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EMERGING SOCIAL SPACE: THE ROLE OF FACEBOOK IN AUSTRALASIAN INTERNATIONAL STUDENT INTEGRATION

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A thesis submitted in fulfilment of the requirements for the degree of PhD in Education,
the University of Auckland, 2014
ABSTRACT

The number of international university students in Australasia is set to increase dramatically over the next five to ten years, making the integration of this group increasingly important to the region. In addition, much of university students’ communicative behaviour continues to shift to Social Network Sites (SNS), namely Facebook (FB). The current study examines the emerging social space created at the crossroad of these two dynamics.

Utilizing a large battery of FB-related and academic integration questions, this study asks four research questions (RQs). RQ1 asks, How do the FB-related items function to explain students’ FB-related behaviour? RQ2 asks, How do the institutional integration items function to explain students’ integrative behaviour? RQ3 asks, What systematic model best represents the role of FB-related and institutional integration factors for international students’ commitment? And, RQ4 asks, What role does demographic play in the model?

Results are based on survey data (N = 491) from a Web-response driven sample of full-time degree-seeking international students enrolled in universities across Australasia. For RQ1, international students’ FB-related behaviour can be understood in terms of six factors: FB Intensity-i, FB Affiliations, FB Maintaining, FB Information Seeking-i, Same FB Group Engagement, and FB Initiating-i. For RQ2, institutional integrative behaviour can be understood in terms of five factors: Peer-Group Interactions, Interaction with Staff, Staff Concern for Student Development and Teaching, Academic and Intellectual Development, and Goal and Institutional Commitment. For RQ3, a Dual-Path Model of International Student Integration is presented that illustrates two parallel paths to improved commitment: (a) the Staff-Academic System where informal social interaction with staff improves international students’ academic progress, and commitment; and, (b) the Student-SNS System where strategic integration of FB
contributes to the on- and offline maintenance of close friends and commitment. For RQ4, findings suggest that (a) younger students are more inclined to use FB to maintain on- and offline connections with close friends, and (b) Islamic-influenced students exhibit higher levels of commitment. Implications for policy and practice are discussed.
DEDICATION

I dedicate this thesis to my wife and family.
ACKNOWLEDGEMENTS

This thesis would not have been possible without the tireless dedication of my supervisors, Professor John Hattie, Associate Professor Gavin Brown and Dr John Hope. I would also like to acknowledge the ongoing support of Professor Nicole Ellison, Professor Charles Steinfield, Associate Professor Lesa Hoffman, Natalie A. Koziol, Professor John Ruscio, Dr. Mario Basto, and Dr. Paul Vincent.
# USE OF FACEBOOK AND INTERNATIONAL STUDENT INTEGRATION

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Glossary A. Social Media Terminology

**Blog:** A website containing a writer’s or group of writers’ own experiences, observations, opinions, etc., and often having images and links to other websites (Random House, 2013).

**Facebook (FB):** The name of a social-networking service and website, launched in 2004 (Random House, 2013).

**Myspace:** A social networking service launched in 2003 with a strong emphasis on music (Sutter, 2010a).

**News Feed:** The centre column of a FB user’s homepage, which shows updates from the people and pages that user follows on FB (Techopedia, 2010).

**Peer-to-peer:** (of a computer network) designed so that computers can send information directly to one another without passing through a centralized server (Collins, 2009).

**Podcasting:** A digital audio or video file or recording, usually part of a themed series, that can be downloaded from a website to a media player or computer (Random House, 2013).

**Social network site (SNS):** Internet-based services that allow users to: (a) construct a public or semi-public profile within a bounded system, (b) articulate a list of other users with whom they share a connection, and (c) view and traverse their list of connections and those made by others within the system (Boyd & Ellison, 2007).

**SixDegrees:** The first social network site starting in 1997 (Boyd & Ellison, 2007).

**Twitter:** The name of a social-networking service and website that limits the length of messages one can post to a certain number of characters (Random House, 2013).

**Wall:** The original space where FB users’ content was displayed until it was replaced by
the Timeline profile layout in December 2011.

**Web 2.0**: A second generation in the development of the World Wide Web, conceived as a combination of concepts, trends, and technologies that focus on user collaboration, sharing of user-generated content, and social networking (Random House, 2013).

