

SOCIAL NETWORKS IN TRANSITION:
Investigating relationship developments & their impact during
the transition to university



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I first thank the students of the two college cohorts contributing to this thesis, for allowing me to follow your every social move during most of your undergraduate experience. It is a bold and kind decision to let a stranger trace your potential break ups, low points, and moments of social isolation. I was thrilled to witness you managing to maintain relationships with loved ones back home while finding your place in college and to learn that raising your awareness of how social bonds enrich your life sparked some lovely changes (my favourite comment on the study's impact will always remain: "Got a girlfriend now, hell yeah!"). I further thank the college for allowing my research to take place and hope the results will help facilitate future students' transitions.

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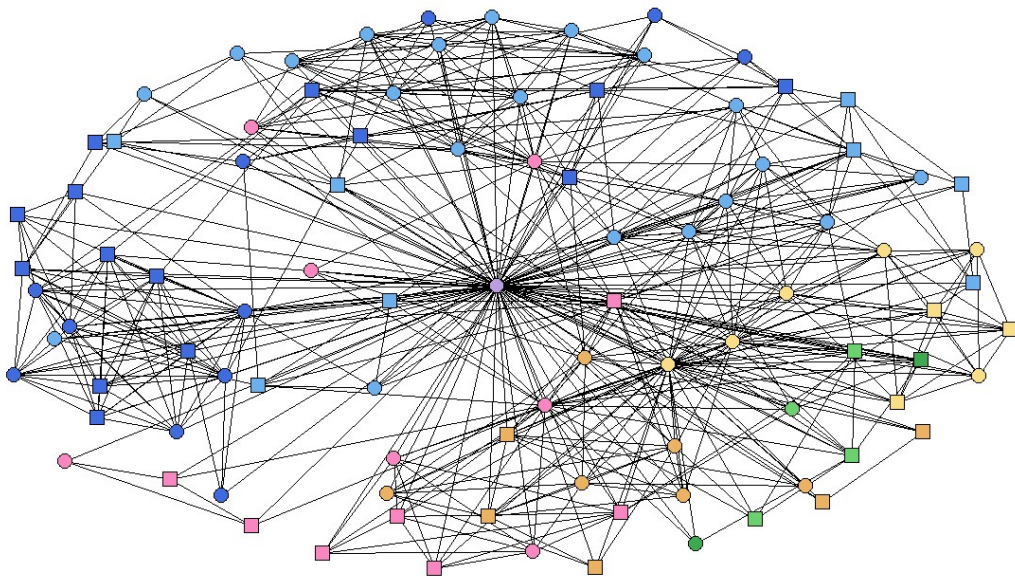
When, in your first year as a DPhil student, your department building abruptly shuts down, in your second year, you overcome chronic fatigue syndrome, and in your third, two of your supervisors resign and the third reluctantly retires (at least partially), you might ask yourself: what's next?

As it turned out, it was the pandemic in my fourth year.
And yet, here we are.

What these experiences have taught me is that I truly have become an expert in facing transitions and in appreciating our social relationships at the very core of our well-being.

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CONTENTS

ACKNOWLEDGEMENTS.....	<i>i</i>
CONTENTS.....	<i>iii</i>
LIST OF FIGURES.....	<i>vii</i>
LIST OF TABLES.....	<i>viii</i>
ABSTRACT.....	<i>1</i>
1 INTRODUCTION.....	<i>2</i>
1.1 Theoretical & Empirical Background.....	<i>5</i>
1.1.1 Social Transitions – Life course theory & the life cycle.....	<i>5</i>
1.1.2 Social Relationships – Social support theory & the consequences of social isolation.....	<i>7</i>
1.1.3 Social Structures – The social brain hypothesis & Dunbar’s number.....	<i>8</i>
1.1.4 Social Dynamics – Social convoy & socioemotional selectivity theory.....	<i>10</i>
1.1.5 Social Orientation – The need to belong & the homophily principle.....	<i>13</i>
1.1.6 Transition to Trajectory – Appreciating there are short- & long-term effects....	<i>16</i>
1.2 The Transition from Home to University – Thesis overview.....	<i>18</i>
1.2.1 Aims.....	<i>18</i>
1.2.2 Approach & Methods.....	<i>19</i>
1.2.3 Thesis Structure.....	<i>27</i>
2 MANAGING PERSONAL RELATIONSHIPS: Ego Network Developments..	<i>31</i>
2.1 Introduction.....	<i>32</i>
2.1.1 Theoretical Background.....	<i>32</i>
2.1.2 Investigating ego network developments during the transition to university....	<i>35</i>
2.1.3 The present research.....	<i>40</i>
2.2 Methods Study 1.....	<i>43</i>
2.2.1 Design.....	<i>43</i>
2.2.2 Participants.....	<i>43</i>
2.2.3 Materials.....	<i>44</i>
2.2.4 Procedure.....	<i>46</i>
2.2.5 Ethics.....	<i>46</i>
2.2.6 Analyses.....	<i>47</i>
2.3 Results & Discussion Study 1.....	<i>52</i>

2.3.1	Step 1: Baseline Snapshot – the ego network pre-transition	52
2.3.2	Step 2: Out with the old, in with the new? – ego network developments during the transition	54
2.3.3	Step 3: A closer look – ego network developments across the layers.....	63
2.3.4	Step 4: In it for the long-haul – the ego network’s composition post-transition	72
2.4	Methods Study 2.....	74
2.4.1	Design	74
2.4.2	Participants.....	75
2.4.3	Materials.....	75
2.4.4	Procedure	77
2.4.5	Analyses.....	77
2.5	Results & Discussion Study 2.....	78
2.5.1	Step 1: Baseline Snapshot – the ego network pre-transition	78
2.5.2	Step 2: Out with the old, in with the new? – ego network developments during the transition	80
2.5.3	Step 3: A closer look – ego network developments across the layers.....	89
2.5.4	Step 4: In it for the long-haul – the ego network’s composition post-transition	96
2.6	General Discussion.....	98
2.6.1	Linking results to hypotheses & other research	98
2.6.2	Limitations, Implications & Applications	106
3	INTEGRATING INTO A COMMUNITY: Cohort Network Dynamics.....	109
3.1	Introduction – From Strangers to Community	110
3.1.1	Theoretical Background.....	111
3.1.2	Investigating homophily shaping cohort network dynamics	115
3.1.3	The present research.....	120
3.2	Methods	123
3.2.1	Design	123
3.2.2	Participants.....	124
3.2.3	Materials.....	124
3.2.4	Procedure	129
3.2.5	Analyses.....	129
3.3	Results.....	139
3.3.1	From strangers to community – network composition and structure	139
3.3.2	Speedy self-segregation – cross-sectional analyses of initial homophily	142
3.3.3	Like attracts like – short term longitudinal homophily dynamics.....	149
3.3.4	Standing the test of time – longer term longitudinal homophily dynamics	152

3.4	Discussion	156
3.4.1	Linking results to hypotheses & other research	156
3.4.2	Implications, Limitations & Applications	166
4	<i>COPING WITH ANXIETY & DEPRESSION: Mental Health Trajectories...</i>	173
4.1	Introduction	174
4.1.1	Theoretical Background.....	175
4.1.2	Investigating mental health developments during the transition to university	177
4.1.3	The present research.....	182
4.2	Methods	185
4.2.1	Design	185
4.2.2	Participants.....	186
4.2.3	Materials.....	187
4.2.4	Procedure	188
4.2.5	Analyses.....	188
4.3	Results	193
4.3.1	Baseline bliss or blues? – mental health before the transition	193
4.3.2	Up one minute, down the next? – mental health during the transition	195
4.3.3	Was it the best of times, or the worst of times? – mental health post-transition	197
4.3.4	All’s well that ends well? – predicting mental health outcomes	200
4.4	Discussion	203
4.4.1	Increases in anxiety and depression.....	203
4.4.2	Gender differences	206
4.4.3	Explaining mental health post-transition	208
4.4.4	Social support & mental health	209
4.4.5	The need to monitor mental health more closely.....	210
4.4.6	Limitations	213
4.4.7	Conclusion	216
5	<i>DISCUSSION</i>	217
5.1	Main Findings	218
5.1.1	Ego network developments.....	218
5.1.2	Cohort network dynamics	220
5.1.3	Mental health trajectories.....	221
5.1.4	Rapid network expansion	223
5.1.5	Network stability & robustness	226
5.1.6	Mental health & the network.....	230

5.2	Wider Implications.....	235
5.2.1	Theoretical Implications	235
5.2.2	Methodological implications	237
5.2.3	Practical implications.....	240
5.3	Limitations.....	242
5.4	Conclusion	249
6	<i>Appendices</i>	252
6.1	Appendix A: Questionnaire Study 1.....	252
6.2	Appendix B: Questionnaire Study 2.....	263
6.3	Appendix C: Auxiliary Analyses of Mental Health	275
7	<i>References</i>.....	278

LIST OF FIGURES

<i>Figure 2.1 Physical proximity at T0</i>	53
<i>Figure 2.2 Contact frequency at T0</i>	53
<i>Figure 2.3 Ego network developments in size and composition</i>	56
<i>Figure 2.4 Developments in emotional closeness</i>	58
<i>Figure 2.5 Developments in physical proximity</i>	59
<i>Figure 2.6 Developments in contact frequency</i>	60
<i>Figure 2.7 Developments in contact type</i>	62
<i>Figure 2.8 Development of ego network layer composition</i>	65
<i>Figure 2.9 Physical proximity at T0</i>	79
<i>Figure 2.10 Contact frequency at T0</i>	79
<i>Figure 2.11 Ego network developments in size and composition</i>	82
<i>Figure 2.12 Developments in emotional closeness</i>	84
<i>Figure 2.13 Developments in physical proximity</i>	85
<i>Figure 2.14 Developments in contact frequency</i>	86
<i>Figure 2.15 Developments in contact type</i>	88
<i>Figure 2.16 Development of ego network layer composition</i>	90
<i>Figure 3.1 Overview of the studies' design</i>	124
<i>Figure 3.2 Study 1 cohort networks and statistics</i>	140
<i>Figure 3.3 Study 2 cohort networks and statistics</i>	142
<i>Figure 4.1 Overview of the studies' design</i>	186
<i>Figure 4.2 Baseline (T0) self-reported anxiety</i>	194
<i>Figure 4.3 Baseline (T0) self-reported depression</i>	195
<i>Figure 4.4 Self-reported anxiety levels during the transition to university</i>	196
<i>Figure 4.5 Self-reported depression levels during the transition to university</i>	197
<i>Figure 4.6 Post-transition (i.e., T4/3) self-reported anxiety levels</i>	199
<i>Figure 4.7 Post-transition (i.e., T4/3) self-reported depression levels</i>	200

LIST OF TABLES

<i>Table 2.1 Development of ego network layer size.....</i>	<i>63</i>
<i>Table 2.2 Summary of individual linear regression models of predictors of relationship maintenance post-transition.....</i>	<i>72</i>
<i>Table 2.3 Development of ego network layer size.....</i>	<i>89</i>
<i>Table 2.4 Summary of individual linear regression models of predictors of relationship maintenance post-transition.....</i>	<i>97</i>
<i>Table 3.1 Initial homophily in Study 1 for 10/16 sources of homophily after one term</i>	<i>143</i>
<i>Table 3.2 Initial homophily in Study 2 for 9/16 sources of homophily after one term .</i>	<i>146</i>
<i>Table 3.3 SIENA estimation results for the short-term models of both studies.....</i>	<i>150</i>
<i>Table 3.4 SIENA estimation results for the long-term models of both studies.</i>	<i>153</i>
<i>Table 4.1 Multiple regression model of anxiety scores post-transition.....</i>	<i>201</i>
<i>Table 4.2 Multiple regression model of depression scores post-transition</i>	<i>202</i>
<i>Table 6.1 Summary of individual linear regression models of predictors of anxiety scores post-transition.....</i>	<i>275</i>
<i>Table 6.2 Summary of individual linear regression models of predictors of depression scores post-transition.....</i>	<i>276</i>
<i>Table 6.3 Summary of the independent t-tests comparing the studies' outcomes & relevant predictors.....</i>	<i>277</i>

ABSTRACT

Supportive relationships are key to a healthy, long, and fulfilled life (Umberson & Karas Montez, 2010). While much is known about the general structure of our personal relationships (i.e., ego networks; Sutcliffe et al., 2012) and self-bounded communities (i.e., complete or cohort networks; Zhou et al., 2005), we still know relatively little about how these social networks adapt to critical life events, such as the transition of entering university (Wrzus et al., 2013). This thesis investigates the effects of this first major transition on young adults' personal relationships, social integration, and mental health. In Chapter 1, I introduce the theoretical and empirical background underlying my research and present my unique prospective, longitudinal social network design in which students of two consecutive cohorts at a College of Oxford University participated (five assessments, across 2.5 years in Study 1, $N = 90$; and seven, across 1.5 years in Study 2, $N = 81$). In Chapter 2, I examine how these students manage their personal relationships and find that ego networks are overall remarkably robust and grow uniformly within just the first two months at university. In Chapter 3, I investigate how students socially integrate into their new social environment and find that cohort networks driven by homophily factors form rapidly and stabilise just as quickly. In Chapter 4, I study the mental health trajectories of these young adults and find uncommonly high levels of anxiety and depression that temporarily or gradually worsen during the transition. Finally, in Chapter 5, I discuss the main findings and outline their theoretical, methodological, and practical implications. Overall, this thesis shows that the impact of the transition to university on students' social relationships and mental health occurs rapidly. Future research might focus on the first few weeks of this transition in more detail and differentiate students' individual experiences further.

1 INTRODUCTION

Maintaining supportive relationships positively affects our health, happiness and general well-being. These manifold benefits of cultivating social relationships appear intuitively understood and have been well-researched (e.g., Argyle, 1992; Umberson & Karas Montez, 2010). Being socially isolated, in contrast, can have grave and similarly wide-ranging consequences (e.g., Stansfeld et al., 1998). Investigating how we can stay socially connected, especially when facing change and undergoing key transitions in life (e.g., from school to university), is therefore important. Doing so seems particularly important in our increasingly globalised yet more and more socially disconnected world (Putnam, 2000c). Especially in a time of social distancing measures with national lockdowns in place in most countries across the world, we are becoming most acutely aware of our well-being's dependency on contact with friends, family, colleagues, and even strangers in the streets.

There is an extensive literature detailing how individuals' personal relationships (termed *ego networks*) and self-bounded communities (termed *complete* or *cohort networks*) are typically structured (e.g., Zhou et al., 2005). Our knowledge of both types of social networks is often limited to stationary settings, however, where individuals' relationships are assumed to be relatively stable, and groups mainly fixed. In contrast, modern life is typically more flexible and often involves relocating for educational, professional or personal purposes (Putnam, 2000c). This increased mobility introduces periods of transition during which individuals have to manage their personal relationships more actively while integrating into their new social environment. In addition, such periods of transition can be stressful and impact our mental health,

especially when the protective effects of stable, supporting relationships might be more fragile (Taylor et al., 2014).

Better understanding how we adapt to such periods of social instability becomes paramount, especially in times of increased uncertainty and rapid change occurring both globally and locally. Even before the current pandemic and its many social distancing measures, loneliness and social isolation have been on the rise while mental health has been on the decline (de Jong Gierveld et al., 2006). There is therefore a pressing need to investigate how we can stay connected, socially integrated, and mentally well during these turbulent times. My thesis therefore investigates how a first major period of transition for many (that from home to university) affects our personal relationships, our social integration within a new community, and our mental health.

In the original research reported in this thesis, I followed two consecutive cohorts (i.e., longitudinal samples) of prospective university students from before they became members of the same Oxford college until they were close to the end of their undergraduate degree and had likely settled into their new social environment. I conducted these two prospective, longitudinal cohort studies to be able to observe how participants' personal relationships, their cohort community, and their mental health developed during this time. This approach moreover allowed me to combine ego and cohort network parameters in my analyses. Doing so acknowledges individuals' interconnectedness (ego network) and further recognises that an individual's personal relationships need to be considered alongside their actual integration in the local

community (cohort network) to gain a more complete and hence more accurate understanding of their social world.

In this introduction, I provide an overview of the theoretical and empirical background guiding my research. This overview highlights three key aspects to consider: ego network developments, cohort network dynamics, and mental health trajectories in early adulthood, revealing the gaps in the existing literature that motivate my thesis. Little previous research has investigated the effects of transitioning to university prospectively (assessing a pre-transition baseline), longitudinally (following an entire cohort throughout most of their undergraduate experience), and by using combined ego and cohort network analyses (appreciating an individual's personal relationships as well as their social embeddedness in the community). I then present an overview of this thesis, which appears to be among the first to incorporate all three of these elements. This approach allows me to investigate the effects of this first major transition on these young people's personal relationships, their social integration, and their mental health. These three aspects are addressed in the three empirical chapters that follow, which respectively focus on students' ego-network developments, cohort network dynamics, and anxiety and depression trajectories. Because each of these chapters tackles a subsection of the overall research question and is hence based on varying theoretical and empirical underpinnings, the specific literature reviews relevant to each are deferred until the respective chapters.

1.1 Theoretical & Empirical Background

1.1.1 Social Transitions – Life course theory & the life cycle

Many factors shape our lives from the moment we are born until the moment we die. Life course theory aims to identify and better understand these factors, while focusing on five major concepts: “cohorts, transitions, trajectories, life events, and turning points” (Hutchison, 2011, p. 1586). This interdisciplinary theory hence acknowledges that change (i.e., transitions, life events, and turning points) represents an inherent and important aspect of life and further recognises the importance of our social environments (i.e., cohorts) in how we deal with such changes. Jointly, these life changes impact the course lives can take (i.e., trajectories). Considering which changes make up a normative life course shows that the transition to university represents a particularly important time of change in a common life cycle. This transition is best understood in the context of social relationships and the cohort within which they are experienced. Furthermore, this transition and the resulting changes in young adults’ social worlds can have an impact on mental health and overall life trajectories, making it particularly relevant to thoroughly investigate them. Hence, life course theory provides a seminal framework guiding my research.

Considering life course theory from a developmental angle, Elder (1998) explored how historical, political, and sociodemographic influences shape life trajectories. In addition, he listed the so called ‘life cycle’ and its associated role changes as having a major impact. The life cycle describes the sequence of often overlapping social roles most of us will adopt over the course of life (e.g., student, spouse, parent, retiree). The transition from home to university involves a particularly high number of such role changes, as

anyone undergoing it simultaneously faces the transition from child to adult, from secondary school pupil to more independent university student, and from junior member of a family household in their hometown to equal member of a new social and often geographical environment (Zarrett & Eccles, 2006). In fact, the transition to adulthood alone has been detailed to involve over 1,100 sequences of roles for men and over 1,800 such sequences for women (Rindfuss et al., 1987).

This role-focused aspect of life course theory also highlights the fact that each person's life course is interlinked with that of other people. Hence, it is vital to incorporate the social dynamics that adopting new social roles typically involve when investigating the effects of the transition from home to university. Transitioning from adolescence into adulthood on its own poses a universal challenge. And with now approximately 50% of a cohort entering university in most Western countries, leaving one's hometown to pursue a tertiary education is becoming the norm in many cultures (Tran, 2016). This phase is often labelled 'emerging adulthood' and is usually defined as the period from the ages eighteen to twenty-five years of age (Arnett, 2000). It involves a letting go of old roles and relationships, while assuming more independence and responsibility in shaping one's social world. Any young person undergoing the transition from home to university is suddenly no longer a somewhat passively embedded member of existing family and school cohort structures but has to actively shape their personal network and procure themselves a position in a new social setting (Eccles & Gootman, 2002). They are expected to form an autonomous identity, all the while learning a broad range of new skills, facing new assignments and assessments, and navigating a new environment. Facing these simultaneous demands might appear overwhelming at times and can

negatively impact mental health (Taylor et al., 2014). I therefore not only observe how young adults' ego networks and the cohort network they are part of develop during this crucial time, but also monitor their mental health development.

1.1.2 Social Relationships – Social support theory & the consequences of social isolation

Friendships matter. As many popular songs, films or books affirm, life is easier with people whom we can depend on for emotional support (Massen et al., 2010). As social animals, living in stable, internally structured groups comes naturally (Dunbar, 2003) and the dyadic relationships making up such interconnected communities are fundamental to our well-being (Hartup & Stevens, 1999) and happiness (Diener & Seligman, 2002). Social support theory (Thoits, 1985) describes the benefits of stable social relationships which provide emotional, tangible, informational, and/or instrumental support in addition to mere companionship (Schwarzer et al., 2003). Apart from positively affecting our physical as well as our mental health (Cohen, 2004; Thoits, 2011), maintaining supportive relationships has also been linked to higher levels of overall life satisfaction (Demir et al., 2015). Moreover, Holt-Lunstad and colleagues' (2010) meta-analysis showed that nurturing reliable relationships effectively cuts one's mortality risk in half, controlling for age, sex, and initial health status. Assuming that most people strive to lead long, happy, and healthy lives (Rouse, 2004), the importance of cultivating one's personal network (consisting of relatives, partners and friends) and integrating into a well-connected community can hardly be overstated.

A perceived lack of social connectedness instead negatively affects both society as a whole, as well as its individual members. In contemporary Western countries, the

continuing rise of social isolation leads to corresponding increases in loneliness (Putnam, 2000b; Reisman et al., 1950), negatively affecting mental health (Keyes, 2003) and professional performance (Putnam, 2000a). Feeling disconnected from others furthermore negatively affects one's mood (Williams et al., 2000; Wölfer & Scheithauer, 2013), and can lead to overall "poor physical, psychological, and social functioning" (Stansfeld et al., 1998, p. 247). Finally, the toxic effects of mere perceived social isolation have been shown to even include "higher rates of morbidity and mortality" (Cacioppo & Cacioppo, 2014, p. 58), leading the authors to declare feeling lonely as outright "dangerous" (p. 67).

Maintaining social bonds and staying socially integrated therefore appear vital for communities and their members to flourish and is especially at risk when leaving familiar surroundings to enter uncharted waters. The transition to university constitutes such a time. It might hence represent a period during which social support is more urgently required but where existing social structures are also less stable.

1.1.3 Social Structures – The social brain hypothesis & Dunbar's number

The outlined benefits of nurturing supportive relationships and the grave consequences of failing to stay socially connected might lead one to suppose it best to simply 'pick up' friend after friend throughout life, in line with the saying 'the more the merrier'. Sadly, this strategy is simply not feasible. As Dunbar (1998) explains with the Social Brain Hypothesis, we are limited both by time and cognitive constraints in how many relationships we can actually maintain. Maintaining relationships requires a substantial time investment, especially the closer and more intimate the relationship (Oswald et al., 2004). It is moreover crucial to remember extraordinary amounts of information about

the other, keeping track of a friend's day-to-day life, general tastes, and meaningful past experiences, while also remembering their pet's name and any relative's upcoming surgery. Such active involvement with another person's life requires substantial cognitive resources that restrict the size of the group we can be actively part of and the number of people to whom we can be close at any one time (Dunbar, 2010).

Dunbar's number specifies this upper limit at approximately 150 people (Dunbar, 1998). The sizes of traditional hunter-gatherer groups, villages in eighteenth century England, Amish and Hutterite communities, army companies, and many corporations all observe this boundary (Dunbar, 2008), as do German campsites (Kordsmeyer et al., 2017). Groups surpassing this maximum, as found in most modern neighbourhoods, consist of subgroups nested within these larger congregations. A community of 150 members in turn also consists of smaller groups that are "structured with a consistent scaling ratio [of three] across the successive layers" (Hill et al., 2008, p. 748).

Interestingly, this constraint on overall size and the breakdown into hierarchically inclusive, scaled sub-units holds true from both a top-down (e.g., Hamilton et al., 2007) and a bottom-up (e.g., Roberts et al., 2009) perspective. This congruency between networks studied at the individual level (concentrating on a single person's relationships, i.e., ego networks) and those examined at the community level (considering whole, often self-bounded groups, i.e., cohort networks) is perhaps surprising, as these networks do not necessarily describe the same set of people, and yet, this congruency is consistently found in the literature (Sutcliffe et al., 2012).

An individual's ego network therefore typically consists of up to 150 members, comprised of friends, family, and other people with whom the person has meaningful relationships, that they wish to continue. Such ego-centred networks are centred around one person (the ego) and illustrate their relationships (to so-called alters) at a given time. There are subgroups, too, as not all members are of equal importance. Hill and Dunbar (2003) showed that an ego's relationships are hierarchically structured in concentric 'circles of acquaintanceships'. As layers increase, the number of members in each layer also increases, while both frequency of interaction and level of intimacy decrease.

The innermost layer forms the 'support clique' and includes three to five people, to whom one would be comfortable to turn "in times of severe emotional and financial distress" (Zhou et al., 2005, p. 440). For those 'inner circle' members, emotional closeness ratings are highest and contact occurs at least weekly (Dunbar & Spoor, 1995). Next, there is the 'sympathy group', containing 12 to 15 members (including the support clique) that are contacted at least monthly and considered "the core of an individual's social world at any given moment" (Stiller & Dunbar, 2007, p. 100). This layer is followed by the affinity group of approximately 50 members, which is in turn embedded in the active network totalling 150 (Sutcliffe et al., 2012).

1.1.4 Social Dynamics – Social convoy & socioemotional selectivity theory

While the limit and structure of a person's relationships at a specific point in time have been well-defined, ego-networks, especially the third and fourth layers, normally do not remain static but change throughout life. In fact, one of the few certainties life offers, apart from the eventual death at its very end, is captured in Greek philosopher

Heraclitus observation that “nothing endures but change” (as cited in Müller-Merbach, 2006, p. 170). Change could hence be considered the natural ‘state’ of life and also our social relationships. Indeed, there are certain transitions that are commonly experienced and, in sequence, make up a normative life course (as explored in 1.1.1). A meta-analysis by Wrzus and colleagues (2013) found that such common life-events generally affected ego network size in the same direction as the age-typical developments during which these events usually occurred. Typically, ego networks first increase in size during early adulthood, followed by a plateau until one’s early 30s, and a continuous decline thereafter. Losing a spouse was associated with a shrinking network, for instance, and tended to mainly affect older people, whose networks generally shrink (Wrzus et al., 2013). This congruency suggests that most life events might be age-related aspects of a normative course of life (Heckhausen, 2006) and prompt the size and compositional changes generally observed in our social networks in those periods. Two developmental theories specify these developments.

Social convoy theory (Kahn & Antonucci, 1980) and socioemotional selectivity theory (Carstensen, 1991) propose explanations for these naturally occurring social network changes. Social convoy theory assumes that our ego-network escorts us, like a convoy accompanying us through life. Those deemed emotionally closest (e.g., relatives, partners and best friends), are expected to remain members (Antonucci & Akiyama, 1987). Less close relationships (e.g., to co-workers, neighbours or acquaintances) are instead sensitive to external circumstances, such as changes in location or social roles (Kahn & Antonucci, 1980). A person’s network is therefore expected to gradually shrink, because the focus is on conserving the more essential relationships in the long run.

Socioemotional selectivity theory, while predicting similar trends, is instead a motivational theory attributing these changes to becoming increasingly aware of time constraints (Carstensen, 1991). While younger adults strive towards 'information acquisition' and hence prefer a large and diverse network with many opportunities for varied information exchange, older adults aim for 'emotion regulation' and value a smaller, but emotionally closer network (Carstensen et al., 1999).

These two complementary theories explaining ego-network developments both agree that more peripheral, non-essential relationships decrease throughout life, while a stable core (akin to Dunbar's 'sympathy group') persists. They merely differ in the underlying mechanisms prompting these changes. Social convoy theory attaches greater importance to external, situational factors (i.e., specific life events), while socioemotional selectivity theory mostly attributes network modifications to internal, motivational factors as we age. However, empirical evidence for either theory tends to either consider the life course as a whole (thus not being able to provide detailed insights into the impact of specific life events), or focuses exclusively on aging populations (therefore ignoring the most pivotal time of change in early adulthood, which often determines an ego-network's long-term trajectory). We therefore still know remarkably little about how our personal relationships adapt during young adulthood, let alone during the transition from home to university. In fact, out of the 277 studies considered in the meta-analysis by Wrzus and colleagues (2013), a single one focused on the concrete changes in ego networks of young adults. This study by Roberts and Dunbar (2011a), as well as related research on ego network developments during the

transition to university are explored in more depth in the first empirical chapter of this thesis.

1.1.5 Social Orientation – The need to belong & the homophily principle

The benefits of forming social bonds and treasuring the emotionally closest throughout life seem inherently understood, as Baumeister and Leary's (1995) 'need to belong' demonstrates. This core human need "to form and maintain strong, stable interpersonal relationships" (Baumeister & Leary, 1995, p. 497) urges us to actively seek social relationships that we heavily invest in and become reluctant to dissolve. The need to belong becomes especially apparent when we enter novel social environments and find ourselves among strangers. Numerous studies have shown that we readily form friendships with those in closest proximity in such circumstances. Sherif and colleagues (1961), for instance, reported how formerly unacquainted boys readily made friends and strongly identified with their randomly assigned group in a summer camp. Similarly, Festinger and colleagues (1950) observed how strangers quickly formed relationships with those living nearby, after veteran families had been assigned new homes in the aftermath of World War II.

Such affiliation-seeking behaviour is not solely motivated by the need to belong as such, but can be further specified as the need to belong to others who are similar to us (McPherson et al., 2001). One reason why we tend to form such highly structured congregations in the first place, is that all individuals of a community do not typically interact with all others, but only with a subset of members (Dávid-Barrett & Dunbar, 2014). Apart from kinship and mere propinquity (both geographical and social proximity) guiding our choice of interaction partners, attraction theories (Byrne, 1971;

Festinger et al., 1950) present homophily (similarity in appearance, traits, behaviour, etc.) as a main driver influencing whom we form relationships with.

The homophily principle states that we naturally orient towards forming social bonds with those deemed similar to us (Lazarsfeld & Merton, 1954). This principle is considered among the most powerful in determining who forms relationships with whom, whether within a romantic, family, friendship, or work context (Roberts et al., 2014). While the perceived likeness that prompts such selective social bonding can be based on an extensive range of characteristics (i.e., demographic, psychological, and behavioural), a comprehensive review highlighted ethnicity as the most influential in determining social structures (McPherson et al., 2001). The other most dominant homophily factors identified in the review were also mainly sociodemographic (i.e., age, religion, education, occupation, and gender). Homophily effects can furthermore be differentiated into 'surface' and 'deep' homophily, where the former refers to more immediately obvious similarities (such as sharing the same ethnicity and gender) while the latter refers to more subtle similarities (such as sharing similar beliefs or educational backgrounds; Reagans, 2011).

The implications of this tendency to orient towards social belonging in general and to bonding with similar others in specific are twofold. On the one hand, naturally seeking connections with others 'like us' can facilitate social bonding in novel environments, as identifying a single, often surface, similarity can be sufficient to quickly satisfy our need to belong in the short-run (Haun & Over, 2015). The homophily principle might hence be considered helpful in connecting former strangers and quickly turning them into an

interconnected community. On the other hand, preferentially mingling with similar others can and often does go hand in hand with negative biases towards, or even discrimination against, those considered dissimilar (Currarini & Mengel, 2016). Forming social relationships based on shared characteristics tends to produce homogenous sub-groups within larger communities (Marsden, 1988). Once formed, these tend to stabilise through group polarisation and socialisation processes (Kandel, 1978). While being part of such homogeneous clusters might satisfy the need to belong on a small scale, it also fosters social self-segregation (Stark & Flache, 2012), which can actively jeopardise larger community cohesion and lead to increased mistrust, tensions, and less understanding between sub-groups (Flint & Robinson, 2008).

The need to belong and the homophily principle hence jointly affect social bonding in novel environments and the resulting social structures. They are especially relevant in the context of young adults navigating a time of transition (such as entering university). This period marks a first opportunity to actively set up their social worlds, making friends that will likely become long-term companions (Kandel et al., 1990), but also risking turning away from dissimilar others and not being part of diverse communities for good (e.g., Braddock II & Del Carmen Gonzalez, 2010). While the homophily literature is rich, the landmark review by McPherson and colleagues (2001) lamented a shortage of studies that are longitudinal (although this phenomenon is inherently and by definition a longitudinal process), that take a social (cohort) network approach, and that consider a range of relevant sources of homophily at once. This major gap in the literature preventing us from better understanding cohort network dynamics during the transition to university is explored in more depth in the second empirical chapter of this thesis.

1.1.6 Transition to Trajectory – Appreciating there are short- & long-term effects

While life transitions can be relatively short in duration, they are often considered the instigators of and determining forces behind longer term life trajectories (Macmillan, 2005). Their long-lasting impact can be especially pronounced when they occur in late adolescence/early adulthood (Elder, 1985). The discrete event of moving away from home and into university accommodation in another town or even another country might occur within a matter of hours. The thereby initiated developments in a student's personal relationships, their integration into the novel community, and their mental health instead take time and can be experienced as a "psychological no-man's-land between the old reality and the new one" (Bridges, 2009, p. 8).

This phase can be considered somewhat of a limbo state, where the new (social) environment might not yet feel comfortable while the old becomes more and more foreign. While sometimes uncomfortable, it is considered a most influential time for exploring one's identity, dealing with feelings of instability and loneliness, but also for recognising possibilities and seizing opportunities for growth (Arnett, 2014). This "dangerous and opportune" (Bridges, 2009, p. 9) in-between place is at the very core of the transition process. During this phase, young adults develop strategies to cope with feeling temporarily uprooted and socially disconnected. Such strategies can be successful, resulting in a supportive ego network, a secure position within the cohort network, and stable mental health. They can also lead to less preferable outcomes, however, such as a lack of social support, perceived social isolation, and increased levels of anxiety and depression (Taylor et al., 2014). And the more these become established, the more difficult it can be, later, to change or re-evaluate them. How we nurture our

personal relationships, how we integrate into the community, and how our mental health develops during this time might hence set the trajectory for years, if not a lifetime, to come (Denice, 2019).

The transition to university therefore represents a pivotal normative life event within a typical life cycle. It does not only shape the direct experience of becoming a university student itself but often also has long-lasting effects shaping the entire life trajectory (e.g., Briggs et al., 2012; Marini, 1984; Taylor et al., 2014). Understanding how the transition from home to university affects our ego-networks, shapes newly established cohort networks, and impacts our mental health is hence vital to ultimately help young adults better navigate this critical period. This major transition's short-term and longer-term effects are worth investigating to identify what factors largely determine common transition experiences and outcomes. They are moreover worthy of investigation so that researchers and practitioners can eventually develop concrete strategies that both institutions of higher education as well as any prospective university students themselves can employ to facilitate the transition itself and to actively and consciously shape longer-term trajectories. While these are my ultimate aims, I hope to provide a first step towards realising this goal with this thesis.

This thesis therefore not only investigates how students' ego and cohort networks develop during this pivotal time but also how their mental health develops during the transition, and crucially how relevant network parameters can help explain mental health outcomes post-transition. A systematic review relating social network parameters to university students' health highlighted a general shortage of such

research, since the final sample of studies spanning the last 33 years comprised just fifteen papers, only two of which specifically targeted mental health (Patterson & Goodson, 2019). Even outside of social network research, a lack of longitudinal studies (Zivin et al., 2009) and too few attempts at jointly considering students' mental health levels, demographics, personality traits, and social support (Bolger & Eckenrode, 1991) have been identified as major gaps in the existing literature. These gaps preventing us from better understanding mental health trajectories in relation to the transition to university are explored in more depth in the third empirical chapter of this thesis.

1.2 The Transition from Home to University – Thesis overview

1.2.1 *Aims*

In this introduction, I have presented the theoretical and empirical underpinnings that motivate my doctoral research, highlighting that the transition from home to university is a pivotal time for the development of young adults' social relationships, their social integration into the community, and their mental health. I have moreover identified the remaining gaps in the literature (i.e., few studies comprehensively investigating this first major transition's impact and a lack of prospective, longitudinal cohort designs permitting social network analyses). These lacunae are important to address, because understanding how the transition to university shapes young adults' social worlds and their mental health allows others to develop strategies to facilitate this critical period. Especially in times of increasing social isolation, loneliness, and mental disorders, identifying what factors influence this transition's course and its outcomes becomes paramount.

This thesis addresses these omissions. It aims to provide a first step in better understanding the transition's impact by using an interdisciplinary approach. This approach involves following developments in these students' ego- and cohort networks as well as in their mental health, crucially linking these to attain a comprehensive grasp of how these three major transition aspects combine to affect outcomes. My main research question therefore focuses on how the transition from home to university affects students' personal relationships, their social integration within a community, and their mental health. Each of these aspects is addressed across the three empirical chapters of this thesis. I will first outline my approach and chosen methods. This outline shows how a prospective, longitudinal design allowing both types of social network analyses is best suited to addressing my main research question and how this design could be realised within given constraints. Finally, I will provide a brief overview of each of the three empirical chapters, detailing their respective focus and their hypotheses.

1.2.2 Approach & Methods

As the reviewed literature highlights, most existing research suffers from one or several of the following shortcomings: A cross-sectional design (rendering one unable to monitor developments over time); an absence of a baseline measure (making it impossible to compare student's social relationships and mental health pre- and post-transition), and an omission to include both ego and cohort network measures (resulting in an incomplete understanding of the impact of the transition on the individual's social world). This thesis therefore employs a prospective, longitudinal design and uses a multi-methodological social-network approach.

1.2.2.1 Investigating transitions – a prospective & longitudinal design

In order to investigate the development of social relationships and mental health during the transition to university, a longitudinal design is essential. To compare post-transition outcomes to the pre-transition baseline, a prospective design is needed. Hence, I chose to employ a prospective, longitudinal design that overcomes many limitations of designs that are cross-sectional or lacking a pre-transition assessment, as briefly explained below.

Cross-sectional approaches to investigating the social relationships and mental health of university students are insufficient to address this thesis' research question. Only providing a snapshot at a given moment in time, cross-sectional data make examining any developments (which are inherently longitudinal) impossible. Cross-sectional data might still offer valuable insights into what a university student's typical ego-network, integration into their cohort, or mental health might look like at a particular point during the transition. For instance, cross-sectional data has been used to show that university students reported more symptoms of major depression than were commonly reported in the general population (Mikolajczyk et al., 2007). Such findings are useful to highlight mental health as an important factor to consider when trying to understand how the transition to university affects students (e.g., Lu, 1994). They cannot, however, explain when, or rather if, mental health dips. Cross-sectional designs therefore severely restrict the conclusions about the transition's impact one can reasonably draw.

While a longitudinal design allows the researcher to observe actual developments in relationships and mental health, a prospective, longitudinal design provides important

additional insights. A need to include a pre-transition measure to pinpoint the transition's effects is highlighted by longitudinal studies without such a baseline. Zivin and colleagues (2009), for instance, explicitly addressed the lack of longitudinal studies tracking university students' mental health with their two-wave design. They were able to show consistently high levels of depression and anxiety in the examined university student population. However, the lack of a prospective design meant that it was impossible to determine whether students had already entered university with elevated symptoms of either disorder or whether symptoms only rose once they became university students. Similarly, not recording a prospective university student's ego-network pre-transition would make it impossible to observe the developments of their social relationships prompted by the transition itself. I therefore use a prospective, longitudinal design to capture the transition's impact.

1.2.2.2 Investigating relationships – a social network approach

Traditional experimental designs as well as those solely relying on self-report are suboptimal when investigating social relationships. Instead, a social network approach appears best suited to capturing the transition's impact on the development of young adults' personal relationships and their social integration. I therefore briefly show why other design choices would have been unsuitable and highlight the advantages of the social network approach I chose to pursue.

Experiments offer the advantage of maximal control over testing conditions, so that few key variables can be actively manipulated, and their isolated effects observed. This approach is useful in establishing causality or in specifying individual aspects of a larger, existing theory. However, these advantages are of limited value when it comes to

investigating the developments of social relationships in real-life circumstances (not to mention the ethical issues raised by manipulating social integration processes). Authentic supportive and stable relationships can hardly be formed overnight, let alone during the few minutes typically available in an artificially created experimental setting (Hall, 2018). Some aspects of pre-existing relationships can be manipulated experimentally. For instance, Walter and Wright (1976) found perceived levels of friendship to increase following intimate but not non-intimate self-disclosure using an experimental design. However, such manipulations are typically limited by only focusing on one or few central relationships and hence are insufficient to observe the developments of whole ego-networks and entire cohort-networks in transition. Such temporary manipulations are furthermore unlikely to have long-lasting effects and appear inappropriate for an investigation of longer-term social developments, such as those likely ignited by the transition to university. They are moreover best suited to specifying well-established theoretical effects rather than exploring relationships between variables that are still less well understood. Lastly, while the internal validity of such research might be high, the external validity of any findings derived by laboratory experimental manipulations of real-life relationships is likely low, given how complex and fragile real-life relationships seem to be (see e.g., Roberts & Dunbar, 2011a, 2015). An experimental approach would therefore not serve me best in addressing my research question but might be suitable to future research complementing this thesis' findings.

Addressing some of the disadvantages of experimental designs, survey research can transcend artificially created situations and environments by seeking self-report data on naturally occurring, and hence more generalisable, phenomena (such as the transition

to university). A survey approach therefore allows going beyond establishing theoretical effects and instead focuses on the actual effects of such a phenomenon. Not involving any manipulations, surveys can capture the authentic developments of existing and newly forming social relationships. They can similarly be used to trace the development of mental health. They moreover allow taking a broader, and hence more comprehensive, approach by measuring many factors at once, instead of focusing on a few key variables. One could also employ a comprehensive survey following an experimental manipulation, of course, which might be desirable in other contexts. These advantages are important to my research, as I am interested in gaining a more comprehensive understanding of the effects of this naturally occurring transition on a range of variables that are likely to also affect one another. I therefore exclusively employed surveys to collect the data analysed in this thesis.

However, survey research is also limited by factors such as social desirability response bias (i.e., the tendency to downplay or omit socially undesirable traits, such as having few friends or ill mental health; Phillips & Clancy, 1972) and demand characteristics (i.e., the desire to provide responses in line with what one perceives to be the experimenter's expectations, such as listing as many friendships as a survey allows; Orne, 1962). These limitations can negatively affect the validity of any study relying solely on self-report. A social network approach can partly address these limitations by including the data of other, interconnected survey participants (Wölfer et al., 2015). When applied within a self-bounded group, the friendship nominations between the group's members cannot just be visualised as an interconnected web but this web's structure can also be analysed both cross-sectionally and longitudinally. This approach does not only acknowledge and

incorporate the existing social structures these participants are naturally embedded in, but also allows the researchers to verify whether listed relationships are mutual, for instance, and hence provides further insights into students' relationship dynamics that surveys alone cannot provide (Buch-Hansen, 2014). In addition to moving beyond the individual, a social network approach (at least when applied to cohort network analyses) addresses another limitation of the self-report method. Participants might unknowingly provide inaccurate information when asked about their friends' demographics, personality, social relationships, and mental health (Wölfer et al., 2015). This source of potential errors is avoided by simply requesting the desired information from these network members themselves, as they too participated in the study. This approach also saves time as every network member only has to provide this information about themselves, and not also about every friend they list. Hence, I employed a social network approach to ameliorate and complement my survey approach.

1.2.2.3 Investigating social networks in transition – cohort studies

To better understand how the transition to university affects young adults, it is paramount to observe how students' personal relationships change during this time as well as how they socially integrate into their new local community. The development of personal relationships (i.e., ego-networks) could be easily investigated via ego-network questionnaires administered to otherwise unconnected young adults all undergoing the transition from home to university. A cohort approach is instead required additionally when one wishes to be able to also investigate the simultaneous development of a newly forming community made up of such young adults. As explained above, doing so yields additional insights that would otherwise be lost. Jointly, ego and cohort network measures are able to generate the most complete picture of young adults' social worlds

in transition. I therefore show why it is essential to conduct cohort studies to address my research question.

Cohorts form one of the five major concepts within life course theory (Hutchison, 2011). While they are often considered through the lens of a cohort-historical perspective, focused on what historical events and circumstances affected an entire generation or those born within a certain year (Elder Jr & George, 2016), cohort studies also allow researchers to track how all the individuals in one self-bounded community simultaneously undergoing the same transition form and develop their network. The effects of the transition from home to university are hence best examined by incorporating both the development of the transitioning person's personal relationships as well as the dynamics of an entire cohort undergoing this transition.

Prospective, longitudinal cohort studies allowing both ego and cohort network analyses address many limitations of alternative design choices. However, some limitations remain. First, a cohort approach restricts sample size, as only members of a self-bound community are eligible to participate. Oxford college cohorts generally represent suitable samples for my research, despite the common use of undergraduate student samples frequently being criticised (e.g., Sears, 1986). The University of Oxford's collegiate system creates self-bounded communities where all members of a given cohort enter simultaneously and bond in an environment that encourages them to live, learn, eat, and socialise together. Using this specific sample is also especially advantageous when observing mental health changes, as it is reasonable to expect higher demands and stress in this group of young adults, as compared to other university

student samples. Nonetheless, I needed to consider the inherent restrictions of sample size when recruiting a college cohort, as Oxford colleges differ in how many students they accept each year. In the interest of maintaining as much statistical power as possible, I therefore exclusively targeted larger colleges (cohorts of 100 or more new members admitted to the college each academic year) when trying to secure a site to conduct my research. This choice made convincing even a single college to allow me to conduct this research even more challenging, as colleges generally seemed reserved about the idea of their students being surveyed. When I initially approached them during my MSc studies, most seemed to fear too much time would be required of their students and perhaps some were also concerned as to what conclusions potentially unwelcome results might invite. Only four colleges showed any interest in exploring my idea further. Two of these allowed me to meet with their various stakeholders (College Board Members, Junior Common Room Presidents, etc.), and in the end, only one agreed to my research being conducted. To this college, I remain eternally grateful.

Another disadvantage of sampling a group as a whole is that non-participation can severely negatively impact results as it can distort the cohort network structure (Kossinets, 2006). Even when the majority of a cohort initially decide to take part, missing data represents a problem in any longitudinal research, but poses additional problems within cohort network analyses (Huisman, 2014; Huisman & Steglich, 2008). To secure as many participants as possible initially, as well as to avoid participant attrition, I committed to making participation as attractive as possible for (prospective) students. This commitment included carefully inviting them to take part pre-transition, just after they had received their A-level results and their conditional offers had been

met but did not end there. I furthermore introduced myself and my research to the entire incoming cohort during Freshers' week and added incentives throughout the duration of the study to remain part of it (e.g., throwing a Pizza Party, adding chocolates to the reminders to fill out the next survey in their letterboxes, as well as gradually increasing the monetary compensation for the surveys to acknowledge participants' loyal participation). I am pleased to report that my efforts did not appear to be in vain, as detailed within the empirical chapters.

1.2.3 Thesis Structure

1.2.3.1 With a little help from my friends – managing the ego-network in transition

My first empirical chapter (Chapter 2) investigates how young adults manage their personal relationships during the transition from home to university. More specifically, I address the first part of the overall research question by examining how ego-networks adapt during this transition. The social brain hypothesis (see 1.1.3), social convoy and socioemotional selectivity theories (see 1.1.4), and their empirical support explain that the number of social relationships comprising one's ego-network is limited and that this ego-network is affected by age-related life course events. While a turn-over of some members seems inevitable, ego-networks generally increase in size during early adulthood (Wrzus et al., 2013) and are robust to some losses (Hobbs & Burke, 2017). Based on this research, I hypothesise that the ego-networks of young adults undergoing the transition to university will overall grow while other ego-network characteristics related to relationship maintenance (i.e., emotional closeness, physical proximity, and both contact type and frequency) will remain relatively stable. In addition, I hypothesise that this influx of new ego-network members will be more pronounced in the network's outer layers than in the more intimate inner layers. Finally, incorporating transition

outcomes, I expect that students will have maintained a higher proportion of baseline ego-network members post-transition if they reported larger, emotionally closer ego-networks pre-transition. I furthermore expect students who reported lower proportions of face-to-face contact and less physical proximity to their ego-networks pre-transition to also maintain a higher proportion of baseline members, because maintenance of such relationships might be less dependent on, and hence less affected by, the geographic relocation usually accompanying the move to university. Complementing these ego-network parameters with a relevant cohort network parameter, I also expect those less popular in their college community will maintain higher proportions of baseline ego-network members.

1.2.3.2 You've got a friend in me – forming a cohort network with former strangers

My second empirical chapter (Chapter 3) investigates how young adults integrate into a new social group (i.e., their college cohort) during the transition from home to university. More specifically, I address the second part of the overall research question by examining cohort-network dynamics during this transition. The need to belong and the homophily principle (see 1.1.5) as well as their empirical support explain that young adults entering their new social environment at university likely perceive an increased urgency to bond with similar others. Based on this research, I hypothesise that the cohort networks consisting of young adults undergoing the transition to university within one Oxford college will form rapidly. Structurally, I expect such a cohort network to be fairly dense, featuring few, if any, isolates (unconnected members), some variations in popularity but an overall flat hierarchy with the majority of friendships being reciprocated. Compositionally, I further expect such a cohort network to be characterised by its members' tendency to befriend others with similar demographical

backgrounds, personality traits, social identities, mental health scores, as well as similar ego- and cohort-network parameters. Finally, incorporating transition outcomes, I include the post-transition structure and composition of these cohort networks in my Simulation Investigation for Empirical Network Analyses (SIENA) models. Doing so allows me to examine whether the initial cohort dynamics evolved further or remained largely static once the former strangers had time to get to know one another and settle into their new social environment.

1.2.3.3 I'll be there for you – coping with potential mental health challenges

My third and final empirical chapter (Chapter 4) investigates how young adults' mental health changes during the transition from home to university as a function of their social network adaptation. More specifically, I address the third part of the overall research question by examining anxiety and depression trajectories during this transition. Social support theory highlighting the manifold benefits of staying social connected and the grave consequences of feeling socially isolated (see 1.1.2) and its substantial empirical support explain that good (mental) health is linked to maintaining supportive, stable relationships with friends and family. Young adults' mental health, as well as such relationships, appear particularly fragile during the transition to university, however. This fragility likely results in mental health fluctuating during this time of change and uncertainty (Taylor et al., 2014), with female students reportedly experiencing more mental health problems than male students (Verger et al., 2009). Based on this research, I hypothesise that the anxiety and depression levels of young adults undergoing this transition will increase. I furthermore expect the anxiety and depression levels of female students to be overall higher than those of male students. Finally, incorporating transition outcomes, I expect that students will have reported higher levels of anxiety

and depression post-transition if they reported higher anxiety and depression levels pre-transition, if they are female, and scored higher on neuroticism and lower on the other four big five personality traits. Incorporating ego as well as cohort network parameters, I also expect those less with larger, emotionally close ego-networks as well as those who are popular and socially active in their college cohort to have maintained higher levels of mental health.

To summarise, this thesis addresses its main research question by splitting it into its three main aspects and their respective hypotheses. In Chapter 2, I investigate the ego network developments of young adults undergoing the transition from home to university. In Chapter 3, I examine the cohort network dynamics emerging from the social connections between these same individuals. In Chapter 4, I trace these students' mental health developments and relate these to social network parameters. Each chapter includes social network-based analyses and considers the changes occurring during the transition itself as well as longer-term developments and transition outcomes. To my knowledge, no other research to date has combined a prospective, longitudinal cohort design combining both major types of social network analyses to examine how the transition to university affects young adults' relationships, social integration, and mental health.

2 MANAGING PERSONAL RELATIONSHIPS:

Ego Network Developments

The transition from school to university involves leaving home to enter a new physical and social environment in most Western countries. How young adults manage their personal relationships to friends and family during such a period is little understood. I studied the ego network developments of two consecutive undergraduate student cohorts ($n_1 = 90$ & $n_2 = 81$) during this life in four steps, using a prospective longitudinal design: assessing participants' baseline ego network characteristics (pre-move to university), examining how these adapt during the transition (across participants' first year as students), differentiating effects based on relationship intensity (considering individual ego network layers), and predicting ego network composition post-transition (towards the end of participants' studies). Results showed that ego networks grew rapidly due to an influx of new friends made at university. Complementary ego network characteristics (i.e., physical proximity, contact type and frequency) instead remained fairly stable, indicating that overall network structure can be maintained while individual members might be replaced. I found no differences between the developments of individual ego network layers, suggesting that the transition affects ego networks uniformly. Finally, ego network size at baseline reliably predicted the proportion of original members with whom relationships had been maintained post-transition. Combined, these results seem to indicate a certain robustness in ego networks in transition, questioning the perceived social trade-off between immersing oneself in a new social environment at the cost of neglecting pre-existing relationships to friends and family.

2.1 Introduction

Aristotle declared, “[w]ithout friends, no one would choose to live” (350 BC, as cited in Rackham, 1934, p. 1155a). He did so millennia before having access to the vast body of literature attesting to the manifold benefits of maintaining supportive relationships with friends and family (e.g., Cohen, 2004; Demir et al., 2015; Diener & Seligman, 2002; Holt-Lunstad et al., 2010; Thoits, 2011). A period of transition, such as leaving home to attend university, introduces both a threat and an opportunity to a young person’s social world, specifically, the individual relationships making up their ego network (i.e., relationships with friends and family). On the one hand, already existing relationships become more effortful to maintain from afar but can be vital sources of support. On the other hand, freshly formed relationships can help to quickly turn the initially unfamiliar environment into a new home but might be less stable and reliable at first.

I investigate the ego network developments that many people experience during this first major life transition, to specify how this potential social trade-off is managed. I begin by outlining the three main theories underpinning this research (i.e., the social brain hypothesis, social convoy theory, and socioemotional selectivity theory). I then briefly summarise the existing literature on the topic and address its main limitations (few studies, small samples, suboptimal designs). Finally, I lay out my approach to answering the major research question: How do ego networks adapt during the transition to university?

