://doi.org/10.1002/jid.2866

Wigfield, A. (1994). Expectancy-Value Theory of Achievement Motivation: A Developmental Perspective. In *Educational Psycholo~ Review* (Vol. 6, Issue 1). http://maaikerotteveel.pbworks.com/f/Wigfield expectancy value theory 2000.pdf

Wigfield, A., & Eccles, J. S. (1992). The development of achievement task values: A theoretical analysis. *Developmental Review*, *12*(3), 265–310. https://doi.org/10.1016/0273-2297(92)90011-P

Wigfield, A., & Eccles, J. S. (2000). Expectancy–Value Theory of Achievement Motivation. *Contemporary Educational Psychology*, *25*(1), 68–81. https://doi.org/10.1006/CEPS.1999.1015

Wigley, S. C. (2009). The relationship between attendance and academic performance in further education college A/S psychology students. *Journal of Further and Higher Education*, *33*(2), 183–190. https://doi.org/10.1080/03098770902874242

Williams, A. . (2013). Worry, intolerance of uncertainty, and statistics anxiety. - PsycNET. *Statistics Education Research Journal* , *12*(1), 48–59. https://psycnet.apa.org/record/2013-45161-004

Williams, J., & MacKinnon, D. P. (2008). Resampling and distribution of the product methods for testing indirect effects in complex models. *Structural Equation Modeling*, *15*(1), 23–51. https://doi.org/10.1080/10705510701758166

Willig, C. (2013). *Introducing qualitative research in psychology*. McGraw-hill education (UK).

Wisniewski, B., Zierer, K., & Hattie, J. (2020). The Power of Feedback Revisited: A Meta-Analysis of Educational Feedback Research. *Frontiers in Psychology*, *10*, 3087. https://doi.org/10.3389/fpsyg.2019.03087

Wood, E. H., & Henderson, S. (2010). Large cohort assessment: Depth, interaction and manageable marking. *Marketing Intelligence and Planning*, *28*(7), 898–907. https://doi.org/10.1108/02634501011086481

Woodfield, R., Jessop, D., & McMillan, L. (2006). Gender differences in undergraduate attendance rates. *Studies in Higher Education*, *31*(1), 1–22. https://doi.org/10.1080/03075070500340127

Rosseel. Y. (2012). lavaan: An R Package for Structural Equation Modeling. *Journal of Statistical Software*, 48(2), 1-36. URL http://www.jstatsoft.org/v48/i02/

Zare, H., Rastegar, A., & Hosseini, S. M. D. (2011). The relation among achievement goals and academic achievement in statistics: the mediating role of statistics anxiety and statistics self-efficacy. *Procedia - Social and Behavioral Sciences*, *30*, 1166–1172. https://doi.org/10.1016/J.SBSPRO.2011.10.227

Zarea, K. (2016). Understanding Thematic Analysis and its Pitfall Quality of care in chronic illness View project Quality of life in chronic illness View project Mostafa Javadi medical university. *J. Clie. Care*, *1*(1), 34–40. https://doi.org/10.15412/J.JCC.02010107

Zeegers, P. (2001). Approaches to learning in science: A longitudinal study. *British Journal of Educational Psychology*, *71*(1), 115–132. https://doi.org/10.1348/000709901158424

Zeidner, M., & Matthews, G. (2005). Evaluation Anxiety: Current Theory and Research. . In A.J Elliot & C. Dweck (Eds.), *Handbook of competence and motivation* (pp. 141–163). Guilford Publications. https://psycnet.apa.org/record/2005-08058-009

Zhao, X., Lynch, J. G., & Chen, Q. (2010). Reconsidering Baron and Kenny: Myths and truths about mediation analysis. *Journal of Consumer Research*, *37*(2), 197–206. https://doi.org/10.1086/651257

Zimmerman, B. J. (1989). A Social Cognitive View of Self-Regulated Academic Learning. In *Journal of Educational Psychology* (Vol. 81, Issue 3). https://pdfs.semanticscholar.org/e1ff/53e710437e009f06bc264b093a2ba9523879.pdf

Zimmerman, B. J. (2002). *Becoming a Self-Regulated Learner: An Overview, Theory Into Practice*. *41*(2), 64–70. https://doi.org/10.1207/s15430421tip4102_2

Zimmerman, B. J. (2008). *Investigating Self-Regulation and Motivation: Historical Background, Methodological Developments, and Future Prospects*. https://doi.org/10.3102/0002831207312909

Zimmerman, B. J., & Martinez-Pons, M. (1990). Student Differences in Self-Regulated Learning: Relating Grade, Sex, and Giftedness to Self-Efficacy and Strategy Use. *Journal of Educational Psychology*, *82*(1), 51–59. https://doi.org/10.1037/0022-0663.82.1.51

Zusho, A., Pintrich, P. R., & Coppola, B. (2003). Skill and will: The role of motivation and cognition in the learning of college chemistry. *International Journal of Science Education*, *25*(9), 1081–1094. https://doi.org/10.1080/0950069032000052207