**Wikis**: A web application that allows anyone visiting a website to edit content on it (Collins, 2009).
## GLOSSARY B. STRUCTURAL EQUATION MODELLING TERMINOLOGY AND SYMBOLS

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Pronunciation</th>
<th>Meaning</th>
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</thead>
<tbody>
<tr>
<td>$i$</td>
<td>ai</td>
<td>Row position in matrix algebra, see Bollen, 1989 (p. 15).</td>
</tr>
<tr>
<td>$j$</td>
<td>jay</td>
<td>Column position in matrix algebra, see Bollen, 1989 (p. 15).</td>
</tr>
<tr>
<td>$h^2$</td>
<td>eych squared</td>
<td>Item communality, i.e., The sum of the squared factor loadings for all factors for a given variable (i.e., row in an EFA solution).</td>
</tr>
<tr>
<td>$k$</td>
<td>kay</td>
<td>The number of latent factors in a model.</td>
</tr>
<tr>
<td>$p$</td>
<td>pee</td>
<td>The number of manifest (observed) variables in a model.</td>
</tr>
<tr>
<td>$\alpha$</td>
<td>alpha</td>
<td>Cronbach’s (1951) alpha which is a measure of an individual factor or principal component’s reliability or internal consistency.</td>
</tr>
<tr>
<td>$\beta$</td>
<td>beta (“bay-ta”)</td>
<td>A path representing a standardised causal relationship (regression coefficient) from one endogenous factor to another endogenous factor.</td>
</tr>
<tr>
<td>$\hat{\gamma}$</td>
<td>gamma hat</td>
<td>A measure of model fit.</td>
</tr>
<tr>
<td>$\gamma$</td>
<td>gamma</td>
<td>A path representing a causal relationship (regression coefficient) from an exogenous factor to an endogenous factor.</td>
</tr>
<tr>
<td>$\delta$</td>
<td>delta</td>
<td>The error term associated with an estimated, measured x variable (exogenous-related).</td>
</tr>
<tr>
<td>Symbol</td>
<td>Name</td>
<td>Description</td>
</tr>
<tr>
<td>--------</td>
<td>------</td>
<td>-------------</td>
</tr>
<tr>
<td>$\epsilon$</td>
<td>epsilon</td>
<td>The error term associated with an estimated, measured $y$ variable (endogenous-related).</td>
</tr>
<tr>
<td>$\iota$</td>
<td>iota</td>
<td>Maximum likelihood measure for the total latent variance variance explained by a two-way interaction (Smeden &amp; Hessen, 2013).</td>
</tr>
<tr>
<td>$\kappa$</td>
<td>kappa</td>
<td>The intercept terms for estimating a latent construct.</td>
</tr>
<tr>
<td>$\lambda$</td>
<td>lambda</td>
<td>A path representing the factor loading between a latent construct and a measured variable.</td>
</tr>
<tr>
<td>$\lambda_{opt}$</td>
<td>optimal lambda</td>
<td>An optimal exponentiation applied to each value in a dataset for the purpose of normalisation.</td>
</tr>
<tr>
<td>$\rho$</td>
<td>rho</td>
<td>The polychoric correlation coefficient.</td>
</tr>
<tr>
<td>$\Sigma$</td>
<td>sigma</td>
<td>The combined covariance matrix of X and Y variables.</td>
</tr>
<tr>
<td>$\tau$</td>
<td>tau (rhymes with “now”)</td>
<td>The intercept terms for estimating a measured variable.</td>
</tr>
<tr>
<td>$\phi$</td>
<td>phi (φ)</td>
<td>A path represented by an arced two-headed arrow representing the covariation between one $\xi$ and another $\xi$; a correlation.</td>
</tr>
<tr>
<td>$\Phi_k$</td>
<td>capital φ “k”</td>
<td>A way of referring to the coefficient of congruence, which is a measure of factor similarity.</td>
</tr>
<tr>
<td>$\chi^2$</td>
<td>Chi (ki)-squared</td>
<td>The likelihood ratio.</td>
</tr>
</tbody>
</table>
CHAPTER 1. INTRODUCTION

A 2004 study by the British Council estimated that the total global demand for international student places would increase from 2.1 million in 2003 to 5.8 million in 2020 (Böhm et al., 2004). It was also predicted that the five major English-speaking destinations, including New Zealand, Australia, the United Kingdom, Canada, and the United States of America, would be the most sought-after (Böhm et al., 2004). With such predictions in the Western market, a substantial increase in international tertiary-level enrolment could be on the horizon. The projected increase in the market underscores the current importance of international tertiary student integration. Successful international student integration carries important social, cultural, and economic ramifications for increasingly diverse campuses and communities. For these reasons, international tertiary student integration is a significant concern for university stakeholders, including administrators, teaching staff, and all students throughout the international tertiary education sector.