2.1.1 *Theoretical Background*

The social brain hypothesis states that we are limited by both time and cognitive constraints to how many social relationships we can actively maintain at any given time

(Dunbar, 1998). While the idea of befriending anyone we come across might be appealing, there simply are not enough hours in a day to nurture relationships at a meaningful level of intimacy with everyone. Furthermore, the size of the human neocortex imposes limits on how much complex information with regards to a social relationship we can absorb, retain, and process (Dunbar, 2010). An individual's network, termed ego network, is therefore restricted to Dunbar's number (i.e., approximately 150 members) of friends, family, and other people with whom a meaningful relationship can be shared and actively maintained.

This overall ego network can be broken into smaller subunits, as individual relationships differ in importance and intensity (Binder et al., 2012). Conceptualised as hierarchically inclusive layers, the number of relationships captured within each layer increases with increasing distance from the network's centre (i.e., the ego). Simultaneously, the emotional closeness to and frequency of contact with these network members decrease with distance from the centre of the network (Hill & Dunbar, 2003). The network's resulting innermost layer is termed the 'support clique' and consists of the ego's 3 to 5 closest allies and confidants (Dunbar & Spoor, 1995). The 'sympathy group' represents the second ego network layer. It includes the aforementioned first layer and is made up of 12 to 15 members (Buys, 1992). Layer three, the 'affinity group' of approximately 50 members, includes the more central members, and is in turn part of the overall active network capped at Dunbar's number of 150 (Sutcliffe et al., 2012).

While the general structure of a person's ego network at a specific point in time is well-defined theoretically and well-validated empirically, networks are rarely static. A meta-

analysis (Wrzus et al., 2013) details the changes ego networks usually show throughout life. It found that ego networks grow in size during early adulthood. A plateau is reached in one's early 30s, after which a continuous decline in terms of quantity of members was observed. Two main theories aim to explain these typical life course changes in ego network size and specify which aspects of the overall network are affected, and how.

Social convoy theory conceptualises ego networks as a convoy that escorts us throughout life (Kahn & Antonucci, 1980). Only the members at the very core (e.g., partners, relatives, and best friends) are expected to weather all storms and stick with us until the very end. Relationships to members of more external layers (e.g., colleagues, acquaintances, and neighbours) are instead considered less stable and more easily affected by situational factors. These more peripheral members are hence at risk of being lost when external circumstances change, such as changes in location, life phase, or social role (Antonucci & Akiyama, 1987). This theory therefore suggests that the decline in ego network size after the age of thirty is due to only the most essential relationships being conserved when major life events occur.

Socioemotional selectivity theory on the other hand, proposes internal, instead of external, change as the cause of these ego network developments (Carstensen, 1991). This motivational theory contends that the perception of time as a limited resource only emerges later in life. It states that people are initially driven by the simple motivation to maximise opportunities for information exchange with others. Hence, younger adults form many social bonds to create large and diverse ego networks. Older adults are instead more mindful of time constraints and shift their motivation towards an approach

in terms of quality over quantity. They hence value a smaller, more homogeneous ego network consisting of fewer, but emotionally closer members (Carstensen et al., 1999).

Both theories essentially observe the same trends (i.e., a decline of peripheral relationships over the life course, while a stable core remains) but attribute these ego network developments to different causes (external vs. internal factors). The described stable core appears to be equivalent to Dunbar's 'sympathy group' of 12 to 15 individuals (Zhou et al., 2005). The maintenance of this core requires 60%, and hence the majority, of our social efforts, in terms of time and cognitive resources (Dunbar, 2018). Both theories thus further highlight the importance of those 12 to 15 core members and provide an overview of a typical ego network's development across the life course. However, both mainly focus on relationship loss at later stages of live. Of the 277 studies included in Wrzus and colleagues' (2013) meta-analysis, only one (Roberts & Dunbar, 2011a) considered the effects of integrating into a new social environment on the networks of people aged 18 – 30. We therefore still know little about the effects of a specific life event, such as the transition to university, on the ego network of younger adults.

2.1.2 Investigating ego network developments during the transition to university

Previous attempts at specifying ego network developments during young adults' transition to university are limited. Roberts and Dunbar (2011a) provide one of the few examples of such studies and featured as the only one of this kind in Wrzus and colleagues' (2013) meta-analysis. They investigated relationship maintenance and decay over the 18 months capturing the transition from school to university. Focusing primarily on the differences between the management of two main relationship types (i.e., family

and friends), they found that “the costs of maintaining friendships are much higher than the costs of maintaining kin relations” (Roberts & Dunbar, 2011a, p. 186). This finding was attributed to relationships to family members being more robust to decreases in contact frequency generally and in face-to-face contact specifically. Relationships to friends instead seemed more easily affected by such changes, as measured in reductions of perceived emotional closeness (a measure of relationship quality). It follows that for friendships to persevere during the transition to university, active maintenance is required.

A major limitation of Roberts and Dunbar’s (2011a) study of relationship maintenance and decay is sample size. Out of the 30 participants who had signed up, 25 completed all three questionnaires (the first while still at secondary school, the second nine months later, and the third a further nine months later). Moreover, six of the remaining participants did not attend university, and out of the 19 who did, eight remained in their hometown. There were therefore only 11 participants who found themselves physically removed from their familiar social environment. The observed ego network developments of so few individuals can hardly be viewed as reliable or generalisable. They can, further, not be considered representative of young adults facing the transition to university generally, because this phase increasingly also involves a change in location (Hechanova-Alampay et al., 2002; Tran, 2016). Others researching student transitions have also noted that the few available studies often focus on too small a sample to meaningfully contribute to the literature (Briggs et al., 2012). There remains therefore a need for studies investigating the effects of the transition to university on the ego network with suitably sized samples.

Roberts and Dunbar's (2011a) overall conclusion that friendships are prone to decay without active maintenance is nonetheless widely supported. This fragility of friendships has been attested both generally (e.g., Canary & Stafford, 1994), and specifically during the transition from school to university (e.g., Cummings et al., 2006). Qualitative (Benson, 2007) and quantitative (Paul & Kelleher, 1995) research in the area further highlighted the perceived social trade-off and resulting stress incoming students face, seemingly having to choose between actively maintaining existing friendships and quickly forming new ones. It thus becomes important to define the necessary factors for successfully maintaining important relationships, or the overall benefits these provide, which can be measured by assessing the overall stability in the structure of the ego network as a whole (even if there is a turnover of individual network members).

In the literature, ego networks have been shown to be robust to some random losses (Hobbs & Burke, 2017), to generally maintain a majority of members who live in the same city as the ego (Bloem et al., 2008), fairly stable contact patterns (Saramäki et al., 2014), and mostly consistent numbers of relationships at varying intimacy levels (Binder et al., 2012). The following factors have therefore emerged as pivotal to which relationships are formed, maintained, or let go of during a phase of transition. These can serve to examine such global ego network developments. Relationship quantity (ego network size) and quality (emotional closeness to network members) are perhaps the most obvious parameters to consider. Physical proximity (e.g., Mok & Wellman, 2007), relationship type (e.g., Roberts & Dunbar, 2011b), contact type (e.g., Cummings et al., 2006; Stern & Messer, 2009), and contact frequency (e.g., Allan, 1979; Newcomb, 1961)

have been identified as further key factors. Jointly, these six factors can be used to better understand and ultimately predict the ego network developments many young adults face during this period.

Roberts and Dunbar (2011b) investigated the effects of ego network quantity, quality, and relationship type on contact patterns and demonstrated that these factors interact and should not be considered in isolation. Studies looking at how these factors combine are, however, rare. Mok and Wellman (2007) also considered different types of contact (i.e., face-to-face vs. phone) and related these to the physical proximity to network members and relationship type (i.e., family or friend). Unfortunately, their sample only comprised 29 participants and their analyses were restricted to networks capped at 11 members (akin to an ego's sympathy group and hence not examining the whole ego network). Furthermore, neither Roberts and Dunbar (2011b) nor Mok and Wellman (2007) observed ego network developments during a transition, let alone the specific transition to university. Understanding how these factors combine during this time of change is essential to identifying which type of relationships are most likely maintained, and how.

Studies aiming to identify which maintenance behaviours are generally most successful, often restrict themselves to a single friendship per participant (e.g., Oswald, Clark, & Kelly, 2004). Even when specifically investigating changes in pre-existing friendships during the first year of university/college, the focus often remains on 'best friends' only (e.g., Oswald & Clark, 2003). While this approach offers some insights into how particularly close relationships develop during this time, it cannot capture the more

global changes affecting the entire ego network of the person in transition. The importance of more peripheral network members (sometimes called 'weak ties') to our well-being has been repeatedly highlighted in the literature (Granovetter, 1977; Sandstrom, 2014; Sandstrom & Dunn, 2014). It is therefore crucial to follow the development of an ego's broader social network during this critical time. Doing so also allows us to determine whether the transition fundamentally changes the composition of the ego network as a whole, or whether individual members are simply replaced while the overall structure remains fairly stable.

In addition to including the key ego network characteristics specified above and considering the entire network instead of just one or few relationships, it is also important to incorporate the ego's position within their wider social environment. Popularity within the university student cohort might indicate how well one is received within the new community (Bukowski, 2011). The initial success (or lack thereof) of one's integration might in turn influence how much effort is directed towards new versus already established relationships (Osterman, 2000). Incorporating such a complete or cohort network measure (derived from how many friendship nominations participants received within the self-bounded group of their college cohort) is therefore crucial to obtaining a fuller grasp of a young person's ego network developments during this transition.

Complementing ego network data with a cohort network parameter requires a carefully designed study, a study focused on a sample of young adults who collectively face this transition in a self-bounded, interconnected group. To my knowledge, there are

currently no studies combining ego- and whole-network parameters to predict what proportion of pre-existing relationships are maintained after the transition to university.

2.1.3 The present research

The present research therefore takes the following four-step approach to answering the main research question, namely: how do ego networks adapt during the transition to university? This question is approached by longitudinally following two consecutive student cohorts from before they move to Oxford to attend university until close to the end of their undergraduate degree. Each participant specified their ego network and accompanying characteristics pre-, during, and post-transition. These studies are presented sequentially, as some insights gained in Study 1 could, with some small changes, be addressed in Study 2.

2.1.3.1 Step 1: Baseline Snapshot – the ego network pre-transition

To observe any changes, we first need to know what the typical ego network of a young adult looks like pre-transition. I therefore begin my investigation by detailing the baseline ego networks of the prospective university students. This pre-transition snapshot involves assessing the average number of the listed friends and family members (the network quantity) and the reported overall emotional closeness to said members (the network quality). In addition, their physical proximity to the ego pre-move, as well as the typical frequency and type of contact with the ego are established.

2.1.3.2 Step 2: Out with the old, in with the new? – ego network developments during the transition

Following this baseline assessment, I observe the ego networks' development during the transition (i.e., during students' first year at university). Tracking changes in network size and composition allows me to specify which relationship types (i.e., family member,

pre-existing friends from home, or new friends at university) develop, and how. Furthermore, I trace changes in emotional closeness to examine changes in perceived relationship quality over time. Observing changes in physical proximity to baseline network members shortly after the move can moreover reveal challenges to maintaining contact 'as before' with family and friends from home. Checking whether the inclusion of new friends at university results in an overall stable proportion of network members living within close proximity then tells us whether the general network structure can be maintained by swapping/adding members. Furthermore, developments in contact frequency and type are investigated. I can therefore test for global changes in students' ego networks to better understand how the transition to university affects the relationship quality, quantity, and the proximity to network members, as well as how and how frequently contact is maintained.

2.1.3.3 Step 3: A closer look – ego network developments across the layers

For an even more nuanced understanding of these changes, I break down the ego networks into their individual layers. The central analyses tracking changes in network size and composition outlined above are applied to the network's support clique (layer 1), sympathy group (layer 2), and affinity group (layer 3) in turn. This more granular approach allows me to examine whether global patterns of ego network development are replicated in each hierarchically inclusive layer, or whether diverging trends emerge. Developments in relationships to members of the support clique and/or sympathy group might be important to differentiate, as they are considered the most stable core of someone's network and hence perhaps less likely to feature much change.

2.1.3.4 Step 4: In it for the long-haul – the ego network’s composition post-transition

Finally, to understand the longer-term consequences of the transition, I identify what network parameters improve prediction of the ego network composition post-transition (i.e., towards the end of the students’ time at university). Specifically, I predict what proportion of baseline relationships have been maintained using the network parameters detailed above.

2.1.3.5 Hypotheses

Based on the reviewed literature, the following four hypotheses (*H*) are tested:

*H*₁ – Ego networks generally increase in size.

*H*₂ – All other global ego network characteristics (i.e., emotional closeness, physical proximity, contact type & frequency) are maintained.

*H*₃ – Ego network size will remain more stable in the inner layers 1 (the support clique) and 2 (the sympathy group) than the outer layers 3 (the affinity group) and 4 (the whole ego network).

*H*₄ – Post-transition, a higher proportion of original members will be maintained for those with 1) larger, 2) emotionally closer baseline ego networks, featuring 3) lower levels of baseline face-to-face contact, and 4) fewer members living in the student’s hometown, and for those 5) less popular in their new social environment (i.e., the college cohort).

2.2 Methods Study 1

2.2.1 *Design*

I used a prospective longitudinal design to follow the ego network developments of students facing the transition from leaving secondary school to beginning as undergraduate students at the University of Oxford. Participants filled out online questionnaires at four different times during this period of transition (each spaced three months apart, spanning nine months in total and taking participants to the end of their first year at university). Participants filled out a fifth questionnaire post-transition, just before starting the final term of their third and final year as undergraduate students.

On the initial questionnaire, they listed their ego network members (family members and friends with whom they maintained an active relationship that they would like to continue) and specified their relationships to each (detailing the type of relationship, emotional closeness, physical closeness, contact frequency, and contact type). Each successive questionnaire provided the option of adding and removing members, so that participants' ego networks were updated as their first year at university unfolded. These longitudinal data thus enabled mapping and analysing the ego networks and their developments across time, crucially starting before the transition trigger – the move to university – took place.

2.2.2 *Participants*

All prospective undergraduate students of one college at the University of Oxford matriculating in October 2016 were invited to take part in the month before their arrival. Of the 121 incoming students, 90 (74%) agreed to take part. There was a retention rate

of 100% across participants' first year (my extensive efforts to retain participants are detailed in Chapter 5). In participants' third year, 80 (89%) completed the fifth and final assessment. In the sample of 90 (used for all analyses except those including the fifth assessment in participants' third year, i.e., 2.3.4), 41 participants were women and 49 were men. Of these participants, 80 (89%) were British nationals, 66 were White, 12 were Asian, ten reported being of a mixed ethnic background, and two selected the 'other' option to describe their ethnic background. Their average age was 18 ($SD = 0.80$, range: 18-23) during the initial assessment and all reported living in college accommodation on the main site during their first year. All participants were compensated for their time (with £20 per assessment, plus an additional £30 if all assessments were completed).

2.2.3 *Materials*

The materials of this study comprised one extensive online questionnaire per assessment (based on Hill & Dunbar, 2003; Roberts & Dunbar, 2011b). Each questionnaire was made up of several sections. Only the sections relevant to answering the research question of this chapter – How do ego networks adapt during the transition to university? – are detailed. The complete questionnaires can be found in Appendix A.

The first questionnaire elicited the participants' baseline ego network (i.e., all of the focal participant's meaningful relationships prior to the move to university). Participants listed all family members and friends with whom they considered having 'a meaningful relationship, that they would like to continue' and with whom they have 'had any type of contact within the last 12 months'. To help participants include all relevant people,

they were asked to consult “any lists of contacts (e.g., phone contacts, social media accounts, address books)” they might have access to.

Participants provided further information specifying the relationship with each listed individual. They indicated each relationship’s subjective quality by rating their perceived emotional closeness on a scale ranging from 1 to 10. This measure is relatively simple to answer and has been shown to be superior to comparable measures, such as the duration of the relationship (Marsden & Campbell, 1984), in establishing relationship strength. Participants further specified physical proximity to members by denoting whether each lived in *the same house/city/country* or in *a different country*. Participants also indicated when the last contact with each member had occurred (*within the last 2 days/3-30 days ago/1-3 months ago/3-12 months ago*). Previous studies had identified this convenient proxy for establishing contact frequency, deeming it more accurate than directly asking participants for an estimate of general contact frequency (e.g., Hill & Dunbar, 2003). Finally, participants indicated typical methods of contact, which were broken into three categories: in-person (*face-to-face*), verbal (*phone, Skype, FaceTime or similar*), and written (*text message, e-mail, social media, letter*).

All ego network members were shown to participants again during all following waves. All items specifying these relationships (emotional closeness, physical closeness, contact frequency, and contact type) were repeated as well, with the exception of physical closeness. This measure was only repeated immediately after the move to university (reflecting the ego’s geographical change in location marking the start of the transition).

Participants had the option to indicate if they no longer had a meaningful relationship with individual members (who would then be removed from future questionnaires). In addition to 'dropping' existing network members, participants could add friendships formed between assessments and provide the same specifying information about each.

2.2.4 Procedure

Participants filled out online questionnaires at four different times: in the month preceding their move to Oxford (i.e., T0) and then in three-month intervals, after each of the three 8-week-long terms in Oxford making up one academic year (i.e., T1-T3). Finally, they filled out a fifth questionnaire before starting their final term of third year (T4). The questionnaires were extensive (taking between 30 and 90 minutes to complete, depending on the number of network members listed). Participants were hence reassured that it was not necessary to complete them in one session, encouraged to take breaks, and sent occasional reminders. I also invited the entire cohort to a short presentation on my overall research aims and how their data will be used, offering refreshments and nibbles, which seemed to have been received well.

2.2.5 Ethics

Participants were recruited via e-mail after their offers had been confirmed following the publication of A-level exam results. In this initial invitation to participate, I outlined the motivation behind the study (i.e., better understanding how social relationships adapt when facing changes in life, such as moving away from home to attend university), described how data collection would take place (i.e., by filling out online questionnaires between terms), and explicitly stated that participation would be voluntary, anonymous, and completely separate from their studies (i.e., none of their fellow college students, nor their tutors or lecturers would know whether they chose to

participate and they were free to drop out of the study at any time without any consequences and without it affecting their academic experience as a student). A participant information sheet was moreover attached (further detailing what participating would involve), and all participants gave their informed consent before participating (by filling out an online consent form), both in accordance with the University of Oxford's Central University Research Ethics Committee.

Only those students who signed up to participate through this process were subsequently given a unique participant number and invited via e-mail to fill out each online questionnaire using said number (to allow linking their contributions across assessments). Participants were reassured that for any representations of friendship patterns making up the cohort network, I would replace their participation numbers with different labels, so that no one should be able to identify one another. Given that participants were asked to provide personal data relating to their mental health, this section of the online questionnaire was always followed up with a list of resources to turn towards if filling out these measures should have made them aware of or anxious about any difficulties or challenges that they might be experiencing.

2.2.6 Analyses

At T0, before the move to Oxford, a total of 4205 network members had been listed by the 90 participants. After each of the three terms making up participants' first year at university (i.e., T1–T3), this total increased to 6217, 6491, and 6557 respectively. Post-transition (i.e., at T4), 6061 members were listed. Not all participants provided all additional information detailing each of these relationships at every assessment, so that the analyses focusing on emotional closeness, physical proximity, contact frequency,

and contact type were carried out on those network members for which that data was available. At T0, this was the case for 98% of the emotional closeness data, 98% of the physical proximity data, 97% of the contact frequency data and 96% of the contact type data. For the remaining assessments, this was the case for at least 93% in each data category throughout.

2.2.6.1 Step 1: Baseline Snapshot – the ego network pre-transition

To examine how ego networks adapt during the transition to university, I first established what the average ego network looked like pre-transition (at T0). This baseline snapshot capturing participants' relationships before their move to Oxford included specifying the mean ego network size and composition (number and proportion of family members). It furthermore entailed detailing overall emotional closeness ratings (i.e., the average across all listed network members) and comparing the ratings given to friends and family members by means of a paired t-test. I moreover computed the average numbers and proportions of network members at the various levels (response categories) of physical proximity and the average numbers and proportions of network members with whom contact was maintained at each specified level of contact frequency and type. This descriptive step was necessary to define the participants' typical ego network structure prior to entering a period of transition, where changes were likely.

2.2.6.2 Step 2: Out with the old, in with the new? – ego network developments during the transition

To track developments in these relationships across the four assessments (T0-T3), I used analyses of variance (ANOVAs) with repeated measures. If Mauchly's test indicated that assumptions of sphericity were violated for individual factors, Greenhouse-Geisser

corrections were used. For all post-hoc tests specifying differences, Bonferroni corrections were used.

Firstly, a 3 (relationship type) x 4 (time) repeated measures ANOVA allowed me to examine changes in overall ego network size while specifying which relationships (family members, friends from home, friends made at university) were affected, and how, during the transition. One-way repeated measures ANOVAs were used to specify changes in overall emotional closeness levels across the nine months under inspection. Paired t-tests were used to compare physical proximity to baseline network members pre- and post-move (i.e., the change that occurred between T0 and T1, when participants moved away from home to attend university). In addition, the relative changes in physical proximity to all network members during this time span (i.e., considering the overall proportion of network members living within varying proximities – including friendships formed at university) were compared via paired t-tests. This approach was taken to examine whether the overall network structure could be maintained despite the decreases in physical proximity to baseline network members. Similarly, one-way repeated measures ANOVAs were used to specify changes in the proportions of network members with whom participants engaged within the varying contact frequencies (*within the last 2 days/3-30 days ago/1-3 months ago/3-12 months ago*) and types (*face-to-face, verbal, written*) across the four assessments.

Due to a coding error, participants had been able to select more than one answer on the item relating to physical proximity to ego network members the second time this measure was answered (i.e., at T1). There were 40 instances of participants selecting

more than one option. In these cases, the 'closer' option was consistently chosen, as response options were hierarchically inclusive (e.g., a network member reported to be living in the same household could be assumed to also live in the same city and country as the participant).

2.2.6.3 Step 3: A closer look – ego network developments across the layers

The central analyses specifying changes in ego network size and composition were repeated for individual layers to examine whether changes occurred uniformly across the network. Preparation for these analyses involved sorting the network members into the four layers. Layers can be derived from the contact frequency or emotional closeness measures, as both have been shown to correspond to relationship intimacy (see Sutcliffe et al., 2012). Since participants all attended the same college and were hence likely to be in contact daily during meals or lectures (irrespective of being close friends or mere acquaintances), using contact frequency would have likely yielded inflated inner layer numbers. Emotional closeness ratings were hence the preferable choice. Members rated at 9 or 10 were therefore sorted into the innermost layer 1 (i.e., the support clique), those with ratings of 7 or 8 were added to jointly make up layer 2 (i.e., the sympathy group), those with ratings of 4 – 6 were added to make up layer 3 (i.e., the affinity group), and adding those with ratings of 1 – 3 made up layer 4 (i.e., the entire active ego network; Binder et al., 2012). Layer developments were analysed for layers 1 – 3, since layer 4 (which includes all others) corresponds to the overall network already explored in Step 2.

2.2.6.4 Step 4: *In it for the long-haul – the composition of the ego network post-transition*

I conducted a multiple regression to determine whether the following five baseline ego network (BEN) parameters predicted the proportion of original ego network members maintained post-transition (i.e., in participants' third year at university): quantity (i.e., number of members), quality (i.e., perceived emotional closeness to members), face-to-face (F2F) contact (i.e., the proportion of members with whom in-person contact was maintained), proximity (i.e., the proportion of members living in the same city), as well as cohort popularity (i.e., the number of college cohort members who had listed the ego as a friend).

Ten participants (11% of the sample) did not fill out the final questionnaire. One participant did not provide all relevant data. Thus, all analyses in this step were carried out on the 79 participants for whom complete data was available.

One variable not used in the previous analyses of this chapter – cohort popularity – had to be computed for this step. This was achieved by summing the number of friendship nominations each participant had received from other participating cohort members. This measure of popularity (also known as *Indegree*; Freeman, 1979) can be used to establish how well a network member is integrated or received in a social group (Jansson, 2000). It was available in this data set as all participants were part of the same cohort within an Oxford college, allowing cohort network data (explored in depth in Chapter 3) to complement the ego network parameters that are the focus of this chapter.

An analysis of standard residuals was carried out, which showed that the data contained no outliers (Std. Residual Min = -2.35, Std. Residual Max = 2.57). Tests to see if the data met the assumption of collinearity indicated that multicollinearity was not a concern (Quantity BEN, Tolerance = .82, VIF = 1.22; Quality BEN, Tolerance = .84, VIF = 1.19; F2F Contact BEN, Tolerance = .98, VIF = 1.02; Proximity BEN, Tolerance = 0.97, VIF = 1.03; Cohort Popularity, Tolerance = .98, VIF = 1.02). The data met the assumption of independent errors (Durbin-Watson value = 2.00). The histogram of standardised residuals indicated that the data contained approximately normally distributed errors, as did the normal P-P plot of standardised residuals, which showed points that were not completely on the line, but close. The scatterplot of standardised residuals showed that the data met the assumptions of homogeneity of variance and linearity. The data also met the assumption of non-zero variances (Quantity BEN, Variance = 577.80; Quality BEN, Variance = 1.37; F2F Contact BEN, Variance = 0.04; Proximity BEN, Variance = 0.07; Cohort Popularity, Variance = 68.01).

2.3 Results & Discussion Study 1

2.3.1 Step 1: Baseline Snapshot – the ego network pre-transition

The average participant listed a mean total of 47.01 ($SD = 23.72$) ego network members. Of these, 16.96 (9.50; or 36%) were considered family members. Reported overall emotional closeness to all network members was 5.85 (1.17) out of 10. The mean emotional closeness of friends was rated 5.78 (1.35), which was not significantly different from the mean rating of 5.88 (1.43) given to family members, $t_{(89)} = 0.65$, $p = .516$.

In terms of physical proximity, 3.23 (1.41) of network members, or 7% overall, were reported to live in the same household. Furthermore, 19.68 (18.49; or 42%) were reported to live in the same city (but not in the same household), 18.20 (14.67; or 39%) in the same country (but not in the same city), and 5.90 (7.38; or 13%) in a different country (see Figure 2.1).

The frequency with which participants engaged with these network members varied (see Figure 2.2). Participants reported being in contact with 10.98 (5.66; or 24%) of their network, *within the last 2 days*. Participants further reported last interacting with 17.60 (11.57; or 38%) of the network *3-30 days ago*, with 10.69 (9.53; or 23%) *1-3 months ago*, and with 7.40 (8.80; or 16%) of their network *3-12 months ago*.

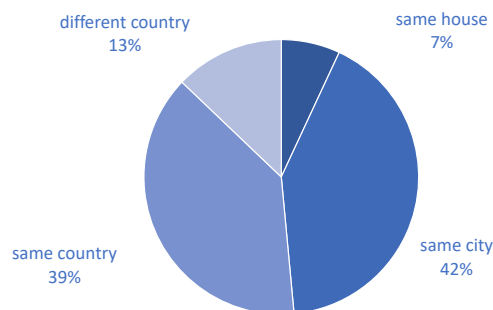


Figure 2.1 Physical proximity at T0

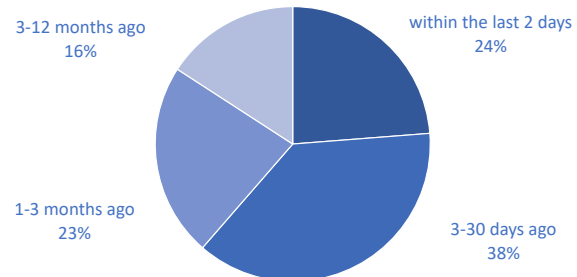


Figure 2.2 Contact frequency at T0

Contact with network members also varied in type. Participants reported interacting with 39.54 (22.85; or 86%) of their network *face-to-face*, with 7.70 (6.60; or 17%) via the *phone, Skype, FaceTime, or a similar verbal method*, and with 23.40 (13.80; or 51%) via *text message, e-mail, letter, social media or another written method*. These three types of interaction were not mutually exclusive (explaining why the combined percentages exceeded one hundred). Overall, participants reported staying in contact using all three

methods with only 4.48 (4.86; or 10%) of their network members. They further reported using at least two methods to stay in touch with 19.94 (14.16; or 43%) of their networks. More specifically, face-to-face contact combined with verbal communication was reported for 5.77 (5.75; or 12%) of members, face-to-face contact combined with written communication for 18.16 (13.47; or 39%), and verbal and written communication combined for 4.98 (5.22; or 11%).

2.3.2 *Step 2: Out with the old, in with the new? – ego network developments during the transition*

2.3.2.1 *Size & Composition*

I conducted a 3 (relationship type) x 4 (time) repeated measures ANOVA to examine changes in the size of students' ego network during the transition from home to the end of the first year at university.

There was a main effect of relationship type, $F_{(2, 178)} = 33.47, p < .001, \eta^2 = .273$. Participants nominated fewer family members ($M_{FM} = 15.88, SE = 0.95$) than both friends from home ($M_{HF} = 26.12, SE = 1.64, p < .001$) and friends at university ($M_{UF} = 24.97, SE = 1.19, p < .001$), which did not differ from one another ($p = .999$).

There was also a main effect of time on the reported overall network size, $F_{(2.07, 184.21)} = 113.35, p < .001, \eta^2 = .560$. Participants' original ego network was significantly smaller before the move to university than at any other assessed time point ($M_{T0} = 47.10, SD = 23.81, ps < .001$). The networks appeared to have grown rapidly during the first term at university ($M_{T1} = 72.88, SD = 34.45$) but then stabilised, as the two terms that followed showed no further increases ($M_{T2} = 73.63, SD = 34.23, M_{T3} = 74.91, SD = 33.92, ps = .999$).

The results of Study 1 hence indicate support for H_1 (expecting ego networks to grow during the transition).

Finally, there was an interaction between relationship type and time, $F_{(2.39, 212.84)} = 231.73, p < .001, \eta^2 = .723$. Figure 2.3 shows that network size did not increase uniformly. Instead, three trends could be observed and confirmed by considering the simple main effects of each relationship type. The number of nominated family members (blue) overall decreased ($F_{(1.63, 144.97)} = 16.65, p < .001, \eta^2 = .158$). Bonferroni-corrected pairwise-comparisons specified that these numbers initially remained stable between participants leaving home and the end of their first term away from home ($M_{T0} = 16.97, SD = 9.50, M_{T1} = 16.76, SD = 9.63, p = .766$), but were significantly lower to either previous assessment after participants had spent two ($M_{T2} = 14.79, SD = 9.27, ps < .001$) and three ($M_{T3} = 15.02, SD = 8.83, p = .001$ and $p = .006$, when compared to T0 and T1, respectively) terms at university. The number of nominated family members in these last two assessments did not differ from one another ($p = .999$). Meanwhile, the number of nominated friends from home (green) also overall decreased ($F_{(1.80, 160.16)} = 37.05, p < .001, \eta^2 = .294$). However, while these numbers initially remained similarly stable between the pre-transition and the first post-transition assessment ($M_{T0} = 30.13, SD = 18.24, M_{T1} = 28.59, SD = 17.32, p = .093$), they were not only significantly lower after participants had spent two ($M_{T2} = 23.74, SD = 14.95, ps < .001$) and three ($M_{T3} = 22.02, SD = 14.64, ps < .001$) terms away from home, but further decreased between T2 and T3 ($p = .024$). This more continuous loss was not only matched but far surpassed by the new additions ($F_{(1.79, 159.22)} = 259.98, p < .001, \eta^2 = .745$), namely the nominated friends at university (red). These increased significantly in number between every assessment

($M_{T0} = 0.00$, $SD = 0.00$, $M_{T1} = 27.53$, $SD = 15.25$, $M_{T2} = 35.10$, $SD = 17.89$, and $M_{T3} = 37.87$, $SD = 19.32$, all $ps = .001$, except between the last two assessments: $p = .014$).

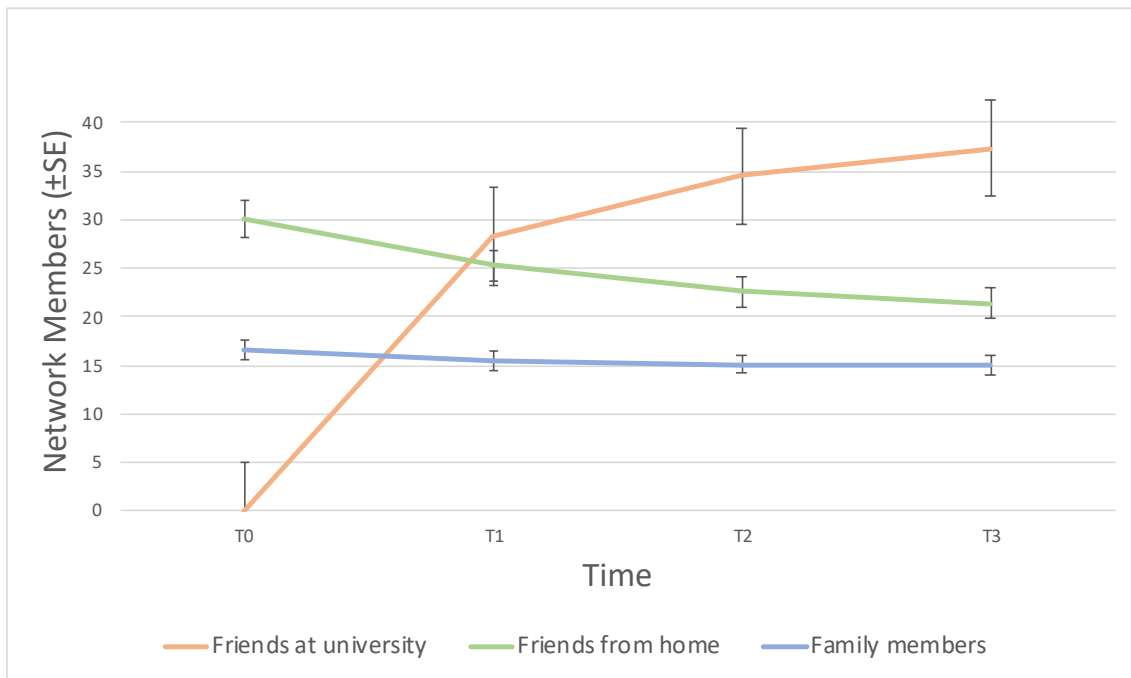


Figure 2.3 Ego network developments in size and composition

Comparing the three relationship types at every assessment, the interaction effect can be further differentiated. At T0 (i.e., the baseline), the number of ego network members in each relationship type category differed ($F_{(1.43, 127.56)} = 175.57$, $p < .001$, $\eta^2 = .664$). Participants nominated significantly more friends from home ($M = 30.13$, $SD = 18.24$) than both family members ($M = 16.97$, $SD = 9.50$, $p < .001$) and friends at university ($M = 0.00$, $SD = 0.00$, $p < .001$), which also differed from one another ($p < .001$). At T1 (i.e., after a first term at university), there were still differences between the relationship types ($F_{(2, 178)} = 33.64$, $p < .001$, $\eta^2 = .274$). However, there was no longer a difference between the number of nominated friends from home ($M = 28.59$, $SD = 17.32$) and that of nominated friends at university ($M = 27.53$, $SD = 15.25$, $p = .999$), which were both higher than those of nominated family members ($M = 16.76$, $SD = 9.63$, $ps < .001$). At T2

(i.e., after a second term at university), there were once again differences between all relationship types ($F_{(2, 178)} = 78.14, p < .001, \eta^2 = .468$), with significantly more friends at university ($M = 35.10, SD = 17.89$) being nominated than both friends from home ($M = 23.74, SD = 14.95, p < .001$) and family members ($M = 14.79, SD = 9.27, p < .001$), which continued to differ from one another ($p < .001$). Lastly, at T3 (i.e., after a third term at university), these differences remained ($F_{(1.78, 158.22)} = 87.42, p < .001, \eta^2 = .496$). Participants nominated more friends at university ($M = 37.87, SD = 19.32$) than both friends from home ($M = 22.02, SD = 14.64, p < .001$) and family members ($M = 15.02, SD = 8.83, p < .001$), which also differed from one another ($p < .001$).

2.3.2.2 Emotional Closeness

I conducted a one-way repeated measures ANOVA to examine changes in perceived emotional closeness across the four assessments.

There was a main effect of time ($F_{(2.50, 222.84)} = 17.54, p < .001, \eta^2 = .165$). Participants reported highest emotional closeness ratings (significantly higher than at any other time) at baseline, pre-move ($M_{T0} = 5.75, SE = 0.12, ps < .001$, see Figure 2.4). After one ($M_{T1} = 5.40, SE = 0.14$), two ($M_{T2} = 5.32, SE = 0.13$), and three terms at university post-move ($M_{T3} = 5.24, SE = 0.14$), emotional closeness ratings did not differ from one another (all $ps \geq .325$).

These results thus do not support H_2 (predicting overall network characteristics would be maintained) with regards to emotional closeness, as participants reported feeling consistently less close to members of their network post-move.

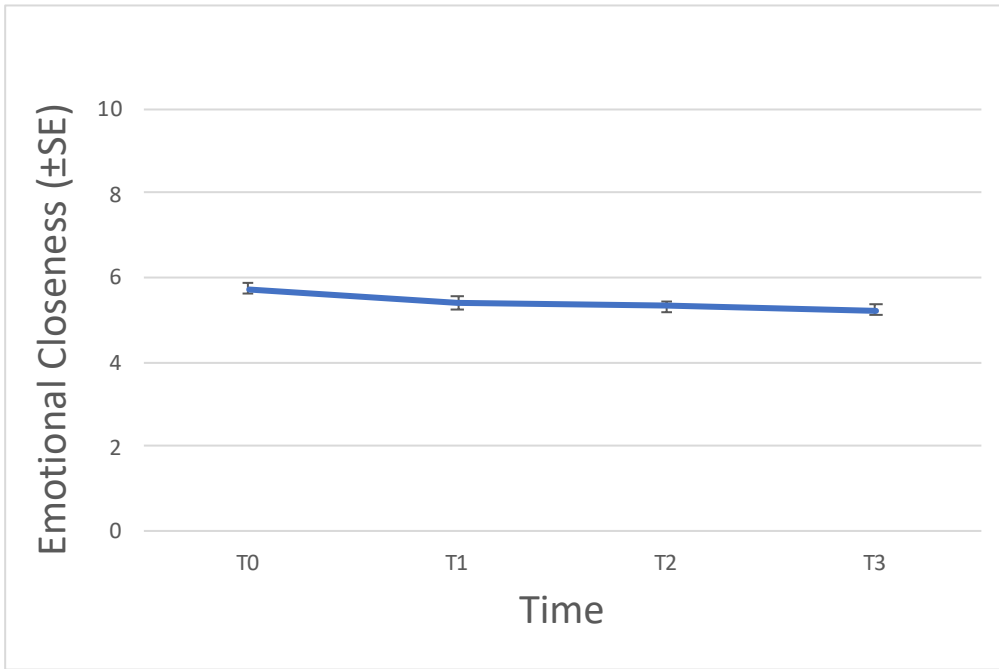


Figure 2.4 Developments in emotional closeness

2.3.2.3 Physical Proximity

I next compared physical proximity to baseline members pre-move (i.e., T0) to post-move (i.e., T1), by means of t-tests. Once at university (at T1), participants reported significantly fewer baseline members living in the same house ($M_{T0} = 3.23$, $SD = 1.42$, $M_{T1} = 0.67$, $SD = 1.41$, $t_{(89)} = 12.35$, $p < .001$) as well as in the same city ($M_{T0} = 19.68$, $SD = 18.49$, $M_{T1} = 3.93$, $SD = 5.91$, $t_{(89)} = 8.21$, $p < .001$). The opposite development was observed for the number of baseline members in the same country, which was reported to have increased ($M_{T0} = 18.20$, $SD = 14.67$, $M_{T1} = 32.83$, $SD = 20.41$, $t_{(89)} = -6.97$, $p < .001$). Only the number of network members in a different country appeared unaffected by the move to university ($M_{T0} = 5.90$, $SD = 7.38$, $M_{T1} = 7.58$, $SD = 10.34$, $t_{(89)} = -1.77$, $p = .080$). The majority of the original network members (90%) therefore no longer shared the same close physical proximity (i.e., living in the same house or city) to the ego post-move.

Comparing ego’s physical proximity to the entire network post-move (i.e., including new friends at university) revealed a slightly diverging development (see Figure 2.5). Paired-sample t-tests showed that there were no overall changes in the proportion of network members reported to live in the same city ($M_{T0} = .39, SD = .26$), $M_{T1} = .39, SD = .14$), $t_{(89)} = -0.13, p = .895$), the same country ($M_{T0} = .39, SD = .24$), $M_{T1} = .44, SD = .19$), $t_{(89)} = -1.49, p = .139$), or a different country ($M_{T0} = .12, SD = .14$, $M_{T1} = .12, SD = .19$, $t_{(89)} = 0.16, p = .871$). There was only a significant decrease in network members reported to live in the same house post-move ($M_{T0} = .09, SD = .11$, $M_{T1} = .05, SD = .39$, $t_{(89)} = 3.77, p < .001$). The influx of new members living in the same city hence appeared to compensate for the baseline members now living further away (but still in the same country) post move.

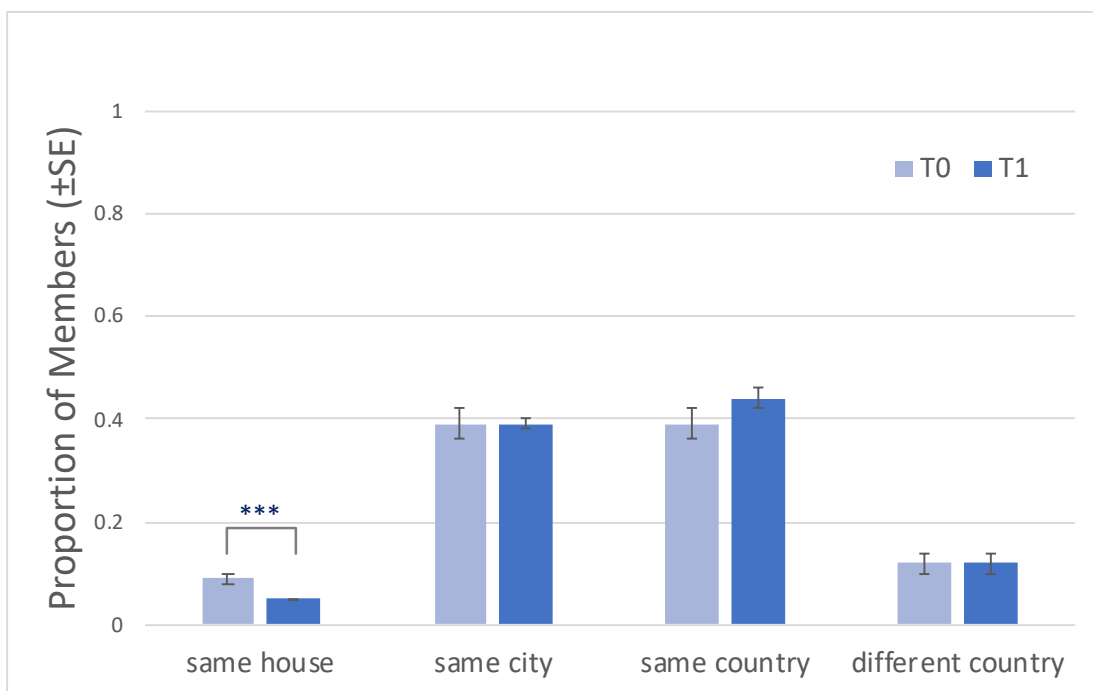


Figure 2.5 Developments in physical proximity (* $p < .05$, ** $p < .01$, *** $p < .001$)

Overall network structure was hence mostly maintained while individual members were replaced or reshuffled. These results partially support H_2 (predicting that overall network characteristics would be maintained), as there was only a decline in the

proportion of ego network members living in the same house post-move while all other three proximities remained unaffected.

2.3.2.4 Contact Frequency

I conducted four separate repeated measures ANOVA's to examine whether participants reported changes in how frequently they interacted with their members of their network (see Figure 2.6).

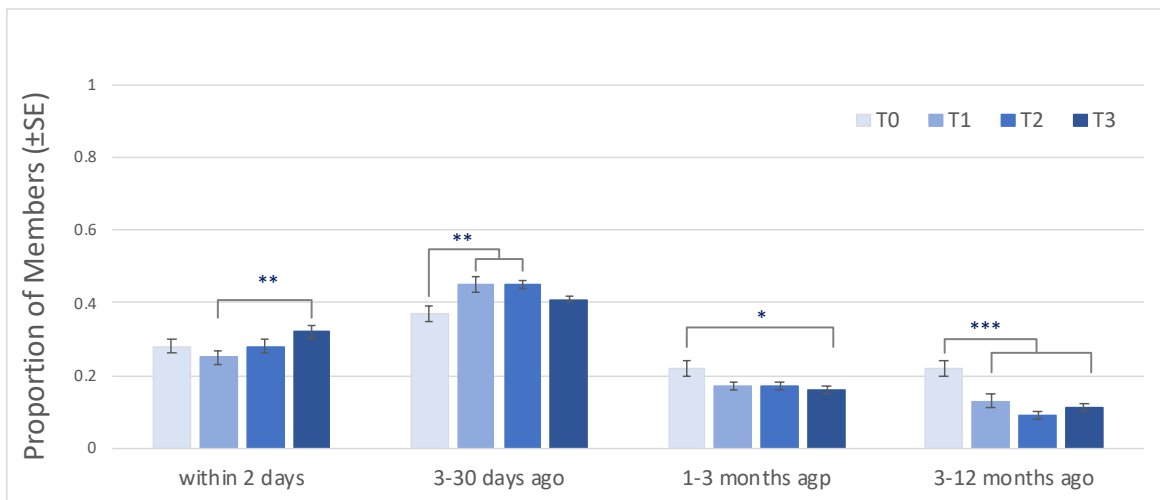


Figure 2.6 Developments in contact frequency (* $p < .05$, ** $p < .01$, *** $p < .001$)

There was a main effect of time for the proportion of network members with whom participants reported being in contact within the last two days ($F_{(3, 267)} = 5.70, p = .001, \eta^2 = .060$). Contact within two days was maintained with a significantly lower proportion of the network immediately after participants' first term away from home ($M_{T1} = .25, SD = .16$), than after their third, that is, at the end of their first year at university ($M_{T3} = .32, SD = .17, p = .002$). Reported levels of close contact did not differ from those reported pre-move ($M_{T0} = .28, SD = .16, p = .768$) or after two terms at university ($M_{T2} = .28, SD = .16, p = .258$). Remaining comparisons revealed no further differences.

There was a main effect of time for the proportion of network members with whom participants reported being in contact within the last 3-30 days ($F_{(2.73, 242.60)} = 7.70, p <$

.001, $\eta^2 = .080$). This level of contact was maintained with a significantly lower proportion of the network pre-move ($M_{T0} = .37, SD = .15$), than after one ($M_{T1} = .45, SD = .15, p = .007$) and two ($M_{T2} = .45, SD = .13, p = .001$) terms at university respectively. After three terms, contact within a month was once again maintained at similar levels to before the move ($M_{T3} = .41, SD = .15, p = .420$). Remaining comparisons revealed no further differences.

Lastly, there was a main effect of time for the proportion of network members with whom participants reported being in contact within the last 3-12 months ($F_{(2.04, 181.57)} = 31.39, p < .001, \eta^2 = .261$). Contact at this frequency was maintained with a significantly higher proportion of the network pre-move ($M_{T0} = .22, SD = .15$), than at all other times during participants' first year at university ($M_{T1} = .13, SD = .12, M_{T2} = .09, SD = .09, M_{T3} = .11, SD = .11, ps < .001$). Furthermore, a higher proportion of contact within 3-12 months was also reported after participants' first term away from home, in comparison to reported levels after the second ($p = .001$). Remaining comparisons revealed no further differences.

These results lend partial support to H_2 (predicting that overall network characteristics would be maintained). While the proportion of network members with whom contact was maintained up to a month ago overall did not change (after initial fluctuations), that with whom contact was maintained a month to a year ago declined over time. This difference might indicate that members at lower frequencies of contact were more often dropped and/or that friends made at university tended to be contacted at higher frequencies, hence only replacing any lost relationships in those categories.

2.3.2.5 Contact Type

I conducted three separate repeated measures ANOVA's to examine how participants reported typically engaging with members of their ego network during the transition to university (see Figure 2.7). There was a main effect of time for the proportion of face-to-face contact participants reported ($F_{(2.69, 239.50)} = 8.38, p < .001, \eta^2 = .086$). The proportion of face-to-face contact had been higher pre-move ($M_{T0} = .85, SD = .19$) than after one ($M_{T1} = .76, SD = .24, p = .002$) and two ($M_{T2} = .73, SD = .20, p < .001$) terms at university respectively. However, levels of face-to-face contact after the third term at university no longer differed from those pre-move ($M_{T3} = .79, SD = .21, p = .141$). Remaining comparisons revealed no further differences.

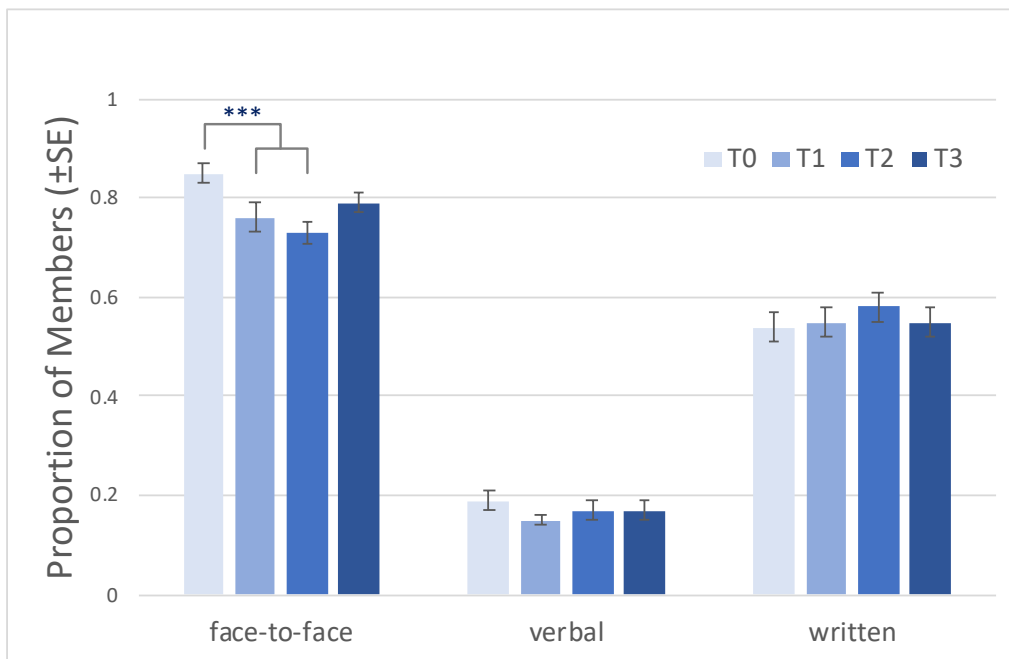


Figure 2.7 Developments in contact type (* $p < .05$, ** $p < .01$, *** $p < .001$)

Participants instead reported constant levels of verbal and written contact with their ego network, as neither the proportion of contact via phone and other voice-based exchanges ($M_{T0} = .19, SD = .16, M_{T1} = .15, SD = .14, M_{T2} = .17, SD = .17, M_{T3} = .17, SD = .17, F_{(2.67, 237.61)} = 1.33, p = .226, \eta^2 = .015$) nor that via text messages, social media and

other forms of text-based exchanges ($M_{T0} = .54, SD = .25, M_{T1} = .55, SD = .26, M_{T2} = .58, SD = .24, M_{T3} = .55, SD = .25, F_{(3, 267)} = 1.57, p = .197, \eta^2 = .017$) changed from before the move until the end of participants' first year at university.

These results lend support to H_2 (predicting that overall network characteristics would be maintained) with regards to what types of contact were used. Overall, the proportion of network members with whom participants engaged face-to-face, and via verbal or written means, remained stable, suggesting a turnover of members does not necessarily impact how relationships are typically maintained.

2.3.3 Step 3: A closer look – ego network developments across the layers

Assigning participants' individual network members into layer 1 (the support clique), layer 2 (the sympathy group), and layer 3 (the affinity group) yielded hierarchically inclusive layer sizes broadly in line with the expected values of 5, 15, and 50 respectively (Sutcliffe et al., 2012; see Table 2.1).

Table 2.1 Development of ego network layer size showing the number of network members (SD) in each ego network layer pre-transition (T0) and after each term of participants' first year at university (T1-T3)

Layer	T0	T1	T2	T3
1	5.03 (3.77)	5.06 (4.89)	5.32 (5.08)	5.66 (5.26)
2	16.81 (9.82)	21.96 (15.91)	22.43 (14.85)	22.98 (15.58)
3	37.30 (19.70)	56.76 (30.40)	57.63 (30.47)	57.26 (30.60)
4/overall	46.59 (24.32)	72.72 (34.35)	74.47 (34.24)	74.64 (34.03)

At baseline (only consisting of friends from home and family members), the support clique at the network's core (layer 1) included 2.51 (1.87; or 51%) family members. The sympathy group (layer 2) included all members already captured in layer 1 and included 6.20 (4.17; or 37%) family members. The affinity group (layer 3) comprised the aforementioned and included 13.04 (7.83; or 35%) family members. Three separate 3 (relationship type) x 4 (time) repeated measures ANOVAs were used to examine the developments in size and composition of each of these three layers during the transition from home to the end of the first year at university (see Figure 2.8).

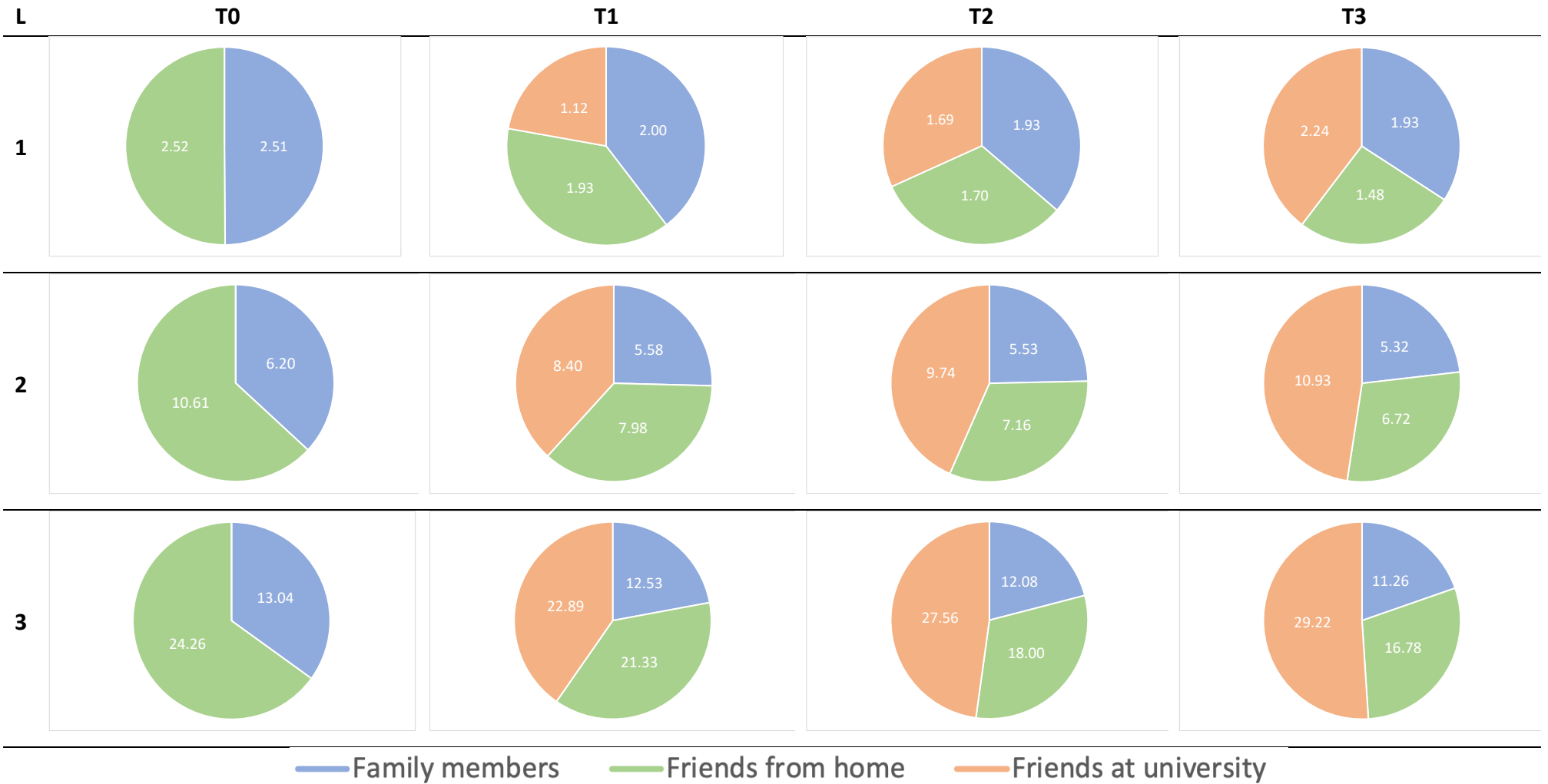


Figure 2.8 Development of ego network layer composition

The support clique (layer 1) did not change in size ($F_{(3, 267)} = 1.48, p = .221, \eta^2 = .016$). Participants listed fewer friends made at university ($M_{UF} = 1.26, SE = 0.19$) than friends from home ($M_{HF} = 1.91, SE = 0.21, p = .001$) or family members ($M_{FA} = 2.09, SE = 0.17, p < .001$), which did not significantly differ from one another ($p = .999, F_{(2, 178)} = 10.47, p < .001, \eta^2 = .105$). There was also an interaction between relationship type and time ($F_{(3.68, 327.30)} = 24.21, p < .001, \eta^2 = .214$), as decomposed below.

Considering the simple main effects of each relationship type in turn, there was a main effect of the number of nominated family members in layer 1 ($F_{(2.62, 233.20)} = 4.43, p = .007, \eta^2 = .047$). More relatives were nominated at baseline ($M_{T0} = 2.51, SD = 1.87$) than in the middle of participants' first year at university (i.e., after two terms, $M_{T2} = 1.93, SD = 1.80, p = .003$), but not when they had only spent one ($M_{T1} = 2.00, SD = 1.68, p = .053$) or all three ($M_{T3} = 1.93, SD = 2.32, p = .058$) terms away from home. All other pairwise comparisons were non-significant. There was a further main effect of the number of nominated friends from home in layer 1 ($F_{(2.54, 266.17)} = 9.32, p < .001, \eta^2 = .095$). More friends from home were nominated at baseline ($M_{T0} = 2.52, SD = 2.92$) than when participants had spent two ($M_{T2} = 1.70, SD = 2.11, p = .004$) and three ($M_{T3} = 1.48, SD = 1.74, p < .001$) terms at university, but not yet when they had only spent one ($M_{T1} = 1.93, SD = 2.41, p = .069$) term away from home. All other pairwise comparisons were non-significant. Finally, there was a main effect of the number of nominated friends at university in layer 1 ($F_{(2.15, 191.16)} = 32.70, p < .001, \eta^2 = .269$). The number of nominated friends at university was lower at baseline ($M_{T0} = 0.00, SD = 0.00$) than at all other assessments ($M_{T1} = 1.12, SD = 2.18, M_{T2} = 1.69, SD = 2.44$, and $M_{T3} = 2.24, SD = 3.03, ps > .001$) and significantly increased between each assessment, so that fewer friends at

university were nominated at T1 than at T2 ($p = .010$) and at T3 ($p < .001$), and also at T2 in comparison to T3 ($p = .028$).

Comparing the three relationship types in layer 1 at every assessment, the interaction effect can be further differentiated. At T0 (i.e., the baseline), there were differences in the number of ego network members in each relationship type category ($F_{(1.56, 138.95)} = 52.04$, $p < .001$, $\eta^2 = .369$). Participants nominated significantly fewer friends at university ($M = 00.00$, $SD = 00.00$) than both family members ($M = 2.51$, $SD = 1.87$, $p < .001$) and friends from home ($M = 2.52$, $SD = 2.92$, $p < .001$), which did not differ from one another ($p = .999$). At T1 (i.e., after a first term at university), there were the same differences between the relationship types ($F_{(2, 178)} = 7.92$, $p = .001$, $\eta^2 = .082$). Participants still nominated significantly fewer friends at university ($M = 1.12$, $SD = 2.18$) than both family members ($M = 2.00$, $SD = 1.68$, $p = .003$) and friends from home ($M = 1.93$, $SD = 2.41$, $p = .003$), which did not differ from one another ($p = .999$). At T2 (i.e., after a second term at university), there were no more differences between relationship types ($F_{(2, 178)} = 0.68$, $p = .510$, $\eta^2 = .008$). Lastly, at T3 (i.e., after a third term at university), there were also no differences between relationship types ($F_{(1.67, 148.63)} = 3.21$, $p = .052$, $\eta^2 = .035$).

The sympathy group (layer 2) increased in size ($F_{(2.57, 228.94)} = 17.03$, $p < .001$, $\eta^2 = .161$). The average number of members listed across relationship types pre-move ($M_{T0} = 5.60$, $SE = 0.35$) was lower than that listed at all three following assessments ($M_{T1} = 7.31$, $SE_{T1} = 0.56$, $M_{T2} = 7.48$, $SE = 0.52$, $M_{T3} = 7.66$, $SE = 0.55$, $ps < .001$), which did not differ from one another ($ps = .999$). Participants also listed fewer family members overall ($M_{FA} =$

5.66, $SE = 0.38$) than they listed friends from home ($M_{HF} = 8.12$, $SE = 0.63$, $p < .001$) or friends at university ($M_{UF} = 2.27$, $SE = 0.61$, $p = .018$), which did not differ from one another ($p = .247$, $F_{(2, 178)} = 11.11$, $p < .001$, $\eta^2 = .111$). There was a similar interaction between relationship type and time ($F_{(3.13, 278.72)} = 85.12$, $p < .001$, $\eta^2 = .489$), as decomposed below.

Considering the simple main effects of each relationship type in turn, there was no main effect of family members in layer 2 ($F_{(3, 267)} = 2.81$, $p = .052$, $\eta^2 = .031$), as the number of nominated family members ($M_{T0} = 6.20$, $SD = 4.21$, $M_{T1} = 5.58$, $SD = 3.97$, $M_{T2} = 5.53$, $SD = 3.81$, and $M_{T3} = 5.32$, $SD = 4.33$) remained fairly stable. There was instead a main effect of the number of nominated friends from home in layer 2 ($F_{(2.28, 202.50)} = 26.24$, $p < .001$, $\eta^2 = .228$). More friends from home were nominated at baseline ($M_{T0} = 10.61$, $SD = 7.57$) than when participants had spent one ($M_{T1} = 7.98$, $SD = 7.13$, $p < .001$), two ($M_{T2} = 7.16$, $SD = 6.13$, $p < .001$) and three ($M_{T3} = 6.72$, $SD = 5.40$, $p < .001$) terms at university, and at T1 in comparison to T3 ($p = .035$). All other pairwise comparisons were non-significant. There was also a main effect of friends at university in layer 2 ($F_{(2.27, 201.65)} = 85.63$, $p < .001$, $\eta^2 = .490$). The number of nominated friends at university was lower at baseline ($M_{T0} = 0.00$, $SD = 0.00$) than at all other assessments ($M_{T1} = 8.40$, $SD = 8.17$, $M_{T2} = 9.74$, $SD = 7.89$, and $M_{T3} = 10.93$, $SD = 9.00$, $ps > .001$) and further significantly increased between T1 and T3 ($p = .003$). All other pairwise comparisons were non-significant.

Comparing the three relationship types in layer 2 at every assessment, the interaction effect can be further differentiated. At T0 (i.e., the baseline), there were differences in the number of ego network members in each relationship type category ($F_{(1.49, 132.29)} =$

119.30, $p < .001$, $\eta^2 = .573$). Participants nominated significantly fewer friends at university ($M = 00.00$, $SD = 00.00$) than both family members ($M = 6.20$, $SD = 4.21$, $p < .001$) and friends from home ($M = 10.61$, $SD = 7.57$, $p < .001$), which also differed from one another ($p < .001$). At T1 (i.e., after a first term at university), there were also differences between the relationship types ($F_{(1.73, 153.53)} = 8.52$, $p = .001$, $\eta^2 = .087$). Participants nominated significantly fewer family members ($M = 5.58$, $SD = 3.97$) than both friends at university ($M = 8.40$, $SD = 8.17$, $p = .003$) and friends from home ($M = 7.98$, $SD = 7.13$, $p < .001$), which no longer differed from one another ($p = .999$). At T2 (i.e., after a second term at university), there were once again differences between all relationship types ($F_{(1.80, 159.74)} = 19.94$, $p < .001$, $\eta^2 = .183$), with significantly more friends at university ($M = 9.74$, $SD = 7.89$) being nominated than both friends from home ($M = 7.16$, $SD = 6.13$, $p < .001$) and family members ($M = 5.53$, $SD = 3.81$, $p < .001$), which also differed from one another ($p = .021$). Lastly, at T3 (i.e., after a third term at university), these differences remained ($F_{(1.53, 135.78)} = 32.02$, $p < .001$, $\eta^2 = .265$). Participants nominated more friends at university ($M = 10.93$, $SD = 9.00$) than both friends from home ($M = 6.72$, $SD = 5.40$, $p < .001$) and family members ($M = 5.32$, $SD = 4.33$, $p < .001$), which also differed from one another ($p = .025$).

The affinity group (layer 3) also increased in size ($F_{(2.24, 198.96)} = 72.08$, $p < .001$, $\eta^2 = .447$). The average number of members listed across relationship types pre-move ($M_{T0} = 12.43$, $SE = 0.69$) was lower than that listed at all three following assessments ($M_{T1} = 18.92$, $SE_{T1} = 1.07$, $M_{T2} = 19.21$, $SE = 1.07$, $M_{T3} = 19.09$, $SE = 1.08$, $ps < .001$), which did not differ from one another ($ps = .999$). Participants listed fewer family members overall ($M_{FA} = 12.23$, $SE = 0.74$) than they listed friends from home ($M_{HF} = 20.09$, $SE_{HF} = 1.37$) or friends

at university ($M_{UF} = 19.92$, $SE = 1.18$, $ps < .001$), which did not differ from one another in numbers ($p = .999$, $F_{(2, 178)} = 33.43$, $p < .001$, $\eta^2 = .273$). There was again an interaction between relationship type and time ($F_{(2.50, 222.58)} = 174.73$, $p < .001$, $\eta^2 = .663$), as decomposed below.

Considering the simple main effects of each relationship type in turn, there was a main effect of family members in layer 3 ($F_{(2.48, 221.09)} = 4.97$, $p = .004$, $\eta^2 = .053$). The number of nominated family members ($M_{T0} = 13.04$, $SD = 7.94$, $M_{T1} = 12.53$, $SD = 7.86$, $M_{T2} = 12.08$, $SD = 7.44$, and $M_{T3} = 11.26$, $SD = 6.85$) remained fairly stable, but significantly decreased between T0 and T3 ($p = .012$). All other pairwise comparisons were non-significant. There was also a main effect of friends from home in layer 3 ($F_{(2.18, 194.16)} = 37.88$, $p < .001$, $\eta^2 = .299$). The number of nominated friends from home was higher at baseline ($M_{T0} = 24.26$, $SD = 15.15$) than when participants had spent one ($M_{T1} = 21.33$, $SD = 14.72$, $p = .013$), two ($M_{T2} = 18.00$, $SD = 12.97$, $p < .001$) and three ($M_{T3} = 16.78$, $SD = 11.87$, $p < .001$) terms at university and significantly decreased between each assessment, so that more friends from home were nominated at T1 than at T2 ($p < .001$) and at T3 ($p < .001$), and also at T2 in comparison to T3 ($p = .036$). There was moreover a main effect of friends at university in layer 3 ($F_{(1.86, 165.26)} = 188.94$, $p < .001$, $\eta^2 = .680$), where number of nominated friends instead significantly increased between each assessment. Fewer friends at university were nominated at baseline ($M_{T0} = 0.00$, $SD = 0.00$) than at all other assessments ($M_{T1} = 22.89$, $SD = 13.89$, $M_{T2} = 27.56$, $SD = 15.91$, and $M_{T3} = 29.22$, $SD = 17.77$, $ps > .001$), which also all significantly differed from one another ($ps < .001$; except T2 and T3, $p = .292$).

Comparing the three relationship types in layer 3 at every assessment, the interaction effect can be further differentiated. At T0 (i.e., the baseline), there were differences in the number of ego network members in each relationship type category ($F_{(1.44, 128.09)} = 162.59, p < .001, \eta^2 = .646$). Participants nominated significantly fewer friends at university ($M = 00.00, SD = 00.00$) than both family members ($M = 13.04, SD = 7.94, p < .001$) and friends from home ($M = 24.26, SD = 15.15, p < .001$), which also differed from one another ($p < .001$). At T1 (i.e., after a first term at university), there were also differences between the relationship types ($F_{(2, 178)} = 34.38, p < .001, \eta^2 = .279$). Participants nominated significantly fewer family members ($M = 12.53, SD = 7.86$) than both friends at university ($M = 22.89, SD = 13.89, p < .001$) and friends from home ($M = 21.33, SD = 14.72, p < .001$), which no longer differed from one another ($p = .788$). At T2 (i.e., after a second term at university), there were once again differences between all relationship types ($F_{(1.85, 164.80)} = 65.66, p < .001, \eta^2 = .425$), with significantly more friends at university ($M = 27.56, SD = 15.91$) being nominated than both friends from home ($M = 18.00, SD = 12.97, p < .001$) and family members ($M = 12.08, SD = 7.44, p < .001$), which differed from one another ($p < .001$). Lastly, at T3 (i.e., after a third term at university), these differences remained ($F_{(1.66, 148.08)} = 79.53, p < .001, \eta^2 = .472$). Participants nominated more friends at university ($M = 29.22, SD = 17.77$) than both friends from home ($M = 16.78, SD = 11.87, p < .001$) and family members ($M = 11.26, SD = 6.85, p < .001$), which also differed from one another ($p < .001$).

H₃ is hence overall partially supported as the size of layer 1 indeed remained stable while that of layer 2, in contrast to my expectation, increased. In line with H₃, layers 3 and 4 (i.e., the overall network explored in step 2) increased in quantity.

2.3.4 Step 4: In it for the long-haul – the ego network’s composition post-transition

I next conducted a multiple regression to identify which baseline ego network parameters (BEN) predicted the proportion of original ego network members maintained post-transition (i.e., before participants started their last term as undergraduate students in their third year at university; $M = .43, SD = .13$). This analysis included the following five predictors: quantity (i.e., number of members), quality (i.e., perceived emotional closeness to members), face-to-face (F2F) contact (i.e., the proportion of members with whom in-person contact was maintained), proximity (i.e., the proportion of members living in the same city), as well as cohort popularity (i.e., the number of college cohort members who listed the ego as a friend). The descriptive statistics for each predictor and their individual impact on the outcome measure (i.e., the proportion of baseline ego network members maintained post-transition) are summarised in Table 2.2.

Table 2.2 Summary of individual linear regression models of predictors of relationship maintenance post-transition

Predictor	<i>M (SD)</i>	<i>p</i>	<i>b (SE)</i>	β
Quantity BEN	46.72 (24.04)	.013	0.00 (0.00)	.28
Quality BEN	5.76 (1.17)	.960	0.00 (0.01)	.01
F2F Contact BEN	0.83 (0.19)	.612	0.04 (0.09)	.06
Proximity BEN	0.48 (0.26)	.024	-0.14 (0.06)	-.26
Cohort Popularity	14.31 (8.25)	.005	-0.01 (0.00)	-.31

Note. BEN denotes baseline ego network.

Using the enter method, the regression showed that five baseline ego network (BEN) parameters (Quantity, Quality, F2F Contact, and Proximity, and Cohort Popularity) jointly explained a significant amount of the variance (27%) in the proportion of baseline ego network members maintained at the end of participants' time as undergraduate students ($F_{(5, 73)} = 5.40, p < .001, R^2 = .27, R^2_{Adjusted} = .22$). As indicated by examining each predictor's individual impact, only three predictors Quantity BEN (i.e., the number of ego network members at baseline, $p = .002$), Proximity BEN (the proportion of ego network members living in the same city at baseline, $p = .026$), and Cohort Popularity (the number of received friendship nominations from fellow participating cohort members after having spent one term together in college, $p = .001$) significantly explained the outcome. Quantity BEN ($p = .006$), Proximity BEN ($p = .036$), and Cohort Popularity ($p = .001$) were also the three predictors that remained in the final model when a backwards elimination regression was run instead, resulting in the following equation:

$$\text{Predicted Proportion of BEN Post-Transition} = 0.50 + 0.02(\text{Quantity BEN}) - 0.12(\text{Proximity BEN}) - 0.01(\text{Cohort Popularity})$$

Relating results to hypotheses, H_4 stated that post-transition, a higher proportion of original members will be maintained for those with 1) larger, 2) emotionally closer baseline ego networks, featuring 3) lower levels of baseline face-to-face contact, and 4) fewer members living in the student's hometown, and for those 5) less popular in their new social environment (i.e., the college cohort). Findings hence partially support H_4 , as three of the five proposed predictors made a significant contribution to explaining the proportion of BEN members maintained. This was the case when these were considered

individually, as well as when predictors were considered jointly in both a simultaneous entry and a backwards elimination regression model.

2.4 Methods Study 2

The methods of Study 2 were identical to those of Study 1 – unless otherwise specified. In this study, I assessed a second cohort of students entering the same Oxford college as those assessed in Study 1 but one year later (i.e., in September 2017, when the first cohort already entered their second year).

2.4.1 Design

Study 2 included three assessments during the transition. These were again spaced three months apart and hence focused on the first six months of the transition: pre-move (T0), post-move one (T1) and two (T2) terms later. The fourth and final assessment took part towards the end of participants' second (rather than third, as in Study 1) year as undergraduate students.

These timing changes were made for three reasons. Firstly, the results of Study 1 (as reported above) revealed that most significant ego network changes took part close in time to the transition itself (i.e., the move to university). Secondly, the College Board (permitting this research to be carried out in the first place) allowed additional assessments during term time in Study 2 (which were unrelated to this chapter but vital to Chapter 4). As a compromise, they required one fewer assessment within participants' first year so as not to request too much time of students. Finally, the time constraints of my DPhil allowed me to re-assess the participants of Study 1 in their (and also my) third year, whereas participants of Study 2 were only in their second year at

the end of my thesis. It can be reasonably assumed that the most volatile phase of ego network changes took place prior to this last assessment (as suggested by Study 1, where most shifts occurred between the pre-move (T0) and the first post-move (T1) assessment). It can hence still be viewed as a 'post-transition' assessment. For these three reasons, fewer, more closely spaced assessments were the most feasible option for Study 2.

2.4.2 Participants

All prospective undergraduate students of the same college at the University of Oxford matriculating in October 2017 were invited to take part in the month before their arrival. Of the 118 prospective students of the incoming cohort, 84 (71%) agreed to take part. Two students dropped out and one passed away, resulting in an overall retention rate of 96%. In the remaining sample of 81 participants, 41 were women and 40 were men. The average age was 18 ($SD = 0.4$, range: 17-20). Of these participants, 71 (88%) were British nationals, 60 were White, 12 were Asian, eight reported being of a mixed ethnic background, and one selected the 'other' option to describe their ethnic background. All participants were compensated for their time (with £15 per assessment, plus an additional £15 if all assessments were completed) and gave their informed consent before participating, in accordance with the University of Oxford's Central University Research Ethics Committee.

2.4.3 Materials

There were three differences, compared to Study 1, that are relevant to this chapter.

Firstly, the prompt relating to the list of friends from home (pre-move to university) was changed, asking participants to include those friendships with people whom they had been in contact within the last month (as opposed to within the entire year, as in Study 1). This change (max. 20 friends from home could now be listed) was made to only elicit participants' core friendships and examine whether these were as prone to decay as the general trend in Study 1 seemed to suggest. Participants could indicate whether they would have liked to add more friends and 16 (20%) did so, specifying that they would have liked to add on average 10.90 ($SD = 7.42$) friendships.

The options specifying contact frequency with each ego network member were consequently also adjusted to focus on a shorter time span. Participants specified last being in contact with each ego network member *this week/last week/two weeks ago/three weeks ago/a month or longer ago*. To allow meaningful comparisons between both studies, these options were grouped into three categories: *this week*, *1-3 weeks ago*, and *a month or longer ago* (cf. *within two days, 3-30 days, 1-3 months, 3-12 months* used in Study 1).

Lastly, friendships within the participating student cohort were elicited by clicking on the names of students (as opposed to listing them from memory, as was the case in Study 1). This change was made to facilitate eliciting the cohort networks at the core of Chapter 3.

The complete questionnaires can be found in Appendix B.

2.4.4 Procedure

Participants filled out online questionnaires at three (instead of four) different times: in the month preceding their move to Oxford (i.e., T0) and then in three-month intervals, after the first (T1) and second (T2) term of their first year at university. Finally, they filled out a fourth questionnaire before starting their final term in their second (not third) year (T3). I also invited the entire cohort to a short talk on my overall research aims and how their data will be used, offering pizza, which seemed to have been received well.

2.4.5 Analyses

At T0, before the move to Oxford, a total of 2216 network members had been listed by the 81 participants (fewer members than in Study 1, likely a result of the altered prompt that focuses on the more central relationships). After each of the two terms (i.e., T1 & T2), this total increased to 4652 and 4432 respectively. Post-transition (i.e., at T3), 4146 members were listed. Not all participants provided all additional information detailing each of these relationships at every assessment, so that the analyses focusing on emotional closeness, physical proximity, contact frequency, and contact type were carried out on those network members for which that data was available. At T0, this was the case for 100% of the emotional closeness data, 99% of the physical proximity data, 95% of the contact frequency data, and 96% of the contact type data. For the remaining assessments, this was the case for at least 96% in each data category throughout.

Analyses for Steps 1-3 were identical to Study 1, except that there was one fewer assessment.

2.4.5.1 Step 4: In it for the long-haul – the ego network's composition post-transition

All 81 participants (100%) filled out the final questionnaire towards the end of second year at university.

An analysis of standard residuals was carried out on the data to identify any outliers, which indicated that one participant needed to be removed. An analysis of standard residuals on the remaining 80 participants was carried out, which showed that the data contained no more outliers (Std. Residual Min = -1.48, Std. Residual Max = 2.69). Tests to see if the data met the assumption of collinearity indicated that multicollinearity was not a concern (Quantity BEN, Tolerance = .94 VIF = 1.06; Quality BEN, Tolerance = .91, VIF = 1.11; F2F Contact BEN, Tolerance = .98, VIF = 1.02; Proximity BEN, Tolerance = 0.94, VIR = 1.06; Cohort Popularity, Tolerance = .98, VIF = 1.02). The data met the assumption of independent errors (Durbin-Watson value = 1.80). The histogram of standardised residuals indicated that the data contained approximately normally distributed errors, as did the normal P-P plot of standardised residuals, which showed points that were not completely on the line, but close. The scatterplot of standardised residuals showed that the data met the assumptions of homogeneity of variance and linearity. The data also met the assumption of non-zero variances (Quantity BEN, Variance = 82.85; Quality BEN, Variance = 1.10; F2F Contact BEN, Variance = 0.01; Proximity BEN, Variance = 0.07; Cohort Popularity, Variance = 108.79).

2.5 Results & Discussion Study 2

2.5.1 Step 1: Baseline Snapshot – the ego network pre-transition

In terms of network quantity, the average participant listed a total of 27.33 (9.36) ego network members. Of these, 13.93 (5.52; or 51%) were considered family members. In

terms of network quality, reported overall emotional closeness to network members was 6.52 (1.05) out of 10. Emotional closeness to friends was rated 7.07 (1.00), a rating higher than that of 6.17 (1.35) given to family members, $t_{(79)} = 5.61, p < .001$.

In terms of physical proximity, 3.10 (1.28; or 11%) of listed network members were reported to live in the same household. Furthermore, 11.49 (7.84; or 42%) were reported to live in the same city, 8.53 (7.08; or 31%) in the same country (but not the same city), and 4.00 (5.73; or 15%) in a different country (see Figure 2.9).

The frequency with which participants engaged with these network members varied (see Figure 2.10). Participants reported being last in contact with 12.96 (6.49; or 50%) of their network *this week*. Participants last interacted with 8.83 (5.49; or 34%) *one to three weeks ago*. Finally, participants reported having last interacted with 4.32 (4.26; or 17%) *a month or longer ago*.

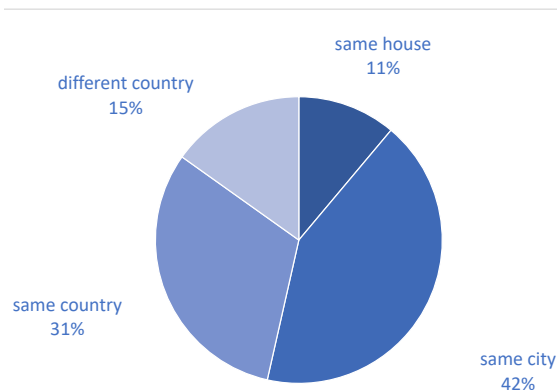


Figure 2.9 Physical proximity at T0

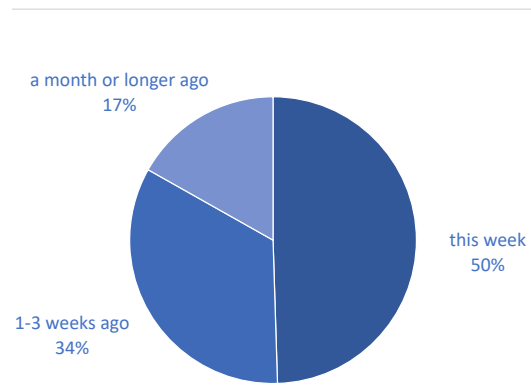


Figure 2.10 Contact frequency at T0

Contact with network members also varied in type. Participants reported interacting with 23.93 (9.12; or 91%) of their network *face-to-face*, with 5.84 (5.40; or 22%) via the *phone, Skype, FaceTime, or a similar verbal method*, and with 15.78 (8.77; or 60%) via

text message, e-mail, letter, social media or another written method. These three types of interaction were not mutually exclusive (explaining while the combined percentages exceeded one hundred). Overall, participants reported staying in contact using all three methods with 3.44 (4.25; or 13%) of their network members. They further reported using at least two methods to stay in touch with 15.73 (9.09; or 60%). More specifically, face-to-face contact combined with verbal communication was reported for 4.99 (5.13; or 19%) of members, face-to-face contact combined with written communication for 13.85 (8.40; or 53%) and verbal and written communication combined for 3.78 (4.49; or 14%).

2.5.2 *Step 2: Out with the old, in with the new? – ego network developments during the transition*

2.5.2.1 *Size & Composition*

I conducted a 3 (relationship type) x 3 (time) repeated measures ANOVA to examine changes in students' ego network size across the first six months of the transition from home to university.

There was a main effect of relationship type, $F_{(1.66, 133.02)} = 35.10$, $p < .001$, $\eta^2 = .305$. Students nominated significantly more friends at university ($M_{UF} = 20.11$, $SE = 1.04$) than both family members ($M_{FA} = 13.53$, $SE = 0.62$) and friends from home ($M_{HF} = 12.86$, $SE = 0.67$, $ps < .001$), which did not differ from one another ($p = .359$).

There was also a main effect of time on the reported overall network size, $F_{(2, 160)} = 201.51$, $p < .001$, $\eta^2 = .716$. Students' original ego network was significantly smaller before the move to university than at any other assessed time point ($M_{T0} = 27.36$, $SD =$

9.36, $ps < .001$). The network seemed to have grown rapidly during their first term at university ($M_{T1} = 57.43$, $SD = 20.73$) but then remained fairly constant, as there were no further increases ($M_{T2} = 54.72$, $SD = 20.79$, $p = .060$).

Finally, there was an interaction between relationship type and time, $F_{(1.94, 155.12)} = 250.92$, $p < .001$, $\eta^2 = .758$. Figure 2.11 shows that network size did not increase uniformly. Instead, three trends could be observed and confirmed by considering the simple main effects of each relationship type. There was no main effect of family member ($F_{(1.40, 111.64)} = 3.02$, $p = .071$, $\eta^2 = .036$), as the number of nominated family members (blue) did not change ($M_{T0} = 13.95$, $SD = 5.52$, $M_{T1} = 13.26$, $SD = 6.09$, and $M_{T2} = 13.38$, $SD = 5.64$). The number of nominated friends from home (green) instead overall decreased ($F_{(1.55, 124.12)} = 6.01$, $p = .006$, $\eta^2 = .070$). More friends from home were nominated pre-transition ($M_{T0} = 13.41$, $SD = 5.98$) than after participants had spent two ($M_{T2} = 12.37$, $SD = 6.00$, $p < .001$) terms at university. The assessment in between, after participants had spent one ($M_{T1} = 12.81$, $SD = 6.55$) term away from home, instead did not differ from either of the other two assessments. This loss was not only matched but far surpassed by the new additions ($F_{(1.79, 143.02)} = 250.56$, $p < .001$, $\eta^2 = .758$), namely friends at university (red). These increased significantly, so that the number of nominated friends at university pre-transition ($M_{T0} = 0.00$, $SD = 0.00$) was significantly lower than those reported after one ($M_{T1} = 31.36$, $SD = 15.15$, $p < .001$) and two ($M_{T2} = 28.96$, $SD = 15.25$, $p < .001$) terms at university, which did not differ from one another ($p = .184$).

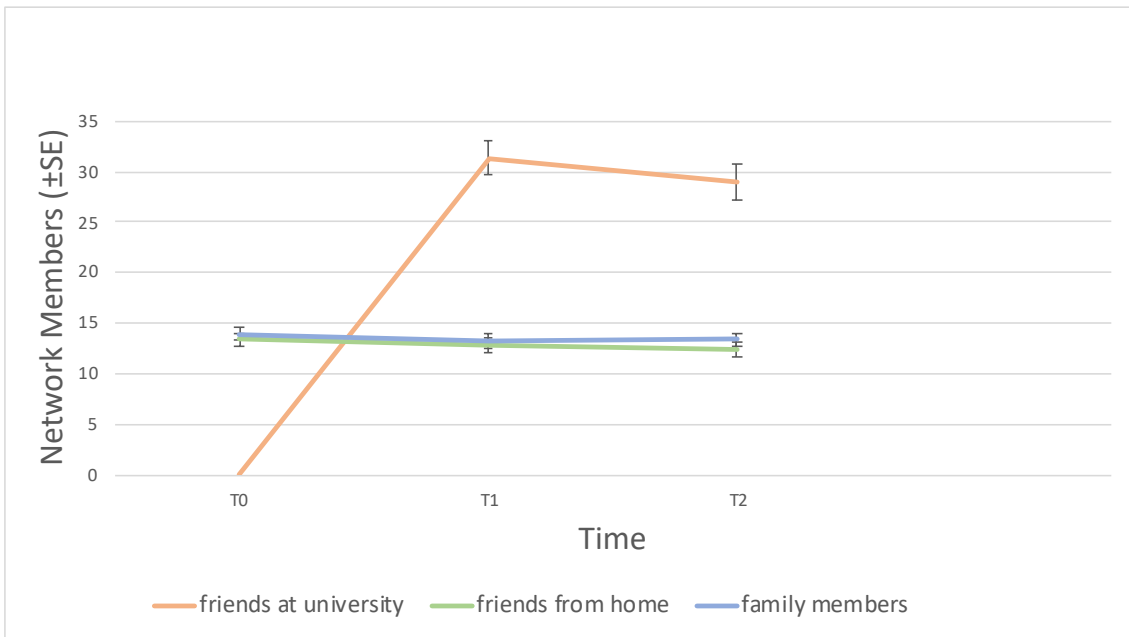


Figure 2.11 Ego network developments in size and composition

Comparing the three relationship types at every assessment, the interaction effect can be further differentiated. At T0 (i.e., the baseline), the number of ego network members in the relationship type categories differed ($F_{(1.90, 152.25)} = 273.80, p < .001, \eta^2 = .774$). Participants nominated significantly fewer friends at university ($M = 0.00, SD = 0.00$) than both family members ($M = 13.95, SD = 5.52, p < .001$) and friends from home ($M = 13.41, SD = 5.98, p < .001$), which did not differ from one another ($p = .999$). At T1 (i.e., after a first term at university), there were further differences between the relationship types ($F_{(1.33, 106.57)} = 109.13, p < .001, \eta^2 = .577$). While there was still no difference between the number of nominated family members ($M = 13.26, SD = 6.09$) and that of nominated friends from home ($M = 12.81, SD = 6.55, p = .999$), that of nominated friends at university ($M = 31.36, SD = 15.15$) was now higher than both of these ($ps < .001$). At T2 (i.e., after a second term at university), these differences remained ($F_{(1.30, 103.98)} = 89.75, p < .001, \eta^2 = .529$), with more friends at university ($M = 28.96, SD = 15.825$) being nominated than both friends from home ($M = 12.37, SD = 6.00, p < .001$) and family

members ($M = 13.38$, $SD = 5.64$, $p < .001$), which continued not to differ from one another ($p = .505$).

Overall, the developments in ego network size and composition support H_1 and mirror those observed in Study 1, with one exception. In Study 1, participants overall nominated fewer family members than both friends from home and friends at university. Conversely, in Study 2, participants nominated similar numbers of family members and friends from home, which were both lower than the number of nominated friends at university. This difference is mainly attributable to the deliberate change in prompt, asking participants to list baseline network members with whom they had been in contact within the last *month* (not entire *year*, as in Study 1). The possible consequences of this difference in relation to these results are elaborated further in the general discussion.

2.5.2.2 Emotional Closeness

I conducted a one-way repeated measures ANOVA (across the three assessments) to examine changes in the participants' perceived emotional closeness to members of their ego network during the first six months of the transition to university. There was a main effect ($F_{(1.52, 121.32)} = 14.28$, $p < .001$, $\eta^2 = .151$, see Figure 2.12). Overall emotional closeness ratings were highest at baseline, pre-move ($M_{T0} = 6.52$, $SE = 0.12$). After one ($M_{T1} = 5.98$, $SE = 0.11$, $p < .001$) and two ($M_{T2} = 6.13$, $SE = 0.11$, $p = .008$) terms at university, emotional closeness ratings did not differ from one another ($p = .130$). These developments in perceived emotional closeness replicate those reported in Study 1 and do not support H_2 (predicting that overall network characteristics would be maintained) when considered in isolation.

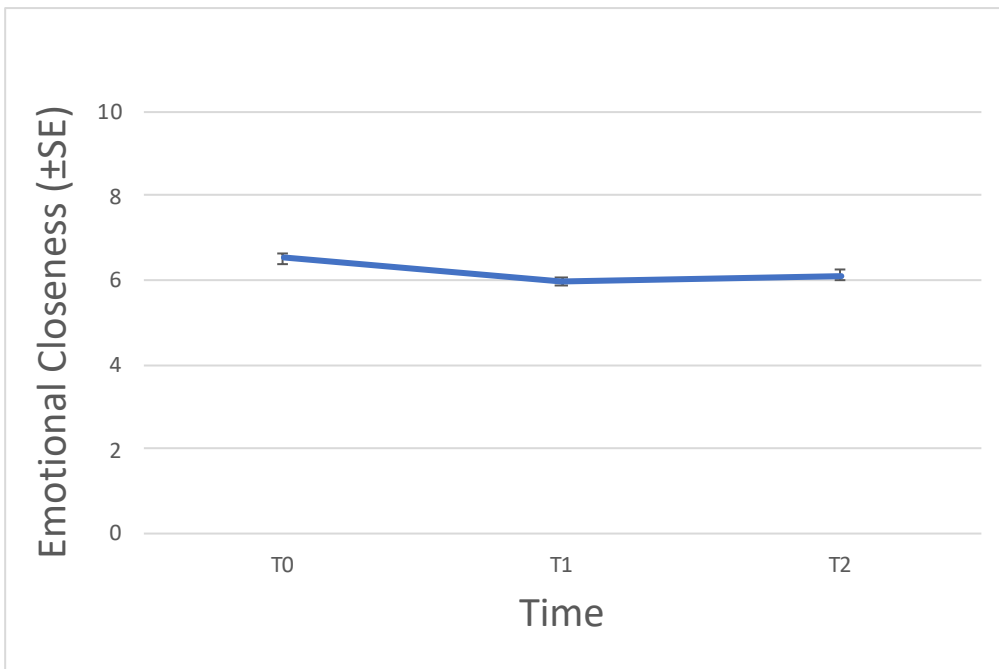


Figure 2.12 Developments in emotional closeness

2.5.2.3 Physical Proximity

I next compared physical proximity to the baseline network members pre-move (i.e., T0) and post-move (i.e., T1) using t-tests. Once at university (at T1), participants reported significantly fewer baseline network members living in the same house ($M_{T0} = 3.10$, $SD = 1.28$, $M_{T1} = 0.21$, $SD = 0.74$, $t_{(80)} = 19.12$, $p < .001$) as well as in the same city ($M_{T0} = 11.49$, $SD = 7.84$, $M_{T1} = 1.89$, $SD = 3.68$, $t_{(80)} = 10.31$, $p < .001$). The opposite development was observed for the number of baseline members in the same country, which participants reported had increased ($M_{T0} = 8.53$, $SD = 7.08$, $M_{T1} = 18.54$, $SD = 11.06$, $t_{(80)} = -12.29$, $p < .001$). Participants even reported that the number of network members in a different country had increased after the move ($M_{T0} = 4.00$, $SD = 5.73$, $M_{T1} = 5.38$, $SD = 7.29$, $t_{(80)} = -2.60$, $p = .027$). Thus, post-move, the majority of the original network members (92%) no longer shared the same close physical proximity (i.e., living in the same house or city) to the ego.

Comparing the physical proximity of the ego to the entire ego network post-move (i.e., including new additions) revealed a slightly diverging development (see Figure 2.13). Paired-sample t-tests showed that there were no overall changes in the proportion of network members reported to live in the same city ($M_{T0} = .42, SD = .26, M_{T1} = .42, SD = .19, t_{(80)} = -0.05, p = .960$) or the same country ($M_{T0} = .30, SD = .23, M_{T1} = .33, SD = .19, t_{(80)} = -0.99, p = .326$). There was a significant decrease in network members reported to live in the same house ($M_{T0} = .12, SD = .08, M_{T1} = .06, SD = .06, t_{(80)} = 5.51, p < .001$) or in a different country ($M_{T0} = .15, SD = .21, M_{T1} = .10, SD = .14, t_{(80)} = 2.41, p = .018$) post-move. Hence, post-move the influx of new members living in the same city appeared to compensate for the many baseline members living further away.

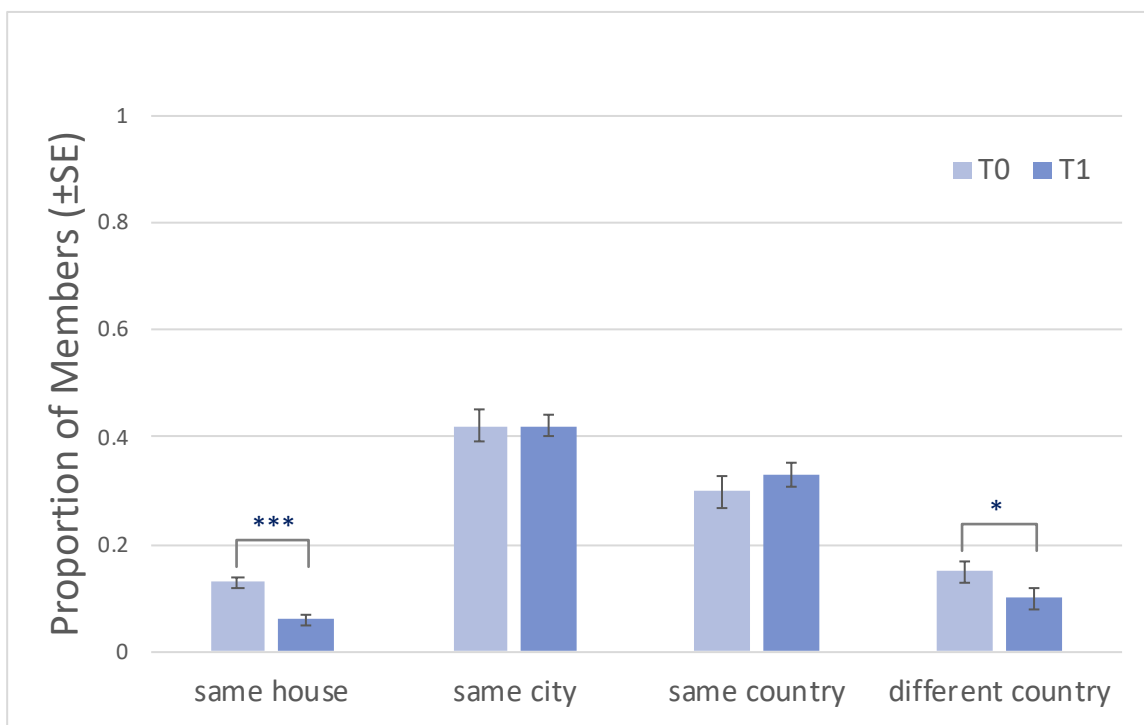


Figure 2.13 Developments in physical proximity (* $p < .05$, ** $p < .01$, *** $p < .001$)

Overall, network structure was mostly maintained while individual members were replaced or reshuffled. These changes in physical proximity are in line with those observed in Study 1, except for the changes regarding network members living in another country (which was not found in Study 1).

2.5.2.4 Contact Frequency

I conducted three separate repeated measures ANOVA's to examine whether participants reported changes in how frequently they interacted with members of their network (see Figure 2.14). There was a main effect of time for the proportion of network members with whom participants reported being in contact *this week* ($F_{(1.79, 133.98)} = 8.20$, $p = .001$, $\eta^2 = .094$). Contact within the same week was maintained with a significantly lower proportion of the network after participants had spent two terms at university ($M_{T2} = .42$, $SD = .18$) than pre-transition ($M_{T0} = .52$, $SD = .20$, $p = .001$). Reported contact levels did not differ from those reported after one term at university ($M_{T1} = .45$, $SD = .20$, $p = .406$). The remaining comparison revealed no further difference either ($p = .061$).

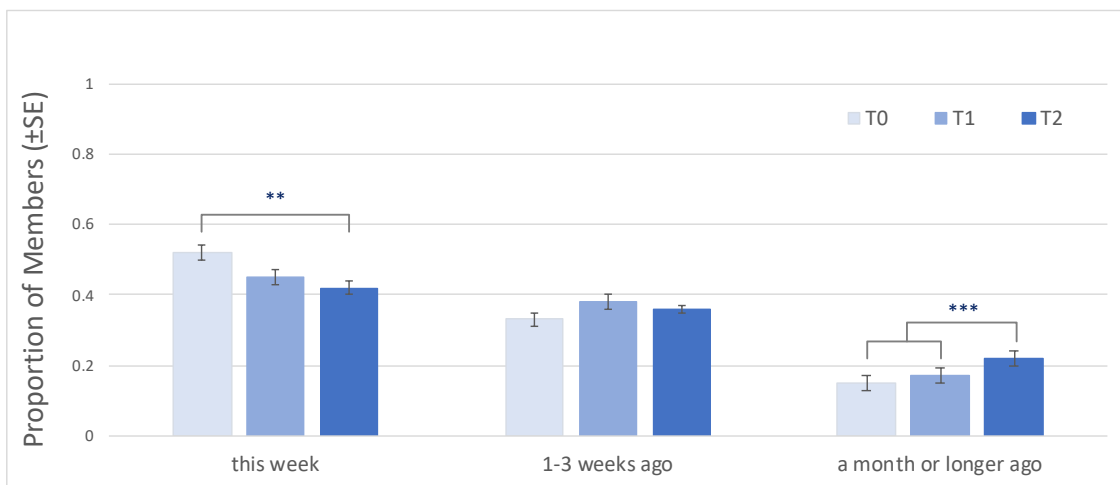


Figure 2.14 Developments in contact frequency (* $p < .05$, ** $p < .01$, *** $p < .001$)

There were no changes in the proportion of network members with whom participants reported being in contact 1-3 weeks ago ($F_{(1.61, 132.63)} = 1.61$, $p = .203$, $\eta^2 = .020$). There was, however, a main effect of time for the proportion of network members with whom participants reported being in contact a month or longer ago ($F_{(2, 158)} = 10.29$, $p < .001$, $\eta^2 = .115$). Contact at this level was maintained with a significantly higher proportion of the network after participants had spent two terms at university ($M_{T2} = .22$, $SD = .15$)

than both pre-move ($M_{T0} = .15$, $SD = .14$, $p < .001$), or after one term at university ($M_{T1} = .17$, $SD = .11$, $p = .002$). These two did not differ from one another ($p = .733$).

These results only partially support H_2 (predicting that overall network characteristics would be maintained) and only partially replicated those found in Study 1. No changes were observed in the proportion of ego network members with whom contact last occurred between 1 and 3 weeks ago, akin to no changes observed in Study 1 regarding 3-30 days ago. However, initial decreases in the proportion of members with whom contact last occurred within 2 days in Study 1 were no longer present at the final assessment at T3. This last assessment was omitted in Study 2, so that it is impossible to know whether levels would have bounced back similarly. Lastly, contact longer than a month ago showed opposite developments in both studies. While levels reportedly dropped in Study 1, they increased in Study 2.

2.5.2.5 Contact Type

I conducted three separate repeated measures ANOVA's to examine how participants reported typically engaging with members of their ego network during the transition to university (see Figure 2.15). There were no changes in the proportion of face-to-face contact participants reported over the observed six months ($M_{T0} = .90$, $SD = .13$, $M_{T1} = .86$, $SD = .18$, and $M_{T2} = .88$, $SD = .13$, $F_{(1.81, 144.96)} = 1.62$, $p = .201$, $\eta^2 = .020$). Participants instead reported decreasing levels of verbal contact with members of their ego network ($F_{(1.74, 139.32)} = 6.93$, $p = .001$, $\eta^2 = .080$). Verbal contact was maintained with a significantly lower proportion of the network after participants had spent two terms at university ($M_{T2} = .13$, $SD = .12$) than pre-move ($M_{T0} = .22$, $SD = .21$, $p = .002$). There was no difference in reported levels of verbal contact after one term ($M_{T1} = .17$, $SD = .15$, $p =$

.294) and also not between pre-move levels and one term post-move ($p = .137$). Lastly, there was also a main effect of time for the proportion of network members with whom participants reported being in written contact ($F_{(2, 160)} = 8.11, p < .001, \eta^2 = .092$). Compared to pre-move levels ($M_{T0} = .57, SD = .26$), participants reported that written contact had declined one term post-move ($M_{T1} = .47, SD = .24, p = .001$) but it seemed to have recovered two terms post-move ($M_{T2} = .51, SD = .23, p = .084$). Reported levels of written contact after one and two terms at university also did not differ ($p = .176$).

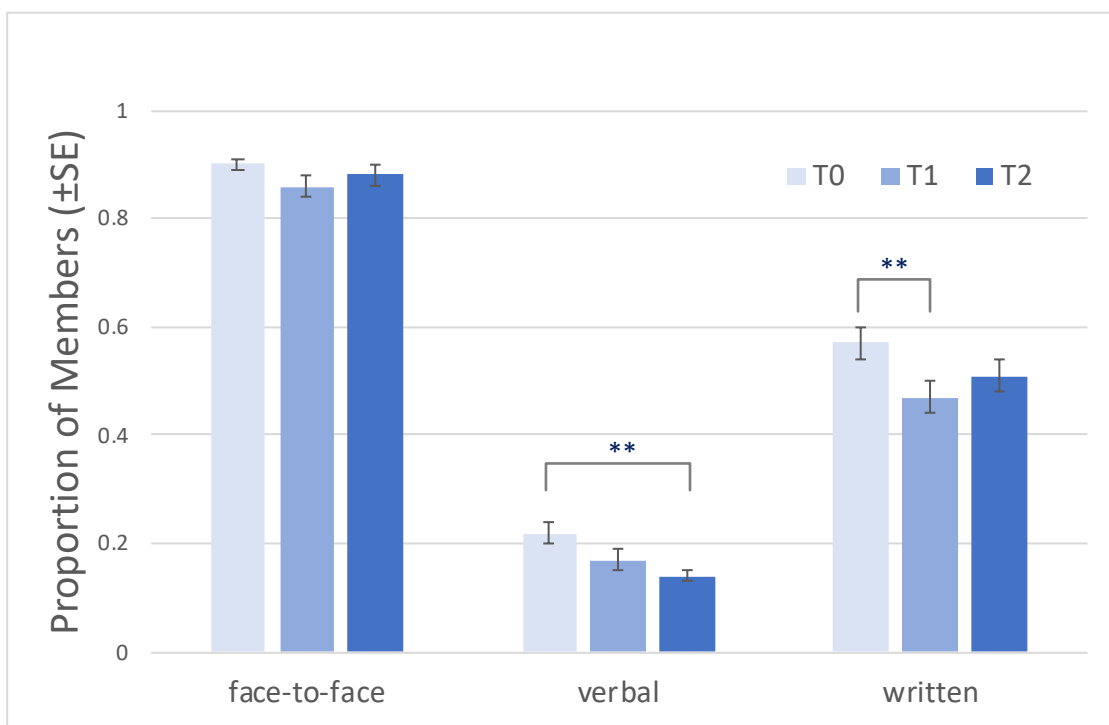


Figure 2.15 Developments in contact type (* $p < .05$, ** $p < .01$, *** $p < .001$)

These results mainly support H_2 (predicting that overall network characteristics would be maintained) and are also mostly in line with those observed in Study 1, with the exception of verbal contact, which was only found to decrease in Study 2. The other two types of contact were overall maintained, as reported in Study 1, too.

2.5.3 Step 3: A closer look – ego network developments across the layers

Assigning participants’ individual network members into layers 1 (the support clique), 2 (the sympathy group), and 3 (the affinity group) yielded hierarchically inclusive layer sizes that were again broadly in line with the expected values of 5, 15, and 50 respectively (see Table 2.3).

Table 2.3 Development of ego network layer size showing the number of network members (SD) in each ego network layer pre-transition (T0), three months later (T1) and another three months later (T2)

Layer	T0	T1	T2
1	5.04 (3.26)	6.56 (5.68)	6.80 (5.61)
2	14.12 (6.90)	23.40 (12.02)	23.73 (11.92)
3	24.43 (9.37)	50.59 (20.24)	48.11 (19.23)
4/overall	27.36 (9.36)	57.43 (20.73)	54.72 (20.79)

At baseline, the support clique at the network’s core (layer 1) included 2.60 (1.88; or 52%) family members. The sympathy group (layer 2) included all members already captured in layer 1 and included 5.99 (3.63; or 42%) family members. The affinity group (layer 3) comprised the aforementioned and included 11.28 (5.08; or 46%) family members. Three separate 3 (relationship type) x 3 (time) repeated measures ANOVA were used to examine the developments in size and composition of each of these three layers during the transition from home to the end of the first year at university (see Figure 2.16).