Statistics published by the New Zealand Ministry of Education (MoE) (Education Counts, 2011a) reveal that New Zealand hosted a total of 45,638 international tertiary students in 2010. For a population of 4.4 million, this represented a very high proportion of tertiary students—approximately one international tertiary student for every 96 New Zealand citizens. Statistics published by the Department of Education, Employment and Work Relations (DEEWR) (2011) reveal that Australia hosted a total 320,157 international tertiary students in 2010—for Australia’s population of 22.4 million, this represented an extremely high proportion of tertiary students—approximately one international student for every 70 Australian citizens. (New Zealand and Australia population statistics based on data from The Population Reference Bureau, 2010). Recent trends affirm the growth of the sector. From 2009 to 2010, total New Zealand
international students enrolled in tertiary education increased by 5.2% (Education Counts, 2011a). Similarly, in the same period, international student enrolments in higher education rose 7.6% in Australia (Australian Education International, 2011). When these global predictions and market trends are considered, international tertiary students look set to be of increasing socio-cultural significance to campuses and associated communities across Australasia in the coming years.

In New Zealand and Australia, most international university students do not come from English speaking countries and thus are likely to have different cultural backgrounds to the Anglo-Commonwealth societies of New Zealand and Australia. Given the likely cultural differences between international and domestic students, international tertiary students often face barriers when attempting to integrate academically and socially into the institutional milieu (Cemalcilar & Falbo, 2008; MoE, 2004, 2008). This lack of integration has been linked to poor academic and social experiences for some international students. Research conducted in New Zealand, for example, has suggested that poor integration in tertiary contexts is related to poor development of language skills and possibly an increase in large marginalised subgroups of international students (Ward, 2005).

Local integration was a key issue in New Zealand’s 2007 National Survey of International Students (MoE, 2008). This survey revealed that among all the international student groups in New Zealand, the international university-based student group had the most difficulty making local New Zealand friends, and that for all such students this was by far the most difficult task they faced (MoE, 2008, p. 94). Therefore, it would appear that, whatever the reasons, international university-based students face considerable barriers to integration and that
overcoming such barriers may well be important to international students’ overall success at tertiary level.

1.1 Social Network Sites (SNSs) and Tertiary Student Integration

Early studies concerning online network support of geographic-based communities concluded that computer-mediated interactions have a positive influence on community interaction, involvement, and social capital (Hampton & Wellman, 2003; Kavanaugh, Carol, Rosson, Zin, & Reese, 2005). More recent studies examining trends on geographic-based university campuses bear out such findings. Ellison, Steinfield, and Lambert’s (2007) study of 286 American university students suggested a connection between engagement with the SNS Facebook (FB) and improved social capital of students with low self-esteem or life satisfaction, prompting the authors to propose that the world’s most popular SNS may serve to “lower the barriers to participation so that students who might otherwise shy away from initiating communication with or responding to others are encouraged to do so through Facebook’s affordances” (p. 1162).

These results may hold some significance for the Australasian international tertiary sector as recent research in Australia suggests that international university students report significantly lower levels of satisfaction with their overall tertiary experience than their domestic counterparts (Australian Education International, 2010). Although limited to conjecture, other research provides support for the idea that the social space provided by FB is conducive to university students who might otherwise face barriers to campus participation. Boogart (2006) surveyed 16,581 American students from five different university campuses in the United States. Demographic analysis revealed statistically significant relationships between SNS use and the integration of student groups of arguably less institutional or hegemonic influence: results showed that student groups on campus, such as females, students of colour, and those of a lower
socio-economic groups used FB as a tool to connect to the campus significantly more than their counterparts. Therefore, it would seem that engagement in SNSs might play an important role in the integration of students who may be experiencing low levels of satisfaction and who may face barriers to integrating on campus.

The reason why such students integrate more effectively may be explained by Selwyn’s (2009) in-depth qualitative analysis of the FB wall activity of 909 undergraduate students in a UK university. The author insisted that Facebook should be seen as part of the ‘identity politics’ of being a student and that the platform should be conceived as social space where students are free from asymmetrical institutional power relations built into the university system. Despite being conceived as a space of institutional resistance, FB engagement has also been linked to re-enrolment, a key indicator of academic engagement. Morris, Reese, Beck, and Mattis’s (2009-2010) study of 375 local university students in the U.S. found a significant relationship between FB friends on campus and re-enrolment.

To summarise, existing research suggests that SNS engagement may be especially conducive to positive social outcomes, including improved social capital for student groups experiencing asymmetrical power relationships on campus. Engagement in such a medium may also be linked to tertiary re-enrolment. The full extent to which these findings apply to international tertiary student groups in Australasia is yet to be assessed in academia.