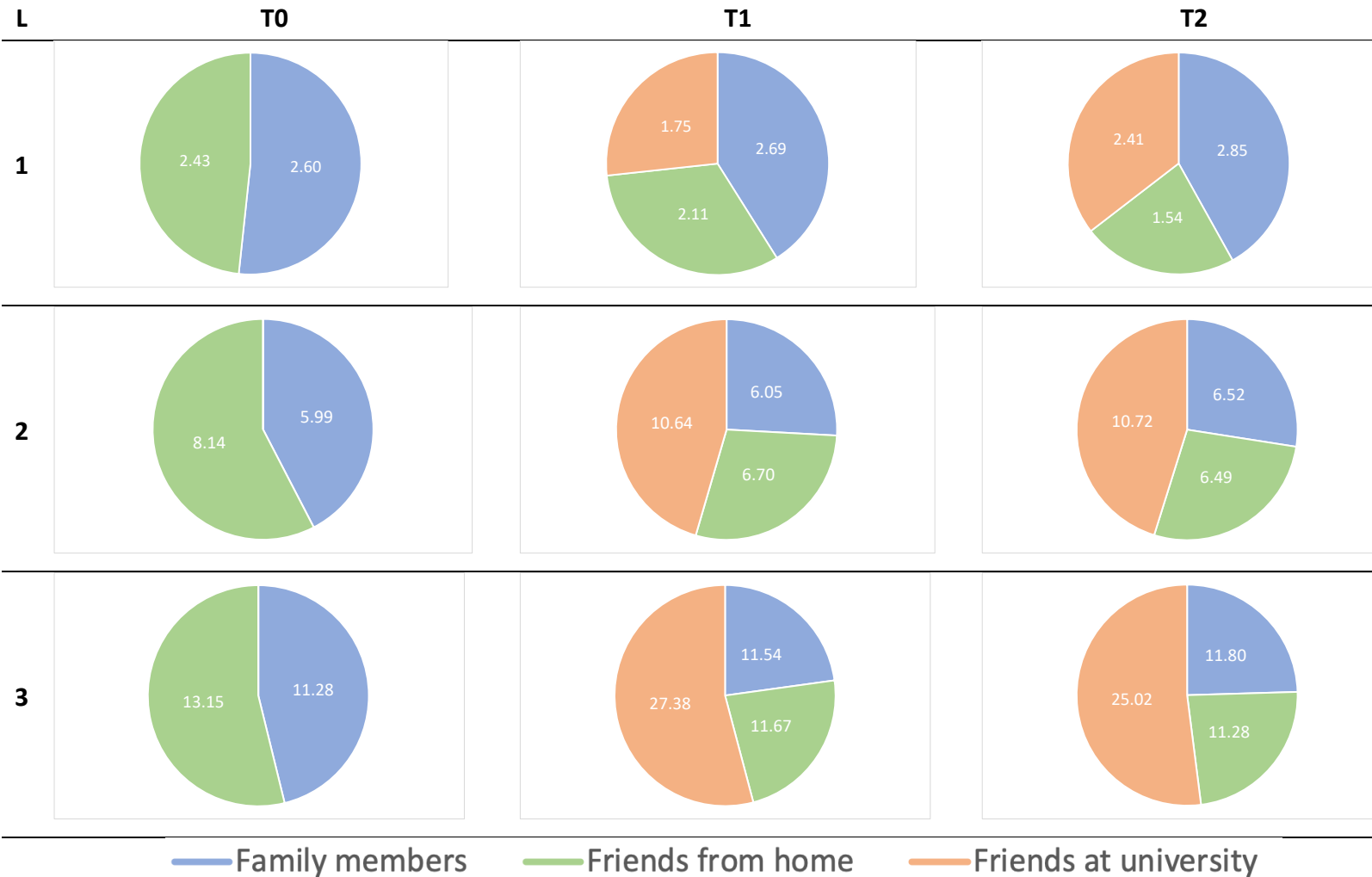


Figure 2.16 Development of ego network layer composition

Layer 1, the support clique, increased in size ($F_{(2, 160)} = 7.12, p = .001, \eta^2 = .082$). The average number of members listed across relationship types pre-move ($M_{T0} = 1.68, SE = 0.12$) was lower than that listed at the two following assessments ($M_{T1} = 2.19, SE = 0.21, p = .015, M_{T2} = 2.27, SE = 0.21, p = .004$), which did not differ from one another ($p = .999$). Participants also listed more family members ($M_{FA} = 2.72, SE = 0.28$) than both friends from home ($M_{HF} = 2.03, SE = 0.17, p = .042$) and at university ($M_{UF} = 1.39, SE = 0.17, p < .001$), while the overall number of friends from home exceeded that of friends made at university ($p = .005; F_{(1.74, 139.33)} = 13.91, p < .001, \eta^2 = .148$). There was moreover an interaction between time and relationship type ($F_{(3.43, 274.08)} = 21.22, p < .001, \eta^2 = .210$), as decomposed below.

Considering the simple main effects of each relationship type in turn, there was no main effect of family member ($F_{(1.46, 116.43)} = 0.53, p = .533, \eta^2 = .007$), as the number of nominated family members did not change in layer 1 ($M_{T0} = 2.60, SD = 1.88, M_{T1} = 2.69, SD = 3.28$, and $M_{T2} = 2.85, SD = 3.13$). The number of nominated friends from home instead overall decreased ($F_{(2, 160)} = 6.38, p = .002, \eta^2 = .074$). More friends from home were nominated pre-transition ($M_{T0} = 2.43, SD = 2.16$) than after participants had spent two ($M_{T2} = 1.54, SD = 1.52, p = .002$) terms at university. The assessment in between, after participants had spent one ($M_{T1} = 2.11, SD = 2.30$) term away from home, instead did not differ from either of the other two assessments. This gradual loss was matched by the new additions ($F_{(1.84, 147.00)} = 30.75, p < .001, \eta^2 = .278$), namely friends at university. These increased significantly, so that the number of nominated friends at university pre-transition ($M_{T0} = 0.00, SD = 0.00$) was significantly lower than those

reported after one ($M_{T1} = 1.75, SD = 2.40, p < .001$) and two ($M_{T2} = 2.41, SD = 3.05, p < .001$) terms at university, which did not differ from one another ($p = .178$).

Comparing the three relationship types at every assessment, the interaction effect can be further differentiated. At T0 (i.e., the baseline), the number of ego network members in the relationship type categories differed ($F_{(1.86, 148.40)} = 73.87, p < .001, \eta^2 = .480$). Participants nominated significantly fewer friends at university in layer 1 ($M = 0.00, SD = 0.00$) than both family members ($M = 2.60, SD = 1.88, p < .001$) and friends from home ($M = 2.43, SD = 2.16, p < .001$), which did not differ from one another ($p = .999$). At T1 (i.e., after a first term at university), there were no longer differences between the relationship types in layer 1 ($F_{(1.83, 146.14)} = 3.29, p = .055, \eta^2 = .039$). At T2 (i.e., after a second term at university), there were differences between the relationship types in layer 1 once more ($F_{(1.94, 155.29)} = 6.58, p = .002, \eta^2 = .076$), with significantly fewer friends from home ($M = 1.54, SD = 1.52$) being nominated than both family members ($M = 2.85, SD = 3.13, p = .001$) and friends at university ($M = 2.41, SD = 3.05, p = .049$), which continued not to differ from one another ($p = .801$).

Layer 2, the sympathy group, increased in size ($F_{(2, 160)} = 53.093, p < .001, \eta^2 = .403$). The average number of members listed across relationship types pre-move ($M_{T0} = 4.71, SE = 0.26$) was lower than that listed at the two following assessments ($M_{T1} = 7.80, SE = 0.45, M_{T2} = 7.91, SE = 0.44; ps < .001$), which did not differ from one another ($p = .999$). There were no differences in the numbers of family members, friends from home and friends at university participants listed in layer 2 ($F_{(1.87, 149.18)} = 1.99, p = .144, \eta^2 = .024$). There

was, however, an interaction between relationship type and time ($F_{(2,62, 209.45)} = 114.43$, $p < .001$, $\eta^2 = .589$), as decomposed below.

Considering the simple main effects of each relationship type in turn, there was no main effect of family member ($F_{(2, 160)} = 1.49$, $p = .230$, $\eta^2 = .018$), as the number of nominated family members did not change in layer 2 ($M_{T0} = 5.99$, $SD = 3.64$, $M_{T1} = 6.05$, $SD = 4.26$, and $M_{T2} = 6.52$, $SD = 4.39$). The number of nominated friends from home instead overall decreased ($F_{(2, 160)} = 9.92$, $p < .001$, $\eta^2 = .110$). More friends from home were nominated pre-transition ($M_{T0} = 8.14$, $SD = 4.52$) than after participants had spent one ($M_{T1} = 6.70$, $SD = 4.50$, $p = .001$) and two ($M_{T2} = 6.49$, $SD = 4.63$, $p < .001$) terms at university, which did not differ from one another ($p = .999$). This loss was matched by the new additions ($F_{(1.84, 146.77)} = 126.80$, $p < .001$, $\eta^2 = .613$), namely friends at university. These increased, so that the number of nominated friends at university pre-transition ($M_{T0} = 0.00$, $SD = 0.00$) was significantly lower than those reported after one ($M_{T1} = 10.64$, $SD = 7.79$, $p < .001$) and two ($M_{T2} = 10.72$, $SD = 7.05$, $p < .001$) terms at university, which did not differ from one another ($p = .999$).

Comparing the three relationship types in layer 2 at every assessment, the interaction effect can be further differentiated. At T0 (i.e., the baseline), the number of ego network members in the relationship type categories differed ($F_{(2, 160)} = 161.91$, $p < .001$, $\eta^2 = .669$). Participants nominated significantly fewer friends at university in layer 2 ($M = 0.00$, $SD = 0.00$) than both family members ($M = 5.99$, $SD = 3.64$, $p < .001$) and friends from home ($M = 8.14$, $SD = 4.52$, $p < .001$), which also differed from one another ($p < .001$). At T1 (i.e., after a first term at university), there were further differences between

the relationship types in layer 2 ($F_{(1.52, 121.50)} = 19.66, p < .001, \eta^2 = .197$). Participants nominated more friends at university ($M = 10.64, SD = 7.79$) than both friends from home ($M = 6.70, SD = 4.50, p < .001$) and family members ($M = 6.05, SD = 4.26, p < .001$), which did not differ from one another ($p = .692$). At T2 (i.e., after a second term at university), these differences remained ($F_{(1.74, 139.30)} = 22.31, p < .001, \eta^2 = .218$), with more friends from university ($M = 10.72, SD = 7.05$) being nominated than both friends from home ($M = 6.49, SD = 4.63, p < .001$) and family members ($M = 6.52, SD = 4.39, p < .001$), which continued not to differ from one another ($p = .999$).

Layer 3, the affinity group, also increased in size ($F_{(2, 160)} = 150.90, p < .001, \eta^2 = .654$). The average number of members listed across relationship types pre-move ($M_{T0} = 8.14, SE = 0.35$) was lower than that listed at the two following assessments ($M_{T1} = 16.86, SE = 0.75, M_{T2} = 16.04, SE = 0.71; ps < .001$), which did not differ from one another ($p = .281$). Overall, participants listed more friends at university ($M_{UF} = 17.47, SE = 0.96$) than they listed family members ($M_{FA} = 11.54, SE = 0.56$) and friends from home ($M_{HF} = 12.03, SE = 0.96; ps < .001$), which did not differ from one another ($p = .999; F_{(1.61, 128.37)} = 28.31, p < .001, \eta^2 = .261$). There was also an interaction between relationship type and time ($F_{(2.08, 165.99)} = 213.73, p < .001, \eta^2 = .728$), as decomposed below.

Considering the simple main effects of each relationship type in turn, there was no main effect of family member ($F_{(2, 160)} = 0.91, p = .404, \eta^2 = .011$), as the number of nominated family members did not change in layer 3 ($M_{T0} = 11.28, SD = 5.08, M_{T1} = 11.54, SD = 5.80$, and $M_{T2} = 11.80, SD = 5.46$). The number of nominated friends from home instead overall decreased ($F_{(2, 160)} = 15.12, p < .001, \eta^2 = .159$). More friends from home were

nominated pre-transition ($M_{T0} = 13.15$, $SD = 5.95$) than after participants had spent one ($M_{T1} = 11.67$, $SD = 6.36$, $p < .001$) and two ($M_{T2} = 11.28$, $SD = 5.98$, $p < .001$) terms at university, which did not differ from one another ($p = .999$). This loss was not only matched but far surpassed by the new additions ($F_{(1.85, 148.06)} = 213.24$, $p < .001$, $\eta^2 = .727$), namely friends at university. These increased, so that the number of nominated friends at university pre-transition ($M_{T0} = 0.00$, $SD = 0.00$) was significantly lower than those reported after one ($M_{T1} = 27.38$, $SD = 14.59$, $p < .001$) and two ($M_{T2} = 25.02$, $SD = 13.55$, $p < .001$) terms at university, which did not differ from one another ($p = .999$).

Comparing the three relationship types in layer 3 at every assessment, the interaction effect can be further differentiated. At T0 (i.e., the baseline), the number of ego network members in the relationship type categories differed ($F_{(2, 160)} = 256.62$, $p < .001$, $\eta^2 = .762$). Participants nominated significantly fewer friends at university in layer 3 ($M = 0.00$, $SD = 0.00$) than both family members ($M = 11.28$, $SD = 5.08$, $p < .001$) and friends from home ($M = 13.15$, $SD = 5.95$, $p < .001$), which also differed from one another ($p = .017$). At T1 (i.e., after a first term at university), there were further differences between the relationship types in layer 3 ($F_{(1.28, 102.48)} = 89.39$, $p < .001$, $\eta^2 = .528$). Participants nominated more friends at university ($M = 27.38$, $SD = 14.59$) than both friends from home ($M = 11.67$, $SD = 6.35$, $p < .001$) and family members ($M = 11.54$, $SD = 5.80$, $p < .001$), which did not differ from one another ($p = .999$). At T2 (i.e., after a second term at university), these differences remained ($F_{(1.31, 104.59)} = 77.99$, $p < .001$, $\eta^2 = .494$), with more friends from university ($M = 25.02$, $SD = 13.55$) being nominated than both friends from home ($M = 11.28$, $SD = 5.98$, $p < .001$) and family members ($M = 11.80$, $SD = 5.46$, $p < .001$), which continued not to differ from one another ($p = .999$).

Thus, results overall do not lend support to H_3 , as all layers grew uniformly between the pre-move (T0) and the first post-move (T1) assessments. These results partly replicate those observed in Study 1, except layer 1 (whose size remained constant).

2.5.4 Step 4: In it for the long-haul – the ego network's composition post-transition

I next conducted a multiple regression to identify which baseline ego network parameters (BEN) predicted the proportion of original ego network members maintained post-transition (i.e., before participants started their last term in their second year at university). This analysis included the following five predictors: quantity (i.e., number of members), quality (i.e., perceived emotional closeness to members), face-to-face (F2F) contact (i.e., the proportion of members with whom in-person contact was maintained), and proximity (i.e., the proportion of members living in the same city), as well as cohort popularity (i.e., the number of college cohort members who listed the ego as a friend). The descriptive statistics for each predictor and their individual impact on the outcome measure (i.e., the proportion of baseline ego network members maintained post-transition) were computed, as summarised in Table 2.4.

Table 2.4 Summary of individual linear regression models of predictors of relationship maintenance post-transition

Predictor	<i>M (SD)</i>	<i>p</i>	<i>b (SE)</i>	β
Quantity BEN	27.63 (9.10)	.001	0.01 (0.00)	.42
Quality BEN	6.53 (1.05)	.744	-0.01 (0.01)	-.04
F2F Contact BEN	0.90 (0.12)	.201	0.16 (0.13)	.15
Proximity BEN	0.42 (0.26)	.995	0.00 (0.06)	-.00
Cohort Popularity	16.24 (10.43)	.296	-0.00 (0.00)	-.12

Note. BEN denotes baseline ego network.

Regression using the enter method showed that baseline ego network (BEN) parameters Quantity, Quality, F2F Contact, and Proximity, as well as Cohort Popularity jointly explain a significant amount of the variance (21%) in the proportion of baseline ego network members maintained at the end of participants' time as undergraduate students ($F_{(5, 74)} = 4.03, p = .003, R^2 = .21, R^2_{Adjusted} = .16$). As indicated by examining the impact of each individual predictor, only Quantity BEN (i.e., the number of ego network members at baseline, $p < .001$) significantly explained the outcome. This was also the only predictor ($p < .001$) left in the final model when a backwards elimination regression was run instead, resulting in the following simple regression equation:

$$\text{Predicted Proportion of BEN Post-Transition} = 0.30 + 0.01(\text{Quantity BEN})$$

Relating results to hypotheses, H_4 stated that post-transition, a higher proportion of original members will be maintained for those with 1) larger, 2) emotionally closer baseline ego networks, featuring 3) lower levels of baseline face-to-face contact, and 4)

fewer members living in the student's hometown, and for those 5) less popular in their new social environment (i.e., the college cohort). Findings hence hardly support H_4 , as only one of the five proposed predictors made a significant contribution to explaining the proportion of BEN members maintained. This was the case when these were considered individually, as well as when predictors were considered jointly in both a simultaneous entry and a backwards elimination regression model.

2.6 General Discussion

I now turn to an integrated discussion of the results of both studies. I evaluate support for the tested hypotheses and consider findings in the light of past research. I then acknowledge some limitations of the research, as well as their possible implications for further research and plausible applications within the higher education context and beyond.

2.6.1 Linking results to hypotheses & other research

This chapter set out to establish how ego networks adapt during the transition from home and school to university. It explored four different aspects of ego networks (i.e., overall size and structure, complementary characteristics, individual layers, and the contributions of specific parameters to post-transition composition), which were translated into four tested hypotheses.

In line with H_1 , both studies showed overall increases in network quantity (or size), which stemmed from a greater influx of new members in relation to the loss of pre-existing relationships. This prediction was based on the meta-analysis by Wrzus and colleagues (2013), which highlighted the developmental aspect of ego network growth

in early adulthood. It appears that the studies presented here might have captured the most important phase of this growth period, taking place immediately upon entering the novel environment (i.e., during students' first term at university, when the majority of new members entered the network in both studies). Results also clarified that any losses in baseline relationships had been more than compensated with new additions, as students typically did not at any time have a network comprised of fewer network members than before the transition but consistently one with overall more members. Small, Pamphile and McMahan (2015) refer to this outcome "in the evolution of the ego's network" (p. 92). as 'transformation' (i.e., an overall increase in size featuring replacement of individual members). Results furthermore echoed previous findings attesting more robustness to relationships with family members than to others, as hardly any losses were observed in either study with regards to this relationship type (Roberts & Dunbar, 2011a).

There was partial support for H_2 , which stated that the ego network characteristics beyond size (i.e., emotional closeness, physical proximity, contact frequency and type) would remain unaffected by the transition. This was mostly the case for the latter three characteristics, in line with past research attesting mostly stable social structures over time (e.g., Fournet & Barrat, 2014; Saramäki et al., 2014; Sekara, Stopczynski, & Lehmann, 2016). There were a few exceptions. With regards to physical proximity, participants of both studies reported a significantly lower proportion of ego network members with whom they shared the same house post-move (which included members living in *the same room/corridor/staircase* to explicitly allow new friends from college to fit this category). With regards to contact frequency, the design of Study 2 (which, unlike

Study 1, did not feature an assessment at T3) did not allow me to observe whether reported decreases in higher frequency contact were temporary (as they appeared to be in Study 1). Moreover, lower frequency contact appeared to decrease in Study 1 but increase in Study 2. With regards to contact type, results of both studies were mainly in line with expectations, except for decreases in verbal contact in Study 2, which might be negligible as those too may have recovered in time (and simply were not captured due to no assessment taking place at T3). Based on the developments of emotional closeness ratings alone, H_2 would appear to have been rejected, however, as participants of both studies reported decreases post-move. Relating these overall decreases to the individual layer analyses addressing H_3 might qualify this finding, however, as explained further below.

Similar research looking at network stability during the transition to (graduate) studies initially predicted overall stasis for the first six to twelve months (Small et al., 2015). Instead, it similarly found that some network parameters changed rapidly. The research by Small and colleagues (2015) focused, however, on core discussion networks with an average of just five members, which could be mistaken for the equivalent of layer 1 but was highlighted as being distinct from the most intimate relationships elsewhere (Small, 2013). Despite this diverging focus, the acknowledgement that contextual changes (i.e., entering an institution of higher education) affected network characteristics more than anticipated echoes some of the results of the present research, showcasing some changes in overall network characteristics (i.e., fewer network members sharing a home with the ego and at least temporary decreases in contact frequency). Recent research on ego network developments in the absence of any transition (or other life event)

further found that even without any contextual changes, network characteristics such as emotional closeness, contact type, and contact frequency can fluctuate and affect ego network size, composition, and overall maintenance (Marin & Hampton, 2019).

With regards to H_3 , support for a differentiation between size developments for inner and outer layers was mainly absent. With the exception of layer 1 in Study 1 (which remained constant in size), all layers in all studies increased significantly between the baseline (T0) and the first assessment after the move (T1). This uniform increase was due to the influx of new members within participants' first term at university, which occurred at every layer. At first glance, these results seem to oppose expectations rooted in social convoy theory (Antonucci & Akiyama, 1987), which would have predicted core members to remain fairly constant over time, translating into stable inner layer sizes and little turnover. However, results might be more easily explained when additionally consulting socioemotional selectivity theory (Carstensen et al., 1999), which proposes a focus on diverse information exchange as a main motivation for maintaining many relationships in early adulthood. The literature generally attests positive associations between relationship quantity and beneficial information exchange but usually attributes these more to an ego network's outer layers (Granovetter, 1977). The inner layers are instead commonly seen to function as sources of more stable and focused social support (Sutcliffe et al., 2012). Participants had just entered adulthood (with a mean age of 18 in both studies). At this age, they were perhaps overall most strongly motivated to pursue a social strategy aimed at maximising opportunities for exchange with as many others as feasible, and at all levels of emotional closeness.

Finally, results only partially support H_4 . This last hypothesis concerned prediction of the proportion of original ego network members with whom participants would still maintain active relationships post-transition, by means of five network parameters (baseline network quantity, quality, levels of face-to-face contact and proximity, as well as popularity/reception within the new social environment). In Study 1, more than half of the proposed network parameters (three out of five) could meaningfully predict the proportion of baseline ego network members who had been maintained post-transition (i.e., just before participants had finished their final year at university). In Study 2, however, this was the case for only one parameter. The size of ego networks pre-move was the only predictor positively associated with the outcome in both studies. This finding indicates that those entering university with more pre-existing relationships were more likely to maintain a larger proportion of these network members throughout the transition.

There are three possible explanations. Participants with larger baseline networks might have simply added fewer new relationships, so that the proportion of original members remained high. Alternatively, adding new relationships might have affected overall proportions of original members less when many had been listed initially (e.g., adding 20 new friendships to a pre-existing network of 70 will result in a higher proportion of maintained baseline members – 0.78 – than adding these same 20 friends to a pre-existing network of only 30 members – 0.60). Finally, participants with larger baseline ego networks might have been used to maintaining more relationships simultaneously, and hence found it easier to prevent these existing friendships from decaying. Extraverts, for instance, tend to have larger ego networks (Pollet et al., 2011). However,

including extraversion as a covariate (recorded for analyses relevant to Chapter 3 and detailed there) did not affect results. These three explanations are not mutually exclusive and may have jointly contributed to this repeated finding.

The literature on factors predicting relationship maintenance is sparse outside of the context of romantic relationships (e.g., Stafford, Dainton, & Haas, 2000). I had chosen the face-to-face contact and physical proximity predictors based on Roberts and Dunbar's (2011a) focus on relationship maintenance and their observation that less time spent together equated to relationship decay. Study 1 of the present research found that the proportion of ego network members living in the same city pre-transition negatively affected the proportion of these baseline members still part of the network post-transition. The finding that an increased distance to previously close friends resulted in fewer of these friendships being maintained hence echoes that of Roberts and Dunbar (2011a). Other research which sought to predict friendship stability for adolescents (Bowker, 2004) and university students (Weisz & Wood, 2005) further echoed the perhaps somewhat surprising result that relationship quality did not appear to meaningfully influence whether friendships persisted in either study. Similarly, previous studies had also noted that distance between ego and network member (and hence the likely absence of face-to-face contact) did not play a major role in relationship persistence (Miczo, 2016; Oswald & Clark, 2003).

In terms of ego network composition changes, results of the studies diverged somewhat, though the minor discrepancy appears to be explained by the marginally altered study design. In Study 1, participants overall listed fewer family members than they listed both

friends from home and from university. In Study 2, participants instead listed fewer family members and fewer friends from home than they did friends at university. This shift towards lower numbers of friends from home was likely due to a deliberate modification of the questionnaire. The initial prompt in Study 1 asked participants to list all friends with whom they had been in contact within an entire year and provided the option of listing up to 85 friendships. This prompt may have encouraged participants to list low contact frequency, peripheral friendships that were doomed to decay, with or without the additional strain imposed by the transition to university (see e.g., Roberts & Dunbar, 2015). Moreover, participants might have succumbed to demand characteristics, giving in to the perceived pressure to fill out as many available slots as possible, thus listing 'friendships' that may not have qualified as such under different conditions (Orne, 1962). In addition, they might have simply been motivated to present themselves as having many friends. Hence, the prompt in Study 2 only asked for friends with whom last contact had occurred no longer than one month ago and provided only 20 slots. Whether the 16 participants (20%) who had indicated they would have had on average ten friends to add would have affected results is unclear. Future replications could hence be improved by either providing more options straight away or by allowing those who indicated the wish to specify these additional relationships, hence avoiding eliciting incomplete ego networks at baseline.

Study 2 also featured one fewer assessment during the transition than Study 1 did. This difference was not expected to affect findings but might have resulted in some developments seen in Study 1 no longer being observed. It is unclear, for instance, whether discrepancies in the developments of contact frequency and type would have

persisted if a fourth assessment had occurred in Study 2, since some temporary fluctuations had returned to baseline by then in Study 1. The design differences in timing were mainly a necessity, to complete the work within the time constraints of a doctoral dissertation and to respond to college authorities' request to reduce the demands made on student participants' time, and future research might hence prioritise obtaining equivalent timespans.

Integrating insights from the separate analyses can furthermore address potential limitations arising from considering each section in isolation. While overall emotional closeness did not appear to remain stable across time in either study, for instance, this result could be further differentiated by incorporating complementary results. Less ego network growth was generally observed in the innermost (emotionally closest) layers than in the outer (less emotionally close) ones. While emotional closeness ratings as a whole declined, this decline might hence not necessarily reflect an overall reduction in perceived closeness. Instead, participants might simply have gained more casual friends than they had at baseline (without necessarily incurring losses in closeness to core network members). This development could have skewed the mean in a somewhat misleading manner. An alternative way to examine changes in emotional closeness could therefore entail an approach similar to that followed with regards to the other global ego network characteristics, namely looking at the changes in the proportion of network members at various closeness levels. This approach has the advantage of not being influenced by overall changes in network quantity but poses some additional challenges, such as establishing sensible groupings of categories. It is therefore important to consider how individual analyses and their results might relate to one

another to obtain a fuller, more detailed grasp of the ego network changes prompted by the transition to university.

2.6.2 Limitations, Implications & Applications

While the dependencies on the Oxford context might impact the generalisability of results, the present research leads to some noteworthy implications and a few potential applications, facilitating young adults' transition to university.

The potential limitation is based on the studies relying on two samples of students attending the University of Oxford. While often considered the bane of psychological research (Sears, 1986), using an undergraduate population was essential to answering the research question. Nonetheless, observing the ego network changes of students at the University of Oxford might make results somewhat specific to the Oxbridge context. The college system offers a fairly unique educational experience, as students live, learn, and 'play' together as one bounded group (Tapper & Palfreyman, 2002). The small group tutorial system further provides ample opportunities for concentrated contact with the same few individuals, hence fostering an environment where new friendships might be more easily formed than they are during the average undergraduate student's experience.

Propinquity (close proximity) and homophily (alikehood) are two of the strongest determinants in forming new relationships (Godley, 2008), and are focused on in Chapter 3, investigating how we integrate into a new social group. The Oxford students making up the participants of the present research might be in closer proximity and more alike than groups of other, perhaps more representative undergraduate student

samples (e.g., Donnelly, 2016; Mccrum, 1998; Watts, 2009). It is therefore difficult to ascertain whether the influx of new members into participants' ego networks would have occurred as rapidly and with seemingly as much ease for students transitioning into life at other institutions of higher education. Future work should hence aim to replicate the effects established in this chapter across a wider range of universities, one ideally spanning institutions beyond the UK, to obtain an even more thorough understanding of the transition to university's effects on students' ego networks generally.

Despite the potential constraints in drawing conclusions from the present research that are generalisable to all young adults facing this first major transition, results have some implications and potential applications worth noting. For one, most ego network change seemed to occur within students' first term at university. Understanding how rapidly some old relationships appear to be cast away while even more new friendships are formed is helpful in pinpointing the period of the transition during which students might be most actively engaged with their ego network's development and hence also potentially most vulnerable to being torn between opposing pressures of fitting into their new social world while not falling out of their old one. That being said, the perceived trade-off between those two seems somewhat unwarranted, given that ego networks generally increased across both studies and all layers.

An implication might be a shift in young adults' perspective. Instead of young people during this period necessarily having to take a firm stance for either preserving relationships or flinging oneself into the unknown, one can embrace the opportunities

for forming new friendships while simultaneously being capable of sharing these experiences with pre-existing friends and family back home. More pragmatically, colleges, universities generally, and even organisations with predominantly young members as such, can become more mindful of the importance of those first few weeks within a new setting. Providing ample opportunities for contact for new additions to a social group, while perhaps even encouraging young people to share their new experience with supportive friends and family (understanding that doing so will likely not harm or pose a threat to the integration process), organisations can facilitate their new members' transition in easy, yet impactful ways.

3 INTEGRATING INTO A COMMUNITY:

Cohort Network Dynamics

Moving away from home to attend university marks the first major life transition for many. Baumeister and Leary's (1995) 'need to belong' is particularly pronounced upon entering such an unfamiliar environment. There is an urgency to bond with others, preferably those with whom we have things in common (McPherson et al., 2001). I have followed two Oxford College cohorts ($n_1 = 90$ & $n_2 = 81$) facing this transition. Their longitudinal network data allowed me to explore how friendships shape the overall structure of an emerging community and what homophily factors influence which former strangers become friends. Using cohort network analyses, I investigated the initial, short-term, and longer-term impact of a broad range of similarity sources (i.e., homophily in demographics, personality characteristics, social identities, mental health & network characteristics) on friendship choice. Results revealed that homophily-driven self-segregation occurred swiftly (within one term for 10/16 and 9/16 of the considered characteristics in cohorts 1 and 2, respectively). There was little change once the initial cohort networks had been established. A need for further work homing in on these rapid, early-stage social developments is discussed alongside potential applications facilitating diverse social bonding at higher education institutions and similar settings where strangers come together to quickly form a new community.

3.1 Introduction – From Strangers to Community

Entering a new social environment, as is the case for incoming university students, offers an opportunity to form new social connections, and additionally introduces a certain urgency with which this social affiliation process unfolds (Stillman & Baumeister, 2009). This chapter focuses on the research question: How do we integrate into a new social group?

Aristotle (350 BC; as cited in Rackham, 1934) declared that people generally “love those who are like themselves” (p. 1371) and the homophily principle attests that alikeness fosters connection (McPherson et al., 2001). It is well-documented, applies across ages, settings, and relationship types, and relates to a variety of factors, ranging from sociodemographic, over personality, social identities, and mental health to network characteristics. Proximity facilitates similar people befriending one another, and many settings (neighbourhoods, organisations, schools, etc.) are inherently homogeneous. Yet, such communities often display homophily above and beyond what would be already expected given their composition.

I hence investigate the cohort network developments of two self-bounded student groups, to specify what sources of similarity shape the emerging friendship patterns of strangers turning into a community. I begin by outlining the main theories underpinning this research (i.e., the need to belong and the homophily principle). I then briefly summarise the existing literature on the topic and address its main limitations (lack of longitudinal designs, few social network analyses, and rare attempts to examine

homophily influences comprehensively). Finally, I lay out my approach to answering the research question.

3.1.1 Theoretical Background

3.1.1.1 Belonging in Times of Need

The need to belong (Baumeister & Leary, 1995) refers to the idea that establishing and maintaining supportive social relationships is one of our most fundamental drives. Maslow's (1943) hierarchy of needs similarly proposed that humans possess a strong motivation to seek 'love and belongingness'. The importance of achieving this goal is ranked immediately above the most basic needs (physiological and safety). Without it being satisfied, higher order aspirations towards esteem and self-actualisation cannot be tackled. Moreover, feeling socially excluded triggers strong, immediate negative reactions and can have long-term negative effects (Gere & Macdonald, 2010). For this need to be met, interactions have to be recurrent and generally pleasant. Furthermore, they ought to occur in a "temporally stable and enduring framework of affective concern for each other's welfare" (Baumeister & Leary, 1995, p. 497). Having frequent interactions with caring others in a mostly stable context is therefore vital to effectively navigating life in general, and is especially necessary during demanding periods, such as the transition from home to university.

The transition to university typically involves entering a new environment (Hechanova-Alampay et al., 2002; Tran, 2016). Moving can pose challenges, since stable, caring relationships that likely already exist (such as with family or long-standing friends) might no longer be accessible as frequently and reliably as required. Meanwhile, first tentative relationships with potential new candidates for regular interactions in close proximity

might be initially neither particularly stable nor caring. Stillman and Baumeister (2009) describe such periods of uncertainty as an acute belongingness threat. The need to belong might hence be especially pronounced when entering a new environment. The many additional uncertainties surrounding the start of a new life phase aside, we might feel uncertain about whether our new social environment will be accepting or rejecting of us, whether we'll 'fit in'. The resulting stress likely increases the urgency to bond, prompting the rapid formation of relationships with others in a similar situation.

Several mechanisms have been proposed to illustrate this increased tendency to seek social affiliation when stressed. Approaching the relationship from a biobehavioural perspective, Taylor (2006) offered a model of affiliative responses to stress. It proposes that gaps in positive social relationships trigger the oxytocin system (among others) and are addressed through increased affiliative efforts. If positive social contact results, a reduction in stress follows. If negative social contact results instead, existing stress levels are only exacerbated. Within social psychology, Schachter (1959) similarly linked heightened anxiety levels with intensified affiliation seeking, showing that the mere presence of others has soothing effects. He proposed an emotional comparison theory (based on the social comparison theory, see Festinger, 1954) postulating that those facing novel situations of high stress prefer to affiliate with others in the same situation. This connection between experiencing challenging periods and increasing one's efforts to form friendships with those in the same boat hence suggests that initial strangers entering university together (i.e., a phase of uncertainty), are likely to quickly self-organise into a connected community.

3.1.1.2 Similarity shapes social structures

Having a potentially stressful transition in common thus makes fellow university first-year students (or freshers, as they are called in the UK) particularly attractive as friends. Within that pool, similarity is one of the strongest predictors of which relationships develop. This tendency to preferably connect with similar others has been termed homophily by Lazarsfeld and Merton (1954). In their landmark review, McPherson and colleagues (2001) confirmed homophily as one of the most powerful principles governing friendship formation. Similarities can be based on sociodemographic, psychological, or behavioural characteristics, as well as on attitudes and abilities. The influence of this broad range of homophily factors has been observed across all types of relationships (with kin, friends, co-workers, and romantic partners) and throughout the life course. Nevertheless, homophily effects are especially relevant for young adults, as they find themselves navigating the turbulent period in life where they become most actively “engaged in the selection and formation of their own contexts” (Kandel et al., 1990, p. 221).

The strongest and most consistent homophily factors identified in McPherson and colleagues’ (2001) review were sociodemographic: ethnicity, gender, age, religion, and education. Homophily in occupation, social network, behaviours and intrapersonal values was also reported but appeared more difficult to disentangle from the more salient sociodemographic factors. Moreover, there is evidence for homophily with regards to personality characteristics (e.g., Selfhout et al., 2010) and mental health (e.g. Schaefer, Kornienko, & Fox, 2011). Similarities can hence be more immediately obvious (e.g., sharing the same ethnicity or gender) or more subtle (e.g., sharing an extraverted

personality or political identity). Reagans (2011) referred to homophily effects on friendship selection of the more obvious type as 'surface' and of the more subtle as 'deep' homophily. He furthermore noted that a shared characteristic's salience influences its impact in a given situation. Two Germans meeting abroad might attribute considerably more significance to their shared nationality than if they bumped into one another in Germany (unless, perhaps, in Munich during Oktoberfest).

Whether salient or more understated, homophily with regards to a range of characteristics has been shown to affect friendship choice and informs how individuals assemble into groups. Close proximity, or propinquity, enables such interactions to take place in the first place. It allows emerging networks to develop quickly by providing ample opportunities for contact. Network members then intuitively orient towards similarity, whereby alike individuals mingle more frequently within the options of nearby interaction partners than would be expected by chance. This process leads to the formation of homogenous sub-groups within a larger community (Marsden, 1988). A shared geographic location therefore facilitates homophily effects, as least effort is involved in connecting with a similar other who is readily available (Zipf, 1949).

In the rapidly evolving era of the internet, it might no longer appear necessary to share a physical space for relationships to develop. However, 'offline' spatial proximity has recently been shown to still play a major part in determining which people connect in the virtual space (Huang, Shen, & Contractor, 2013). Moreover, face-to-face communication remains "the dominant mode of interaction" (Baym et al., 2004, p. 299) for most university students. Selecting likeminded friends within a larger pool of options

is hence easiest within a new group that offers frequent occasions to interact, as is the case for a student cohort of an Oxford College.

Similar people also tend to be drawn to similar places (Verbrugge, 1977). Many communities thus consist of alike individuals: neighbourhoods are often segregated along ethnic lines (e.g., Blumenstock, Toomet, Ahas, & Saluveer, 2014; Farley, Steeh, Krysan, Jackson, & Reeves, 1994), organisations have been shown to be homogeneous with regards to personality (King et al., 2017), and schools often cluster students according to levels of attainment (Ekstrom, 1961). In the education system generally, and within higher education specifically, stratification along sociodemographic characteristics is also pervasive (Shavit et al., 2007). While outreach efforts to widen access to higher institutions are increasing, attending university still remains most easily achieved for a socioeconomically privileged subset of society (Scull & Cuthill, 2010). Students at one of the University of Oxford's colleges hence likely already have more in common than their age and a thirst for knowledge. One therefore has to differentiate between existing baseline homogeneity (based on the mere composition of the group under study) and actual homophily (effects beyond the inherent opportunities to bond with similar others; McPherson et al., 2001).

3.1.2 Investigating homophily shaping cohort network dynamics

While we already know many things in this field of research, some things remain unanswered. When investigating how homophily shapes the formation and development of a new community, such as a college cohort, the following three elements are central: taking a longitudinal approach, analysing an entire network, and

focusing on friendship selection with regards to a broad range of possible sources of homophily. Research incorporating these elements is still sparse, however.

3.1.2.1 Investigating homophily longitudinally

Friendships are generally not static entities (Blieszner & Adams, 1992). This instability is exacerbated during school transitions (Hafen et al., 2011). Observing changes in friendship patterns over time recognises this inherent flexibility in human relationships and is especially relevant for studying a group coming together for the first time. Furthermore, when former strangers become friends, similarity might be continuously reappraised. While 'surface' similarity may be the most salient initially, 'deep' similarity might emerge as people get to know one another over time (Reagans, 2011). Hwang, Singh and Argote (2012) provide an example of originally influential surface-level homophily fading in favour of more deep-level homophily in their paper on knowledge transfer between colleagues within an organisation. A longitudinal approach is hence essential to investigating how homophily affects friendship dynamics.

In addition to tracing changes in the relative strength of specific homophily effects, longitudinal studies allow the researcher to determine whether homophily generally plays a more active role at specific times during a community's development. McPherson and colleagues (2001) asserted that the influence of homophily generally increases over time. Conversely, Godley (2008) presented evidence of homophily effects generally fading over time, as university students formed friendships founded primarily on similarity in their first year, but then reported friendships mostly based on mere proximity in the three years that followed. It therefore remains unclear when homophily effects are most pronounced during the transition to university. Studying the effects of

homophily on friendship selection longitudinally is necessary in either case, as one cannot simply assume that effects observed at one time point are representative of other stages of the affiliation process.

Addressing the lack of longitudinal research was thus a main suggestion in McPherson and colleagues' (2001) review. Cross-sectional designs only examine a static snapshot and fail to capture friendship dynamics. Traditionally, the majority of the few studies investigating friendships longitudinally focused on friendships among children (e.g., Graham, Cohen, Zbikowski, & Secrist, 1998) or measured changes in friendship intensity, rather than friendship selection itself (e.g., Hays, 1985). Since the review, more longitudinal explorations into how homophily influences friendship selection have been undertaken. However, most continue to concentrate on childhood or early adolescence. A study by Hafen and colleagues (2011), for instance, showed that stable friends among Swedish youth were more similar with regards to delinquency, intoxication frequency, achievement motivation, and self-esteem than unstable friends. There therefore remains a gap in the literature when it comes to investigating homophily in adult friendships longitudinally.

3.1.2.2 Investigating homophily in a network

A social network approach to investigating homophily addresses some of the limitations of self-report and acknowledges individuals' embeddedness within a larger social structure, accounting for the data's interdependence and existing structural effects on friendship choice.

Homophily in friendships has been primarily investigated by relying on self-report, which is prone to biases (Marsden, 1990). In such studies, participants are asked to list one or

more meaningful relationships alongside further information (specifying duration, shared characteristics, intensity, etc.). By solely considering individuals' own accounts of friendships, however, one fails to address possible biases, such as the social desirability response bias (Phillips & Clancy, 1972) or demand characteristics (Orne, 1962). Denying socially undesirable characteristics (for example an avoidance of ethnically different friends) or trying to fulfil the researcher's alleged expectations (for instance by listing as many friends as a questionnaire allows) can distort a dataset.

Furthermore, participants might inadvertently supply inaccurate information about their listed friends' characteristics and attitudes. They might subjectively consider their friends to be more similar to themselves (i.e., projection) than they actually appear to be, for instance with regards to their personality characteristics or political identity. Research relying exclusively on self-report might thus obtain biased and possibly inaccurate information not only about the participants themselves but also about their nominated friends (Feld & Carter, 2002).

Self-report on its own moreover ignores the wider social structure individuals are embedded in. Any social relationship inherently involves more than one person. Yet, the social support literature has long remained individual focused (Felton & Shinn, 1992). While this chapter's research addresses how individuals integrate into a new social environment, these individuals form dyads with others, who are in turn connected to further members of the same student cohort community. A social network approach acknowledges that dyadic relationships seldomly occur in isolation, and formally recognises the inherent interdependency of individuals' relationships within a group (Laursen et al., 2011).

Individual responses from such a bounded community can hence contribute to generating a network that relies on many different sources of information. Relationship reciprocity can be verified and there is no need for participants to provide additional information about their listed friends' characteristics, as these friends also participated and can therefore provide the sought-after information directly. Social network analysis therefore addresses some limitations inherent in self-report data, such as possible biases or providing incorrect information due to a lack of knowledge (Wölfer et al., 2015).

While the increasing use of social network analyses rapidly helps advance our understanding of friendship formation processes, such longitudinal works often emphasise socialisation effects (becoming more similar to our friends over time, mostly in behaviour) over selection effects (choosing friends based on existing, stable similarities). This emphasis makes sense for studies focusing on peer pressure on highly susceptible adolescents, for instance. Most studies employing state of the art network analyses (i.e., Simulation Investigation for Empirical Network Analyses, SIENA – employed in this chapter) might therefore excessively focus on undesirable socialisation effects in early adolescents, such as alcohol consumption (e.g., Huang, Soto, Fujimoto, & Valente, 2014), smoking (e.g., Mercken, Steglich, Sinclair, & Holliday, 2012), or delinquency (e.g., Weerman, 2011). This narrow focus on the influence of friends on behaviour might, however, not reflect more common issues in adulthood where peer pressure might become less of an issue but where there is instead ample evidence of the negative consequences of social self-segregation according to characteristics one has little autonomy over (e.g., Phillips, 2006). There therefore remains a gap in the

literature when it comes to longitudinally investigating adult friendship selection processes in a new group.

3.1.2.3 Investigating homophily comprehensively

Most network studies investigating homophily in friendships only include few similarity measures in their models. These are usually centred on just one homophily type. Shin and Ryan (2014), for instance, focused solely on 6th graders' academic performance and examined homophily in academic motivation, engagement, and achievement. Block and Grund (2014) were among the first to address this issue formally, urging other researchers to appreciate people's multidimensionality. Including a "multitude of sociologically relevant dimensions" (Block & Grund, 2014, p. 189) allows controlling for individual homophily effects within one model. This approach can prevent erroneously claiming homophily in ethnicity, for instance, when it might be gender that actually drove friendship formation. To explore which sources of homophily best explain both the initial formation and then maintenance of friendships in the cohort, it is hence crucial "to measure homophily simultaneously on multiple characteristics" (McPherson et al., 2001, p. 418).

3.1.3 The present research

These gaps in the literature motivated the present research, which followed a longitudinal, cohort network approach that comprehensively assessed how homophily shapes an emerging community of initial strangers. It addressed the following research question: How do we integrate into a new social group? To answer it, I conducted two studies, each following the development of an emerging network comprised of incoming students of an Oxford college. Using online questionnaires, I recorded these students' cohort friendships multiple times during their first year, and once more towards the end

of their time at university, alongside a comprehensive inventory of sixteen possible sources of homophily. These included the following types of homophily that had been identified as influencing friendships in the literature: demographics (i.e., gender, ethnicity, educational background), personality traits (i.e., openness, conscientiousness, extraversion, agreeableness, neuroticism), social attitudes (i.e., political identity and religiosity), mental health (i.e., depression and anxiety), and network parameters (i.e., cohort popularity [the number of friendship nominations received] and cohort activity [the number of nominated friends], as well as the quality and quantity of social relationships outside of the cohort).

This design enables consideration of a range of homophily factors in one model, incorporating the network's structure itself, and observing changes longitudinally (differentiating between immediate, short-term and longer-term homophily effects). In this way, I can distinguish between what happens in the first phase, when strangers are thrown into an unfamiliar environment and encouraged to bond and what happens over time, when strangers have become friends within a group. An incoming cohort of an Oxford College provides a suitable setting, as network boundaries are clear, and all previously unconnected students become members of a self-bounded group simultaneously.

3.1.3.1 Hypotheses

As established above, people in unfamiliar environments tend to bond quickly with similar others in close proximity (e.g., Berg & Clark, 1986; Hays, 1985; McPherson et al., 2001). Combined with the insights from work on the evolution of student friendship

networks (e.g., van de Bunt et al., 1999; Zeggelink, 1993), my main predictions can be formalised and grouped according to two overarching themes.

H₁ – Structural Cohort Network Development:

The cohort network is overall expected to 1) quickly form a fairly densely connected network with 2) few isolates (members unconnected to the network due to either not nominating any friends or not being nominated oneself) and 3) relatively high reciprocity (mutual friendships). Made up of members of equal status, the cohort network is further expected to 4) be characterised by a flat hierarchy, though 5) some variation in popularity is likely.

H₂ – Homophily Effects:

With regards to demographics, cohort members will show a tendency to befriend others of the same 1) gender, 2) ethnicity, and 3) educational background. With regards to personality traits, cohort members will show a tendency to befriend others who score similarly to themselves on 1) openness, 2) conscientiousness 3) extraversion 4) agreeableness, and 5) neuroticism. Regarding social identities, cohort members will show a tendency to befriend others with similar 1) political and 2) religious identities to themselves. In relation to mental health, cohort members will show a tendency to befriend others who score similarly to themselves on 1) depression and 2) anxiety. Lastly, when considering network parameters, cohort members will show a tendency to befriend others who are similar to themselves with regards to their 1) popularity in the cohort, 2) activity in the cohort, 3) quantity of social relationships before becoming cohort members, and 4) quality of these relationships.

3.2 Methods

3.2.1 Design

I conducted two studies (Study 1 & Study 2) using a longitudinal cohort network design, which involved following the development of consecutive student cohorts of an Oxford College. Filling out online questionnaires several times during their first year, and once more at a later stage during their time at university, participants listed friends within their respective freshers' college cohorts. These data allowed mapping and analysing the friendship networks of each self-contained group across time. Participants also provided demographic information, filled out a brief personality scale, reported on their mental health, and indicated their political identity in the first questionnaire. Of this information, only the mental health assessments were repeated in subsequent questionnaires to incorporate potential fluctuations. The other characteristics were assumed to be time invariant for the considered timespan. Alongside four network parameters, these data served as the homophily variables under investigation, amounting to a range of fifteen possible sources of homophily.

Study 1 comprised three assessments in the students' first year (spanning six months in total), and a fourth assessment towards the end of participants' time in college (2.5 years after initial contact, to examine longer-term cohort network developments). Study 2 was timed slightly differently and comprised only two assessments in the students' first year (spanning a total of three months), and a third roughly half-way through participants' time in college (1.5 years after initial contact). The three main reasons for these timing differences have already been explained in Chapter 2. The number and placement of the studies' assessments are depicted in Figure 3.1.



Figure 3.1 Overview of the studies' design: T1 & 2 are directly comparable between studies. In Study 1, T3 took place three months later while T4 took place 2.5 years after initial contact (T0, not analysed in this chapter); in Study 2, T3 instead occurred 1.5 years after T0 (not analysed in this chapter).

3.2.2 Participants

As detailed in Chapter 2, 90 of 121 (74%) incoming students agreed to participate in Study 1. All contributed to all assessments across the first year of the study (100%) and 80 (89%) still contributed during the final assessment (2.5 years after contact was first initiated). In Study 2, 84 of the 118 (71%) incoming students of the consecutive cohort agreed to participate. Two students dropped out and one passed away after initial contact, resulting in an overall retention rate 81 participants (96%) across assessments.

3.2.3 Materials

Both Study 1 and 2 used one extensive online questionnaire per assessment, each made up of several sections. Only the sections relevant to answering the research question of this chapter – How do we integrate into a new social group? – are detailed here. The complete questionnaires can be found in Appendices A & B.

The questionnaires asked participants to nominate their fellow cohort friends at each assessment. The following sections were only included once (except the mental health assessments, which were also repeated at every assessment):

3.2.3.1 Demographic Information – gender, ethnicity & educational background

Participants were asked to supply their age, gender, ethnicity, nationality, and educational background (i.e., whether they had attended a private or a state school). With the exception of age (as virtually all participants across both studies were the same age, i.e., 18), and nationality (as the overwhelming majority was British, i.e., 89% in Study 1 and 88% in Study 2), these characteristics were assessed as possible demographic homophily sources. Responses to these items are generally assumed to be stable over time (at least for the relatively short time spans considered). They were therefore collected only once.

3.2.3.2 Personality Traits – the big five

Participants were asked to fill out a condensed version of the International Personality Item Pool (Goldberg, 1999). The Mini-IPIP uses only 20 items (i.e., four per personality trait; Donnellan, Oswald, Baird, & Lucas, 2006) and was chosen for its brevity. It uses a 5-point scale ranging from *very inaccurate* (1) to *very accurate* (5) and has been shown to yield reliable results (Baldasaro et al., 2013). The five traits, namely agreeableness ($\alpha = 0.78$ in Study 1 and $\alpha = 0.76$ in Study 2), conscientiousness ($\alpha = 0.57$ in Study 1 and $\alpha = 0.66$ in Study 2), extraversion ($\alpha = 0.83$ in Study 1 and $\alpha = 0.76$ in Study 2), neuroticism ($\alpha = 0.74$ in Study 1 and $\alpha = 0.72$ in Study 2), and openness ($\alpha = 0.73$ in Study 1 and $\alpha = 0.79$ in Study 2), were assessed as possible sources of homophily based on personality.

Personality traits are also assumed to remain fairly stable at this age (McCrae & Costa, 2003) and were hence also only assessed once.

3.2.3.3 *Social Identities - political identity & religiosity*

Participants were asked to complete the following two statements to assess their political identity: “I favour political values that are ...” and “I am politically ...”. Response options were given on a 7-point scale ranging from *strongly socialist* (-3) to *strongly conservative* (3) and *far left of centre* (-3) to *far right of centre* (3), respectively. Participants were also asked for their religion. In the first social network (Study 1), 50 students were not religious, 30 were Christian and ten reported being members of a different faith (Buddhist = 1, Hindu = 1, Muslim = 4, Sikh = 2, Other = 2). In the second social network (Study 2), 47 students were not religious, 23 were Christian and eleven reported being members of a different faith (Buddhist = 2, Hindu = 4, Muslim = 2, Sikh = 1, Other = 2). Given these small numbers in all religious subcategories except Christianity, participants were grouped as either religious or non-religious, as general religion homophily effects had been previously found (e.g., French, Purwono, & Rodkin, 2012). Both social identities were assessed once.

3.2.3.4 *Mental Health – depression & anxiety*

Participants were asked to fill out the Patient Health Questionnaire (PHQ)-9 made up of nine items ($\alpha = 0.83$ in Study 1 and $\alpha = 0.79$ in Study 2; Kroenke & Spitzer, 2002) and the General Anxiety Disorder (GAD)-7 made up of seven items ($\alpha = 0.79$ in Study 1 and $\alpha = 0.82$ in Study 2; Spitzer et al., 2006) in every questionnaire. Response options for both were given on a 4-point scale ranging from *not at all* (0) to *nearly every day* (3). These measures were used to assess depression and generalised anxiety disorder, respectively. Depression is the most prevalent mental illness in this age group (Kessler

et al., 2003; Kessler & Walters, 1998), especially in a university context (Weitzman, 2004). Generalised anxiety is highly comorbid with depression and affects university students more frequently than other young adults (Eisenberg et al., 2007). These two measures were assessed as possible mental health homophily sources and included in each assessment to acknowledge potential fluctuations over time.

3.2.3.5 *Network Parameters – relationships within the cohort & beyond*

There is evidence for homophily with regards to popularity in preadolescent (Logis et al., 2013) and adolescent friendship networks (Dijkstra et al., 2013). *Cohort popularity* can be ascertained via network parameter ‘indegree’ (i.e., the number of friendship nominations received from fellow participants). Likewise, *cohort activity* can be determined via network parameter ‘outdegree’ (i.e., the number of friendship nominations made within the cohort). While these two network parameters are exclusively derived from the friendship patterns within the cohort, it is important to also incorporate participants’ relationships outside of this boundary (Wölfer et al., 2015). Therefore, participants’ baseline ego-network (BEN) quality and quantity were explored as possible sources of homophily. During initial contact with participants (which took part before moving to university, i.e., before the first cohort network assessment was possible), they had been asked to list all family members and friends with whom they had meaningful relationships that they wished to continue (i.e., their ego-network) and provided emotional closeness ratings (between 1 and 10) for each. The average number of these members (*BEN quantity*) and of the emotional closeness ratings (*BEN quality*) were computed to serve as potential network homophily factors from beyond the cohort.

3.2.3.6 *Cohort friendship nominations*

In Study 1, participants were asked to list “all those people with whom you consider that you have some kind of personal relationship (friend, romantic partner, acquaintance, someone with whom you interact on a regular basis)” within the college cohort of fellow first year students. To facilitate recall, the prompt encouraged participants to consult “any lists of contacts (e.g., your phone contacts, social media accounts, address books)”. At each following assessment, participants were shown their initial list and asked to add or remove names, to respectively signal the formation or dissolution of cohort friendships.

In Study 2, an alternative nomination procedure was used. Participants were shown a list of all students in the college in their year (also including those who did not themselves participate in the study) at each assessment and could simply tick those whom they considered a friend at that time (the phrasing of Study 1 was maintained). Hence, the second study’s design used recognition in favour of recall during the first assessment. At subsequent assessments, participants were not shown their past choices and thus not reminded whom they had previously considered a friend (unlike in Study 1). Instead, they could choose from the full list of cohort members in each assessment anew.

This amended nomination procedure of Study 2 was chosen for three reasons. Firstly, Study 1’s method allowed for errors, as participants could list friends that were outside of the cohort boundary or that were difficult to accurately identify as cohort members (due to misspellings, the use of nicknames, or inconsistencies across assessments).

Secondly, there is some evidence that a recognition technique yields more accurate results in larger networks with strong activity (Neyer, 1997), as in the case in a cohort of an Oxford College, where members work and live together. Thirdly, stochastic actor-oriented models used to analyse network dynamics require a certain amount of change in the friendship nominations between assessments to accurately estimate parameters and hence fit a sophisticated model (Veenstra et al., 2013). Showing participants their initial friendship lists at subsequent assessments in Study 1 could have produced more static networks (as elaborated in the Discussion). Study 2 therefore was designed to produce an improved nomination procedure.

3.2.4 Procedure

Participants completed an online questionnaire at each assessment. During initial contact (T0; before Michaelmas Term 2016 and 2017 for Studies 1 and 2, respectively), the data on stable characteristics (i.e., demographics, personality traits, and social identities), the baseline ego-network's quantity and quality, and baseline mental health measures were collected. The first cohort network assessment took place after participants had been in Oxford for one term (T1) and was repeated at every subsequent assessment (T1-T4 in Study 1 and T1-T3 in Study 2). The mental health measures were also repeated during each assessment.

3.2.5 Analyses

To examine how homophily shapes an emerging community, analyses focused on the initial network composition, short-term dynamics and longer-term dynamics. Initial homophily was assessed cross-sectionally, while stochastic actor-oriented models were used to examine homophily longitudinally. This approach allowed me to compare

homophily influences over time, observing which types of similarities similarity shape friendship patterns at what stage of the community's development.

3.2.5.1 Treatment of Missing Data

Missing data is particularly problematic in cohort network studies, as it can distort the network's structural properties and thus bias results (Burt, 1987). There are three types of non-response in longitudinal network studies: unit non-response, assessment non-response, and item non-response (Huisman, 2014). These are described and their treatments explained.

Unit non-response refers to cohort members who did not participate in the study themselves (31/121 in Study 1 and 34/118 in Study 2) and from whom data is therefore neither collected nor analysed. However, participants were asked to nominate any cohort members they considered friends and were not told who else was or was not participating in the study. Friendship nominations were therefore filtered to only include ties to fellow participants. Excluding ties to non-participating cohort members was necessary to comply with the data protection requirements of the Central University Research Ethics Committee and meant no data imputation strategies for non-participants could be considered.

Assessment non-response refers to participants not contributing to every assessment. In Study 1, only ten participants (11.1%) no longer contributed to the final assessment but had filled out all previous questionnaires. In Study 2, three participants (3.6%) contributed only to the first assessment. To allow longitudinal analyses, participants had to have contributed to at least two assessments of data collection for their responses to

be included. In Study 1, all 90 participants fulfilled this inclusion criterion. To deal with the ten assessment non-responses within the stochastic actor-oriented models, the SIENA method was employed (Ripley et al., 2019). This method is the default, imputes nominations by way of simulation based on previous responses, and was recommended in a paper comparing different treatments of assessment non-response (Huisman & Steglich, 2008). In Study 2, the three participants who contributed to only one assessment were excluded from analyses as no changes could be observed.

Item non-response refers to participants omitting items of an otherwise completed questionnaire. Overall, item non-response was very low (occurring on only four measures, and never exceeding 5.6%). In Study 1, it occurred with regards to the items on political identity (which had been highlighted as optional) in five cases (5.6%). The mental health measures were assessed longitudinally at each assessment. Item non-response occurred only at T2, once (1.1%) in the GAD-7 assessing anxiety. In Study 2, item non-response occurred with regards to the items on political identity in 4 cases (4.9%) and with regards to those on educational background in 1 case (1.2%). All other measures were completed in all assessments. Again, the recommended default imputation procedure in SIENA was utilised to address these minor item non-responses (Zandberg & Huisman, 2019).

3.2.5.2 Variable Coding

All cohort nominations were converted to integers that did not correspond to the participants' unique participation numbers, to avoid being identifiable. In Study 1, 99% of within-cohort nominations based on free-recall could be correctly identified and

converted at T1, 96% at T2 and T3 and 99% at T4. In Study 2, participants ticked their friends on a list of all cohort members so that matching nominations posed no problems.

The demographic data was coded dichotomously for two reasons. Firstly, the cross-sectional analyses (detailed below) rely on determining whether nominated friends share a characteristic with the participant, or not. Therefore, binary data sufficed. Secondly, SIENA models (detailed below) cannot incorporate categorical data unless it is binary. Therefore, the demographic homophily factors *gender* (female/male), *ethnicity* (non-white/white), and *educational background* (private/state school) were coded as 0 or 1 respectively. Categories were based on majorities, i.e., the majority of the cohort was male (56% in Study 1 & 51% in Study 2), white (73% in Study 1 & 71% in Study 2), and state school educated (54% in Study 1 & 57% in Study 2).

For the initial cross-sectional analysis only, the personality trait scores were dichotomised by applying a median cut. In Study 1, the median scores were as follows: *openness* = 14, *conscientiousness* = 14, *extraversion* = 14, *agreeableness* = 17, *neuroticism* = 12. In Study 2, the median scores were as follows: *openness* = 14, *conscientiousness* = 13, *extraversion* = 14, *agreeableness* = 17, *neuroticism* = 11. Participants were hence coded as scoring either *high* or *low* on a trait in relation to their fellow cohort members. Participants with the exact median score were consistently coded as scoring *high*. This choice was made to avoid data loss (given the relatively small samples) and since median scores were always above or on the mid-point of the scale (i.e., 12; except that for neuroticism in Study 2). Across all traits, this was only the case for 14% of participants in Study 1 and 18% in Study 2. The results of the cross-sectional

analyses (the only time these dichotomised personality scores were used) remain the same if median scores are categories as *low* instead¹. The ordinal scores were used in the SIENA models. These were, on average, as follows in Study 1: *openness* = 14.06 (1.95), *conscientiousness* = 13.61 (2.77), *extraversion* = 13.38 (3.30), *agreeableness* = 16.22 (2.61), *neuroticism* = 11.41 (3.31). Personality trait scores were on average as follows in Study 2: *openness* = 13.69 (2.35), *conscientiousness* = 13.22 (2.95), *extraversion* = 13.88 (3.04), *agreeableness* = 16.16 (2.84), *neuroticism* = 11.28 (3.34).

The social identity items were coded as follows. The two political items were scored on a scale from -3 (*strongly socialist/far left of centre*) to 3 (*strongly conservative/far right of centre*). Reliability analyses produced Cronbach's alpha scores in the excellent reliability range for studies 1 ($\alpha = .95$) and 2 ($\alpha = .92$). Responses were therefore combined into single scores that were used in the SIENA models. For the initial cross-sectional analyses, these scores were dichotomised using the mid-point of the scale (i.e., 0). Participants were hence categorised as either *left leaning/socialist* or *right leaning/conservative*. The mid-point itself was the composite score for 13% of participants in Study 1 and 16% of participants in Study 2. These cases were consistently categorised as *right leaning/conservative*, given that the medians were negative (-0.5 in Study 1 and -1.0 in Study 2), indicating that participants who identified as *left leaning/socialist* were the majority.

¹ There was one exception: in Study 2, there is evidence for homophily with regards to personality characteristic *agreeableness* when median scores are included in the *low* rather than the *high* group.

The other social identity item related to participants' religion. In Study 1, 56% of participant identified as non-religious. In Study 2, 58% of participants identified as non-religious. Responses were again coded into binary variables (*religious/non-religious*) to be used in both the cross-sectional and SIENA analyses.

The mental health data were coded as follows. Responses to both the PHQ-9 and the GAD-7 scales were scored on a scale from 0 (*not at all*) to 3 (*nearly every day*) and then combined into one depression and anxiety score, respectively. For the initial cross-sectional analyses, these scores were dichotomised using the cut-off score of five that is used to make clinical diagnoses (Kroenke & Spitzer, 2002; Spitzer et al., 2006). Participants with scores below that cut-off were respectively categorised as not being depressed or anxious. Participants with scores of five or above were respectively categorised as depressed or anxious.

The cohort network parameters *popularity* and *activity* were computed based on participants' friendship nominations. For the initial cross-sectional analyses, these scores were dichotomised by applying a median cut. In Study 1, the median scores were as follows: *cohort popularity* = 13 and *cohort activity* = 14. In Study 2, the median scores were as follows: *cohort popularity* = 16, *cohort activity* = 16. Participants were hence coded as either scoring *high* or *low* in relation to the other cohort members. Participants with the exact median score were consistently coded as scoring *high*. In Study 1, this was only the case for 3% and 6% of participants with regards to their *cohort popularity* and *activity* respectively. In Study 2, this was only the case for 1% and 5%.

The baseline ego-network (BEN) parameters *quantity* and *quality* were respectively computed based on the average of family members and friends from home participants had listed at initial contact (i.e., before meeting their fellow cohort members) and the average emotional closeness ratings provided for each of these. For the initial cross-sectional analyses, these scores were dichotomised by applying a median cut. In Study 1, the median scores were as follows: *quantity* = 42 and *quality* = 5.7. In Study 2, the median scores were as follows: *quantity* = 28 and *quality* = 6.6. Participants were hence coded as scoring either *high* or *low* in relation to the other cohort members. Participants with the exact median score were consistently coded as scoring *high*. In Study 1, this was only the case for 4% and 3% of participants with regards to their *quantity* and *quality* respectively. In Study 2, this was the case for 4% and 6%.

3.2.5.3 *Network composition & structure*

Before considering homophily effects, I generated the networks as a whole at each assessment of participants' first year at university (i.e., three assessments in Study 1 and two assessments in Study 2). The visualised friendship patterns were analysed in R using packages *foreign*, *reshape2*, and *igraph*. These cross-sectional social network analyses were used to describe the cohort structure in terms of the most relevant network characteristics, i.e. the total number of ties (connections made), the average number of outdegrees (friendship nominations made), the overall level of reciprocity (the proportion of friendships that were mutual), the overall network density (specifying the proportion of all possible ties that were realised), the network's centralisation score (indicating how hierarchically the network is structured), the indegree range (identifying the variations of popularity within the group), and the presence of isolates (individuals entirely unconnected to any other network member).

3.2.5.4 *Cross-sectional analyses of initial homophily*

Before investigating homophily effects longitudinally, I examined the initial cohort networks of both studies cross-sectionally to evaluate the likelihood of any immediate homophily effects. This examination occurred at T1, that is, after participants had spent one term of eight weeks getting to know one another. Using one-sample t-tests, I first compared the overall proportion of same-characteristic friends of each of the 16 possible sources of homophily with the proportion that reflects nominations based purely on chance (i.e., .50). This approach also allowed me to compare the relative influence of individual sources on friendship patterns via analyses of variance (ANOVAs). In a second step, I specified if/which subgroups within each category displayed homophily by comparing the proportion of same-characteristics friends with the proportion of that characteristic within the cohort itself (e.g., .80 for *white* students and .20 for *non-white* students).

3.2.5.5 *Longitudinal analyses using stochastic actor-based models*

The longitudinal developments of the observed friendship patterns were analysed using Simulation Investigation for Empirical Network Analyses (SIENA; Snijders, Van De Bunt, & Steglich, 2010) implemented in R. This software estimates dynamic actor-driven models for the evolution of networks. It can account for and examine the naturally occurring interdependence between the overall network structure and the characteristics of the individuals making up said network (Steglich et al., 2006). SIENA thus allows assessment of which individual characteristics (demographics, personality, etc.) influence relationship formation over time, making the resulting network structure itself the 'dependent variable' in a sense. One can test for specific selection effects (i.e., 'selecting' friendships with similar others). Any such selection effects can be interpreted

as logistic regression coefficients. An estimate/log-odds ratio of 1.7 with regards to *depression* would, for instance, indicate that participants were $e^{1.7} = 5.5$ times more likely to make friends with cohort members who scored similarly to themselves on the depression scale than they were with those who scored differently.

An additional advantage of this approach is the possibility to simultaneously include a large number of homophily factors without affecting a model's power and fit (Ripley et al., 2019). These control for one another, and hence increase the confidence in any specific homophily effects. Each modelled homophily effect is additionally controlled for by two related effects. The *ego* effect accounts for cohort members of a given characteristic who are simply particularly active in the network (e.g., female members making lots of friends, but not necessarily discriminating whom they befriend in terms of gender). The *alter* effect instead accounts for cohort members of a given characteristic who are simply popular (e.g., female members being befriended by many cohort members irrespective of these sharing the same gender). These default controls are reported for completeness' sake but not interpreted, as they are unrelated to the main research question of this chapter.

SIENA models further include structural controls relating to common relationship processes that are unrelated to the characteristics under consideration (Ripley et al., 2019). These account for the tendency of network members to form relationships with those already in social proximity. More specifically, they account for the tendency to form relationships with those who are positioned nearby within the overall network structure (denoted by a negative *outdegree* effect, signalling that friendships are not

formed irrespective of social distance), with those who already consider us a friend (*reciprocity*), and with those who are friends-of-friends (*transitive triplets & transitive ties*). Incorporating these controls thus also allows one to differentiate homophily effects from such underlying relationship dynamics.

Therefore, the SIENA model includes a comprehensive range of homophily factors, the two default controls per factor, and the four structural controls listed above. To differentiate short-term from longer-term effects, I ran each simulation twice for each study. The first pair of resulting models focused on the participants' first few months at university (i.e., T1-3 in Study 1 spanning six months, and T1 & 2 in Study 2 spanning three months). The second pair of models additionally included the final assessment (i.e., T4 for Study 1, two years after the last assessment, and T3 for Study 2, one year after the last assessment). These models simultaneously tested for the sixteen different homophily effects.

An overall maximum convergence ratio below 0.25 and all individual convergence t-ratios below 0.1 indicate a well-estimated model (Ripley et al., 2019). The overall convergence ratios for the short-term models were 0.12 and 0.14 for Study 1 and 2, respectively. The convergence ratios for the long-term models were 0.17 and 0.13 for Study 1 and 2, respectively. Furthermore, all individual convergence t-ratios were below 0.1, so that all requirements were met in all models. The rate parameters of all four models furthermore indicated that significant network change occurred between assessments, a precondition for any following analyses ($p < .001$). In addition, the Jaccard Index indicates the 'fraction of stable friendship nominations' (Veenstra et al.,

2013, p. 403) between assessments. These indices should be above .30 (denoting at least 30% network stability) between each of the successive networks making up a model (Ripley et al., 2019). For Study 1, this condition was met with Jaccard indices of 0.87, 0.89, and 0.37. For Study 2, this condition was also met with Jaccard indices of 0.47 and 0.54. Lastly, all four structural controls in all four models significantly contributed to the model in the anticipated directions ($ps < .001$).

3.3 Results

3.3.1 From strangers to community – network composition and structure

3.3.1.1 Study 1

Having spent a first term (i.e., eight weeks) at university, participants in Study 1 nominated on average 14.31 (10.03) fellow, also participating, cohort members as friends. Overall, 1288 nominations were made, forming the cohort network depicted in Figure 3.2. This total number of ties resulted in a network *density* of .16, meaning 16% of all possible ties (i.e., each network member listing every other member as a friend) were realised. There were no *isolates*, as each participant either listed at least one other cohort member as a friend or was listed as a friend by at least one other cohort member. While not all nominations were reciprocated, 54% of friendships were mutual. The possibility of some students being listed as friends more often than others was furthermore reflected in the *indegree range*, spanning from 0 to 31. This popularity index refers to the number of received nominations and suggests some variation in popularity in the cohort. However, the *centralization* score was 0.19. This measure can range from 0 to 1 and indicates a relatively flat hierarchical structure in this case, as might be expected within a university student cohort. The development of this network

during participants' first year at university is also depicted in Figure 3.2 and shows little change across all considered network parameters.

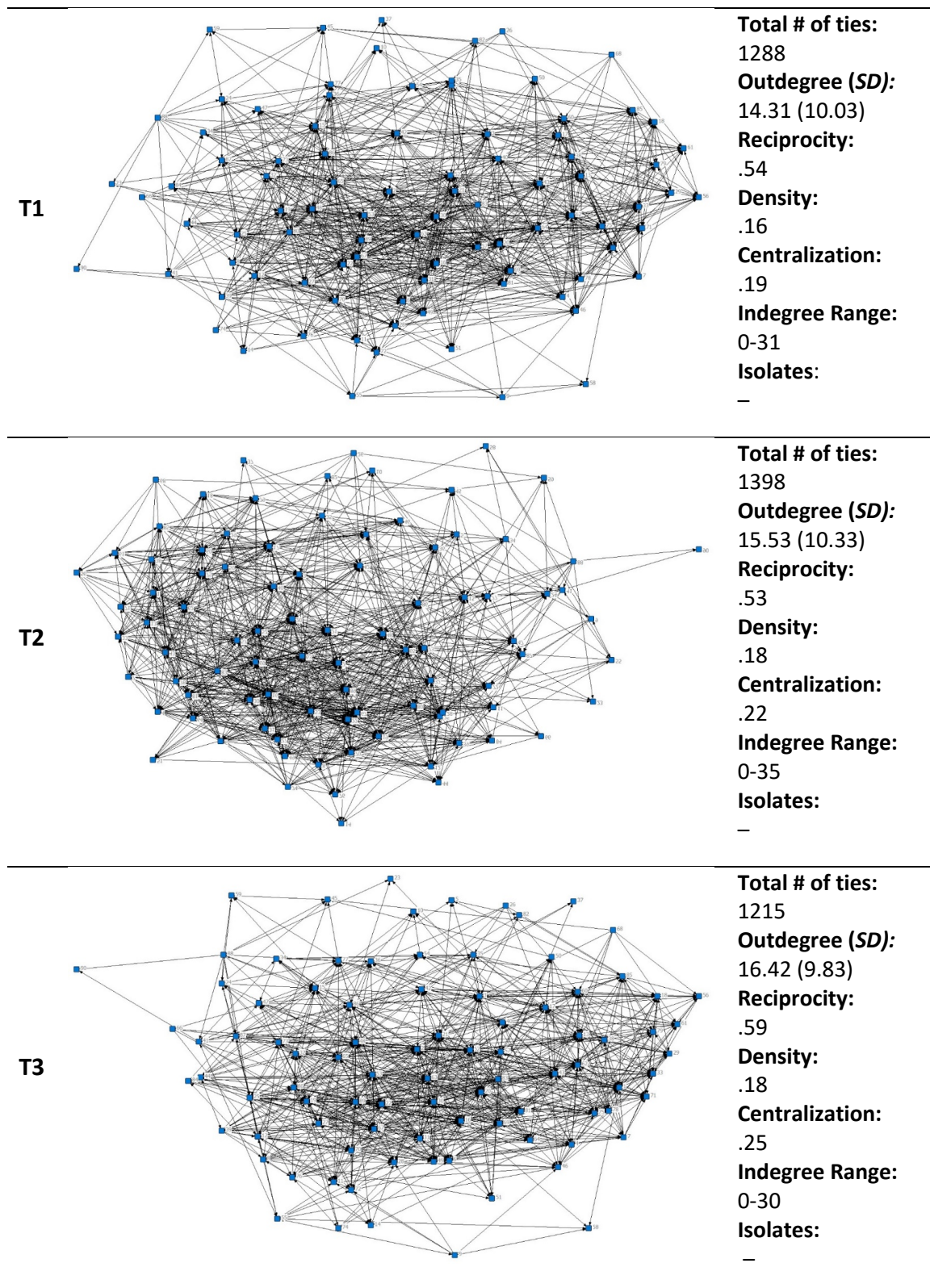


Figure 3.2 Study 1 cohort networks and statistics after one (T1), two (T2) and three (T3) terms at university respectively. Each node (square) represents a student, and each tie (link between nodes) represents a friendship.

3.3.1.2 Study 2

The cohort network of Study 2 is similarly composed to that of Study 1. After their first term (i.e., eight weeks) at university, participants nominated on average 16.61 (8.23) fellow, also participating, cohort members as friends. Overall, 1304 nominations were made, forming the cohort network depicted in Figure 3.3. This total number of ties resulted in a network *density* of .20, meaning 20% of all possible ties (i.e., each network member listing every other member as a friend) were realised. There were also no *isolates*, as each participant either listed at least one other cohort member as a friend or was listed as a friend by at least one other cohort member. While not all nominations were reciprocated, 61% of friendships were mutual. The possibility of some students being listed as friends more often than others was furthermore reflected in the *indegree range*, spanning from 0 to 40. This popularity index refers to the number of received nominations and suggests some variation in popularity in the cohort. However, the *centralization* score was 0.30. This measure can range from 0 to 1 and indicates a slightly more hierarchical structure than in Study 1. The development of this network during students' first two terms at university is also depicted in Figure 3.3 and shows little change across the considered network parameters.

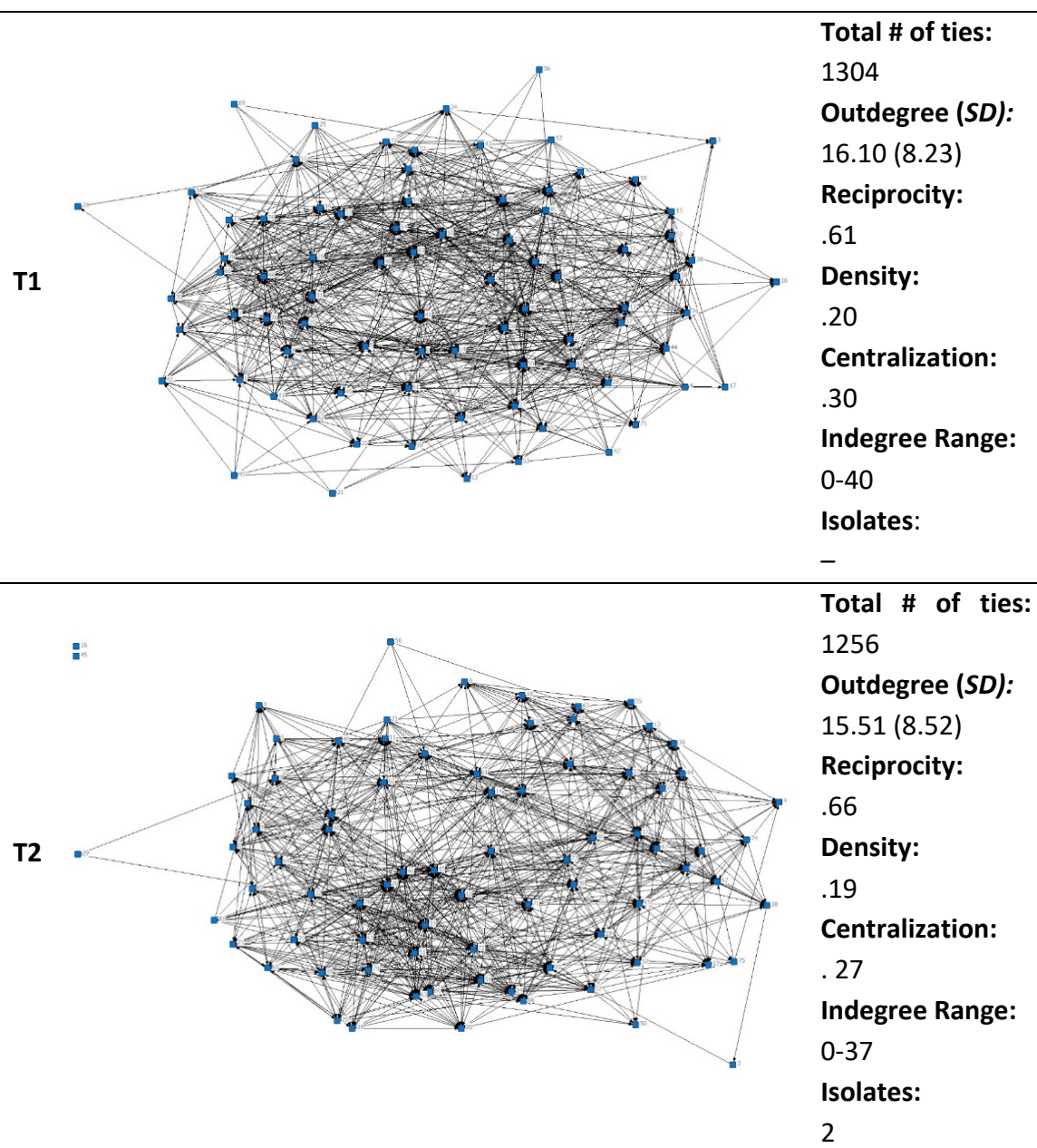


Figure 3.3 Study 2 cohort networks and statistics after one (T1) and two (T2) terms at university respectively. Each node (square) represents a student, and each tie (link between nodes) represents a friendship.

3.3.2 Speedy self-segregation – cross-sectional analyses of initial homophily

I first examined whether participants initially (after having spent their first term together), nominated a higher proportion of friends with whom they share a certain characteristic than would be expected by chance (i.e., testing the proportions of friendships where a characteristic is shared against the critical value .50). To specify how these overall tendencies to befriend similar others contributed to shaping the cohort

network, I further incorporated the actual cohort composition. I therefore conducted separate one-sample t-tests splitting members of each category into their respective groups (e.g., *male* and *female* for gender, *low* and *high* scores for agreeableness). I then tested each group's 'shared-characteristic' friendship proportions against the test value corresponding to the actual proportion of the respective occurrence of that characteristic in the cohort. The results are displayed in Table 3.1 and Table 3.2 for Studies 1 and 2 respectively and are described below.

Table 3.1 Initial homophily in Study 1 for 10/16 sources of homophily after one term

Source of similarity	OVERALL proportion of same-characteristic friends (SD)	SUBGROUP proportion of same-characteristic friends (SD)	Characteristic distribution in cohort (proportion)
Gender	.53 (.16)	< .55 (.15)	Male (.56)
		< .50 (.17)*	Female (.44)
Ethnicity	.66 (.27)***	< .79 (.11)**	White (.73)
		< .25 (.22)	Non-white (.27)
Educational Background	.52 (.17)	< .57(.18)	State school (.54)
		< .46 (.14)	Private school (.46)
Openness	.60 (.22)**	< .70 (.15)	High (.69)
		< .34 (.15)	Low (.31)
Conscientiousness	.50 (.18)	< .49 (.19)	High (.51)
		< .51 (.18)	Low (.49)
Extraversion	.55 (.20)*	< .65 (.18)***	High (.51)
		< .46 (.16)	Low (.49)
Agreeableness	.52 (.16)	< .57 (.15)**	High (.51)
		< .46 (.14)	Low (.49)
Neuroticism	.50 (.16)	< .51 (.17)	High (.51)
		< .50 (.16)	Low (.49)
Political Identity	.53 (.23)	< .63 (.19)**	Left (.54)
		< .39 (.22)	Right (.46)
Religion	.49 (.16)	< .56 (.15)	Non-religious (.56)
		< .40 (.13)	Religious (.44)

Anxiety	.51 (.16)	<	.49 (.16)	Yes (.44)
			.51 (.18)	No (.56)
Depression	.54 (.17)*	<	.46 (.18)	Yes (.46)
			.59 (.16)*	No (.54)
Cohort Popularity	.55 (.27)	<	.75 (.16)***	<i>High (.51)</i>
			.32 (.16)***	<i>Low (.49)</i>
Cohort Activity	.51 (.32)	<	.71 (.10)***	<i>High (.51)</i>
			.24 (.32)***	<i>Low (.49)</i>
BEN Quantity	.53 (.18)	<	.56 (.15)*	<i>High (.51)</i>
			.49 (.21)	<i>Low (.49)</i>
BEN Quality	.51 (.15)	<	.52 (.15)	<i>High (.51)</i>
			.50 (.15)	<i>Low (.49)</i>

* significant at alpha level .05 ** significant at alpha level .001 *** significant at alpha level < .001
Note. Use of bold in first column denotes significant effect; use of '<' specifies homophily effects in binary subgroups

3.3.2.1 Study 1

There was evidence for homophily quickly shaping the network with regards to ten out of the sixteen considered characteristics when homophily in the overall cohort and its subgroups were jointly considered (see Table 3.1). Participants overall nominated a higher proportion of *same-characteristic* friends than would be expected by chance (i.e., .50) with regards to four characteristics: *ethnicity*, and levels of *openness*, *extraversion*, and *depression* (all coded dichotomously as either *high* or *low*). When the cohort was considered as a whole, the other possible sources of homophily did not appear to influence friendship choice (see Table 3.1, column 2: *OVERALL proportion of same-characteristic friends*).

This method of computing 'shared-characteristic' proportions has the advantage of allowing direct comparisons between the different characteristics. I therefore conducted a one-way ANOVA, comparing the relative importance of the sixteen

characteristics in influencing initial friendship choice. Results confirmed that the relative importance of the considered characteristics shaping the cohort network varied ($F_{(8.27, 595.29)} = 2.74, p < .001, \eta^2 = .037$). Bonferroni-corrected pairwise-comparisons specified that the tendency to befriend alike cohort members was strongest for the characteristic *ethnicity*. Participants shared a *white/non-white ethnicity* with 66% ($SD = 27\%$) of their cohort friends, a shared-characteristic preference higher than that of four other characteristics (*religion, p = .003; openness, p = .009; anxiety, p = .013; BEN quality, p = .002*). All other differences were non-significant. The means and standard deviations of the individual 'shared-characteristic' proportions are those reported in Table 3.1, column 2: *OVERALL proportion of same-characteristic friends*.

Splitting the cohort for each characteristic according to its binary subgroups produced evidence for homophily with regards to ten characteristics (see Table 3.1, column 3: *SUBGROUP proportion of same-characteristic friends*): *female* and *white* participants nominated significantly more friends of the same *gender* and *ethnicity* respectively than expected, given the proportion of female and white students in the cohort (see Table 3.1, column 4: *Characteristic distribution in cohort (proportion)*). Additionally, participants scoring *high* on personality traits *extraversion* and *agreeableness* nominated more same-characteristic friends than cohort proportions suggested. Participants identifying as politically *left* also nominated more same-characteristic friends with regards to *political identity* than cohort proportions would predict. With regards to mental health, participants who were *not diagnosed with depression* had nominated more same-characteristic friends than expected. With regards to network parameters, highly *popular* participants befriended more same-characteristic friends

than cohort proportions would predict, while less popular participants avoided befriending other less popular cohort members. Similarly, highly *active* participants (who had made many friends) befriended more same-characteristic friends than cohort proportions would predict, while less active participants (with fewer formed friendships) avoided befriending other same-characteristic cohort members. Lastly, those with large baseline ego-networks (*BEN quantity*) befriended more same-characteristic friends than expected given cohort proportions.

Table 3.2 Initial homophily in Study 2 for 9/16 sources of homophily after one term

Source of similarity	OVERALL proportion of same-characteristic friends (SD)		SUBGROUP proportion of same-characteristic friends (SD)	Characteristic distribution in cohort (proportion)
Gender	.56 (.14)***	<	.52 (.17)	Male (.51)
			.60 (.11)**	Female (.49)
Ethnicity	.61 (.22)***	<	.72 (.11)	White (.74)
			.29 (.09)	Non-white (.26)
Educational Background	.51 (.15)	<	.56 (.14)	State school (.56)
			.44 (.13)	Private school (.44)
Openness	.54 (.17)*	<	.62 (.15)	High (.59)
			.42 (.12)	Low (.41)
Conscientiousness	.53 (.17)	<	.58 (.15)**	High (.64)
			.43 (.09)***	Low (.36)
Extraversion	.53 (.15)*	<	.72 (.10)***	High (.60)
			.38 (.17)	Low (.40)
Agreeableness	.57 (.21)**	<	.55 (.14)	High (.52)
			.51 (.14)	Low (.48)
Neuroticism	.49 (.13)	<	.64 (.12)	High (.63)
			.37 (.11)	Low (.37)
Political Identity	.57 (.21)**	<	.70 (.11)***	Left (.62)
			.35 (.15)	Right (.38)
Religion	.50 (.15)	<	.56 (.12)	Non-religious (.58)
			.42 (.15)	Religious (.42)

Anxiety	.48 (.15)	<	.33 (.15)	Yes (.33)
			.65 (.16)	No (.67)
Depression	.49 (.15)	<	.40 (.17)	Yes (.38)
			.58 (.13)	No (.62)
Cohort Popularity	.53 (.29)	<	.79 (.07)***	<i>High (.51)</i>
			.26 (.16)***	<i>Low (.49)</i>
Cohort Activity	.51 (.20)	<	.64 (.06)***	<i>High (.53)</i>
			.37 (.20)**	<i>Low (.47)</i>
BEN Quality	.50 (.16)	<	.53 (.14)	High (.51)
			.47 (.14)	Low (.49)
BEN Quantity	.50 (.14)	<	.46 (.18)	High (.51)
			.53 (.14)	Low (.49)

* significant at alpha level .05 ** significant at alpha level .001 *** significant at alpha level < .001
 Note. Use of bold in first column denotes significant effect; use of '<' specifies homophily effects in binary subgroups.

3.3.2.2 Study 2

There was evidence for self-segregation quickly shaping the network with regards to nine out of the sixteen considered characteristics when homophily in the overall cohort and its subgroups were jointly considered (see Table 3.2). Participants overall nominated a higher proportion of *same-characteristic* friends than would be expected by chance (i.e., .50) with regards to six characteristics: *gender*, *ethnicity*, levels of *openness*, *extraversion*, and *agreeableness* (all coded as either *high* or *low*), and *political identity* (coded as either *left* or *right*). When the cohort was considered as a whole, the other possible sources of homophily did not appear to influence friendship choice (see Table 3.2, column 2: *OVERALL proportion of same-characteristic friends*).

I again conducted a one-way ANOVA to compare the relative importance of the sixteen characteristics in influencing initial friendship choice. Results confirmed that the relative importance of the considered characteristics shaping the cohort network varied ($F_{(9.72, 767.70)} = 2.62, p < .001, \eta^2 = .032$). Bonferroni-corrected pairwise-comparisons specified

that the tendency to befriend alike cohort members was strongest for the characteristic *ethnicity*. Participants shared a *white/non-white ethnicity* with 61% ($SD = 22\%$) of their cohort friends, a shared-characteristic preference higher than that of five other characteristics (*religion*, $p = .040$; *educational background*, $p = .009$; *neuroticism*, $p < .001$; *BEN quantity*, $p = .021$; *BEN quality*, $p = .016$). Participants further reported a higher proportion of same-characteristic friendships with cohort members who scored similarly to themselves on personality trait *openness* in comparison to *neuroticism* ($p = .047$). All other differences were non-significant. The means and standard deviations of the individual 'shared-characteristic' proportions are those reported in Table 3.2, column 2: *OVERALL proportion of same-characteristic friends*.

Splitting the cohort for each characteristic according to its binary subgroups produced evidence for homophily with regards to six characteristics (see Table 3.2, column 3: *SUBGROUP proportion of same-characteristic friends*): *female* participants nominated significantly more friends of the same *gender* than expected, given the proportion of female students in the cohort (see Table 3.2, column 4: *Characteristic distribution in cohort (proportion)*). Participants scoring *high* on personality traits *extraversion* and *conscientiousness* as well as participants identifying as politically *left* also nominated more same-characteristic friends than cohort proportions suggested. With regards to network parameters, highly *popular* participants befriended more same-characteristic friends and less popular participants befriended fewer same-characteristic friends than cohort proportions would predict. Similarly, highly *active* participants (who had made many friends) befriended more same-characteristic friends and less active participants befriended fewer same-characteristic friends than cohort proportions would predict.

3.3.3 Like attracts like – short term longitudinal homophily dynamics

Table 3.3 reports the generated short-term network dynamics SIENA estimations for both Study 1 and Study 2. Study 1's developments were considered over a six months period and spanned three assessments (assessing the cohort network after one, two, and three terms and hence throughout their entire first year at the University of Oxford). The developments of Study 2 were considered over a three-month period spanning two assessments (i.e., one after the first and the other after the second term as a member of the college cohort). Estimates represent log-odds ratios specifying the probabilities of the network change. The t-value of each effect can be determined by dividing said estimate by its accompanying standard error and the associated p-values are specified. Significant positive homophily effects implied that network members tended to befriend similar others, which meaningfully contributed to the network-autocorrelation of this variable by affecting the network structure (while the variable itself remained unchanged).

There was evidence for homophily shaping the network in the short run in one instance in each study. In Study 1, there was homophily with regards to *gender* ($p = .008$). In Study 2, there was homophily with regards to *openness* ($p = .033$). The estimates/log-ratios of these effects can be interpreted to state that in Study 1, cohort members were 1.3 times more likely to befriend those of the same gender ($e^{0.30} = 1.3$), while in Study 2, cohort members were 1.6 times more likely to befriend those who scored similarly to themselves on the openness scale ($e^{0.47} = 1.6$).

There was also one significant negative homophily effect in Study 1, and two in Study 2, suggesting that network members tended to befriend those in the cohort who were different to themselves with regards to certain characteristics or behaviours. In Study 1, this was the case with regards to *cohort activity* ($p < .001$), suggesting that cohort members who had made few friends themselves often befriended those who had made many friends and/or vice versa. In Study 2, negative homophily effects were observed with regards to *conscientiousness* ($p = .002$) and *cohort popularity* ($p < .001$). Cohort members hence preferentially befriended those scoring differently to themselves on the conscientiousness scale (e.g., highly conscientious students befriending less conscientious ones) as well as those not as popular as themselves (e.g., unpopular students befriending popular ones).

Table 3.3 SIENA estimation results for the short-term models of both studies.

Short-term	Study 1			Study 2		
	Estimate	St. Error	p - value	Estimate	St. Error	p - value
Structural Controls						
outdegree (density)	-3.37	0.27	<.001	-3.86	0.29	<.001
reciprocity	1.47	0.14	<.001	1.29	0.10	<.001
transitive triplets	0.21	0.02	<.001	0.18	0.01	<.001
transitive ties	0.89	0.21	<.001	1.03	0.30	<.001
Gender						
homophily	0.30	0.11	.008	0.06	0.07	.391
alter	-0.47	0.14	.001	0.07	0.09	.465
ego	0.59	0.22	.008	0.11	0.09	.244
Ethnicity						
homophily	-0.10	0.15	.503	0.07	0.09	.459
alter	0.08	0.16	.622	-0.23	0.12	.056
ego	0.42	0.20	.043	-0.04	0.12	.740

Educational Background						
homophily	0.15	0.11	.175	0.07	0.07	.305
alter	-0.08	0.12	.515	0.04	0.09	.662
ego	0.71	0.22	.001	0.12	0.09	.175
Openness						
homophily	0.07	0.35	.837	0.47	0.22	.033
alter	-0.00	0.03	.933	-0.05	0.02	.005
ego	-0.02	0.05	.783	-0.03	0.02	.090
Conscientiousness						
homophily	0.16	0.39	.683	-0.64	0.21	.002
alter	0.02	0.03	.374	-0.00	0.01	.844
ego	0.12	0.05	.010	0.02	0.02	.292
Extraversion						
homophily	-0.09	0.33	.781	0.02	0.20	.913
alter	0.00	0.02	.860	0.05	0.02	.004
ego	0.00	0.03	.902	-0.01	0.02	.469
Agreeableness						
homophily	-0.19	0.42	.649	0.46	0.29	.109
alter	-0.02	0.03	.495	0.01	0.02	.721
ego	0.07	0.04	.081	0.04	0.02	.036
Neuroticism						
homophily	0.07	0.32	.817	0.14	0.23	.544
alter	-0.02	0.02	.478	0.05	0.02	.003
ego	0.08	0.03	.014	-0.01	0.02	.679
Religion						
homophily	0.06	0.11	.614	-0.02	0.07	.817
alter	0.18	0.12	.146	0.03	0.08	.709
ego	-0.22	0.18	.214	0.01	0.08	.930
Political Identity						
homophily	0.19	0.34	.563	-0.24	0.18	.174
alter	-0.07	0.05	.232	0.08	0.04	.074

ego	0.20	0.09	.021	0.07	0.04	.107
Anxiety						
homophily	-0.02	0.39	.968	-0.36	0.37	.322
alter	-0.01	0.02	.836	0.00	0.02	.972
ego	-0.02	0.03	.594	-0.04	0.02	.103
Depression						
homophily	-0.25	0.42	.546	0.51	0.36	.157
alter	0.02	0.02	.362	-0.02	0.02	.272
ego	-0.01	0.03	.695	0.04	0.02	.016
Cohort Popularity						
homophily	-0.55	0.30	.065	-0.83	0.19	<.001
alter	-0.02	0.01	.020	-0.05	0.01	<.001
ego	-0.01	0.02	.442	-0.02	0.00	<.001
Cohort Activity						
homophily	-1.38	0.32	<.001	-0.22	0.22	.317
alter	-0.04	0.01	<.001	-0.04	0.01	<.001
ego	-0.07	0.02	<.001	-0.06	0.01	<.001
BEN Quality						
homophily	0.48	0.441	.277	-0.24	0.26	.348
alter	-0.01	0.06	.856	-0.10	0.04	.010
ego	-0.02	0.08	.833	0.12	0.04	.002
BEN Quantity						
homophily	-0.20	0.40	.628	0.15	0.17	.406
alter	-0.00	0.00	.423	-0.01	0.01	.301
ego	0.01	0.01	.214	0.02	0.01	<.001

Note. BEN denotes baseline ego network; Use of bold in first column denotes significant homophily effects.

3.3.4 Standing the test of time – longer term longitudinal homophily dynamics

Table 3.4 reports the generated long-term network dynamics SIENA estimations for both Study 1 and Study 2. Study 1's developments were considered over a 2.5 year-long period and spanned four assessments (assessing the cohort network after one, two, and

three terms in their first year and just before their last term in their third and final year). The developments of Study 2 were considered over a 1.5 year-long period spanning three assessments (i.e., one after the first and the second term in their first year and just before their last term in their second year). There was no evidence for homophily further shaping the network in the long run.

There was, however, one significant negative homophily effect in Study 1, and three in Study 2, suggesting network members tended to befriend those in the cohort that were different to themselves with regards to certain characteristics or behaviours. In Study 1, this was the case with regards to *cohort activity* ($p < .001$), as in the short-term model. In Study 2, negative homophily effects that had already been present in the short-term model were again observed with regards to *conscientiousness* ($p = .024$) and *cohort popularity* ($p < .001$). In addition, the long-term model also included a significant negative homophily effect with regards to *cohort activity* ($p < .017$), replicating the same effect observed in Study 1.

Table 3.4 SIENA estimation results for the long-term models of both studies.

Long-term	Study 1			Study 2		
	Estimate	St. Error	<i>p</i> - value	Estimate	St. Error	<i>p</i> - value
Structural Controls						
outdegree (density)	-3.54	0.20	<.001	-3.91	0.21	<.001
reciprocity	1.59	0.10	<.001	1.43	0.07	<.001
transitive triplets	0.13	0.01	<.001	0.16	0.01	<.001
transitive ties	1.11	0.18	<.001	1.21	0.21	<.001
Gender						
homophily	0.08	0.05	.110	0.02	0.05	.633
alter	-0.10	0.08	.184	-0.02	0.06	.726

ego	0.08	0.07	.266	0.14	0.06	.027
Ethnicity						
homophily	0.05	0.07	.499	0.07	0.06	.290
alter	0.09	0.08	.273	-0.19	0.09	.026
ego	0.01	0.08	.893	-0.10	0.08	.203
Educational Background						
homophily	0.03	0.05	.546	0.04	0.05	.413
alter	0.12	0.06	.064	-0.08	0.06	.236
ego	-0.07	0.07	.309	0.20	0.06	.001
Openness						
homophily	0.18	0.15	.237	0.10	0.15	.512
alter	-0.05	0.02	.002	0.00	0.01	.960
ego	-0.01	0.02	.410	-0.02	0.01	.091
Conscientiousness						
homophily	0.26	0.17	.129	-0.32	0.14	.024
alter	-0.02	0.01	.171	0.00	0.01	.968
ego	0.05	0.01	<.001	0.01	0.01	.137
Extraversion						
homophily	-0.13	0.15	.397	0.18	0.14	.196
alter	0.00	0.01	.744	0.03	0.01	.006
ego	0.03	0.01	.006	-0.01	0.01	.254
Agreeableness						
homophily	-0.27	0.19	.159	0.04	0.19	.835
alter	0.04	0.02	.010	0.02	0.01	.123
ego	0.04	0.02	.039	0.04	0.01	.001
Neuroticism						
homophily	-0.18	0.15	.217	0.06	0.15	.719
alter	-0.02	0.01	.050	0.02	0.01	.019
ego	0.03	0.01	.029	0.00	0.01	.736
Religion						
homophily	0.01	0.05	.814	0.06	0.05	.260

alter	0.07	0.06	.281	-0.02	0.06	.754
ego	-0.24	0.06	<.001	-0.05	0.06	.376
Political Identity						
homophily	-0.12	0.16	.456	0.02	0.13	.868
alter	0.04	0.03	.118	0.08	0.03	.012
ego	0.04	0.03	.193	0.03	0.03	.350
Anxiety						
homophily	0.06	0.18	.715	0.08	0.22	.733
alter	0.02	0.01	.074	-0.03	0.01	.051
ego	-0.02	0.01	.041	-0.01	0.01	.507
Depression						
homophily	0.38	0.24	.114	-0.09	0.24	.698
alter	-0.01	0.01	.588	0.02	0.01	.166
ego	0.01	0.01	.167	0.02	0.01	.108
Cohort Popularity						
homophily	0.17	0.15	.281	-0.58	0.15	<.001
alter	-0.01	0.01	.221	-0.04	0.00	<.001
ego	-0.02	0.01	.001	-0.02	0.00	<.001
Cohort Activity						
homophily	-0.80	0.16	<.001	-0.37	0.16	.017
alter	-0.04	0.01	<.001	-0.05	0.01	<.001
ego	-0.04	0.01	<.001	-0.05	0.01	<.001
BEN Quality						
homophily	0.33	0.19	.080	-0.12	0.18	.511
alter	-0.05	0.03	.149	-0.11	0.03	<.001
ego	-0.07	0.03	.030	0.13	0.03	<.001
BEN Quantity						
homophily	0.10	0.19	.592	0.22	0.13	.078
alter	-0.01	0.00	.001	0.00	0.00	.928
ego	0.00	0.00	.034	0.01	0.00	<.001

Note. BEN denotes baseline ego network; Use of bold in first column denotes significant homophily effects.

3.4 Discussion

This chapter set out to establish how a cohort network forms and develops during the transition to university. It first explored the general cohort structure and development and then investigated how 16 possible homophily characteristics influenced the observed friendship pattern, cross-sectionally, in the short-run, and in the long-run. The former constituted one hypothesis focused on the general cohort structure, while the latter constituted a second hypothesis, which specified homophily effects for each considered type of similarity in turn. In general, cohort members in both studies quickly formed one interconnected group that showed little development in structure once it had been established. There was furthermore evidence for homophily shaping the friendship patterns with regards to 10 and 9 of the investigated 16 characteristics in Study 1 and 2, respectively. As with overall cohort structure, these initial homophily effects showed little development over time. I discuss this main finding of participants rapidly forming a network that then remains fairly static for each hypothesis separately below, linking my results to previous research, to then explore implications, limitations, and applications of the present research.

3.4.1 Linking results to hypotheses & other research

In terms of the cohort network's general structure and development, results of both studies provided support for H_1 . This hypothesis predicted that the previous strangers would quickly connect, resulting in a fairly dense network with few isolates. In both studies, participants had nominated around 15 friends after spending a first term (i.e., two months) together, resulting in an overall network density of .16 and .20 in Study 1 and 2, respectively, and no member remained entirely unconnected to their peers. Throughout participants' first year, roughly a fifth of all possible friendships continued

to be realised (i.e., density of or close to .20), and only two temporary isolates were observed in Study 2. Other research comparing the characteristics of 51 social networks reported densities between 0.02 and 0.86 (Faust, 2006) and studies focusing explicitly on student networks reported densities between 0.07 and 0.32 (Ahn & Rodkin, 2014). Hence the two cohort networks observed in the present research matched expectations rooted in the literature.

H_1 further predicted a relatively high reciprocity, a flat hierarchy, and moderate variations in popularity. The cohort networks of the studies were indeed continuously characterised by the (albeit slim) majority of friendships being mutual, centralisation scores at or below .30, and a maximum indegree range of 0 – 40 (meaning while at least one cohort member was not considered a friend by anyone, at least one cohort member was considered a friend by 40 fellow members). These findings are also roughly in line with other research, that studied 28 student networks (Moody et al., 2011), two “Massive Open Online Course” learning student networks (Fincham et al., 2018), and two university student networks based on a hybrid model combining online and offline teaching (Sousa-Vieira et al., 2017). The only notable exception was with regards to network characteristic reciprocity, which seemed higher in the present research than elsewhere in the literature, perhaps due to the unique nature of the cohort, in which students learn, live, and ‘play’ together. Overall, then, there was support for H_1 .

With regards to this chapter’s main objective, determining the influence of homophily on friendship choice, I tested a second hypotheses relating to five different types of homophily sources under investigation.

Examining homophily with regards to demographics (namely *gender*, *ethnicity*, and *educational background*), I mostly found support for H_2 . During the initial cross-sectional assessment of friendship patterns at T1 (once students had spent a first term, i.e., two months, together), there was homophily with regards to *gender* in both studies, as female participants nominated more same-gender friends than cohort proportions would predict. Beyond this initial cross-sectional assessment of homophily-based self-segregation, there was evidence of gender homophily shaping cohort network dynamics in the short run in Study 1. Participants were 1.3 times more likely to befriend those of the same gender within their first year as cohort members. Similarly, there was initial evidence for homophily with regards to *ethnicity* in both studies, as participants generally listed more same-ethnicity friends than would be expected based on chance. In Study 1, this general homophily effect could be further specified, as white participants nominated more fellow white cohort members than the composition of the cohort (which already consisted of 73% of white students) would predict. Furthermore, in a direct cross-sectional comparison of all sixteen considered homophily characteristics, *ethnicity* appeared to affect initial friendship choice the most, as students chose a significantly higher proportion of same-ethnicity friends than the proportion of friends chosen with regards to four and five other shared characteristics, in studies 1 and 2, respectively. Finally, there was no evidence with regards to participants' educational background playing a role in the selection of cohort friends.

Gender and ethnicity have consistently been found to be among the strongest predictors of homophily, not just within demographic sources of similarity, but in

general (McPherson et al., 2001). It is hence unsurprising that both studies showed participants immediately listing friends similar to themselves along these two dimensions. Educational background can be viewed as a proxy of socio-economic background (Epple et al., 2004; Long & Toma, 1988) and had been shown to affect relationship choice (Skopek et al., 2011), even when controlling for homophily in gender and ethnicity (Louch, 2000). However, educational homophily only seems to play a predominant role with increasing age (Webster et al., 2018). Most studies finding this type of homophily focus, furthermore, on samples beyond university years, where the decisive factor might be whether someone attended university at all, instead of whether a fellow university student attended a certain type of secondary school. It might therefore be less surprising to detect no educational homophily in the two present cohort samples. H_2 , predicting shared demographics to influence friendships choice was hence supported with regards to the most commonly cited homophily factors *gender* and *ethnicity*.

Examining homophily with regards to the big five personality traits (Goldberg, 1999), evidence again mostly supported H_2 . Both studies found the initial friendship patterns (when participants had spent their first term together) influenced by similarities in three of the five traits (*openness*, *extraversion*, and *agreeableness*). In Study 2, there was furthermore evidence of participants scoring high on *conscientiousness* to have listed more friendships with those also scoring high on this personality trait than cohort proportions would predict. Beyond this initial cross-sectional assessment of homophily based self-segregation, Study 2 also provided evidence of homophily with regards to *openness* shaping cohort network dynamics in the short run. Participants were 1.6 times

more likely to befriend those scoring similarly on this trait within their first year as cohort members. Interestingly, a negative homophily effect was also observed in Study 2. Both in the short- and the long-run, participants listed more friendships with cohort members scoring differently to themselves on the personality trait *conscientiousness*. There was no evidence of the personality trait *neuroticism* influencing friendship choice at any stage of the network formation process in either study.

In the literature, there is evidence for homophily with regards to the three traits for which effects were found in both studies (i.e., *openness*, *extraversion*, and *agreeableness*). In research that focused on 'friendship networks among just-acquainted individuals' (Selfhout et al., 2010, p. 509) by following university students during their first year at university, Selfhout and colleagues also observed the tendency to befriend those scoring similarly on openness, extraversion, and agreeableness. Furthermore, my own previous work focusing on friendship patterns of university students also observed this same trend (Kempnich, 2016). However, the literature relating to personality homophily has yielded mixed findings. Some studies found personality homophily for just one of the traits (e.g., openness; Lee et al., 2009), others for two (e.g., extraversion and agreeableness; van Zalk & Denissen, 2015), and yet others for a slightly different trio than that those reliably observed in both of the present studies (e.g., conscientiousness, agreeableness, and extraversion; Noë et al., 2016). Overall, past research appears to converge on the notion that homophily in the three personality traits that yielded effects in the present research reliably shape university student friendship patterns. H_2 is thus mostly supported.

Exploring homophily rooted in social identities, the next aspect of H_2 stated that cohort members would show a tendency to befriend others with similar political and religious identities to themselves. This part of the hypothesis was only partially supported. In both studies, participants who identified as politically left leaning initially nominated more same-characteristic friends than cohort proportions would predict (despite already making up 54% and 62% of the cohort in studies 1 and 2, respectively). Political identity did not seem to affect friendship choice beyond this initial cross-sectional assessment of homophily-based self-segregation. Moreover, there was no evidence of *religion* influencing friendship choice at any stage of the network formation process in either study.

A political homophily effect has previously been observed in the literature on online dating and was estimated to be roughly half as large as typical ethnicity homophily effects in the same context (Huber & Malhotra, 2017). Within online networks more generally (e.g., twitter), political homophily was also observed, especially for those who considered themselves left leaning (i.e., Democrats; Colleoni et al., 2014). The present research might indicate that political identity might play a similar, albeit more minor, role in left leaning university student friendships compared to that in romantic relationships or on online platforms that might encourage exchange between politically like-minded people (Halberstam & Knight, 2016).

Previous research also observed homophily effects with regards to religion (French et al., 2012). The present research did not replicate such findings, which might be due to the majority of participants reporting that they were not religious. They might thus have

been less likely to perceive the absence of a characteristic as an important factor in their friendship choices. Furthermore, the remaining minority did not exclusively adhere to one religion (i.e., 75% and 68% out of the religious participants were Christian in studies 1 and 2 respectively). There could have hence been small, undetected homophily effects in religious subgroups (which might have instead shown up as often closely related ethnic homophily; see Phalet et al., 2013). Moreover, participants were not asked to indicate a level of religiosity so that practising and non-practising members of a certain faith could not be differentiated either. Homophily with regards to religion might thus have been difficult to detect under these circumstances. Exploring homophily with regards to social identity, there was overall only evidence for homophily with regards to friendships between those identifying as politically left leaning, hence only minimally supporting H_2 .

Examining homophily with regards to mental health (namely *depression* and *anxiety*), I found similarly little support for H_2 . There was only evidence for scores of *depression* affecting initial friendship patterns in Study 1, where more same-characteristic friendships had been formed than expected by chance. This overall finding seemed to be driven by those not diagnosed with depression (a majority of 54%) nominating more cohort members also not diagnosed with the disorder than group composition would predict. There was no evidence for depression shaping friendship patterns beyond this initial cross-sectional assessment of homophily-based self-segregation in Study 1 and none whatsoever in Study 2. Furthermore, there was no evidence of *anxiety* influencing friendship choice at any stage of the network formation process in either study.

The literature on homophily with regards to mental health tells a similar story. There is evidence of homophily with regards to depression (Hogue & Steinberg, 1995; Rosenquist et al., 2011). Similarly to the results of the present research, homophily based on depression could also be specified to mainly emerge indirectly (Schaefer et al., 2011), highlighting different mechanisms responsible for such self-segregation (e.g., people without depression preferentially seeking to befriend similar others versus people with depression simply withdrawing socially, and hence being less likely named as friends by those without the disorder and less likely to nominate friends themselves). The former (in line with the present research) was the conclusion drawn by Chee (2010) who stated that it is ‘happy [and hence likely depression-free] people [who] tend to associate with one another’ (p. 1) who drive such effects.

While homophily has been reported with regards to mental health in general (e.g., Baggio, Luisier, & Vladescu, 2016), there have been hardly any attempts at investigating homophily with regards to anxiety specifically. A recent exploration into the topic found no evidence that anxiety influenced friendship choices in a student sample (Long et al., 2020), mirroring the absence of this type of homophily in the present research. Overall, results were hence mostly congruent with the literature, attesting some support for H_2 (solely in relation to depression – or rather a lack thereof).

Finally, the last aspect of H_2 explored homophily in relation to network parameters. I predicted that cohort members would show a tendency to befriend others who are similar to themselves with regards to cohort popularity and activity as well as with regards to the quantity and quality of their relationships (with friends and family)

outside of the cohort. There was some mixed evidence in relation to this aspect of the hypothesis. Initially (i.e., after a first term together), participants of both studies listed more friendships with those scoring similarly high on both cohort popularity and cohort activity than the cohort composition would predict. In addition, participants scoring low on both cohort popularity and activity listed fewer friendships with those scoring similarly low than the cohort composition would predict. In Study 1, such a negative homophily effect (i.e., a preference for friendships with dissimilar others) could also be detected both in the short-run and the long-run for the cohort activity parameter. Similarly, a negative homophily effect could be found both in the short-run and the long-run for cohort popularity in Study 2. In addition, there was a negative cohort activity effect in the long-run in Study 2.

It hence appears as if highly popular and active participants initially sought friendships with those who were similarly popular and those who made similar efforts to actively integrate into the forming group. Less popular and active participants, in contrast, seemed to avoid befriending others like them, instead forming friendships with those more popular and more socially active than themselves. With time, this tendency to seek friendships with dissimilar others dominated with regards to both how many friendship nominations they made (i.e., cohort activity) and received (i.e., cohort popularity). This initially observed homophily matches existing literature observing similar behaviours (Dijkstra et al., 2013; Logis et al., 2013). The observed persistent preference for friendships with dissimilar others with regards to popularity and social activity has been explained elsewhere by a status paradigm, arguing that network members seek affiliation with those of higher social status while avoiding those of lower

status (Yap & Harrigan, 2015). The observed negative homophily effects could simply represent a lessening of the initial self-segregation of highly popular and active cohort members observed. Alternatively, and perhaps more probable, it could represent increasing efforts to befriend others more popular or active than oneself.

Similarity in relationships outside of the cohort boundary hardly affected friendship choices. In Study 1, participants with a large baseline ego-network (i.e., *BEN Quantity*) nominated more friends with a similar social background to themselves than cohort proportions would predict. There was no evidence for *BEN Quantity* shaping friendship patterns beyond this initial cross-sectional assessment of homophily-based self-segregation in Study 1 and none whatsoever in Study 2. Furthermore, there was no evidence of *BEN Quality* influencing friendship choice at any stage of the network formation process in either study. These ego-network parameters had been included to acknowledge that participants' social worlds extend beyond the cohort boundaries. This choice was also informed by a belief-based theory of homophily, which assumes that homophily effects stem from people's preference to reduce uncertainty about others' actions (Kets & Sandroni, 2019). Having a similar ego-network might simply make being friends easier, as participants with large families or many friends at home might share similar expectations with regards to their social role in the new cohort. The present research provided only limited support for this idea, however, so that combined with the cohort parameter results, there was overall little support for H_2 in relation to network parameters.

3.4.2 Implications, Limitations & Applications

Overall, my findings suggest that homophily happens quickly in an emerging community and that the resulting self-segregation is long lasting. I discuss the implications, limitations, and potential applications following these findings, considering how future research and institutions of higher learning can better understand and ultimately facilitate young adults' transition to university.

3.4.2.1 Implications

A major implication of the present research results from the studies' timing. Findings overall suggest that the answer to the research question (How do we integrate into a new social group?) might simply be 'rather quickly'. Participants had already formed one interconnected network after spending a single term together (i.e., within eight weeks of knowing one another). No cohort member was left entirely unconnected, and all network characteristics remained fairly stable across the transition thereafter. Likewise, participants quickly self-segregated according to the majority of the investigated homophily characteristics in both studies, with little developments occurring after the very first assessment. The slightly different timings of studies 1 and 2 could potentially have produced vastly different results but this was not the case, further suggesting that the most important developments occur early on (i.e., within participants first term). Selfhout and colleagues (2010) similarly observed that the friendship network formation process of just-acquainted university students mainly occurred during the first three months and then tended to stabilise.

It is important to note in this context that SIENA models examine network dynamics, with the first assessment serving as the status quo from which further developments

are analysed (Ripley et al., 2019). The absence of homophily effects in the short- and long-term models hence does not indicate that similarity played no role in friendship formation beyond the initial assessment, but, rather, that there was little development beyond the already existing self-segregation. Given that participants seemed to have immediately formed friendships based on similarity with regards to the majority of characteristics under consideration, it is less surprising not to have observed many additional homophily effects – there is only so much room for growth once homogeneous clusters have already been established.

These findings might hence suggest that homophily happens somewhat hastily. When initial strangers were thrown into an unfamiliar environment, they appeared to bond straightaway, with little development taking place over time, when these strangers had become one community. This interpretation is in line with the notion that an acute belongingness threat (as when entering a completely novel environment) prompts a hurried search for likeminded people facing the same social uncertainty (Schachter, 1959; Stillman & Baumeister, 2009). Living and learning in close proximity to a whole pool of such people, participants might have additionally profited from propinquity facilitating their integration attempts, so that homogeneous subgroups could form even more quickly (Marsden, 1988; Zipf, 1949). As addressed in Chapter 2, the Oxbridge context with its fairly unique college system might have provided a particularly fruitful breeding ground for strangers swiftly becoming a community (Tapper & Palfreyman, 2002). Nonetheless, my comprehensive, longitudinal approach of examining homophily in an emerging network provide findings that suggest that the frequently cited landmark

review by McPherson and colleagues (2001) might need a revision to incorporate the speed at which self-segregation appears to occur.

3.4.2.2 *Limitations*

In designing the studies, I had relied on Veenstra and colleagues' (2013) review to inform the spacing of assessments. I may therefore have underestimated the speed of these affiliation seeking efforts while overestimating the duration of the social integration process. A major limitation of the present research might thus be its inability to specify the cohort network dynamics taking place *within* participants' first term. Not requesting any time commitment from participants during term time had been a pre-condition to being allowed to carry out the research, however. I therefore had no opportunity to detail how the cohort network established at the end of participants' first term together evolved. Relatedly, the slightly different timings of Studies 1 and 2 could have produced vastly different results but this was not the case, further suggesting that the most important developments occur early on (i.e., within participants' first term). Hopefully, with the present research highlighting the need to take a more granular approach, it might become possible to invite participants to nominate cohort friendships during their first term together in future studies, perhaps in lieu of later assessments that revealed few additional network developments.

Similarly, future studies could benefit from homing in on the homophily factors reliably found to impact friendship patterns. A strength of the present research is that I was able to replicate the overall cohort network structure and the relatively static development found in Study 1 in Study 2. I was also able to replicate homophily effects for the majority of the characteristics considered (10/16 in Study 1 and 9/16 in Study 2). More

specifically, both studies showed evidence of homophily with regards to eight characteristics, namely *gender, ethnicity, openness, extraversion, agreeableness, political identity, cohort popularity, and cohort activity*. While it has been a necessary and fruitful endeavour to take a broad approach to exploring which types of homophily most govern how groups form, the robust results presented here might allow future research to discount factors that proved negligible. Future research could hence specify hypotheses informed by these present results, thereby reducing the number of possible homophily factors to consider by half (from 16 to 8).

In terms of other limitations, the friendship nomination procedure used in Study 1 could have produced networks that appeared more static than the underlying cohort dynamics actually were. Participants were shown a list of the friends they had previously nominated at each follow-up assessment. They therefore had to make a choice to actively 'drop' a former friend to have them be removed from their network. The threshold for making such a deliberate choice might be higher than that for simply forgetting to list this friend next time around (Bell et al., 2007; Neyer, 1997). Indeed, the Jaccard indices of Study 1 indicated that 87% and 89% of network ties remained static between the assessments in participants' first year. However, the models' rate parameters did indicate that sufficient network change occurred between assessments to allow meaningful modelling. Furthermore, while the recognition-based nomination procedure used in Study 2 produced more dynamic networks (denoting only 47% network stability between assessments in participants' first year), the two studies' results hardly diverged from another. Therefore, the nomination procedure might have hardly impacted findings.

Moreover, the friendship nominations and possible homophily characteristics had been recorded via self-report. The complete network approach I utilised addresses most possible limitations of this method of data collection with regards to eliciting the cohort network (Wölfer et al., 2015). However, self-assessments regarding the examined homophily characteristics might differ from objective assessments for less salient characteristics (e.g., personality, social identities, or mental health). Differentiating between “perceived, actual, and peer-rated similarity” (Selfhout et al., 2009, p. 1152) has yielded diverging results with regards to personality homophily, for instance. Studies deriving personality characteristics from social media data (Golbeck et al., 2011; Park et al., 2015) and a meta-analysis on this technique (Azucar et al., 2018) suggest another promising avenue for future research, where self-report and social media data might mutually inform one another to more accurately determine homophily effects. Youyou, Stillwell, Schwartz and Kosinski (2017), for instance, confirmed personality homophily in friendships using such a blended approach.

3.4.2.3 Applications

Lastly, the present research has some noteworthy possible applications. The social integration process of these young adults seems to occur within a mere eight weeks of first being introduced to one another and homophily appears to play a major role in the forming of a new network. Being able to specify the most crucial timespan during, and the governing forces behind, a social integration process can inform institutional initiation processes and organisational onboarding practises. Understanding that stable homogeneous sub-groups will rapidly form when a group of initial strangers are brought together and encouraged to bond without any further external input highlights the need

to focus on those newcomers who might not stand the best chances to successfully integrate under these conditions.

Any group member joining late might, for instance, struggle to enter the rapidly established static social structures and could wind up at the fringes of the community. Similarly, minorities might find themselves somewhat disadvantaged as the pool of 'others like them' is likely much smaller than that of their majority counterparts. In addition, they might perceive a heightened urgency to bond in an environment where they are 'different' to most other members. Moreover, group members might unnecessarily miss out on the many benefits connecting with diverse others can have (e.g., Wells, Fox, & Cordova-Cobo, 2016). Especially in light of the present research highlighting ethnicity and gender as particularly strong self-segregating forces, it becomes important to be conscious of such likely group formation dynamics unfolding.

Institutions of higher learning and other contexts in which a group of initial strangers frequently come together might hence profit from mindfully guiding these earliest stages of the affiliation-seeking process. Knowing that propinquity is another strong determinant of who bonds with whom, organisations could, for instance, facilitate their new members' transition by creating situations where more heterogeneous sub-groups are formed on newcomers' first day. Previous research has shown that merely seating people next to one another (determined by something as simple as alphabetical order) can result in long-lasting friendships (Segal, 1974). Furthermore, assigning incoming students to specific sub-groups during an induction event lasting a mere few hours was shown to create more diverse friendships in the cohort, at least during the first few

months of the transition (Boda et al., 2020). Employing strategies like these, organisations could take an even more active role in shaping their communities. They could encourage the exchange with and bonding of its diverse members, hence overcoming the default tendencies to immediately 'flock together' with similar others and resulting in long-lasting relationships forming an enriching community for all.

4 COPING WITH ANXIETY & DEPRESSION:

Mental Health Trajectories

Investigating students' mental health developments during the transition from school to university and examining what factors – including social network parameters – predict mental health outcomes allow us to better understand how young adults experience and, if necessary, cope with this important life event. I therefore examined the self-reported anxiety and depression scores of two consecutive undergraduate student cohorts ($n_1 = 90$ & $n_2 = 81$) in four steps, using a prospective longitudinal design. I assessed participants' baseline anxiety and depression levels (pre-move to university), examined how these change during the transition (across participants' first year as students), re-assessed participants' mental health levels post-transition (towards the end of their studies), and predicted these post-transition anxiety and depression scores with the help of baseline measures of mental health, demographics, personality traits and social network parameters. Results showed that the average participant entered university neither clinically anxious nor depressed. Self-reported mental health scores increased somewhat during participants' first year at university and beyond. During the transition itself, female participants generally reported higher anxiety and depression scores than did male participants. Towards the end of their studies, post-transition scores characterised the average participant as both mildly anxious and depressed. These post-transition scores were most reliably predicted by the respective baseline scores and the personality trait agreeableness. Combined, these results seem to indicate that mental health developments during the transition to university might be subtle, at least temporarily diverging for female and male students, and not necessarily dependent on social network parameters.

4.1 Introduction

This thesis overall investigates how young adults navigate the transition to university, which can be a challenging time that negatively affects those experiencing it (Lu, 1994). For many young people, the effects of this first major life event likely extend beyond a reshuffling of their social relationships (Briggs et al., 2012). Mental health, in particular, appears fragile during this time of change and uncertainty (Mikolajczyk et al., 2007). From a developmental point of view, most psychological disorders manifest during late adolescence/early adulthood (Jones, 2013). Developing such disorders during (but not necessarily because of) the potentially stressful transition to university might pose “a potent risk factor for a range of psychiatric problems later in [life]” (Copeland et al., 2013, p. 791) and can hence determine long term mental health trajectories.

Fortunately, stable, supportive relationships have been shown to protect, or ‘buffer’ our mental health during stressful events (Cohen & Wills, 1985). These relationships might themselves be especially fragile during this period, however, making prospective university students particularly vulnerable to developing symptoms of anxiety and depression (Taylor et al., 2014). Our changing social relationships (i.e., the ego-network developments and cohort network dynamics detailed in Chapters 2 and 3, respectively) might therefore play an important role in young people’s mental health developments during this time. And yet, few attempts have been made to link the two using a range of social network parameters.

I therefore investigate the anxiety and depression levels of students during this important life event, examining their developments, and predicting post-transition

scores. I first introduce the theoretical basis for this research (i.e., social support theory and the buffering hypothesis). I then provide an overview of the existing research on the topic, highlighting the remaining gap in the literature (a lack of prospective, longitudinal studies incorporating social network parameters alongside demographics and personality traits). Finally, I outline my approach to answering the main research question addressed in this chapter: How does the transition to university affect mental health?

4.1.1 Theoretical Background

Social support theory (Thoits, 1985) describes the benefits of relationships or social interactions, in which people fulfil helpful functions for significant others. Such social support can range from emotional, informational, tangible, and instrumental support to offering mere companionship (Schwarzer et al., 2003) and receiving social support is thought to enhance both health and well-being (Lakey & Cohen, 2000). Maintaining supportive relationships has indeed been shown to positively affect health in general (House et al., 1988) and mental health specifically (Kawachi & Berkman, 2001). Not having access to social support can instead have detrimental consequences, and has been linked to both higher overall mortality risks (Holt-Lunstad et al., 2010) and increased suicide risks (Durkheim, 1897, as cited in Berrios & Mohanna, 1990).

Social support theory crucially suggests not only that receiving social support enhances one's life directly, but also that it can actively protect us from the harmful effects of stress (Cohen & Wills, 1985). The theory emerged from the stress and coping process model (Lazarus, 1966), which aimed to explain how we cope with stress, especially when this stress is not merely physiological but psychological. While physiological stress

describes a range of physical responses to a perceived bodily threat (such as hunger, pain, or sleep deprivation), psychological stress instead refers to internal responses to a perceived social threat (such as being ostracised, failing at a task, or receiving negative evaluations from others; Kogler et al., 2015). In this context, social support is understood as a moderator – or buffer – between such social stressors and their potentially detrimental effects on health (Cassel, 1974; Cobb, 1976).

This understanding of social support as a protective mechanism resulted in the formulation of the buffering hypothesis (Cohen & Wills, 1985) and might be particularly relevant to young adults facing the transition to university. The buffering hypothesis proposes that social support can, under certain conditions, protect (or “buffer”) individuals from the harmful effects of stressful situations (e.g., challenges related to moving away from home for the first time and to entering a novel environment). For this buffering process to take place, the social resources available to cope with a stressor must first be assessed by the individual experiencing stress, and must then be actively drawn upon as the situation unfolds. The positive buffering effects of social support hence depend on both perceived and actually provided social support (Wilcox & Vernberg, 1985).

While our theoretical understanding of the buffering hypothesis can still be further refined (see Lakey & Cohen, 2000), decades of research have repeatedly provided support for the moderating effects of social support on mental health during stressful times (e.g., Jackson, 1992; Kawachi & Berkman, 2001; Raffaelli et al., 2013; Wilcox, 1981). During the transition to university, this hypothesis hence predicts that those who

have more supportive relationships generally cope better with this supposedly stressful life event (and hence report lower levels of anxiety and depression) than those who seemingly face it with less support. I therefore investigate how mental health develops during this time to then test if and how social support can explain mental health outcomes post-transition.

4.1.2 Investigating mental health developments during the transition to university

When investigating mental health in relation to the transition to university, focusing on the most relevant aspects of students' mental health is key. Major depressive disorder (MDD) is the most prevalent mental illness in young adults (Kessler et al., 2003; Kessler & Walters, 1998), and is especially common in university students (Weitzman, 2004). Generalised anxiety disorder (GAD) is highly comorbid with depression and also affects university students more than other young adults (Eisenberg et al., 2007). Matar Boumosleh and Jaalouk (2017), for instance, found that approximately 25% of university students reported being anxious while approximately 20% reported being depressed. These prevalence rates are indeed much higher than those of 5-6% reported for GAD (Hinz et al., 2017; Löwe et al., 2008) and 5-9% reported for MDD (Kocalevent et al., 2013; Martin et al., 2006) in the general population. Hence, Bayram and Bilgel (2008, p. 667) rightfully consider these "high prevalence of depression, anxiety and stress symptoms among university students [...] alarming". These two mental disorders therefore appear vital to monitor during this transition.

When focusing on the development of anxiety and depression symptoms during this life event and beyond, it is crucial to take a prospective and longitudinal approach that

considers a range of possible outcome predictors (i.e., demographic, personality, and social network characteristics). These elements have rarely all been combined, however.

A lack of longitudinal studies has been acknowledged and tackled in a study assessing university student mental health levels two years apart (Zivin et al., 2009). It found that baseline anxiety or depression scores could reliably predict respective outcome scores. However, the initial assessment had taken place in the middle of students' first semester, when a "variety of stresses associated with moving, settling into a routine, or preparing for [...] exams and projects' had already been faced" (Eisenberg et al., 2007, p. 535, describing the baseline data analysed in Zivin et al., 2009). This study was therefore not prospective and did not allow the researchers to determine whether pre-transition mental health levels explain post-transition levels. Furthermore, it only considered one type of predictor alongside mental health scores (i.e., demographics).

A later study by Farrer and colleagues (2016) did include both demographic and psychological predictors of GAD and MDD in a sample of university students, but only assessed participants once. This study produced some interesting insights, as female students as well as those who moved away from home to attend university were shown to be at a higher risk of developing symptoms of either disorder than male students or those who attended university in their hometown. However, due to its cross-sectional design, it is impossible to know students' mental health levels before they started university and hence also to observe any development over the course of their studies.

Lastly, Bolger and Eckenrode (1991) highlighted the importance of jointly considering baseline mental health levels, demographics, personality traits, and social support to determine which factors impact mental health in relation to stressful life events. However, few studies include such a range of possible predictors. Instead, there is mostly evidence of each type of predictor individually affecting university students' mental health.

In terms of demographics, gender and ethnicity have been repeatedly related to students' mental health (e.g., Gratch, Bassett, & Attra, 1995). Female students were shown to be more likely to develop GAD than their male counterparts, for instance (Farrer et al., 2016). When considered alongside social support, female students' mental health was furthermore found to be more dependent on social support than that of male students (Verger et al., 2009). Ethnic minority students also reported higher anxiety scores in one study exploring student experience at a North American university (Patterson et al., 2019). Other studies also investigating US university students' mental health, however, found the opposite with ethnic minorities reporting lower levels of mental disorders than their majority counterparts (Chen et al., 2019). These differences could have been due to a higher reluctance of minority students to self-report symptoms (especially as similar rates of past-year suicide attempts had been observed), although it is unclear why that would not have similar applied in Patterson and colleagues' (2019) study. Nonetheless, both studies identify ethnicity as an important characteristic to consider.

Personality traits have also been identified as important predictors of mental health in general (Bienvenu et al., 2004), and in relation to undergraduate students specifically (Tosevski et al., 2010). Neuroticism has repeatedly been shown to be negatively associated with students' mental health (Jafarnejad et al., 2005; Lewis & Cardwell, 2020; Lu, 1994; Wang & Miao, 2009). Higher levels of this personality trait were also linked to less perceived social support (Russell et al., 1997) and more perceived loneliness (Stokes, 1985). Extraversion and Openness (Jafarnejad et al., 2005), Conscientiousness (Lewis & Cardwell, 2020) and Agreeableness (Shi, Liu, et al., 2015) have, in contrast, been shown to be positively associated with the mental health of university students.

Finally, as explained by social support theory and the buffering hypothesis, social support has also been linked to students' anxiety and depression levels during the transition from high school to university (Taylor et al., 2014). In a recent cross-cultural test of the buffering hypothesis with over 3,000 university student participants, social support was shown to moderate the impact of depressive symptoms on suicide ideation (Siegmann et al., 2018). Even within the context of unusually high stress levels, such as the current pandemic, social support has been shown to positively affect university students' mental health (Cao et al., 2020).

While social support has been repeatedly shown to buffer against the stresses involved in adapting to university, less is known about how specific social network parameters affect students' anxiety and depression levels. The perceived social support provided by a student's entire ego-network as well as that offered by a central subset of this network (i.e., the closest family members and friends) have been shown to act as such a buffer (Raffaelli et al., 2013). The perceived quality of social relationships has furthermore been

shown to directly predict students' anxiety and depression levels during this transition (Taylor et al., 2014). The quantity and quality of ego-networks hence appear relevant to predicting students' mental health outcomes.

A person's 'degree of integration in a large social network' (Cohen & Wills, 1985, p. 310) additionally seems to play an important role in buffering against the stress of the transition to university and can be captured with complete/cohort network parameters. Friendships with fellow students have been shown to positively affect students' mental health (Steven Lee & Goldstein, 2016). Both high levels of cohort popularity (i.e., the number of friendship nominations received) and low levels of cohort activity (i.e., the number of friendship nominations made, termed 'gregariousness' in the study) have been linked to heightened cortisol levels, which are associated with higher stress (Kornienko et al., 2013). Popularity has also been shown to affect depressive symptoms directly, albeit in different directions for male and female students (Kornienko & Santos, 2014). While higher levels of popularity were negatively related to depressive symptoms for male students, perhaps surprisingly, the opposite relationship was observed for female students. How much we are actually included by, and how actively we are integrated into, a self-bounded group hence seem to be important predictors of students' mental health outcomes.

A recent systematic review examined studies using either ego-network or complete/cohort network analyses in relation to university students' health (Patterson & Goodson, 2019). However, the final sample of this review spanning 33 years only comprised fifteen studies. Eleven of these explored substance abuse (drinking

behaviour, smoking, or drugs), six investigated sexual, dating, or aggressive behaviours, and only two explicitly focused on mental health (stress and homesickness). Other previous research has also linked social network parameters to the university student experience, but tended to focus on their impact on academic attainment, rather than mental health (e.g., Stadtfeld et al., 2019). Patterson and Goodson (2019) thus highlight the need for studies investigating how social network parameters relate to university students' depression and anxiety levels and hence confirm that there remains a gap in the literature.

4.1.3 The present research

To address this gap, I chose to answer this chapter's research question (How does the transition to university affect mental health?) with a prospective, longitudinal approach that considers a relevant range of mental health outcome predictors, as described in the four steps below.

I first established students' baseline anxiety and depression levels in order to be able to determine whether these increase during the transition to university and whether they contribute to post-transition anxiety and depression levels. This first step is crucial as it allows differentiating the effects of the transition itself on students' mental health from student populations perhaps generally reporting higher levels of anxiety and depression than the general population (Eisenberg et al., 2007). Likewise, this step allows determining whether post-transition mental health outcomes are explained by the other investigated predictors if baseline levels are controlled for (Wadsworth et al., 2003). This prospective approach is hence vital to avoid misinterpreting results, which

can occur when high levels of anxiety and depression are attributed to the transition without checking whether baseline levels were already high (Colman et al., 2007).

I then observe any developments in students' mental health during the transition. In this second step, I define 'the transition' as lasting until the end of students' first year at university. This timeframe has been previously indicated as being particularly stressful (Verger et al., 2009) and "a particularly vulnerable period of adjustment for students" (Farrer et al., 2016, p. 247). It is hence most advisable to closely monitor students' mental health during this period. This longitudinal approach allows determining whether anxiety and depression symptoms increase during the transition and specifying when such increases occur.

In step three, I consider post-transition mental health scores, collected when students were nearing the end of their time as undergraduate students. These 'transition outcomes' are compared to the baseline scores to determine whether any mental health developments observed during the transition were mainly temporary or represented enduring trends. While the former would suggest that anxiety and depression levels return to the baseline after a perhaps somewhat turbulent first year of finding one's feet, the latter might indicate that the transition to university can have a longer lasting impact on students' mental health.

Throughout steps one to three, I furthermore differentiate between female and male students' self-reported anxiety and depression levels. Women might be more prone to internalised mental health disorders like anxiety and depression in general (Rosenfield

& Mouzon, 2013), and such gender differences might be especially relevant during the transition to university (Gao et al., 2019; Zuckerman, 1989). One might hence expect female students to report more symptoms than male students during this challenging time.

In the fourth and final step, I considered a range of relevant predictors, as indicated by the reviewed literature, as possible explanations of post-transition mental health outcomes. Alongside baseline anxiety and depression scores (Zivin et al., 2009), I consider students' gender (Gao et al., 2019) and ethnicity (Chen et al., 2019; Gratch et al., 1995) together with the big five personality traits (Tosevski et al., 2010). Finally, social support appears to play an especially important role in how students cope with adapting to university (Taylor et al., 2014). To capture levels of perceived social support, I included the size of student's ego-network overall, the size of its very core (i.e., the support clique, see Chapter 2 and Dunbar & Spoors, 1995), and the perceived emotional closeness to all ego-network members (as a proxy of social support quality). To also capture levels of actual social support and integration, I furthermore considered cohort popularity (i.e., the number of times fellow cohort members named a student as a friend) and cohort activity (i.e., the number of cohort friends students listed; Kornienko et al., 2013).

4.1.3.1 Hypotheses

Based on the reviewed literature, the following three hypotheses (*H*) are tested:

*H*₁ – Anxiety and depression levels will increase during the transition (i.e., from the baseline to the end of students' first year) and remain increased post-transition (i.e., when students are nearing the end of their undergraduate studies).

*H*₂ – Anxiety and depression levels of female students will be higher than those of male students throughout (i.e., at baseline, during, as well as post-transition).

*H*₃ – Post-transition, higher levels of anxiety and depression will be reported by those who 1) reported higher baseline anxiety and depression levels, 2) are female and from ethnic minorities, 3) scored higher on neuroticism and lower on openness, conscientiousness, agreeableness, and extraversion, 4) have larger, emotionally closer ego-networks, and 5) are popular and socially active in their college cohort.

4.2 Methods

4.2.1 Design

I conducted two studies (Study 1 & Study 2) to observe the changes in reported anxiety and depression levels taking place during the transition from home/school to university and to predict these levels post-transition. Study 1 comprised one baseline assessment (T0), three assessments (T1-3) during participants' first year at university, and a final assessment (T4) post-transition. Study 2 also comprised one baseline assessment (T0), two assessments (T1&2) during participants' first year at university (administered after

the first two terms), and a final assessment (T3) post-transition. In addition, participants in this second study also reported their anxiety and depression levels during each term of their first year (i.e., T0.5, T1.5 & T2.5). Study 2 hence comprised a total of seven assessments, three of which were congruent with those in Study 1 (i.e., T0-T2). The reasons for these timing differences have already been explained in Chapter 2. The number and placement of the studies' assessments are depicted in Figure 4.1.



4

Figure 4.1 Overview of the studies' design: T0-T2 are directly comparable between studies. In Study 1, T3 took place three months later, while T4 took place 2.5 years after the baseline assessment (T0); in Study 2, T3 instead occurred 1.5 years after the baseline assessment (T0). While these assessments all took place outside of term time, Study 2 comprises three further assessments taken during each of the three terms making up participants' first year at university (T0.5, T1.5 and T2.5).

4.2.2 Participants

As detailed in Chapter 2, 90 of 121 (74%) incoming students (41 women and 49 men) agreed to participate in Study 1. There was a retention rate of 100% across participants' first year (T0-T3) and 80 students (89%) completed the final assessment (T4). In Study 2, 84 of the 118 (71%) incoming students of the consecutive cohort agreed to participate. There was a retention rate of 96%. In the remaining sample of 81 participants, 41 were women and 40 were men.

4.2.3 Materials

Both Study 1 and 2 comprised one online questionnaire per assessment, consisting of different sections. Only the sections relevant to answering the research question of this chapter – How does the transition to university affect mental health? – are detailed. The complete questionnaires can be found in Appendices A & B.

4.2.3.1 Mental Health – anxiety & depression

Participants were asked to fill out the GAD-7 made up of seven items (Spitzer et al., 2006) and the PHQ-9 made up of nine items (Kroenke & Spitzer, 2002). Response options for both scales were given on a 4-point scale ranging from *not at all (0)* to *nearly every day (3)*. These measures were used to assess generalised anxiety disorder and depression, respectively. Reliability and validity have been confirmed for both the GAD-7 (Hinz et al., 2017; Löwe et al., 2008) and the PHQ-9 (Kocalevent et al., 2013; Kroenke et al., 2001; Martin et al., 2006). Both measures were included in each assessment to capture the potential fluctuations in mental health participants likely experienced during the transition to university (Lu, 1994).

4.2.3.2 Demographic information, personality traits, and network parameters

Participants were asked to supply their age, gender and ethnicity. Participants were also asked to fill out the Mini-IPIP (Donnellan, Oswald, Baird, & Lucas, 2006). This big five personality assessment uses a 5-point scale ranging from *very inaccurate (1)* to *very accurate (5)* and has been shown to provide reliable results (Baldasaro et al., 2013). These measures were only included once, during the baseline assessment.

Finally, participants were asked to list their baseline ego-network (BEN; i.e., all family members and friends prior to moving to Oxford) and to rate the perceived emotional

closeness to each member on a scale ranging from 1 to 10 (both based on Roberts & Dunbar, 2011). The latter serves dually, once to indicate perceived social support (Kaul & Lakey, 2003) and once to identify participants' support clique (i.e., those who received the highest emotional closeness ratings of 9 or 10; see Binder et al., 2012, who identified core ties as those with emotional closeness ratings above 8).

These ego-network parameters were complemented by two cohort network parameters: college cohort popularity and activity. The former can be ascertained via parameter 'indegree' (i.e., the number of friendship nominations received from fellow participants). The latter can be determined via cohort network parameter 'outdegree' (i.e., the number of friendship nominations made within the cohort). Both measures have been shown to be associated with students' stress levels and hence likely impact mental health (Kornienko et al., 2013). Both ego and cohort network parameters were measured at each assessment.

4.2.4 Procedure

Participants completed an online questionnaire at each assessment. Most questionnaires were extensive (taking between 30 and 90 minutes to complete, depending on the number of network members listed). Participants were hence reassured that it was not necessary to complete them in one session, they were encouraged to take breaks, and sent occasional reminders.

4.2.5 Analyses

4.2.5.1 Investigating anxiety & depression levels before the transition

To examine how students' mental health changes during the transition to university, I first established the mental health baseline for each cohort (capturing the proportion of

participants whose GAD-7 and PHQ-9 scores classified them as suffering from no, mild, moderate, or severe anxiety and depression, respectively). I therefore computed sum scores across the number of items for each scale. The scale score of the GAD-7 can range from 0 to 21, while that of the PHQ-9 can range from 0 to 27. Based on the recommendations from the developers of the two scales, cut points of 5, 10, and 15 respectively represented the thresholds for mild, moderate, and severe levels of anxiety on the GAD-7 (Spitzer et al., 2006) and depression on the PHQ-9 (Kroenke & Spitzer, 2002). In addition, I also compared the baseline mental health scores of female and male participants via independent t-tests to determine if gender differences were present before the move to university took place.

4.2.5.2 Investigating anxiety and depression levels developments during the transition

To trace developments in anxiety and depression scores across participants' first year at university, I used a 2 (gender) x 4/6 (assessments for studies 1 and 2, respectively) mixed measures analyses of variance (ANOVA). This choice of analysis was made to determine whether female and male students' mental health scores developed differently. If Mauchly's test indicated that assumptions of sphericity were violated, Greenhouse-Geisser corrections were used. For all post-hoc tests specifying differences, Bonferroni corrections were used.

4.2.5.3 Investigating anxiety and depression levels post-transition

To examine whether students' mental health levels after the transition were significantly different from the baseline (i.e., before participants became university students), I first established their post-transition anxiety and depression scores. I then compared these to the baseline scores via paired t-tests. I also compared the post-

transition scores of female and male participants via independent t-tests to determine if gender differences were present towards the end of participants' time at university.

4.2.5.4 *Predicting anxiety & depression levels post-transition*

There were fourteen possible predictors of post-transition (i.e., at T4 in Study 1 and at T3 in Study 2) mental health scores: *baseline anxiety*, *baseline depression*, *gender*, *ethnicity*, *openness*, *conscientiousness*, *extraversion*, *agreeableness*, *neuroticism*, *baseline ego-network [BEN] quantity* (i.e., the number of friends and family from home), *BEN quality* (i.e., the perceived emotional closeness to these members), *BEN support clique size* (i.e., the number of core members given the highest emotional closeness ratings of 9 or 10), *cohort popularity* (i.e., the number of cohort friendship nominations received), and *cohort activity* (i.e., the number of cohort friendship nominations made).

While some have argued that two participants per predictor is sufficient to yield an “accurate estimation of linear regression models” (Austin & Steyerberg, 2015, p. 634), others proposed more stringent guidelines of 10 (Harrell et al., 1984, 1996), 15 (Pedhazur, 1997), and even 50 (Steyerberg et al., 2000) participants per predictor. More recently, 20 participants per predictor were recommended as a reasonable rule of thumb (Austin & Steyerberg, 2017). I therefore selected this limit to keep the risk of overfitting low. If both studies ($n_1 = 80$ & $n_2 = 81$ during the final assessment) were analysed separately, this upper limit would already be reached with four predictors. If studies were instead combined ($n = 161$), up to eight predictors could keep the risk of overfitting relatively low. This approach was therefore preferable, especially given the exploratory nature of these final analyses.

For each study, I conducted separate simple regressions for each predictor to determine whether they had an individual impact on participants' anxiety and depression scores post-transition (i.e., towards the end of participants' third or second year at university for studies 1 and 2, respectively). These are reported in Appendix C (see Table 6.1 and Table 6.2 for Study 1 and 2, respectively). For the analyses combining both studies, I selected the predictors that had been shown individually to explain post-transition mental-health scores in at least one study. Having verified that there were no major differences between the studies (via independent t-tests, see Appendix C, Table 6.3), I conducted multiple linear regressions with the selected predictors. This approach yielded six predictors in the combined anxiety model (*baseline anxiety, baseline depression, openness, conscientiousness, agreeableness, neuroticism*) and seven in the combined depression model (*baseline anxiety, baseline depression, conscientiousness, agreeableness, neuroticism, BEN quality, BEN support clique size*). Finally, 'study' was added as a predictor, resulting in a total of seven and eight predictors in the anxiety and depression models, respectively (hence staying within the imposed limit of no more than eight predictors).

I confirmed that all assumptions for both models were met. For the anxiety model, an analysis of standard residuals was carried out, which showed that the data contained no outliers (Std. Residual Min = -2.31, Std. Residual Max = 2.99). Tests to see if the data met the assumption of collinearity indicated that multicollinearity was not a concern (Study, Tolerance = .97, VIF = 1.03; Baseline Anxiety, Tolerance = .54, VIF = 1.86; Baseline Depression, Tolerance = .63, VIF = 1.58; Openness, Tolerance = .91, VIF = 1.10; Conscientiousness, Tolerance = .87, VIF = 1.15; Agreeableness, Tolerance = .88, VIF =

1.13; Neuroticism, Tolerance = .59, VIF = 1.68). The data also met the assumption of independent errors (Durbin-Watson value = 2.15). The histogram of standardised residuals indicated that the data contained approximately normally distributed errors, as did the normal P-P plot of standardised residuals, which showed points that were not completely on the line, but close. The scatterplot of standardised residuals showed that the data met the assumptions of homogeneity of variance and linearity. The data also met the assumption of non-zero variances (Study, Variance = 0.25; Baseline Anxiety, Variance = 12.00; Baseline Depression, Variance = 15.06; Openness, Variance = 4.66; Conscientiousness, Variance = 8.43; Agreeableness, Variance = 7.28; Neuroticism, Variance = 11.05).

For the depression model, an analysis of standard residuals was also carried out, which showed that the data contained four outliers, which needed to be removed. The repeated analysis showed that the data no longer contained outliers (Std. Residual Min = -2.56, Std. Residual Max = 3.05). Tests to see if the data met the assumption of collinearity indicated that multicollinearity was not a concern (Study, Tolerance = .86, VIF = 1.16; Baseline Anxiety, Tolerance = .52, VIF = 1.94; Baseline Depression, Tolerance = .62, VIF = 1.62; Conscientiousness, Tolerance = .88, VIF = 1.14; Agreeableness, Tolerance = .85, VIF = 1.17; Neuroticism, Tolerance = .58, VIF = 1.73; BEN Quality, Tolerance = .70, VIF = 1.43; BEN Support Clique Size, Tolerance = .72, VIF = 1.39). The data furthermore met the assumption of independent errors (Durbin-Watson value = 1.97). The histogram of standardised residuals indicated that the data contained approximately normally distributed errors, as did the normal P-P plot of standardised residuals, which showed points that were not completely on the line, but close. The

scatterplot of standardised residuals showed that the data met the assumptions of homogeneity of variance and linearity. The data also met the assumption of non-zero variances (Study, Variance = 0.25; Baseline Anxiety, Variance = 11.93; Baseline Depression, Variance = 15.33; Conscientiousness, Variance = 8.55; Agreeableness, Variance = 7.00; Neuroticism, Variance = 11.12; BEN Quality, Variance = 1.41; BEN Support Clique Size, Variance = 12.88).

4.3 Results

To better understand how the transition to university affects students' mental health both as it unfolds and in the longer-term, I first present self-reported baseline scores (T0) and their development until the end of participants' first year at university (T0-3/2). I then present self-reported post-transition scores in participants' third (second) year at T4 (T3) and predict these using multiple regressions. To aid the reader, I group results within these steps by mental disorder, so that both studies' anxiety and depression results are directly comparable.

4.3.1 Baseline bliss or blues? – mental health before the transition

In Studies 1 and 2, respectively, participants reported anxiety scores of 4.10 ($SD = 3.34$) and 4.04 (3.62). These scores indicate that the average participant in both studies entered university reportedly not being clinically anxious, as scores fell below the cut point for even mild anxiety of 5 (Kroenke & Spitzer, 2002; Spitzer et al., 2006). Splitting participants' scores into diagnoses of no (<5), mild (5-9), moderate (10-14), and severe (15+) anxiety confirmed that the majority of students' anxiety scores (60% for Study 1 and 64% for Study 2) fell below the clinically relevant range at T0 (see Figure 4.2). Splitting participants by gender, I found that female participants in Study 1 reported a

mean anxiety score of 4.73 (3.54), which was not significantly higher than the mean anxiety score of 3.59 (3.11) reported by male participants in that study, $t_{(87)} = 1.61, p = .112$. Similarly, female participants in Study 2 reported a mean anxiety score of 4.58 (3.86), which was also not significantly higher than the mean anxiety score of 3.51 (3.35) reported by male participants in that study, $t_{(79)} = 1.33, p = .189$.

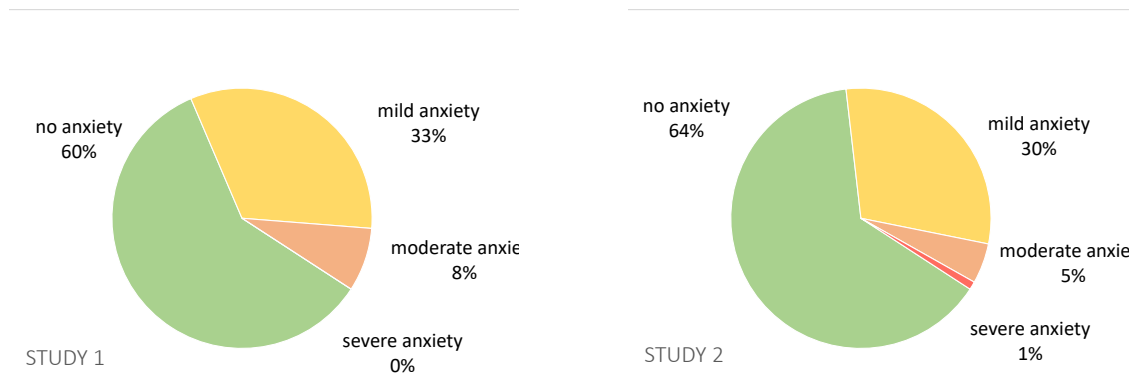


Figure 4.2 Baseline (T0) self-reported anxiety

Participants in Studies 1 and 2 reported depression scores of 4.80 (4.30) and 4.14 (3.47), respectively. These scores indicate that the average participant entered university reportedly not being clinically depressed either, as scores fell below the cut point for even mild depression of 5 in both studies. Splitting participants' scores into diagnoses of no (<5), mild (5-9), moderate (10-14), and severe (15+) depression confirmed that the majority of students' scores (63% for Study 1 and 68% for Study 2) fell below the clinically relevant range at T0 (see Figure 4.3). Splitting participants by gender once more, female participants in Study 1 reported a mean depression score of 4.30 (4.42), which was not significantly lower than the mean depression score of 5.20 (4.21) reported by male participants in that study, $t_{(87)} = -0.99, p = .327$. Similarly, female participants in Study 2 reported a mean depression score of 4.60 (3.59), which was not

significantly higher than the mean depression score of 3.68 (3.34) reported by male participants, $t_{(79)} = 1.19, p = .237$.

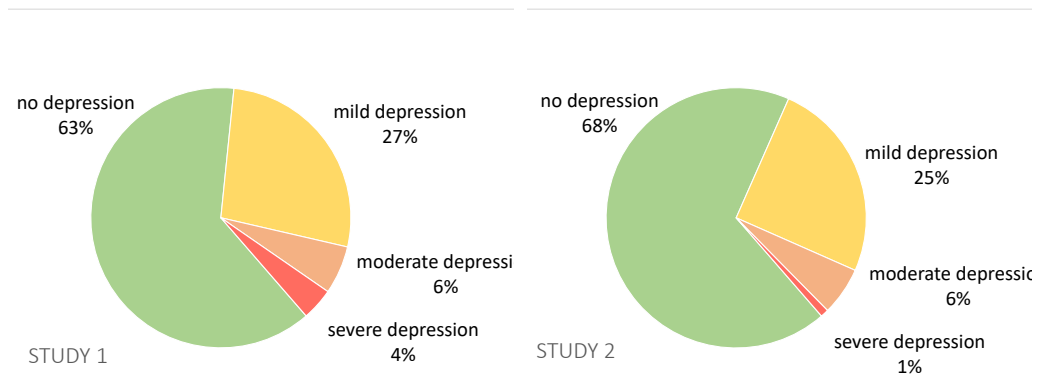


Figure 4.3 Baseline (T0) self-reported depression

4.3.2 Up one minute, down the next? – mental health during the transition

I conducted 2 (gender) x 4/6 (time) mixed measures ANOVAs to examine changes in participants' reported anxiety and depression scores during the transition from home to the end of the first year at university in Study 1/2.

Examining reported anxiety scores in Study 1, I found main effects of both gender ($F_{(1, 86)} = 7.19, p = .009, \eta^2 = .077$) and time ($F_{(2.72, 234.15)} = 5.00, p = .002, \eta^2 = .055$). Female participants reported higher anxiety scores ($M_F = 5.99, SD_F = 0.52$) than male participants did ($M_M = 4.13, SD_M = 0.46$). In addition, reported anxiety scores at the end of participants' first year at university ($M_{T3} = 5.97, SD_{T3} = 0.54$) were higher than they had been prior to the move at baseline ($M_{T0} = 4.13, SD_{T0} = 0.36, p = .004$). There was no statistically significant interaction between gender and time, $F_{(2.72, 234.15)} = 1.19, p = .315, \eta^2 = .014$. Thus, female and male participants' scores did not develop differently over time (see Figure 4.4, Study 1). Remaining comparisons revealed no further differences.

Examining reported anxiety scores in Study 2, I also found a main effect of gender ($F_{(1, 79)} = 9.14, p = .003, \eta^2 = .104$). Female participants reported higher anxiety scores ($M_F =$

5.31, $SD_F = 0.54$) than male participants did ($M_M = 3.04$, $SD_M = 0.53$). There was neither a main effect of time ($F_{(3.86, 304,53)} = 1.76$, $p = .139$, $\eta^2 = .022$), nor a statistically significant interaction ($F_{(3.86, 304,53)} = 1.74$, $p = .143$, $\eta^2 = .022$). Thus, while female and male participants' scores differed from one another, there was no overall development in reported anxiety levels during the transition to university in Study 2 (see Figure 4.4, Study 2).

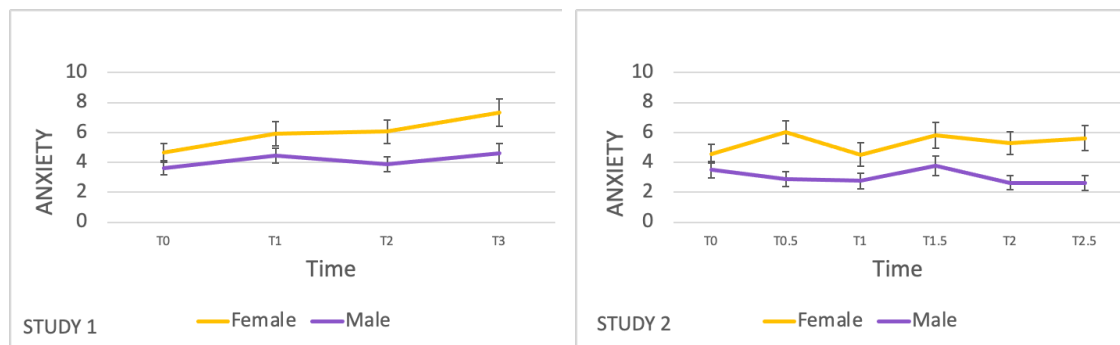


Figure 4.4 Self-reported anxiety levels during the transition to university

Examining reported depression scores in Study 1, I found no main effects, either of gender ($F_{(1, 87)} = 0.12$, $p = .733$, $\eta^2 = .001$), or of time ($F_{(3, 261)} = 2.57$, $p = .055$, $\eta^2 = .029$). There was a statistically significant interaction between gender and time, however ($F_{(3, 261)} = 4.47$, $p = .004$, $\eta^2 = .049$). Thus, female and male participants' scores developed differently over time in this study (as specified below), even if depression scores as a whole did not change significantly (see Figure 4.5, Study 1). There were no statistically relevant differences between the genders' depression scores when these were compared via univariate tests at every assessment (T0: $F_{(1, 87)} = 0.97$, $p = .327$, $\eta^2 = .011$; T1: $F_{(1, 88)} = 0.73$, $p = .394$, $\eta^2 = .008$; T2: $F_{(1, 88)} = 0.84$, $p = .362$, $\eta^2 = .009$; T3: $F_{(1, 88)} = 3.14$, $p = .080$, $\eta^2 = .034$). However, while there was no statistically significant effect of time on depression scores for male participants ($F_{(2.58, 123.83)} = 0.61$, $p = .586$, $\eta^2 = .013$), there was one for female participants ($F_{(2.41, 94.14)} = 5.14$, $p = .005$, $\eta^2 = .116$). Pairwise-

comparison showed that reported depression scores at the end of female participants' first year at university ($M_{T3} = 7.08, SD_{T3} = 0.97$) were higher than they had been prior to the move at baseline ($M_{T0} = 4.30, SD_{T0} = 0.70, p = .004$). Remaining comparisons revealed no further differences.

Examining reported depression scores in Study 2, I found main effects of both gender ($F_{(1, 79)} = 5.20, p = .025, \eta^2 = .062$) and time ($F_{(4.24, 335.24)} = 4.35, p = .002, \eta^2 = .052$). Female participants' reported depression scores ($M_F = 6.10, SD_F = 0.62$) that were overall higher than those reported by male participants ($M_M = 4.10, SD_M = 0.62$). Moreover, reported depression scores during participants' first ($M_{T0.5} = 5.61, SD_{T0.5} = 0.54$) and second ($M_{T1.5} = 5.85, SD_{T1.5} = 0.55$) term at university were higher than they had been prior to the move at baseline ($M_{T0} = 4.14, SD_{T0} = 0.39, \text{both } ps = .005$). There was no statistically significant interaction between gender and time, $F_{(4.24, 335.24)} = 1.00, p = .412, \eta^2 = .012$. Female and male participants' scores hence did not develop differently over time in this study (see Figure 4.5, Study 2). Remaining comparisons revealed no further differences.

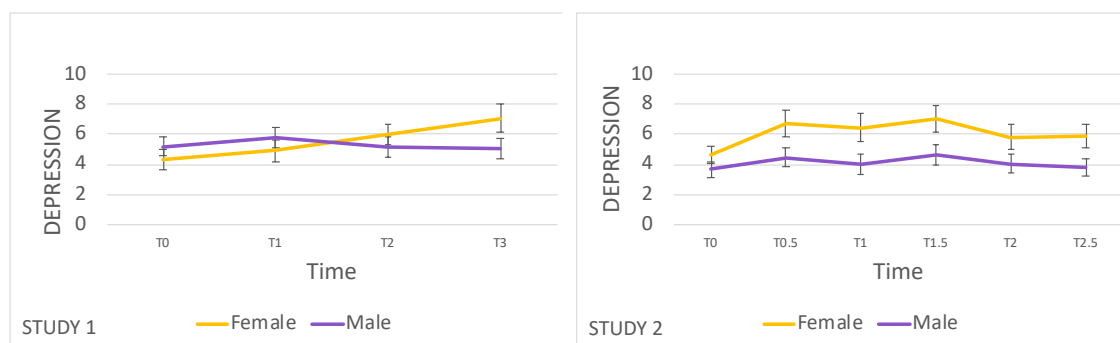


Figure 4.5 Self-reported depression levels during the transition to university

4.3.3 Was it the best of times, or the worst of times? – mental health post-transition

To better understand students' mental health levels post-transition, it is important to first assess participants' anxiety and depression scores towards the end of their time as

undergraduate students (i.e., in participants' third year at T4 for Study 1 and in their second year at T3 in Study 2). I therefore first present the mental health outcomes before examining what factors best predict these.

In Study 1, participants overall reported anxiety scores of 5.67 (4.92) towards the end of their third year (T4). These were significantly higher than those of 4.09 (3.31) reported at baseline ($t_{(78)} = -2.81, p = .006$). Splitting participants by gender once more, I found that female participants reported a mean anxiety score of 6.47 (5.76), which was not significantly higher than the mean anxiety score of 5.02 (3.99) reported by male participants, $t_{(78)} = 1.28, p = .206$.

In Study 2, participants overall reported anxiety scores of 4.73 (4.20) towards the end of their second year (T3). These scores did not significantly differ from those of 4.04 (3.62) reported at baseline ($t_{(79)} = -1.72, p = .090$). Similarly to Study 1, female participants reported a mean anxiety score of 5.48 (4.59), which was also not significantly higher than the mean anxiety score of 4.00 (3.70) reported by male participants, $t_{(79)} = 1.59, p = .115$.

In both studies, splitting participants' scores into diagnoses of no (<5), mild (5-9), moderate (10-14), and severe (15+) anxiety showed that the majority of students' scores (55% in Study 1 and 59% in Study 2) still fell below the clinically relevant range post-transition (see Figure 4.6).

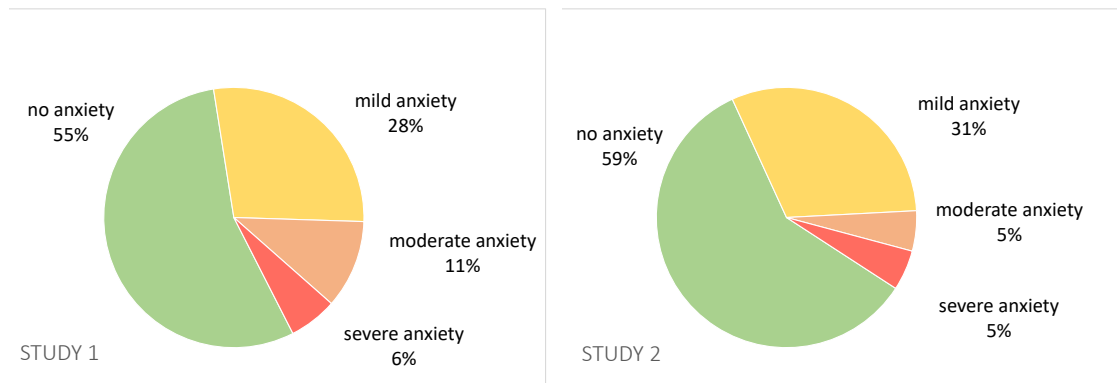


Figure 4.6 Post-transition (i.e., T4/3) self-reported anxiety levels

In Study 1, participants reported depression scores of 5.44 (4.75) towards the end of their third year (T4). These scores did not differ statistically from those of 4.65 (4.26) reported at baseline ($t_{(78)} = -1.56, p = .124$). Splitting participants by gender, I found that female participants reported a mean depression score of 5.75 (5.30), which was not significantly higher than the mean depression score of 5.27 (4.28) reported by male participants, $t_{(78)} = 0.45, p = .657$.

In Study 2, participants reported depression scores of 6.25 (5.33) towards the end of their second year (T3). These scores were significantly higher than those of 4.14 (3.47) reported at baseline ($t_{(79)} = -3.99, p < .001$). Similarly to Study 1, female participants reported a mean depression score of 6.83 (5.07), which was not significantly higher than the mean depression score of 5.68 (5.57) reported by male participants, $t_{(79)} = 0.96, p = .338$.

In both studies, these post-transition scores indicate that while the average participant entered university reportedly not being clinically depressed, they approached the end of their studies reportedly mildly depressed (i.e., with a score above the cut point of 5). Splitting participants' scores into diagnoses of no (<5), mild (5-9), moderate (10-14), and severe (15+) depression showed that, post-transition, while the majority of students'

scores still fell below the clinically relevant range in Study 1 (55%), this was no longer the case in Study 2 (47%, see Figure 4.7).

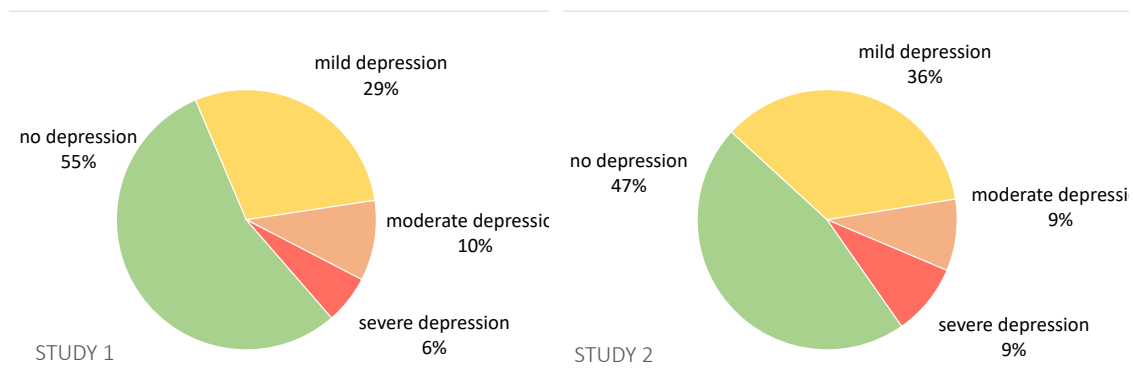


Figure 4.7 Post-transition (i.e., T4/3) self-reported depression levels

4.3.4 All's well that ends well? – predicting mental health outcomes

Using the enter method, I next conducted a multiple regression to identify which factors predicted participants' anxiety scores post-transition. This analysis combined both studies ($n = 161$) and included the following seven predictors: *study*, *baseline anxiety*, *baseline depression*, *openness*, *conscientiousness*, *agreeableness*, *neuroticism*. The resulting model overall explained a significant amount of the variance (31%) in the reported anxiety scores towards the end of participants' time as undergraduate students ($F_{(7, 159)} = 9.64, p < .001, R^2 = .31, R^2_{Adjusted} = .28$). Upon examining each predictor's individual impact to this overall model, four predictors – *baseline anxiety*, *openness*, *agreeableness*, and *neuroticism* – significantly explained the outcome (see Table 4.1).

Table 4.1 Multiple regression model of anxiety scores post-transition

Predictor	b (SE)	β	p
Constant	12.56 (3.56)		.001
Study (1 or 2)	-1.09 (0.63)	-.12	.084
Baseline anxiety	<i>0.44 (0.12)</i>	<i>.33</i>	<i><.001</i>
Baseline depression	0.07 (0.10)	.06	.487
Openness	<i>-0.39 (0.15)</i>	<i>-.19</i>	<i>.010</i>
Conscientiousness	-0.09 (0.12)	-.06	.440
Agreeableness	<i>-0.26 (0.12)</i>	<i>-.15</i>	<i>.036</i>
Neuroticism	<i>0.26 (0.12)</i>	<i>.19</i>	<i>.030</i>

When a backwards elimination regression was run instead, the same four predictors – *baseline anxiety* ($p < .001$), *openness* ($p = .012$), *agreeableness* ($p = .011$), and *neuroticism* ($p = .011$) – remained in the final model ($F_{(5, 159)} = 13.28$, $p < .001$, $R^2 = .30$, $R^2_{Adjusted} = .28$). In addition, *study* also remained in the final model, albeit as a non-significant predictor ($p = .084$), resulting in the following equation:

$$\text{Anxiety Score Post-Transition} = 11.59 - 1.07(\text{study}) + 0.46(\text{baseline anxiety}) - 0.38(\text{openness}) - 0.30(\text{agreeableness}) + 0.30(\text{neuroticism})$$

Using the enter method, I also conducted a multiple regression to identify which factors predicted the depression scores post-transition. This analysis also combined the two studies and included the following eight predictors: *study*, *baseline anxiety*, *baseline depression*, *conscientiousness*, *agreeableness*, *neuroticism*, *BEN quality*, *BEN support clique size*. The resulting model overall explained a significant amount of the variance (40%) in the reported depression scores towards the end of participants' time as

undergraduate students ($F_{(8, 155)} = 12.37, p < .001, R^2 = .40, R^2_{Adjusted} = .37$). Upon examining each predictor's individual impact to this overall model, two predictors – *baseline depression* and *agreeableness* – significantly explained the outcome (see Table 4.2).

Table 4.2 Multiple regression model of depression scores post-transition

Predictor	b (SE)	β	p
Constant	6.71 (3.06)		.030
Study (1 or 2)	0.87 (0.61)	.10	.154
Baseline anxiety	-0.02 (0.12)	-.02	.843
Baseline depression	0.58 (0.09)	.51	<.001
Conscientiousness	-0.04 (0.10)	-.03	.693
Agreeableness	-0.25 (0.12)	-.15	.036
Neuroticism	0.16 (0.11)	.12	.158
BEN quality	-0.29 (0.29)	-.08	.313
BEN support clique size	-0.09 (0.09)	-.08	.316

Note. BEN = baseline ego-network

When a backwards elimination regression was run instead, these same two predictors – *baseline depression* ($p < .001$), and *agreeableness* ($p = .024$) – remained in the final model ($F_{(4, 155)} = 24.30, p < .001, R^2 = .39, R^2_{Adjusted} = .38$). In addition, *neuroticism* and *BEN support clique size* also remained in the final model, albeit as non-significant predictors ($p = .075$ and $p = .090$, respectively), resulting in the following equation:

$$\text{Depression Score Post-Transition} = 5.94 + 0.57 (\text{baseline depression}) - 0.26(\text{agreeableness}) + 0.17(\text{neuroticism}) - 0.14(\text{BEN support clique size})$$

4.4 Discussion

This chapter set out to establish how the transition to university affected students' mental health. After reporting participants' baseline anxiety and depression scores, I examined whether these increased during the first year at university, whether female and male mental health scores differed, and how post-transition anxiety and depression scores related to the baseline and other hypothesised predictors (i.e., demographics, personality traits, and social network parameters). These steps translated into the three tested hypotheses (H_1 - H_3).

Overall, participants' baseline anxiety and depression scores (which did not differ between female and male students) seemed to only occasionally increase during the transition itself. However, in both studies, female students reported higher levels of both anxiety and depression than did male students during this first year at university. Post-transition, there were no more gender differences but reported anxiety and depression levels were overall higher than they had been at baseline (albeit not always statistically significantly so). These post-transition scores could best be predicted with the respective baseline scores and one or more personality traits. I discuss these main findings with regards to each hypothesis below, linking my results to previous and future research, to then explore implications, applications, and limitations of this research.

4.4.1 *Increases in anxiety and depression*

In terms of participants' mental health developments during and after the transition to university, results of both studies provided some support for H_1 . This hypothesis predicted that anxiety and depression scores would increase. In Study 1, reported anxiety scores increased at the end of participants' first year and remained higher than

at the baseline in their third and final year. However, no such increases in anxiety levels were found in Study 2. Similarly, no increases in depression levels were found in Study 1. In Study 2, however, participants' reported depression scores increased in their first year, albeit only temporarily so during term time (which was not measured in Study 1). Depression scores in Study 2 were also higher than the baseline post-transition. H_1 can thus be considered to be supported for one of the two considered disorders in either study.

Previous research labelled the transition to university as a period of heightened anxiety and depression symptoms but only provided cross-sectional data to support this claim (Farrer et al., 2016; Lu, 1994; Matar Boumosleh & Jaalouk, 2017; Mikolajczyk et al., 2007; Verger et al., 2009; Weitzman, 2004). These studies were hence unable to observe any kind of mental health development and merely recorded 'high' levels of anxiety or depression during students' time at university. A longitudinal study with two assessments also highlighted students' time at university as a particularly vulnerable time in relation to mental health (Zivin et al., 2009). However, Zivin and colleagues' (2009) study only presented cross-tabulations of mental health developments without testing for statistically significant increases. Furthermore, it did not include a baseline measure pre-transition and instead first assessed anxiety and depression levels once students had already somewhat integrated into their new environment (i.e., in the middle of their first semester).

Given the lack of prospective, longitudinal research investigating university students' mental health developments, the present research can best be compared to other

research findings on general anxiety and depression levels in university student samples. The obtained baseline scores suggested 40% and 36% (in Studies 1 and 2, respectively) of prospective university students were already at least mildly anxious before moving away from home. Similarly, 37% and 32% (in Studies 1 and 2, respectively) also reported being at least mildly depressed pre-transition. In contrast, a similar study found only 13% and 16% of students in a midwestern public university in the US to be at least a mildly anxious or depressed (Eisenberg et al., 2007). Another found approximately 25% of Lebanese university students to be anxious and 20% to be depressed (Matar Boumosleh & Jaalouk, 2017), prevalence rates somewhat closer to those found in the present research. Only a most recent study investigating Spanish university students' mental health during the uniquely demanding time of the current pandemic found rates similar to those reported in the present research, as 35% and 48% of students reported suffering from anxiety and depression, respectively (Odrizola-González et al., 2020).

Comparing the above research with my own seems to indicate that the incoming Oxford students' anxiety and depression levels were likely already above those reported in other student samples. It is therefore possible that I only observed increases in mental health symptoms that either did not replicate or that appeared to be temporary (i.e., the spikes in depression scores during term time in Study 2), because anxiety and depression levels were unusually high in the Oxford student cohorts pre-transition. It is unclear whether participants reported high anxiety and depression levels at baseline because they were assessed in the month before becoming university students and thus potentially already in anticipation of the transition (especially when it was made salient while filling out the questionnaire), or whether these highlighted dispositional

differences to other student samples. As discussed in Chapter 2, students at the University at Oxford might not always represent general student populations. While past research had indeed once attested Oxford students higher rates of mental health problems than found in other young adults (e.g., Hawton et al., 1978), a study considering the last thirty years no longer found such differences (Hawton et al., 2012). Thus, future research should study students' mental health developments at a range of universities, including both elite and non-elite institutions.

4.4.2 Gender differences

Examining gender differences with regards to mental health and the transition to university, results of both studies overall provided support for H_2 – when it was restricted to participants' first year as students. This hypothesis predicted that reported anxiety and depression levels of female participants would be higher than those of male participants. While there were no statistically significant gender differences in reported anxiety and depression levels both pre- and post-transition (i.e., during the baseline assessment and once students were past their first year), female participants consistently reported higher GAD and MDD scores (or a steeper increase in scores) than male participants during the transition itself (i.e., during their first year). This trend was observed in both studies for both considered disorders. While female and male students hence seemed to enter and exit university with similar anxiety and depression levels, female students' mental health appeared temporarily more affected by the transition. H_2 was therefore supported when mental health developments during students' first year were considered.

A study investigating depressive symptoms of university students in Germany, Denmark, Poland, and Bulgaria also found that female students reported significantly higher levels of depressive symptoms than did male students in all four countries (Mikolajczyk et al., 2007). A recent study investigated university student experiences during the arguably particularly stressful time of the current pandemic also found that female students consistently reported higher levels of stress, anxiety, loneliness, and more depressive symptoms than male students (Elmer et al., 2020). Finally, a longitudinal study confirmed the findings of the present research, that female students reported higher anxiety than males students especially during the beginning of their time at university but less so once they had become more accustomed to their new environment (Gao et al., 2019). The results I presented hence appear in line with the existing literature.

It might be interesting for future research to verify whether mental health developments of female and male students only diverge temporarily (i.e., during the most challenging first year). While it appears reassuring to see no long-lasting gender differences in the present research, it remains unclear whether increased mental health problems during the first year negatively impact other transition outcomes besides anxiety and depression levels. Academic performance (Gao et al., 2019), overall enjoyment of one's university experience (Clemes et al., 2007), and self-esteem (Zuckerman, 1989) might be worthwhile alternative outcomes to consider. While I did ask participants for their current level of academic attainment (see the complete questionnaires in Appendices A & B), there was little variation, as 84% and 83% of participants (in Studies 1 and 2, respectively) reported grades at a first class or upper second class level with almost all of the remaining students (16% and 12% in Studies 1

and 2, respectively) not choosing to disclose their grades. Still, it appears important to determine whether and how female students' heightened levels of anxiety and depression during their first year at university affect them during this shaping stage of life (O'Shea, 2014).

4.4.3 Explaining mental health post-transition

With regards to H_3 , there was evidence that baseline mental health levels and at least one personality trait – agreeableness – reliably predicted post-transition anxiety and depression levels in multiple regression models combining the two studies. In contrast, neither demographics nor network parameters were associated with post-transition mental health levels. Since H_3 predicted that those who 1) reported higher baseline anxiety/depression levels, 2) were female and from ethnic minorities, 3) scored higher on neuroticism and lower on openness, conscientiousness, agreeableness, and extraversion, 4) had larger, emotionally closer ego-networks, and 5) were popular and socially active in their college cohort would report higher levels of anxiety/depression; this hypothesis was at best partially supported.

The results of the present research are in line with previous research showing that students' baseline anxiety and depression levels predicted the respective anxiety and depression levels two years later (Zivin et al., 2009). They further mirror previous findings of the negative relationship between the personality trait agreeableness and both depression (Shi, Liu, et al., 2015) and anxiety (Wong et al., 2007). Just as in the present research, post-transition anxiety scores have also been shown to be negatively associated not only with agreeableness but also with openness, and positively associated with neuroticism (Shi, Liu Pfizer, et al., 2015). While not all other research found a meaningful relationship between agreeableness and university students'

mental health (e.g., Jafarnejad et al., 2005), this personality trait was identified as an important predictor for anxiety and depression post-transition outcomes in the literature and in the present research. Overall, the mental health baseline scores and personality traits identified as predictors of mental health outcomes are hence in line with other research.

4.4.4 Social support & mental health

The presented results are, contrary to expectations and a well-established body of literature, seemingly at odds with social support theory (Thoits, 1985, 2011) and related research, because none of the considered social network parameters meaningfully explained mental health outcomes. While social support has been deemed vital in protecting university students from developing mental disorders, such research tends not to consider any other factors besides social support (Taylor et al., 2014), only includes demographics in addition to social support measures (Cao et al., 2020), or focuses on alternative additional predictors to those considered in the present research (such as life-satisfaction, see Siegmann et al., 2018). Even when controlling for baseline scores and personality traits, however, social support has been shown to buffer against increases in anxiety (Bolger & Eckenrode, 1991). This last study appears to contradict the present research's findings but only included personality traits extraversion and neuroticism. It was hence unable to test the influence of agreeableness and openness (which I identified as significant negative predictors of anxiety post-transition). However, one study did yield similar results to mine: Cheng and colleagues (2019) found that social support did not buffer the effects of stress on depression levels.

And yet, this chapter set out to investigate how the transition to university affects students' mental health, expecting to find a strong link between levels of perceived social support (as measured by the ego-network parameters), actual social integration (as measured by the cohort-network parameters), and mental health. No such link has been found. Apart from the possible explanations outlined above (i.e., previous studies not incorporating the same wide range of alternative predictors), it is also possible that not including a measure of participants' stress levels prevented me from establishing a clear link. The overall size of a person's network, as well as the number of their emotionally closest relationships had been shown to moderate the relationship between stress and depression levels, for instance (Raffaelli et al., 2013). In addition to these ego-network parameters, the two cohort network parameters, popularity and activity had also been shown to affect students' stress levels (Kornienko et al., 2013), with a similar study by the same first author relating these network parameters to symptoms of depression (Kornienko & Santos, 2014). While I had expected to find a direct relationship between social support and mental health, it is possible that social support's impact is best observed when considered as a moderator between mental health and stress. Future research would hence profit from incorporating a stress measure.

4.4.5 The need to monitor mental health more closely

The present research further suggests that an even more granular approach to tracking mental health changes (e.g., weekly) might be advisable. The college in which the study was run had required me to only assess participants in between terms in Study 1. This requirement essentially determined that data were collected approximately every three months during the transition to university. This approach enabled me to capture a

gradual increase in anxiety levels during participants' first year. In Study 2, I was allowed to additionally assess participants during term time (i.e., in week 5 of an eight-week term). These additional assessments captured temporary spikes in depression levels occurring in the middle of participants' first and second term at university (that Study 1 would have been unable to detect). Anecdotally, the term 'fifth-week blues' is used to refer to these commonly perceived temporary dips in mood and motivation mid-term (Castles, 2011; Knight, 2018). However, to my knowledge, there have been no prior academic attempts to verify whether mental health is particularly fragile during this week and whether any temporary increases in symptoms build up and diminish gradually, or more abruptly. One implication of the present research might thus be that future studies may need to further specify mental health developments during term time. Brief, weekly assessments could test whether week 5 truly is the time during which students experience most mental health problems and to investigate how quickly these rise and fall.

Seeing the depression scores in Study 2 return to baseline levels in between terms has further implications. The temporary nature of increased MDD symptoms seems to attest to a certain resilience in students, whose mental health appears to repeatedly bounce back after experiencing short-term stressors. Others specified that university students with high levels of resilience also reported high levels of "perceived social support [and] campus connectedness, and [low levels of] psychological distress" (Pidgeon et al., 2014, p. 14). It would hence be interesting also to incorporate a resilience measure to determine if some students manage term-time stress better than others.

I used a cut point at five to diagnose participants as having at least mild anxiety or depression, in line with the recommendations made by the developers of the scales (Kroenke & Spitzer, 2002; Spitzer et al., 2006). A systematic review examining the diagnostic accuracy of the GAD-7 (Plummer et al., 2016) and a meta-analysis with the same goal in relation to the PHQ-9 (Manea et al., 2012) both suggested a cut point at eight instead, no longer differentiating between mild, moderate, and severe cases. Applying the more stringent criterion of five in the present research hence resulted in lowering the proportions of participants still classified as falling below the clinically relevant threshold than applying this alternative criterion would have. My choice neither affected findings on participants' mental health developments nor those on what factors predicted post-transition mental health levels, as none of these analyses required classifying scores. However, adhering to the originally suggested cut points allowed me to highlight that across both studies, a quarter to a third of participants consistently reported being mildly anxious and depressed. Even mild anxiety (Rickwood & Bradford, 2012) and depression (Berndt & Berndt, 1980) can and often do negatively affect young adults during this important life stage. It might therefore be especially important to monitor how these students' mental health develops, as understanding when and why mild cases become moderate or even severe could help educational institutions to offer students additional support during vulnerable periods. Future studies targeting larger samples could hence split participants into mild, moderate, and severe categories using their baseline scores to observe if and when developments diverge.

Lastly, having established baseline scores and personality traits as decisive factors in students' mental health outcomes has important implications as well. Understanding that participants' anxiety and depression scores before the transition as well as their agreeableness score seem to essentially determine their anxiety or depression levels after the transition might seem disheartening at first. It appears that we have little control over our mental health outcomes and cannot simply focus on maintaining close social relationships or on making an active effort to integrate into the new social environment to avoid feeling anxious or depressed. Others have found that time-invariant, stable factors also largely explained mental health outcomes in clinical populations (Naragon-Gainey et al., 2013; Uebelacker et al., 2009). Given that poor mental health likely negatively affects students' academic performance and increases the risk of dropping out, universities could benefit from screening incoming students to better assist those already struggling with anxiety and depression or scoring low in agreeableness (Eisenberg et al., 2009). Such targeted support could prove valuable in preventing symptoms from worsening but also pose difficult ethical questions surrounding students' personal data being so systematically shared with institutions of higher education.

4.4.6 Limitations

An alternative method to better understand what individual differences affect students' mental health developments would have been latent growth curve modelling (LGCM; Burant, 2016). This method allows looking at each participant's individual anxiety or depression trajectory and hence promises to detect which underlying factors determine how a student's mental health develops during the transition to university. However, analysing the data from the present research using LGCM was not feasible for two

interrelated reasons: insufficient sample size and insufficient mental health developments.

Sample size restricted my choices of analysis. Samples of at least 200 (Diallo & Morin, 2015), 400 (Diallo et al., 2014), or even larger than 500 (Hertzog & Ghisletta, 2006) have been identified as necessary to obtain acceptable levels of statistical power for LGCM. Even combined, the two studies of the present research do not meet the lowest of these requirements. Moreover, to model change, change needs to have occurred. As discussed above, anxiety and depression levels each only rose in one of the two studies. In addition, while anxiety levels increased linearly in Study 1 (but not at all in Study 2), depression levels only increased temporarily, spiking during term time, in Study 2 (and not at all in Study 1). While LGCM “can be used to track either linear or curvilinear trajectories” (Burant, 2016, p. 336), studies would have had to have been kept separate to model the linear increase of anxiety symptoms in Study 1 and the quadratic development of depression symptoms in Study 2. With samples of below 100 in either case, this approach would have provided limited, if any meaningful, insights into what factors best explain students’ mental health developments during the transition to university.

Given the sample size ($n_1 = 80$ & $n_2 = 81$ during the post-transition assessments), I was also unable to include all fourteen predictors that I had identified as potentially affecting mental health outcomes at once. Combining the studies to include only those predictors that had individually been shown to explain outcomes scores at least once appeared to be a sensible and pragmatic choice. This approach allowed the inclusion of all predictors

that appeared related to mental health levels post-transition without compromising the established rule of having at least 20 participants per predictor (Austin & Steyerberg, 2017). However, this choice also meant that I could not attempt to replicate findings within this chapter, which prevents me from assessing their reliability. Sample size in the current research was limited by cohort size, a necessary restriction to obtain and be able to include cohort network parameters. Given that neither of the two included cohort network parameters seemed to impact anxiety or depression post-transition scores at all, however, future research could attempt to replicate findings using a larger sample of students who do not necessarily all have to be members of one self-bound group.

Lastly, I operationalised the included ego-network parameters as measuring perceived social support and the considered cohort/complete network parameters as measuring actual social support. I made this choice as listing a large overall ego-network and/or support clique and perceiving their members as emotionally close does not necessarily equate to actually receiving high levels of support. The cohort parameters instead offer a better representation of how socially embedded (and hence likely supported) participants actually were. Since working with social network parameters within this context is still fairly novel, most previous literature solely relies on self-report, assessing perceived social support (e.g., Siegmann et al., 2018). Social network parameters, and especially cohort derived ones, could arguably be seen as a methodological improvement. These incorporate data from all participating members of a self-bounded group and can therefore provide a more accurate measure of actual support. However, perhaps ironically, this theoretically improved assessment of social support could have

actually proven slightly disadvantageous in this case. The subjective perception of social support might be more important than the objective reality. Park and colleagues (2016), for instance, used social network data derived from facebook and showed symptoms of depression were negatively correlated with perceived social support but positively correlated with actual social support.

4.4.7 Conclusion

Overall, the present research found that while the average student of two incoming Oxford college cohorts entered university neither clinically anxious nor depressed, they approached the end of their studies both mildly depressed and anxious. While these increases in self-reported mental health symptoms were not always statistically significant, the overall high prevalence rates of anxiety and depression in both cohorts confirm the need to monitor students' mental health closely in order to better understand what factors affect its development. These developments seemed to diverge only temporarily for the two genders, as female students experienced higher levels of anxiety and depression than male students solely during their first year, and post-transition scores were best predicted by respective baseline scores and personality trait agreeableness. Future research should seek to recruit larger samples, incorporating additional measures, and timing the longitudinal assessments more closely together to further specify how the important transition from home and school to university affects students' mental health.

5 DISCUSSION

In this thesis, I have investigated the effects of the transition from home to university on young adults' personal relationships, social integration, and mental health. There have been few previous attempts in the literature to specify the impact of this first common transition on our social networks (Wrzus et al., 2013). This oversight is surprising given the extensive body of research attesting to the general importance of sustaining supportive relationships for our health and well-being (e.g., Thoits, 2011) and the specific need for such support during this time of change and uncertainty (e.g., Larose & Boivin, 1998; Taylor et al., 2014). Within the already small pool of studies focusing on this transition's impact on our social world and mental health, fewer still have taken a prospective, longitudinal or cohort study approach that also incorporates social network parameters. My thesis therefore combined these elements to achieve a more comprehensive understanding of three main aspects of this transition: students' personal relationships, their social integration into the new environment, and their mental health.

I first considered how young adults manage their personal relationships during this transition by examining developments in their ego networks (Chapter 2). I then studied how friendships are formed with initial strangers within their new community by examining their cohort networks' dynamics (Chapter 3). Finally, I assessed how these students coped with symptoms of anxiety and depression by examining their mental health trajectories (Chapter 4). In this final chapter of the thesis, I will summarise, discuss, and integrate the main findings of each of these three empirical chapters and identify promising next steps for future research. I will then turn my attention towards

the wider implications of my research, focusing on the theoretical, methodological, and practical implications of my findings. Finally, I consider some limitations of my research and end with an overall conclusion.

5.1 Main Findings

In the following subsections, I will first briefly revisit each empirical chapter in turn, to then discuss and integrate their main findings in relation to the subsequent questions they raise and how future studies might confirm, specify, or extend them.

5.1.1 Ego network developments

I first investigated how young adults managed their personal relationships (operationalised as their ego networks) during the transition from home to university. The research question addressed was: How do ego networks adapt during the transition to university? I tested four hypotheses across my two studies (Study 1 and Study 2), relating to different aspects of these ego network developments (i.e., overall size and structure, individual layers, complementary characteristics, and the contributions of specific network parameters to post-transition composition), using analyses of variance and multiple regressions. These aspects translate into the following four main findings. During the transition to university, ego networks grew in size due to an influx of new members within the first two months at university. Furthermore, ego network layers mainly increased uniformly, as new friendships were made at all levels of intimacy. Most other ego network characteristics remained fairly stable despite individual members being added or replaced. Lastly, ego network size pre-transition most reliably predicted the overall proportion of baseline network members who were still part of the network post-transition.

Overall, the findings presented in this first empirical chapter seem to indicate that fears regarding a social trade-off, where young adults in the midst of the transition need to choose between putting their effort towards maintaining already existing relationships or focusing on forming new friendships, seem largely unwarranted (when considering the average student in isolation of their mental health; see 5.1.6 for a more integrated appraisal). Instead of a prolonged “psychological no-man’s-land between the old reality and the new one” (Bridges, 2009, p. 8) where old relationships are lost and new ones yet to be formed, participants’ ego networks only ever grew and did so rapidly (within two months, see 5.1.4), uniformly (across all levels of intimacy), and without affecting their general structure (maintaining contact and geographical proximity patterns, see 5.1.5). Entering university with a larger ego network seemed to predict finishing university with a large number of those relationships still intact, suggesting there might be less of a need to add many new friendships or let go of many existing bonds if the ego network is already more saturated pre-transition.

Chapter 2 explored young adults’ ego-network developments during the transition to university. It provides a first step in better understanding how the average university student manages their personal relationships as a whole during this pivotal time. This first step can hopefully serve as a basis, from which these developments can be examined further. Now that such ‘typical behaviour’ is established, future research can start to differentiate individual trajectories and home in on developments affecting relationships of individual network members. Additionally, it would be interesting to compare the ego network developments of young adults undergoing the transition to

university and a control group who do not. Why this is easier said than done is elaborated further below in 5.3.

5.1.2 Cohort network dynamics

I next investigated how young adults integrated into a new community (operationalised as their cohort network) during the transition from home to university. The research question addressed in Chapter 3 was: How do we integrate into a new social group? I tested two hypotheses across my two studies, using cross-sectional and longitudinal social network analyses. One related to the general cohort network structure and its development, and the other to the influences of specific homophily factors (i.e., demographics, personality traits, social identities, mental health, and network parameters) on these cohort network dynamics. Grouped according to short- and longer-term effects, these cohort network aspects translate into the following main findings. During the transition to university, stable cohort networks largely shaped by homophily factors formed rapidly (i.e., within the first two months at university). These initial homophily effects and the resulting cohort structure then showed little development over time.

Overall, the findings of Chapter 3 suggest once more that the transition-to-university's most pivotal period appears to be the first term students spend in their new social environment. Within two months, seemingly stable cohort friendships had been formed in both studies, as neither the general network structure nor specific homophily-based patterns changed much during the rest of students' first year and beyond. These rapid social dynamics (see 5.1.4) seem to support the notion that incoming university students face an acute belongingness threat to which they respond by hastily forming friendships

with those who are similar to themselves and who are also in a similar situation to themselves (Schachter, 1959; Stillman & Baumeister, 2009). Once this heightened need to belong is satisfied, there might be less perceived pressure to reconsider these initial friendship choices (and instead more pressure to focus on academic work), resulting in fairly stable cohort friendship patterns (see 5.1.5).

Within this context, it is important to acknowledge that the absence of short- and longer-term homophily effects in SIENA models does not indicate that similarity played no role in friendship formation beyond the initial cross-sectional assessment. Instead, such findings propose that there was little further development beyond the homophily-based self-segregation already established in the network. Since there was cross-sectional evidence that the majority of the homophily traits considered had already influenced the friendship patterns after two months, it is less surprising that I have not found many additional homophily dynamics on top of these. These initially rapid cohort network dynamics that quickly stabilise are further explored in relation to the parallel ego network developments observed in Chapter 2 in 5.1.4 and 5.1.5, respectively. Birds of a feather do seem to quickly flock together – and then see little reason to disperse again.

5.1.3 Mental health trajectories

Finally, I investigated how young adults coped with challenges to their mental health (operationalised as anxiety and depression) during the transition from home to university. The concrete research question addressed in Chapter 4 was: How does the transition to university affect mental health? I tested three hypotheses across my two studies using analyses of variance and multiple regression analyses, one relating

developments of anxiety and depression levels during the transition, one relating to gender differences with regards to these developments, and one relating post-transition mental health levels to a range of factors (i.e., baseline mental health levels, demographics, personality traits, and network parameters). These translate into the following three main findings. Study 1 provided evidence for long-lasting increases in students' anxiety levels (compared to the baseline), while Study 2 only provided such evidence for students' depression levels. Female participants reported higher anxiety and depression levels than male participants during the transition itself (i.e., students' first year at university). Lastly, baseline mental health levels and the personality trait agreeableness reliably predicted post-transition mental health outcomes (i.e., anxiety and depression scores towards the end of students' undergraduate studies).

Overall, Chapter 4 explored students' mental health trajectories during the transition to university. The findings of this final empirical chapter have shown that students entered, and headed towards exiting, university with uncommonly high anxiety and depression levels and that post-transition mental health seemed to be largely determined by personality traits instead of social support. While the mental health trajectories of male and female students only temporarily diverged, and while any reported increases in anxiety or depression symptoms could not be replicated across both studies, these findings suggest that students' mental health ought to be monitored to verify this apparent overall resilience in young adults navigating the transition to university. This need to mindfully monitor students' mental health is further explored in relation to the other two empirical chapters in 5.1.6.

5.1.4 *Rapid network expansion*

The social brain hypothesis (Dunbar, 1998) and its ample empirical support (e.g., Dunbar & Spoor, 1995; Hill et al., 2008; Hill & Dunbar, 2003; Sutcliffe et al., 2012; Zhou et al., 2005) suggest that the number of social relationships we can maintain is limited. One might hence suppose that leaving home to attend university involves a letting go of some previously existing relationships in favour of creating space for new friendships formed in the new environment (Cummings et al., 2006). Developmentally, however, ego networks still tend to grow during early adulthood until they reach their maximal size and plateau between one's mid-twenties and early thirties (Wrzus et al., 2013). While some turn-over of members was to be expected, I therefore still anticipated an overall increase in the ego-network size of young adults facing the transition to university.

Ego networks did indeed grow during students' first term at university, undergoing a rapid transformation (i.e., an overall increase in size featuring replacement of individual members, as defined in Small et al., 2015). These results are in line with other research emphasising the developmental aspect of ego-network growth in early adulthood (Wrzus et al., 2013) and specific studies attesting such rapid transformations during the first six months at university (e.g., Small et al., 2015). My findings therefore suggest that the transition to university might act as a sort of catalyst, facilitating the growth of young adults' ego networks as they mature towards their maximum capacity by supplying plenty of opportunities to form new friendships.

I furthermore predicted that this overall growth would be unevenly distributed across ego network layers. Based on social convoy theory (Kahn & Antonucci, 1980) and socioemotional selectivity theory (Carstensen, 1991), I expected that the inner layers (where members are perceived as emotionally closest) would remain more stable than the outer layers (where relationships are generally less intimate and less secure). Instead, all layers grew uniformly, contrary to expectations, as participants formed new relationships at all levels of emotional closeness (i.e., new best friends and new acquaintances alike).

These findings might suggest that young adults navigating the transition to university not only benefit from increased informational exchange with a wide range of looser social bonds (i.e., outer layer members; in line with Carstensen et al., 1999; Granovetter, 1977) but also from increased social support from more reliable, emotionally closer core friends (as explained by Binder et al., 2012; Sutcliffe et al., 2012). My findings therefore propose that young adults might benefit most from a social strategy of general ego-network expansion during the transition to university, at all levels of intimacy. This not necessarily deliberate strategy makes maximal use of the new pool of potential friends, whether these represent life-long relationships or more fleeting company.

This rapid ego-network expansion was further reflected in the formation of the participants' cohort networks, which resulted from the quickly formed friendship bonds between the cohort members. I anticipated the need to belong (Baumeister & Leary, 1995) to be particularly pronounced during the early stages of the transition to university and that this might create a heightened sense of urgency to make new friends

in the new setting. Within the first term at university (i.e., eight weeks at the university whose students comprised my sample), participants in both studies had indeed already formed one large cohort network connecting every participant to at least one other. These findings are in line with similar research (e.g., Fincham et al., 2018; Moody et al., 2011; Sousa-Vieira et al., 2017). They seem to support the notion that incoming university students quickly bonded with one another, and thereby also increased the size of their personal networks (since not as many already existing relationships were dissolved as new friendships were made).

With regards to determining the influence and speed of homophily on the cohort network, I anticipated friendship choices to be affected by cohort members sharing similarities along several dimensions (i.e., demographics, personality traits, social identities, mental health, and network parameters). This expectation was rooted in the ample support for a broad range of homophily effects summarised in McPherson and colleagues' (2001) review.

When cross-sectionally considering the initial cohort network composition after students had spent a first term (i.e., eight weeks) together, this expectation was generally met. More than half of the sixteen considered homophily factors appeared to have already shaped friendship patterns at this stage of the transition in both studies. In line with a comprehensive summary of previous research (McPherson et al., 2001), demographic traits (i.e., gender and ethnicity) were found to be among the strongest predictors of homophily in the cohort network. In addition, both studies found homophily effects based on the personality traits, agreeableness, extraversion, and

openness, as had others (e.g., Kempnich, 2016; Selfhout et al., 2010). McPherson and colleagues (2001) moreover found homophily effects based on both participants' political identities (similarly to e.g., Colleoni et al., 2014) and on the two network parameters, cohort popularity and activity (in line with Dijkstra et al., 2013; Logis et al., 2013). I therefore found the friendship patterns making up the cohort networks of both studies to already be largely shaped by a diverse range of homophily factors after a mere eight weeks of these former strangers getting to know one another. Once established, hardly any change seemed to occur in the initial cohort network structure over the course of the transition in either study.

Combined, these findings suggest that friendships are formed rapidly during the transition to university, resulting in both increased ego networks and quickly formed cohort networks within just eight weeks. Future research might therefore benefit from homing in on those first few weeks making up the first term during which the majority of both the ego network growth and the cohort network formation occurred, as further discussed in 5.2.2.

5.1.5 Network stability & robustness

Despite the general ego network expansion, I anticipated that participants would manage their individual personal relationships in a way that would leave the ego network as a whole fairly unchanged. This prediction was rooted in literature attesting ego network robustness to some random losses (e.g., Hobbs & Burke, 2017) and the general tendency to maintain a majority of one's relationships with those living in the same city (Bloem et al., 2008), to maintain fairly stable contact patterns (Saramäki et al., 2014), as well as to maintain mostly consistent numbers of relationships at varying

intimacy levels (Binder et al., 2012). I therefore expected little change in the additional ego network characteristics under study (i.e., the proportion of members in close proximity, typical contact types and frequencies, and perceived emotional closeness).

My findings mainly supported this expectation, with a few exceptions. The proportion of ego network members with whom participants maintained the various types of contact at the various frequencies and across the various geographical distances considered remained largely unchanged, despite the ego itself moving cities. Some declines in contact frequency and changes in preferred contact types appeared to be only temporary, and only overall perceived emotional closeness seemed to reliably decrease. This decrease did not necessarily reflect participants' feeling less close to individual members, but rather appeared to be a consequence of the network's growth across layers (which also increased the number of less intimate acquaintanceships and hence negatively affected the mean emotional closeness for the whole ego network). These results are in line with the "high stability of the contact patterns across days and across years" (Fournet & Barrat, 2014, p. 1) observed in the ego networks of a French student sample and with the "strong temporal and spatial regularity" (Sekara et al., 2016, p. 9977) observed in the maintenance of the ego networks of Danish university students.

My findings thus appear to show that even if an ego leaves their familiar environment, they can maintain the general structure of their ego network by adding new members and by reshuffling or replacing existing ones. This strategy allows them to maintain

overall similar contact patterns and proximity levels and attests to a certain robustness and stability of the ego network as a whole.

Relatedly, I anticipated that the proportion of original (i.e., pre-transition) ego network members still in the network post-transition could be explained by network parameters (baseline ego network size, emotional closeness, levels of face-to-face contact and proximity, as well as popularity, a cohort network parameter capturing the ego's reception within the new social environment). My results showed that the size of participants' ego networks pre-transition was the only reliable positive predictor of the outcome (i.e., the proportion of baseline members still in the ego network post-transition) in both studies.

This finding indicates that those entering university with larger ego networks manage to maintain a larger proportion of these relationships throughout the transition, thereby maintaining a certain network stability. Young adults who already have a large ego network pre-transition might simply perceive less pressure to add more members. Alternatively, they may have made just as many new friends as their counterparts, but this might have affected the overall proportions of original members less, as this is a relative measure. Thirdly, they might have more experience in maintaining a higher number of individual relationships (perhaps due to being extraverted or due to other individual differences) and hence may have found it easier to prevent relationship decay. Future research would benefit from testing these three possible explanations, specifying whether those with larger baseline ego networks tend to add fewer new members, let go of fewer existing members, or both, than those with smaller networks.

Relationship types might also be a valuable factor to consider, as those with baseline ego networks made up of mostly family members might require less social effort to maintain these relationships than those with ego networks mostly consisting of friends (Roberts & Dunbar, 2011a).

A similar robustness and stability characterised the cohort networks in both studies. Both the general cohort network structure and the initially found homophily effects showed little development over time. Even in the short run (i.e., within participants' first year at university), the Simulation Investigation for Empirical Network Analyses (SIENA) models I examined only produced evidence for one homophily trait affecting cohort network dynamics in either study. Participants in Study 1 were 1.3 times more likely to befriend cohort members of the same gender, while participants in Study 2 were 1.6 times more likely to befriend cohort members who scored similarly to them on the personality trait openness. In the longer run (spanning 2.5 years in Study 1 and 1.5 years in Study 2), the SIENA models produced no evidence for homophily further shaping the developments of the cohort friendship patterns in either study at all.

Once established, it appears friendship patterns are overall rather stable. Even as individual network members were added, dropped, or reshuffled, participants generally maintained their overall ego network structure. Those entering with a larger number of friends and family were also more likely to maintain most of these relationships throughout the transition and beyond. Moreover, once participants had formed a cohort network, this network showed little developments over time. Future research might specify whether this network robustness and stability is present in all individual

layers of an ego network. Similarly, it might examine whether cohort members are able to still adjust their individual position within an overall stable network structure and consider how one's position might affect transition outcomes other than mental health (as neither cohort popularity nor cohort activity had been shown to be associated with post-transition anxiety or depression levels; see Chapter 4).

In this context, it would be interesting to test how both types of network stability vary according to individual differences (e.g., personality traits, turnover of ego network members, baseline contact patterns, frequency of visiting home, demographics). Pinpointing for whom initial ego network compositions and cohort network positions appear more permanent and how these differences affect outcomes might then translate into actionable implications within the higher education sector that facilitate the transition for those less likely to socially integrate with ease (as outlined in 5.2.3).

5.1.6 Mental health & the network

While the existing empirical literature generally reports the transition to university to be associated with heightened anxiety and depression symptoms, most such studies are either cross-sectional (e.g., Lu, 1994; Mikolajczyk et al., 2007; Weitzman, 2004) or did not include a pre-transition assessment and were therefore also unable to detect any actual increases (e.g., Zivin et al., 2009). Comparing my findings with the general anxiety and depression levels reported in the other university student samples (e.g., Eisenberg et al., 2007; Matar Boumosleh & Jaalouk, 2017) showed that participants in my samples appeared to report higher levels of anxiety and depression than commonly cited throughout (i.e., even at the baseline).

These findings suggest that despite the already high anxiety and depression levels reported pre-transition, reported mental health still overall deteriorated in both studies. Study 1 included a mental health assessment at the end of students' first year, which was omitted in favour of assessments during term time in Study 2. Symptoms may hence not have always been shown to increase across both studies, as Study 1 could not capture the temporary spikes in depression levels reported in Study 2, and since Study 2 could not capture the increased end-of-year anxiety levels reported in Study 1. Future research might hence benefit from replications including both of these assessments and the inclusion of students from a wider range of universities to specify whether the samples I investigated represent most university students, or whether the Oxbridge context accounts for generally higher rates of mental health problems than observed elsewhere (Hawton et al., 1978, 2012; see 2.6.2).

I further found reported anxiety and depression levels of female participants to be higher than those of male participants across both studies and both disorders, at least during the transition itself (i.e., during students' first year at university). I found no gender differences in mental health pre- and post-transition, however. These findings suggest that while male and female students seemed to enter and exit university with similar anxiety and depression levels, female students' mental health appeared more negatively affected by the transition than that of male students. Other research found female students generally reporting higher levels of depression than their male counterparts (e.g., Mikolajczyk et al., 2007), and also specified that such differences were more pronounced in the early stages of the transition to university (e.g., Gao et

al., 2019). One possible explanation for these findings is that women might be more likely to internalise symptoms than men, especially during late adolescence/early adulthood (Rosenfield & Mouzon, 2013).

It is worth noting that most research in this context relies on self-report. While women are generally more likely to report anxiety and depression, more men than women actually commit suicide, suggesting at least similarly high prevalence rates in both genders (see Afifi, 2007, for a review). The gender differences I presented might hence not necessarily reflect true differences in mental health, as discrepancies could be smaller than they appear due to an underreporting of mental health symptoms in male students. However, given that no statistically significant gender differences were reported pre- and post-transition, this possibility seems slim. Nonetheless, future research might consider alternative methods of assessing students' mental health, such as using social media profiles to deduce mental disorders from language patterns and online activity (Guntuku et al., 2017), which raise some additional ethical concerns and practical challenges (Chancellor et al., 2019). Future research might also seek to verify whether the mental health trajectories of female and male university students only diverge temporarily, while the transition is likely still unfolding, and whether even such temporary differences affect other transition outcomes besides mental health itself (e.g., academic attainment, self-esteem, and student satisfaction).

With regards to predicting mental health outcomes, I expected post-transition levels of anxiety and depression to be predicted by baseline mental health levels, demographic characteristics (i.e., gender and ethnicity), personality traits (i.e., the big five), and,

notably, social network parameters (i.e., ego network quantity and quality, as well as cohort network popularity and activity). This hypothesis was based on empirical support showing that these factors affect students' mental health (e.g., Gratch et al., 1995; Taylor et al., 2014; Tosevski et al., 2010) and a theoretical foundation affirming the importance of maintaining supportive relationships to benefit one's mental health (Thoits, 1985), especially during stressful periods (Cohen & Wills, 1985). Surprisingly, no network parameters (and also no demographic characteristics) were associated with either mental health outcome. In addition to the respective baseline mental health level, there was only a negative relationship between personality trait agreeableness and both post-transition anxiety and depression levels, while the personality traits openness and neuroticism were, respectively, also negatively and positively associated with anxiety but not with depression outcomes.

The literature supports the reported positive relationship between mental health levels pre- and post-transition (e.g., Zivin et al., 2009), and the negative relationship between agreeableness and mental health outcomes (e.g., Shi, Liu, et al., 2015; Wong et al., 2007). A negative relationship between openness and post-transition anxiety as well as a positive one between neuroticism and post-transition anxiety have also been reported elsewhere (Shi, Liu Pfizer, et al., 2015). Nonetheless, finding no associations between any social network parameter and anxiety or depression appeared to contradict established and widely empirically supported notions that receiving social support positively affects mental health (e.g., Kornienko et al., 2013; Raffaelli et al., 2013; Thoits, 1985, 2011). One explanation might be that since both ego and cohort networks appeared to have stabilised by the end of students' first term, social support was

generally provided fairly consistently and hence was not a major influence on mental health developments. Alternatively, the impact of social support on anxiety and depression levels might be better observed when it is considered as a moderator between mental health and stress (which was not measured), as in the classic 'buffering hypothesis', rather than when a direct relationship is considered (Cohen & Wills, 1985).

Linking students' mental health to their networks therefore overall proved more challenging than anticipated. Future research might consider including an explicit stress measure to allow a direct test of the buffering hypothesis (Thoits, 2011) and could moreover specify whether the absence of a relationship between any social network parameter and mental health might be due to the students perhaps not perceiving themselves to be unusually stressed during the transition to university. More objective stress markers, such as missed deadlines or absences might also be valuable factors to consider. Moreover, future research could further investigate the impact of personality traits on university students' mental health. While some studies have looked at this link (Tosevski et al., 2010), it seems an underappreciated factor in identifying who might be prone to navigating the transition to university with more difficulties.

Lastly, a more subtle relationship between students' mental health and their social networks might be found when considering the possible consequences of being part of a quickly-formed university student cohort that has self-segregated into stable, homogenous sub-groups. We generally know that remaining largely disconnected from, and hence not in contact with, those whom we might perceive as dissimilar to us can

negatively affect our attitudes toward such ‘different’ others (Allport, 1954). We also know that such self-segregation often results in heightened levels of distrust and even hostility between groups (Pettigrew & Tropp, 2006), which might arguably negatively affect mental health and overall well-being. Cross-group friendships have instead been shown to be positively associated with mental health and well-being, resulting in the formulation of the “well-being through social integration hypothesis” (Bagci et al., 2018, p. 776). Future research could hence add attitude and trust measures into the study of cohort networks forming. These could help us to determine if the strong and persistent homophily effects found in the present research negatively affect the cohort community as a whole or some individual (perhaps minority) of its members (e.g., Wells, Fox, & Cordova-Cobo, 2016).

5.2 Wider Implications

The main findings discussed above have wider implications for our understanding, study, and management of the transition to university’s impact on young adults. In the following three subsections, I therefore respectively detail the theoretical, methodological and practical implications of the present research.

5.2.1 *Theoretical Implications*

Considering the findings presented in this thesis as a whole, the transition to university seems to impact students’ social relationships and mental health less severely than anticipated. Students’ ego networks increased throughout the transition and yet largely maintained their overall structure; stable cohort networks formed within a mere eight weeks, and anxiety and depression levels had already been high pre-transition and only occasionally increased during the transition itself. Taken together, the main findings of

my empirical chapters hence suggest that concerns about losing and making friends at university and this negatively impacting mental health and well-being (e.g., Paul & Kelleher, 1995) appear somewhat unwarranted. We might therefore consider appreciating this transition mainly as a time for general ego network expansion (in line with typical age-related developments, see Wrzus et al., 2013), where new cohort friendships are quickly established, and social support is largely maintained. This conceptualisation of the transition to university no longer frames it as a time of particular concern or vulnerability, at which a social trade-off needs to be navigated (Benson, 2007). Instead, it appears to denote a period where new social bonds are formed rapidly and at little cost to existing relationships or mental health.

Furthermore, the theories underpinning this research might jointly explain how these ego network developments, cohort network dynamics, and mental health trajectories interact with one another. It appears that young adults' ego networks display a certain robustness to this first major life event and simply grow uniformly during students' first term. It also appears that the integration into students' new social environment based on friendships with similar others occurs as swiftly. These results confirm our theoretical understanding of how our personal relationships are generally structured and maintained (see Carstensen, 1991; Dunbar, 1998; Kahn & Antonucci, 1980) and also highlight the influence of the homophily principle (McPherson et al., 2001) on the emerging cohort friendship patterns. They moreover indicate that a heightened need to belong likely motivates such rapid friendship formation in new social environments (Baumeister & Leary, 1995; Stillman & Baumeister, 2009). In combination, they seem to suggest that social support (Thoits, 1985) is not necessarily jeopardised during the

transition to university, which might explain less drastic declines in mental health than anticipated.

In light of this integrated theoretical foundation, these findings make a contribution to our understanding of how students integrate into their new social environment by highlighting the speed of this process and the stability of social structures. Contrary to expectations of the integration process being a lengthy one where network members initially find themselves socially isolated and only gradually form connections (e.g., Steven Lee & Goldstein, 2016; Taylor et al., 2014), eight weeks appeared sufficient to establish a persisting cohort structure and an expanded ego network. We might therefore appreciate the first few weeks of the transition to university as pivotal in shaping the students' social experience and consider the theoretical implications for students not managing to socially integrate during this brief time frame.

5.2.2 Methodological implications

Across all empirical chapters, the most dramatic developments occurred between the baseline (when students had left school but were yet to enter university) and the end of their first term (when they had spent two months away from home living in their new college cohort community). When initially planning my studies, I had been guided by a literature review of network-behaviour dynamics (Veenstra et al., 2013). This review suggested separating initial network assessments by several weeks to then increase the time between assessments to several months when examining adolescents forming friendships in new environments. Since the college allowing me to conduct the research also initially insisted on keeping term time free of assessments, I was only able to re-assess students after they had already spent two months at university.

Methodologically, my results seem to suggest that a more granular approach is preferable, however, as it would allow capturing the transition's impact on these initial eight weeks.

Future longitudinal approaches would benefit from assessing students more frequently during this initial phase (e.g., with bi-weekly or even weekly assessments throughout their first term). If college concerns about students' time commitment persist, later assessments (e.g., after students' second and third terms) could be omitted instead. The addition of mental health assessments in Study 2 already showed that mental health problems appear to temporarily spike during this first term. Such insight is lost when assessments are spaced too far apart. Appreciating that the transition to university initially likely involves rapid changes in students' ego networks, cohort networks, and mental health, and little development across these areas thereafter, allows fine-tuning methodological design choices to best capture these changes.

Two comprehensive cohort studies provided the data analysed in all empirical chapters. The design choices most suited for the analyses of one chapter may have therefore not always best served those of another chapter. For instance, eliciting the ego networks in Study 1 by using free recall and then updating the resulting list at each subsequent wave might have somewhat affected the cohort network analyses. The cohort network might have appeared more static than it was, because participants would have had to actively 'kick out' friends they had previously listed to sever an existing tie. Doing so could appear quite drastic and final. The default may have thus been, instead, to simply keep network members on the list as long as no major disruptions of the relationship had occurred

around (Bell et al., 2007; Neyer, 1997). Study 2 used a recognition procedure for cohort nominations instead, addressing this concern. Participants in both studies nominated approximately fifteen cohort friends in either study and the respective cohort network analyses produced similar results, suggesting different cohort friendship nomination procedures might not be a concern. Nonetheless, methodologically speaking, it might be advisable to design separate studies to best address each of the three main transition aspects considered in this thesis.

Another example of a design choice benefitting one chapter while perhaps adversely affecting another is illustrated by the decision to collect mental health data during term time in Study 2, which meant a compromise had to be struck with the college, so as not to demand too much time from students. This compromise meant foregoing a final assessment at the end of participants' first year like that included in Study 1, making the studies less directly comparable and hence also affecting the two preceding chapters. Thirdly, sampling whole college cohorts restricted the overall sample size and affected statistical power, so that, for instance, latent growth curve modelling to better analyse students' mental health trajectories was not feasible. Future research might hence benefit from focusing on one of the three main research questions explored in this thesis separately. It is important to note, however, that the combination of ego-network and cohort network parameters is what offers us a more complete picture of students' transition to university. Both are thus crucial to record. A balance between how these measures are best elicited in one design must hence be carefully struck.

5.2.3 *Practical implications*

One practical implications of my research concerns how universities facilitate their students' transition. The first few weeks at university seem to be key in securing a new community member's social integration and well-being and therefore ought not to be neglected. Understanding that the transition mainly takes place within students' first term, that new friendships form very quickly and are largely based on having traits in common, might help institutions of higher learning to design more targeted induction or onboarding events. If we want to prevent such homogenous clusters forming and stabilising, it might be sensible to assign incoming students to subgroups designed with promoting diversity in mind. Creating such subgroups during Freshers week or specific induction events (as proposed in Boda et al., 2020) would allow universities to assume a more active role in shaping their communities. They could hence help their members to overcome the allure of giving in to the perceived urgency to belong by gravitating to those most similar to oneself and do so with relatively little effort.

Knowing that (at least during their first year) female students appear to experience more anxiety and depression symptoms than male students, and that those scoring low on agreeableness are more prone to experience mental ill-health can be of further benefit.

In line with the above suggestion, universities could use the findings of this thesis to identify students more at risk of struggling to socially integrate or of developing mental health problems. A strength of the present research are the unusually high participant retention rates (89% in Study 1 spanning 5 assessments across 2.5 years and 98% in Study 2 spanning 7 assessments across 1.5 years). These high rates indicate that it is unlikely that the students more adversely affected by the transition dropped out and

therefore did not contribute their data, because in Study 1, I did not lose a single participant during the first year of the transition (and only ten no longer contributed to the final wave in students' third year) and in Study 2, I only lost two participants (one of which unexpectedly died).

While there are some ethical questions to consider, being able to provide targeted support to students likely to adapt less well to the transition than others might not only prove cost effective but could make a real difference to those students' overall university experience. The price of social isolation and mental ill-health is high for everyone (Cacioppo & Cacioppo, 2014; de Jong Gierveld et al., 2006) and young adults navigating the transition to university are especially at risk of paying it (Steven Lee & Goldstein, 2016; Taylor et al., 2014). If we collectively wish to pursue social connection and mental well-being, acting on these outlined pragmatic implications of my research can make a meaningful contribution to this goal.

Convincing a college to take part in research comprehensively examining its students' transition experience has been difficult to accomplish, as I spent most of my year pursuing an MSc at Oxford setting up my DPhil studies. Most initial discussions with colleges ended quickly, with few expressing tentative interest and requesting that another college play the 'guinea-pig' first. There appeared to be some general apprehension about what I might find and unvoiced fears about being portrayed in a negative light. However, we can only improve future student experiences when we have an accurate understanding of what the current student experience entails. Fortunately, perhaps, my results overall paint a more positive picture than initially anticipated. I

therefore hope that my thesis can serve as a first step, highlighting the factors most worthy of consideration when colleges, institutions of higher education, and similar organisations in general discuss how they can facilitate young adults' transition into a new social environment. Perhaps now that this first step has been taken, other colleges or universities will be receptive towards future research on, but for, their students as well.

5.3 Limitations

Despite its contributions, the research reported herein inevitably suffers from some limitations, of which I note the main ones (the timing of assessments, the absence of a control group, the specificity of the Oxford context, and the role of social media) here.

A limitation was the timing of assessments. It was important to me to capture baseline measures and hence place the first assessment before participants had left their homes. This prospective design offers the advantage of being able to differentiate between participants whose personal relationships or mental health levels hardly changed and those who experienced significant developments in these measures. While the timing of the first assessment was hence a necessity and a major strength of my work, subsequent assessments, in retrospect, appear, with the benefit of hindsight, to be spaced too far apart. In Chapters 2 and 3 focusing on the ego-network and the cohort network developments respectively, most meaningful change seemed to have occurred within the very first term at university (i.e., within the first two months of the transition). The majority of new friendships had been formed at this point, increasing ego-network size overall and at each individual layer (except for layer 1 in Study 1). Further additions or losses of relationships only marginally affected the ego-network after this

assessment. Likewise, homophily with regards to the majority of traits considered (10/16 in Study 1 and 9/16 in Study 2) had already shaped cohort friendship patterns after students had spent one term together and few similarity-driven effects were observed thereafter.

The timing of assessments was restricted by the participating college's understandable concerns about accessing busy students during term time. The eight weeks making up an Oxford term are academically intense and while the college wanted to avoid distracting students from their learning, it was also deemed possible, even likely, that if I had made demands on them in this period missing data, or worse, students dropping out of the study, might have increased. Filling out each questionnaire could last anywhere from less than half an hour to almost two hours (depending on how many network members, and related information about each, participants listed). I therefore made the decision, with the college, to avoid disrupting students during term time by only assessing them in between term time in Study 1. In Study 2, this requirement was somewhat loosened, since I was allowed to exclusively assess participants' mental health three times during term time. Nonetheless, an even more granular approach featuring multiple network assessments during students' first term is ultimately desirable, as already outlined in 5.2.2

Another limitation consists of there not being a control or comparison group, at least for the mental health chapter. When investigating the effects of the transition to university on relationships and mental health, I would ideally want to contrast my studies' findings with those from a comparable control sample that was not facing said

transition. Such a design would allow differentiating the transition's effects from other influences that might be typical for young adults in this phase of life (see Zarrett & Eccles, 2006). Doing so is important to better understand what unique challenges or network and mental health developments are faced by young adults leaving their home to enter university. Roberts and Dunbar's (2011a) 18-month longitudinal study of relationship maintenance and decay included participants who, following their graduating from secondary school, either entered university or did not. Unfortunately, the small sample of a total of 25 young adults did not allow differentiating ego network developments between those two subgroups either.

This limitation could not be addressed within this thesis for two reasons, availability of resources and availability of a suitable control sample. Resources were scarce in terms of both time and money. I have invested nine months during my one-year long MSc to set up the initial study, which involved approaching the various stakeholders of several Oxford colleges, visiting and collaborating with other researchers in Denmark, Finland, the UK, the Netherlands, and Spain, and carefully considering the ethical implications of assessing young adults' transition to university so comprehensively. Wishing to be able to also capture post-transition outcomes assessed towards the end of students' undergraduate studies, I did not want to delay collecting data further and administered the first assessment even before my DPhil had officially begun. In addition, since participant attrition was a real concern, I decided to compensate participants generously and had a limited research budget to do so. Secondly, even theoretically defining a suitable control sample appears challenging. To allow comparability, such a sample would ideally have to be from the same culture and socioeconomic background.

Unfortunately, however, access to higher education continues to be largely determined by socioeconomic background (Usher & Medow, 2010), especially when the university is regarded as an elite institution of higher education (Donnelly, 2016; Mullen, 2009). A future research option, if buy-in from enough colleges could be achieved, would be to recruit a 'wait-list' control group comprised of students who defer entry until the following year, although this would necessarily be a small sample.

As explored in the general discussion of Chapter 2, the Oxford context has the potential to somewhat limit the generalisability of this thesis' findings. While using an undergraduate population was essential to capturing the impact of the transition from home to university, the University of Oxford might provide a study experience somewhat different from that offered by other institutions of higher education within and outside of the UK. The differences most relevant to assessing the generalisability of the results presented in this thesis concern the college system and student intake and are therefore considered in turn.

The college system provides a smaller-scale environment within the larger university, in which a cohort of incoming students live and learn together in close proximity. Living in student accommodation might not be unusual among universities in the UK and beyond. However, accommodation sites at other universities might be more widely dispersed through a city and not all students might opt to live in such facilities. Furthermore, many might not nurture an active community culture and might be considered rather separate from students' studies. Instead, each incoming Oxford student is allocated to their own college community, which, in the case of the sample

considered in this thesis at least, not only provides first-year accommodation in very close proximity but also serves as a place to both live and study (as first year tutorials are typically organised by the college itself, not the student's department). This set up could have impacted students' ego network developments, cohort network dynamics, and mental health trajectories. There may have been uncommonly many opportunities to bond with fellow college members, thereby accelerating the influx of new ego network members and the social integration process. In addition, having nearly constant access to these potential sources of social support may have reduced the potential for social isolation to negatively affect mental health and well-being.

The intake of students at the University of Oxford also likely differs somewhat from that at other universities. On average, more students might attend who come from more privileged socio-economic backgrounds, featuring less diversity in ethnicity and age as commonly observed elsewhere (where higher proportions of students from ethnic minorities, mature students, or students studying in their hometowns or commuting to nearby universities might be the norm). These differences might have resulted in more homogeneous cohorts whose members were more likely to have a range of characteristics in common with one another when compared to those in other university settings. Such similarities might have in turn facilitated ego network growth and cohort network formation, especially benefitting students well-represented within the group but perhaps inadvertently having a negative impact on minority cohort members who may have stood out more. Educational background, which can be considered a proxy for socio-economic status, has not been shown to affect friendship formation in either cohort but ethnicity turned out to be the strongest homophily factor in both. Self-

reported mental health problems were also found to be higher than commonly reported in university student samples (except when these were reported during the current pandemic, which arguably represents an unusually stressful period not representative of typical student experiences). Apart from baseline mental health levels, personality traits (especially agreeableness) best predicted post-transition mental health in the studied Oxford students. It might therefore be interesting to consider whether the university, or elite institutions of higher learning more generally, attract students with personalities that differ, on average, from those of students at perhaps more representative universities, and how such differences might affect network development during the transition.

Considering the possible effects of the University of Oxford's rather specific college system and student intake jointly, the social processes typically at play during the transition to university might have been simply slightly sped up by the somewhat concentrated, homogenous environment the college system provides and its likely more-similar-than-average members. While being able to investigate the effects of this period in such a conducive setting to quick social bonding appears a helpful first step to better understand how students' networks adapt under the best social conditions, future research will have to specify whether the same speed is observed in university settings without the college structure potentially serving as a catalyst of social network developments.

Lastly, it is worth briefly contemplating whether and how social media platforms and messaging services (e.g., Facebook, Instagram, Twitter, WhatsApp) might have affected

the results presented in this thesis. For one, these might have facilitated maintaining existing relationships with family members and friends back home. Previous generations or those with restricted access to such services likely perceive the increased geographical distance to the baseline ego network as more of an obstacle to continued contact and might hence be less able to retain as many of those meaningful relationships as reported in my samples. At the same time, such easy access to already existing sources of social support could have lessened participants' need to belong, thereby reducing the urgency with which to form new friendships with people in close proximity. This possibility seems unlikely, however, given how rapidly ego networks expanded and cohort networks formed.

Instead, being able to broadcast one's life and to communicate with large numbers of friends, acquaintances, and even strangers at once and in real time might have further facilitated the social integration process. This possibility appears more likely given shared interests can be gauged at a glance from perusing others' profiles and since in-person restrictions on how many people we can be reasonably engage in conversation at once can be easily surpassed. Future research might therefore benefit from incorporating social media use beyond participants reporting whether they engaged with their network members in-person, via text-based or via voice-based exchanges. Such designs might either ask participants to specify what social media channels they utilised how, or directly access big data obtained through such services. The latter option seems both appealing due to the possibility to circumvent some of the caveats of self-report and the richness of the data involved and complicated given recent data protection regulations and the ethical considerations involved. Finally, it would be

interesting to compare the results reported here with those from samples less able to access such services or for whom access is restricted, though it might prove challenging to find such samples that are otherwise comparable to mine.

5.4 Conclusion

This thesis aimed to better understand the effects of the transition from home to university. To achieve this goal, I focused on three main aspects of this transition: young adults' personal relationships, their social integration, and their mental health. I investigated the impact of this first major life event by taking a prospective, longitudinal cohort approach that integrated both ego and cohort network parameters and therefore combined elements frequently cited as lacking in the existing literature (e.g., McPherson et al., 2001; Wrzus et al., 2013; Zivin et al., 2009). This approach involved administering social network questionnaires to two consecutive Oxford college cohorts from before they entered university until they were nearing the end of their undergraduate studies. My three empirical chapters then focused on each of the three main transition aspects in turn. Chapter 2 examined how students managed their personal relationships during this transition by analysing their ego network developments. Chapter 3 investigated how incoming students integrated into their new social environment by inspecting their cohort networks' dynamics. Chapter 4 studied how these same young adults coped with symptoms of anxiety and depression by studying their mental health trajectories.

Combined, my findings suggest that the impact of the transition to university on students' social relationships and mental health is less severe than anticipated. Students' ego networks overall showed remarkable robustness, their cohort networks,

once formed, remained fairly stable, and their mental health seemed to only occasionally fluctuate or gradually worsen over time. Furthermore, the speed at which the transition to university seems to occur became apparent throughout these empirical chapters. I found that within one term (i.e., eight weeks), participants' ego networks grew significantly and uniformly, while their overall structure was largely maintained, and few previously existing relationships lost. Within this same time frame, participants also seemed to have integrated into their new college community. This was achieved predominantly by forming friendships with similar others and resulted in one interconnected cohort network made up of homogeneous friendships. While some mental health problems appeared to spike during term time, such fluctuations seemed mostly resolved after the term had ended.


These results open new avenues for future research, which might wish to focus on the first few weeks of this transition to differentiate students' experience further. While the average student might have been shown to fare rather well, individual differences such as gender, ethnicity, personality traits, and baseline network parameters as well as baseline mental health levels have been shown to play a role in how individual students are impacted by the transition. Adopting an overall more granular approach is hence advisable as a next step. Nonetheless, the findings presented in this thesis already have some meaningful wider implications. They appear to challenge pervasive theoretical conceptualisations of this transition necessarily involving a social trade-off and a period of mental ill-health, or of it jeopardising social support, and highlight the first few weeks as most pivotal in determining individual transition trajectories. The findings of the present research can also already be applied within the higher education context and

beyond by facilitating first student interactions more consciously, by actively promoting the formation of diverse friendship groups during induction events, and by monitoring the social integration and mental health of those students most at risk of being adversely affected by the transition to university.

6 Appendices

6.1 Appendix A: Questionnaire Study 1

DEPARTMENT OF
EXPERIMENTAL PSYCHOLOGY


UNIVERSITY OF
OXFORD

PARTICIPANT CONSENT FORM: Student Networks in Transition
researcher: Maria Kempnich – maria.kempnich@psy.ox.ac.uk

This study investigates how social networks (friends & family) adapt when we move to a new place, such as university. We still know very little about how students transition into university life, and would thus like to find out more about how we settle in and make new friends. We hope this study will contribute to a better understanding of how existing relationships change over time as well as how new friendships form. Please tick each box to give consent.

- I have read and understood the Participation Information Sheet.
- I have had the opportunity to ask any questions about the study and have received satisfactory answers or the additional information requested.
- I understand that I may withdraw from the study at any time without penalty, and won't be asked for reasons of withdrawal.
- I understand that this study has been reviewed and approved by Oxford University Central University Research Ethics Committee.
- I understand how my data will be stored, who will have access to my data, and what will happen to my data at the end of this study.
- I understand that the research will be written up as a DPhil project and how personal data from this research will be used
- I understand how to raise any concerns or complaints about this study
- I understand that personal data may be collected during this study. This may include information relating to myself, my mental health, and relationships and interactions with others.
- I understand that in this project and all future works using my responses, all personal and sensitive data will be anonymised.
- I agree to take part in this study

Social Network Questionnaire - PART 1

We are interested in the size and composition of social networks – the circle of people with whom you interact regularly and with whom you feel you have a personal relationship – in short, your friends and acquaintances.

This first part of the questionnaire should take 30 to 45 minutes to complete. You don't have to do it all at one sitting (You can save your answers and return to the questionnaire simply by clicking on the link you received via e-mail). Please read any instructions carefully before completing each section.

The information gained from the questionnaire will be completely confidential and anonymous. Once you have completed PART 1, you will be sent access to PART 2.

Please enter your unique participation number that you have received.



About yourself

Please tell us a
little bit about
yourself.

How old are you?

What is your gender?

What country do you
currently live in?

How long have you
been living in your
current home?

How many people live
in your home (excluding
yourself)?

Which of these best describes your ethnic group? Please enter the letter that applies.

WHITE

- A - White (English/Welsh/Scottish/Northern Irish/British)
- B - White (Irish)
- C - White (Gypsy or Irish Traveller)
- D - Any other White background

MIXED

- E - Mixed White and Black Caribbean
- F - Mixed White and Black African
- G - Mixed White and Asian
- H - Any other mixed background

ASIAN

- I - Asian or Asian British (Indian)
- J - Asian or Asian British (Pakistani)
- K - Asian or Asian British (Bangladeshi)
- L - Asian or Asian British (Chinese)
- M - Any other Asian/Asian British background

BLACK

- N - Black or Black British (Caribbean)
- O - Black or Black British (African)
- P - Any other Black/Black British background

OTHER ETHNIC GROUP

- Q - Arab
- R - Any other ethnic group

S - Don't know

T - Refused

What is your religion?

- No religion
- Christian
- Buddhist
- Hindu
- Jewish
- Muslim
- Sikh
- Other

Do you own a smartphone?

- Yes, an iPhone
- Yes, an Android
- Yes, but neither iPhone nor Android
- No

Personality traits

Please use the rating scale below to describe how accurately each statement describes you. Describe yourself as you generally are now, not as you wish to be in the future. Describe yourself as you honestly see yourself, in relation to other people you know of the same sex as you are, and roughly the same age as you. So that you can describe yourself in an honest manner, your responses will be kept in absolute confidence. Please read each statement carefully, and then tick the box that corresponds to the number on the scale.

	very inaccurate	moderately inaccurate	neither inaccurate nor accurate	moderately accurate	very accurate
1) I am the life of the party	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2) I sympathize with others' feelings	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3) I get chores done right away	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4) I have frequent mood swings	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5) I have a vivid imagination	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6) I don't talk a lot	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7) I am not interested in other people's problems	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8) I often forget to put things back in their proper place	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9) I am relaxed most of the time	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10) I am not interested in abstract ideas	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11) I talk to a lot of different people at parties	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
12) I feel others' emotions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
13) I like order	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
14) I get upset easily	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
15) I have difficulty understanding abstract ideas	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
16) I keep in the background	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
17) I am not really interested in others	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
18) I make a mess of things	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
19) I seldom feel blue	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
20) I do not have a good imagination	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Your political orientation & engagement

These questions are completely anonymous and optional.

I favour political values that are

strongly socialist socialist somewhat socialist neither socialist nor conservative somewhat conservative conservative strongly conservative

I am politically

far left of centre left of centre somewhat left of centre centre somewhat right of centre right of centre far right of centre

With regards to politics, I see myself as

very uninterested uninterested somewhat uninterested neither interested nor uninterested somewhat interested interested very interested

I follow what is going on in government and public affairs

hardly at all only now and then some of the time most of the time

Where do you usually get your news from? (Please tick all that apply.)

- newspaper (printed or online)
- radio
- TV
- Facebook
- Twitter
- other social media platform
- other people
- other

Your relatives

Please list all relatives - parents, siblings, (great-)grandparents, (great-)aunts, (great-)uncles, first cousins, nephews and nieces - which you have in the table on the next page, and fill in the requested information for each individual in the columns.

- Only include people who are alive today and with whom you have had any type of contact **within the last 12 months**.

- If you have more than one of any type of relative, please be sure to list them all.

- As well as genetic (blood-related) relatives, also include adoptive and step relatives and relatives-by-marriage (e.g. your aunt's husband or your brother's wife). Please specify the relationship if they are not your blood relative.

When you enter them into the table, you may like to use their initials, first name, nickname or some other way of identifying them to you so that you can keep track of them in your mind and will know who they refer to in the future.

We would also like you to tell us how emotionally close these individuals are to you. We are asking you to give a number on a 1 to 10 scale that summarises the closeness of the relationship that you feel you have with each individual in your list. You can scale these relationships in any way you choose, but you might think of something like the following:

- 1 someone you never see or hear from
- 2 someone whom you meet only occasionally at social events or family get-togethers like weddings and for whom you don't have any emotional relationship;
-
- 10 someone with whom you have a deeply emotional relationship, perhaps someone you might go to for advice or comfort in times of major trauma or crisis.

Your relatives

The columns relating to ethnicity and nationality will be used to look at the diversity and composition of students' networks only; it is completely anonymous and optional.

	Name/Initials	Relationship to you	Emotional Closeness	How far away do they live?	How do you typically engage with them? Please choose all that apply.	When were you last in contact with them?	What ethnicity are they?						
	(or anything to help you keep them straight in your mind)	e.g. mother, uncle (related by marriage), stepsister, adoptive grandfather	On a scale from 1-10 (where 10 is very close), please say how close the person is to you in terms of how you feel about them	same house same city same country different country	Face-to-face phone, Skype, FaceTime or similar text message, e-mail, social media, letter		White	East Asian	South Asian	Black/African/Afro-Caribbean	Middle Eastern	Latino/Hispanic	Other
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													

Well-being

This last part is much quicker than the ones before - thank you very much for filling those out already! :-)

There are a few short questionnaires asking about how you might be feeling or acting. We do not use your data to make any diagnoses and your answers will be kept strictly confidential and anonymous. We will not share this data with any third parties, such as your GP, your parents or your college. It is normal for our well-being to fluctuate, especially during a phase of change (e.g. finishing school and starting university). Your data can contribute to understanding what factors influence such changes and the insights gained can be applied to assist future students in their transition from home to uni.

Could you please indicate to what extent you have experienced the following in the past 4 weeks:

	not	weak	moderate	strong	very strong
Missing your parents	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Missing your family	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Missing home	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Feeling missed by your family	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Feeling lonely	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Feeling unloved	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Feeling isolated from the rest of the world	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Feeling uprooted	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Longing for acquaintances	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Searching for familiar faces	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Missing people whom you trust and can talk with	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Missing your friends	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Finding it difficult adjusting to a new situation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Feeling uncomfortable in a new situation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Feeling lost in a new situation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Having difficulties in getting used to new customs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Having thoughts that an old situation was better than here and now	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Regretting the decision to leave an old situation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Continuously having thoughts about home	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Repeatedly thinking of the past	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Over the **last 2 weeks**, how often have you been bothered by the following problems?

Please choose which applies best.

	not at all	several days	more than half the days	nearly every day
Feeling nervous, anxious or on edge	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Not being able to stop or control worrying	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Worrying too much about different things	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Trouble relaxing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Being so restless that it is hard to sit still	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Becoming easily annoyed or irritable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Feeling afraid as if something awful might happen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

If you checked off **any** problems, how **difficult** have these problems made it for you to do your work, take care of things at home, or get along with other people?

not difficult at all	somewhat difficult	very difficult	extremely difficult
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please choose with applies best.

	not at all	a little bit	somewhat	very much	extremely
Fear of embarrassment causes me to avoid doing things or speaking to people	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I avoid activities in which I am the centre of attention	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Being embarrassed or looking stupid are among my worse fears	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Over the **last 2 weeks**, how often have you been bothered by any of the following problems?

Please choose which applies best.

	not at all	several days	more than half the days	nearly every day
Little interest or pleasure in doing things	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Feeling down, depressed, or hopeless	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Trouble falling or staying asleep, or sleeping too much	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Feeling tired or having little energy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Poor appetite or overeating	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Feeling bad about yourself - or that you are a failure or have let yourself or your family down	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Trouble concentrating on things, such as reading the newspaper or watching television	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Moving or speaking so slowly that other people could have noticed? Or the opposite - being so fidgety or restless that you have been moving around a lot more than usual	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Thoughts that you would be better off dead or of hurting yourself in some way	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

If you checked off **any** problems, how **difficult** have these problems made it for you to do your work, take care of things at home, or get along with other people?

not difficult at all	somewhat difficult	very difficult	extremely difficult
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

If filling out this last questionnaire has made you aware of or anxious about difficulties you might be experiencing, please seek help from your GP or other local services in your hometown. Once you arrive in Oxford, there are a range of services you can consult:

The University Counselling Service - <https://www.ox.ac.uk/students/welfare/counselling?wssl=1>

New College's Welfare Services - <http://www.new.ox.ac.uk/welfare-and-advice>

Student-led Support:

OUSU Student Advice Service - <https://ousu.org/advice/student-advice-service/>

Nightline - <http://oxfordnightline.org>

Student Minds - <http://www.studentminds.org.uk/find-support.html>

Social Network Questionnaire - PART 2

We are interested in the size and composition of social networks – the circle of people with whom you interact regularly and with whom you feel you have a personal relationship – in short, your friends and acquaintances.

This second part of the questionnaire should also take 30 to 45 minutes to complete. You don't have to do it all at one sitting (You can save your answers and return to the questionnaire simply by clicking on the link you received via e-mail). Please read any instructions carefully before completing each section.

The information gained from the questionnaire will be completely confidential and anonymous.

Your friends & acquaintances

We are interested in who else is in your social network, **other than your relatives**. To do this, and list all those people with whom you consider that you have some kind of personal relationship (friend, romantic partner, acquaintance, someone with whom you interact on a regular basis at a club or other activity).

There are 3 exceptions:

- **Do not** include family/relatives (as these were already listed in part 1 already);
- **Do not** include people who you would definitely not consider to be a member of your social network (for example, please do not include professional/business contacts, or the local takeaway – unless you feel you have a real relationship with them.);
- Only include people with whom you have had some kind of contact (face-to-face, phone calls, social media interactions) **within the last 12 months** and with whom you feel you would wish the relationship to continue.

There are two final things to bear in mind when completing the table:

- **Please do not duplicate** (if someone is in both your e-mail and mobile telephone address books, for example, only list them once);
- If one particular telephone number or address encompasses more than one person, then be sure to list **every** person at that number/address whom you would consider to be a member of your social network.

Since we know listing all of your friends and acquaintances might take a little longer, this is the only task in this part of the questionnaire. Once you have filled out the table, you are **DONE** with PART 2! :-)

Your friends & acquaintances

The columns relating to ethnicity and nationality will be used to look at the diversity and composition of students' networks only; it is completely anonymous and optional.

	Name/Initials <small>(or anything to help you keep them straight in your mind)</small>	Emotional Closeness <small>On a scale from 1-10 (where 10 is very close), please say how close the person is to you in terms of how you feel about them</small>	How far away do they live?				How do you typically engage with them? <small>Please choose all that apply</small>			When were you last in contact with them?	What ethnicity are they?	What is their nationality?		<small>ANDROID USERS ONLY: Please list the last 6 digits of their phone number. ONLY you have exchanged phone calls and/or text messages within the last 3 months</small> <small>This information is us to match your contact with your phone interactions while safeguarding your anonymity (should you choose to share it with us later on)</small>
			same house	same city	same country	different country	Face-to-face	phone, Skype, FaceTime or similar	text message, e-mail, social media, letter			British	Non-British	
1	<input type="text"/>	<input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
2	<input type="text"/>	<input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
3	<input type="text"/>	<input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
4	<input type="text"/>	<input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
5	<input type="text"/>	<input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
6	<input type="text"/>	<input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
7	<input type="text"/>	<input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
8	<input type="text"/>	<input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
9	<input type="text"/>	<input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
10	<input type="text"/>	<input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>

THANK YOU for filling out the second part of this study, we really appreciate your contribution! I hope you have enjoyed participating thus far and are excited for your time at Oxford to start.

You will receive the payment for your participation thus far (£20), after we have met in Freshers' Week where you can provide us with your bank details.

I wish you a great start here in Oxford!

See you soon!

Best,
Mary



Only included in subsequent assessments (after participants had moved to Oxford):

Your new friends & acquaintances

We are interested in who you have become acquainted with since moving to Oxford.

Please quickly look through any lists of contacts (e.g. your phone contacts, social media accounts, address books) you might have and list all those people with whom you consider that you have some kind of personal relationship (friend, romantic partner, acquaintance, someone with whom you interact on a regular basis at a club or other activity) and **whom you have met since moving to Oxford**.

We are looking to create a network showing the friendships between anonymised participants and will thus ask you for the full names (first and last name) of your friends/acquaintances **at College only**. I will convert these names into the respective participation numbers to match the nominations. Since you only know how many friends you have nominated, but not the responses of the other participants (i.e. how many friends they have nominated each and how many times they have nominated you), no one should not be able to identify one another from the overall friendship pattern, where the participation numbers are removed.

	Are they College Student?	Full name for College students	Emotional Closeness	How far away do they live? (in Oxford)				How do you typically engage with them? Please choose all that apply.			When were you last in contact with them?
	yes	(first names, nicknames or initials can be used for non- students you got to know last term)	On a scale from 1-10 (where 10 is very close), please say how close the person is to you in terms of how you feel about them	same room/flat/staircase	same building	same college	same city	Face- to- face	phone, Skype, FaceTime or similar	text message, e- mail, social media, letter	
1	<input type="radio"/>	<input type="text"/>	<input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>
2	<input type="radio"/>	<input type="text"/>	<input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>
3	<input type="radio"/>	<input type="text"/>	<input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>
4	<input type="radio"/>	<input type="text"/>	<input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>
5	<input type="radio"/>	<input type="text"/>	<input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>
6	<input type="radio"/>	<input type="text"/>	<input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>
7	<input type="radio"/>	<input type="text"/>	<input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>
8	<input type="radio"/>	<input type="text"/>	<input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>
9	<input type="radio"/>	<input type="text"/>	<input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>
10	<input type="radio"/>	<input type="text"/>	<input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>

6.2 Appendix B: Questionnaire Study 2

PARTICIPANT CONSENT FORM: Transitioning to University Life

CUREC Approval Reference Number: R52698/RE001

This study investigates how social networks (friends & family) adapt when we move to a new place, such as university. We still know very little about how students transition into university life, and would thus like to find out more about how we settle in and make new friends. We hope this study will contribute to a better understanding of how existing relationships change over time as well as how new friendships form. Please tick each box to give consent.

- I confirm that I have read and understood the Participation Information Sheet.
- I have had the opportunity to consider the information, ask questions and have received satisfactory answers or the additional information requested.
- I understand that my participation is voluntary and that I may withdraw from the study at any time without penalty, and will not be asked for reasons of withdrawal.
- I understand that this study has been reviewed and approved by the University of Oxford's Central University Research Ethics Committee.
- I understand how my data will be stored, who will have access to my data, and what will happen to my data at the end of this study.
- I understand that the research will be written up as a DPhil project and how personal data from this research will be used.
- I understand how to raise any concerns or complaints about this study.
- I understand that personal data will be collected during this study. This may include information relating to myself, my mental health, and relationships and interactions with others.
- I understand that in this project and all future works using my responses, all personal and sensitive data will be anonymised.
- I understand that the data will be accessed by our research team as well as by our EU collaborators in Finland and Spain.
- I agree to take part in this study.

Please enter your unique participation number that you have received.

PART A - About Yourself

We would first like to find out more about you.

This first half of the questionnaire should take around 10 to 15 minutes. You don't have to do it all in one sitting (you can save your answers and return to the questionnaire simply by clicking on the link you received via e-mail). Please read any instructions carefully before completing each section.

The information gained from the questionnaire will be completely confidential and anonymous.

Please tell us a little bit
about yourself.

How old are you?

What is your gender?

What country do you currently live
in?

How long have you been living in
your current home? (in years)

How many people live in your home
(including yourself)?

Which of these best describes your ethnic group? Please enter the letter that applies.

WHITE

- A - White (English/Welsh/Scottish/Northern Irish/British)
- B - White (Irish)
- C - White (Gypsy or Irish Traveller)
- D - Any other White background

MIXED

- E - Mixed White and Black Caribbean
- F - Mixed White and Black African
- G - Mixed White and Asian
- H - Any other mixed background

ASIAN

- I - Asian or Asian British (Indian)
- J - Asian or Asian British (Pakistani)
- K - Asian or Asian British (Bangladeshi)
- L - Asian or Asian British (Chinese)
- M - Any other Asian/Asian British background

BLACK

- N - Black or Black British (Caribbean)
- O - Black or Black British (African)
- P - Any other Black/Black British background

OTHER ETHNIC GROUP

- Q - Arab
- R - Any other ethnic group

- S - Don't know
- T - Refused

Your political orientation & engagement

These questions are completely anonymous and optional.

I favour political values that are

strongly socialist socialist somewhat socialist neither socialist nor conservative somewhat conservative conservative strongly conservative

I am politically

far left of centre left of centre somewhat left of centre centre somewhat right of centre right of centre far right of centre

With regards to politics, I see myself as

very uninterested uninterested somewhat uninterested neither interested nor uninterested somewhat interested interested very interested

I follow what is going on in government and public affairs

hardly at all only now and then some of the time most of the time

Where do you usually get your news from? (Please tick all that apply.)

- newspaper (printed or online)
- radio
- TV
- Facebook
- Twitter
- other social media platform
- other people
- other

DEPARTMENT OF
EXPERIMENTAL PSYCHOLOGY



Well-being

Almost done with the section about yourself! There are only a few short questionnaires left asking about how you might be feeling or acting.

We are not using your data to make any diagnoses and your answers will be kept strictly confidential and anonymous. We will not share this data with any third parties, such as your GP, your parents or your college. It is normal for our well-being to fluctuate, especially during a phase of change (e.g. finishing school and starting university). Your data can contribute to understanding what factors influence such changes and the insights gained can be applied to assist future students in their transition from home to uni.

We greatly appreciate you sharing this information with us.

Could you please indicate to what extent you have experienced the following in the past 4 weeks:

	not	weak	moderate	strong	very strong
Missing your parents	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Missing your family	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Missing home	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Feeling missed by your family	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Feeling lonely	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Feeling unloved	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Feeling isolated from the rest of the world	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Feeling uprooted	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Longing for acquaintances	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Searching for familiar faces	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Missing people whom you trust and can talk with	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Missing your friends	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Finding it difficult adjusting to a new situation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Feeling uncomfortable in a new situation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Feeling lost in a new situation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Having difficulties in getting used to new customs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Having thoughts that an old situation was better than here and now	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Regretting the decision to leave an old situation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Continuously having thoughts about home	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Repeatedly thinking of the past	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Over the **last 2 weeks**, how often have you been bothered by the following problems?

Please choose which applies best.

	not at all	several days	more than half the days	nearly every day
Feeling nervous, anxious or on edge	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Not being able to stop or control worrying	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Worrying too much about different things	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Trouble relaxing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Being so restless that it is hard to sit still	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Becoming easily annoyed or irritable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Feeling afraid as if something awful might happen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

If you checked off **any** problems, how **difficult** have these problems made it for you to do your work, take care of things at home, or get along with other people?

not difficult at all	somewhat difficult	very difficult	extremely difficult
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please choose with applies best.

	not at all	a little bit	somewhat	very much	extremely
Fear of embarrassment causes me to avoid doing things or speaking to people	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I avoid activities in which I am the centre of attention	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Being embarrassed or looking stupid are among my worse fears	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Over the **last 2 weeks**, how often have you been bothered by any of the following problems?

Please choose which applies best.

	not at all	several days	more than half the days	nearly every day
Little interest or pleasure in doing things	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Feeling down, depressed, or hopeless	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Trouble falling or staying asleep, or sleeping too much	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Feeling tired or having little energy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Poor appetite or overeating	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Feeling bad about yourself - or that you are a failure or have let yourself or your family down	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Trouble concentrating on things, such as reading the newspaper or watching television	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Moving or speaking so slowly that other people could have noticed? Or the opposite - being so fidgety or restless that you have been moving around a lot more than usual	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Thoughts that you would be better off dead or of hurting yourself in some way	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

If you checked off **any** problems, how **difficult** have these problems made it for you to do your work, take care of things at home, or get along with other people?

not difficult at all	somewhat difficult	very difficult	extremely difficult
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

If filling out this last questionnaire has made you aware of or anxious about difficulties you might be experiencing, please seek help from your GP or other local services in your hometown. Once you arrive in Oxford, there are a range of services you can consult:

The University Counselling Service - <https://www.ox.ac.uk/students/welfare/counselling?wssl=1>

New College's Welfare Services - <http://www.new.ox.ac.uk/welfare-and-advice>

Student-led Support:

OUSU Student Advice Service - <https://ousu.org/advice/student-advice-service/>

Nightline - <http://oxfordnightline.org>

Student Minds - <http://www.studentminds.org.uk/find-support.html>

PART B - Your network

Finally, we are interested in the size and composition of your social network – the circle of people with whom you interact regularly and with whom you feel you have a personal relationship – in short, your family & friends.

This second and final part of the questionnaire should take roughly 20 minutes to complete. Again, you don't have to do it all at one sitting (you can save your answers and return to the questionnaire simply by clicking on the link you received via e-mail). Please read any instructions carefully before completing each section.

The information gained from the questionnaire will be completely confidential and anonymous.

Your relatives

Please list all relatives - parents, siblings, (great-)grandparents, (great-)aunts, (great-)uncles, first cousins, nephews and nieces - that you have in the table below, and fill in the requested information for each individual in the columns.

- Only include people who are alive today and with whom you have had **a meaningful relationship within the last 12 months**.
- As well as genetic (blood-related) relatives, also include adoptive and step relatives and relatives-by-marriage (e.g. your aunt's husband or your brother's wife). Please specify the relationship if they are not your blood relative.

When you enter them into the table, you may like to use their initials, first name, nickname or some other way of identifying them to yourself **so that you can keep track of them in your mind and will know whom they refer to in the future**.

We would also like you to tell us how emotionally close these individuals are to you. We are asking you to give a number on a 1 to 10 scale that summarises the closeness of the relationship that you feel you have with each individual in your list. You can scale these relationships in any way you choose, but you might think of something like the following:

- 1 someone you never see or hear from
- 2 someone whom you meet only occasionally at social events or family get-togethers like weddings and for whom you don't have any emotional relationship;
-
- 10 someone with whom you have a deeply emotional relationship, perhaps someone you might go to for advice or comfort in times of major trauma or crisis.

Your relatives

	Name/Initials <small>(or anything to help you keep them straight in your mind)</small>	Relationship to you <small>e.g. mother, uncle (related by marriage), stepsister, adoptive grandfather</small>	Emotional Closeness <small>On a scale from 1-10 (where 10 is very close), please say how close the person is to you in terms of how you feel about them</small>	How far away do they live?	How do you typically engage with them? Please choose all that apply. <small>Face-to-face phone, Skype, FaceTime or similar text message, e-mail, social media, letter</small>	When were you last in contact with them?
1	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="text"/>
2	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="text"/>
3	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="text"/>
4	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="text"/>
5	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="text"/>
6	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="text"/>
7	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="text"/>
8	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="text"/>
9	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="text"/>
10	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="text"/>
11	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="text"/>
12	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="text"/>
13	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="text"/>

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Your friends

We are also interested in the friends making up your social network.

Please look through any lists of contacts (e.g. your phone contacts, social media accounts, etc.) and list all those people with whom you consider that you have a **meaningful personal relationship** (friend or romantic partner) and with whom you have **initiated contact in the past month** (unless there was a specific reason why you could not be in contact).

There are 3 exceptions:

- **Do not include** family/relatives (as you have just listed them already)
- **Do not include** people who you would definitely not consider to be part of your network (e.g. professional contacts or the local takeaway, unless you feel you have a real relationship with them)
- **Only include** people with whom you would wish the relationship to continue.

Your friends & acquaintances

	Name/Initials (or anything to help you keep them straight in your mind)	Are you in a romantic relationship with this person? YES	Emotional Closeness On a scale from 1-10 (where 10 is very close), please say how close the person is to you in terms of how you feel about them	How far away do they live?
1	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
2	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
3	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
4	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
5	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
6	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
7	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
8	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
9	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
10	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>

same house
 same city
 same country
 different country

Your friends & acquaintances

The columns relating to ethnicity and nationality will be used to look at the diversity and composition of the networks only; it is completely anonymous and optional.

	How do you typically engage with them? Please choose all that apply.	When were you last in contact with them?	What ethnicity are they?	What is their nationality?
	<input type="checkbox"/> Face-to-face <input type="checkbox"/> phone, Skype, FaceTime or similar <input type="checkbox"/> text message, e-mail, social media, letter	<input type="text"/>	<input type="text"/>	<input type="text"/>
	<input type="checkbox"/> Face-to-face <input type="checkbox"/> phone, Skype, FaceTime or similar <input type="checkbox"/> text message, e-mail, social media, letter	<input type="text"/>	<input type="text"/>	<input type="text"/>
	<input type="checkbox"/> Face-to-face <input type="checkbox"/> phone, Skype, FaceTime or similar <input type="checkbox"/> text message, e-mail, social media, letter	<input type="text"/>	<input type="text"/>	<input type="text"/>
	<input type="checkbox"/> Face-to-face <input type="checkbox"/> phone, Skype, FaceTime or similar <input type="checkbox"/> text message, e-mail, social media, letter	<input type="text"/>	<input type="text"/>	<input type="text"/>
	<input type="checkbox"/> Face-to-face <input type="checkbox"/> phone, Skype, FaceTime or similar <input type="checkbox"/> text message, e-mail, social media, letter	<input type="text"/>	<input type="text"/>	<input type="text"/>
	<input type="checkbox"/> Face-to-face <input type="checkbox"/> phone, Skype, FaceTime or similar <input type="checkbox"/> text message, e-mail, social media, letter	<input type="text"/>	<input type="text"/>	<input type="text"/>
	<input type="checkbox"/> Face-to-face <input type="checkbox"/> phone, Skype, FaceTime or similar <input type="checkbox"/> text message, e-mail, social media, letter	<input type="text"/>	<input type="text"/>	<input type="text"/>
	<input type="checkbox"/> Face-to-face <input type="checkbox"/> phone, Skype, FaceTime or similar <input type="checkbox"/> text message, e-mail, social media, letter	<input type="text"/>	<input type="text"/>	<input type="text"/>
	<input type="checkbox"/> Face-to-face <input type="checkbox"/> phone, Skype, FaceTime or similar <input type="checkbox"/> text message, e-mail, social media, letter	<input type="text"/>	<input type="text"/>	<input type="text"/>
	<input type="checkbox"/> Face-to-face <input type="checkbox"/> phone, Skype, FaceTime or similar <input type="checkbox"/> text message, e-mail, social media, letter	<input type="text"/>	<input type="text"/>	<input type="text"/>



THANK YOU for filling out the first questionnaire of this study. We really appreciate your contribution!

This first questionnaire was necessarily a bit longer than subsequent ones will be, and we are especially grateful for your time. I hope you will enjoy participating in the study, the results of which should be of great use, and are excited for your time in Oxford to start.

We will meet towards the end of your first term, once you've gotten to know Oxford a little, to chat about the study a little more. Until then, enjoy the rest of your time at home & I wish you a great start here at New College.

See you soon!

Best,
Mary

Only included in subsequent assessments (after participants had moved to Oxford):



PART A - NEW additions to your network

Now that you have spent a term at [redacted] we are interested in who you have become friends with since moving to Oxford.

We are looking to create a network showing the friendships between anonymised participants and thus use the full names (first and last name) of your friends/acquaintances in your year at [redacted] only. I will convert these names into the respective participation numbers to match the nominations. Since you only know how many friends you have nominated, but not the responses of the other participants (i.e. how many friends they have nominated each and how many times they have nominated you), no one should be able to identify one another from the overall friendship pattern, where the participation numbers are removed and replaced with different labels.

The information gained from the questionnaire will be completely confidential and anonymous.

Please tick the names of your fellow first year [redacted] students with whom you consider that you have some kind of personal relationship (friend, romantic partner, someone with whom you interact on a regular basis). You can tick as many or as few names as you'd like.

[redacted]
 [redacted]
 [redacted]
 [redacted]

[redacted]
 [redacted]
 [redacted]
 [redacted]

Please also quickly look through any lists of contacts (e.g. your phone, social media, address books) you might have and list any additional people with whom you consider that you have some kind of personal relationship (friend, romantic partner, someone with whom you interact on a regular basis at a club or other activity) and **whom you have met since moving to Oxford.**

Please do not include anyone who was already listed on the previous page.

	Name (you can use nicknames or initials, just make sure you will be able to recognise them again)	Are they a student [redacted] College?		Are you/Have you been in a romantic relationship with this person?	Emotional Closeness On a scale from 1-10 (where 10 is very close), please say how close the person is to you in terms of how you feel about them	When were you last in contact with them?	How do you typically engage with them? Please choose all that apply.		
		YES	YES	YES			Face-to-face	phone, Skype, FaceTime or similar	text message, e-mail, social media, letter
1	<input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	<input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	<input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	<input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	<input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	<input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	<input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	<input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	<input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	<input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

6.3 Appendix C: Auxiliary Analyses of Mental Health

Table 6.1 Summary of individual linear regression models of predictors of anxiety scores post-transition

Predictor	Study 1				Study 2			
	<i>M (SD)</i>	<i>p</i>	<i>b (SE)</i>	β	<i>M (SD)</i>	<i>p</i>	<i>b (SE)</i>	β
baseline anxiety	4.09 (3.31)	.005	0.46 (0.16)	.31	4.73 (3.62)	<.001	0.67 (0.11)	.58
baseline depression	4.65 (4.26)	.009	0.34 (0.13)	.29	4.14 (3.47)	<.001	0.52 (0.12)	.43
gender (female – 0, male – 1)	0.55 (.50)	.189	-1.45 (1.09)	-.15	0.51 (0.50)	.115	-1.48 (0.93)	-.18
ethnicity (non-white – 0, white – 1)	0.76 (0.43)	.716	0.47 (1.29)	.04	0.74 (0.44)	.379	-0.95 (1.07)	-.10
openness	14.09 (1.94)	.003	-0.92 (0.27)	-.33	13.69 (2.35)	.613	0.10 (0.20)	.06
conscientiousness	13.68 (2.85)	.765	-0.06 (0.19)	-.03	13.22 (2.95)	.040	-0.33 (0.16)	-.23
extraversion	13.48 (3.41)	.929	0.02 (0.16)	.01	13.88 (3.04)	.711	-0.06 (0.16)	-.04
agreeableness	16.29 (2.56)	.378	-0.19 (0.22)	-.10	16.16 (2.84)	.034	-0.35 (0.16)	-.24
neuroticism	11.39 (3.32)	.005	0.45 (0.16)	.31	11.28 (3.34)	<.001	0.63 (0.12)	.50
BEN quantity	46.78 (23.27)	.383	-0.02 (0.02)	-.10	27.33 (9.36)	.574	0.03 (0.05)	.06
BEN quality	5.79 (1.21)	.651	-0.21 (0.46)	-.05	6.52 (1.05)	.197	-0.58 (0.44)	-.15
BEN support clique size	5.28 (3.88)	.639	-0.07 (0.14)	-.05	5.04 (3.26)	.723	0.05 (0.15)	.04

cohort popularity	14.73 (8.25)	.875	0.01 (0.07)	.02	16.10 (10.44)	.384	0.04 (0.05)	.10
cohort activity	14.33 (9.96)	.408	0.05 (0.06)	.09	16.10 (8.11)	.760	0.02 (0.06)	.04

Note. BEN = baseline ego-network

Table 6.2 Summary of individual linear regression models of predictors of depression scores post-transition

Predictor	Study 1				Study 2			
	<i>M (SD)</i>	<i>p</i>	<i>b (SE)</i>	β	<i>M (SD)</i>	<i>p</i>	<i>b (SE)</i>	β
baseline anxiety	4.09 (3.31)	.221	0.20 (0.16)	.14	4.04 (3.62)	.001	0.55 (0.15)	.38
baseline depression	4.65 (4.26)	<.001	0.55 (0.11)	.49	4.14 (3.47)	<.001	0.74 (0.15)	.48
gender (female – 0, male – 1)	0.55 (.50)	.657	-0.48 (1.07)	-.05	0.51 (0.50)	.338	-1.14 (1.19)	-.11
ethnicity (non-white – 0, white – 1)	0.76 (0.43)	.650	0.57 (1.25)	.05	0.74 (0.44)	.400	-1.15 (1.35)	-.10
openness	14.09 (1.94)	.182	-0.37 (0.27)	-.15	13.69 (2.35)	.952	-0.02 (0.26)	-.01
conscientiousness	13.68 (2.85)	.058	-0.35 (0.18)	-.21	13.22 (2.95)	.030	-0.44 (0.20)	-.24
extraversion	13.48 (3.41)	.611	-0.08 (0.16)	-.06	13.88 (3.04)	.715	-0.07 (0.20)	-.04
agreeableness	16.29 (2.56)	.021	-0.48 (0.20)	-.26	16.16 (2.84)	.014	-0.51 (0.20)	-.27
neuroticism	11.39 (3.32)	.018	0.38 (0.16)	.26	11.28 (3.34)	.005	0.50 (0.17)	.31
BEN quantity	46.78 (23.27)	.387	-0.02 (0.02)	-.10	27.33 (9.36)	.554	0.04 (0.06)	.07

BEN quality	5.79 (1.21)	.050	-0.86 (0.43)	-.22	6.52 (1.05)	.039	-1.17 (0.55)	-.23
BEN support clique size	5.28 (3.88)	.027	-0.30 (0.13)	-.25	5.04 (3.26)	.508	-0.12 (0.18)	-.08
cohort popularity	14.73 (8.25)	.464	-0.05 (0.07)	-.08	16.10 (10.44)	.539	0.04 (0.06)	.07
cohort activity	14.33 (9.96)	.689	0.02 (0.05)	.05	16.10 (8.11)	.413	0.06 (0.07)	.09

Note. BEN = baseline ego-network

Table 6.3 Summary of the independent t-tests comparing the studies' outcomes & relevant predictors

Outcome	t	p
post-transition anxiety	1.32	.189
post-transition depression	-0.96	.341
Predictors		
baseline anxiety	0.09	.925
baseline depression	0.83	.408
openness	1.17	.246
conscientiousness	0.99	.324
agreeableness	0.30	.766
neuroticism	0.20	.844
BEN quality	-4.07	.001
BEN support clique size	0.42	.674

Note. BEN = baseline ego-network

7 References

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