1.2 SNS Use in Education

Although growing numbers of educationalists are open to the potential of SNSs and related media in education, others fear that the influence of such applications compromises student engagement with traditional educational programs (Brabazon, 2007; Bugeja, 2006; Cassidy, 2006; Crossley-Holland, 2010). Generally, these concerns centre on fears of heightened
disengagement from linear forms of learning, and traditional skills and literacies. Despite such critiques, a growing number of scholars are pointing to the educational applicability of SNSs and associated technologies (Beckenham, 2008; Maloney, 2007; Oliveira & Teixeira, 2009; Selwyn, 2009; Thomas, 2008; Watermeyer, 2010). The general argument in support of SNS use for university students is that the conversational and communal qualities inherent to SNS applications “mirror much of what we know to be good models of learning, in that they are collaborative and encourage active participatory roles for users” (Maloney, 2007, p. 26). Watermeyer (2010) takes this notion further by positing that SNSs have the capacity to radically enhance the education system: “SNS space complements the situational setting and orientation of Higher Education, in that it offers critical reflection, peer consultation, collaboration and feedback” (p. 5). As SNSs and related platforms play a bigger role in tertiary student communication, theories vis-à-vis improved interconnectivity and educational applicability abound.

Despite the existence of such theories, little is known about actual organic education-related use of SNSs (i.e., education-related use not facilitated by a university administrator). However, Selwyn’s (2009) qualitative study of 909 undergraduates provides some insight into the organic education-related use of the FB platform. Results showed that educational use tends to centre on reflections of learning experiences, information exchange concerning course requirements, and moral support of fellow students.

The recent proliferation in SNS use by university students is a new and controversial area in academia. SNSs are controversial and unsettling to those who do not readily see their potential for social connectedness, pedagogical application, and knowledge construction in higher education. Existing research concerning tertiary student engagement in SNSs provides some
corroboration of theory suggesting that organic education-related use in FB involves reflective learning, exchange of information, and support. Therefore, an assessment of FB engagement and associated educational outcomes for international tertiary students in Australasia could be seen as a new and important area of research.

1.3 Why Facebook?

Before providing details as to the research aims and relevance of the current study, a short explanation of why the current investigation focuses on FB behaviour will be provided. There are several reasons why the current investigation examines FB-related behaviour, as opposed to general SNS-related behaviour across various SNS platforms.

First, in 2010, FB became the most popular SNS among youth and young adults in New Zealand (Nielsen, 2010a) and Australia (Nielsen, 2010b). Therefore, key statistics suggest that FB plays an important role in mediating social communication in Australasian university contexts. Given the current study purports to measure international student integration, use of FB, as opposed to other less popular and culturally specific SNS platforms, is most relevant to the study at hand.

Secondly, the extensive use of the FB platform, especially among the university-age demographic, has resulted in FB’s prevalence in recent academic literature concerning SNS use. As a result, more up-to-date and relevant instrumentation principally concerns the use of FB (for example, Ellison et al., 2007, Ellison, Lampe, & Steinfield, 2009; Burke, Marlow, & Lento, 2010; Morris et al., 2009-2010). For this reason, a more valid and universally comparable assessment of SNS-related behaviour can be gleaned from research across the FB platform.

Finally, an overarching assessment of general SNS-related behaviour across disparate SNS platforms, although practicable to a point, carries with it new sets of complications, especially
when attempting to more accurately examine SNS-related behaviour. Dwyer, Hiltz, and Passerini (2007) and Papacharrisi (2009) point out that different SNS platforms vary significantly in terms of architecture and functionality. Dwyer et al. (2007) posit that FB provides more room for spontaneous interaction and network generation compared with Myspace. Thus, inconsistencies across platforms have made it difficult and impractical for researchers to develop more general SNS usage scales. In addition, an examination of the use of disparate SNS platforms would prevent a robust comparative analysis of individual use and restrict analysis to those individuals whom happen to utilise the same SNS platform.

In summary, the current study’s assessment of solely FB-related SNS behaviour, although partially limited, is the most appropriate methodological approach given the current SNS landscape. FB is the most dominant SNS platform among the studied demographic and is therefore the most relevant. Thus, an assessment of FB-related behaviour in Australasia will provide an up-to-date and relevant contribution to the field.

1.4 Research Aims and Relevance

The current investigation, which surveyed 491 full-time international degree-seeking university students, represents an important first step in assessing the relevance of SNSs and associated technologies to the Australasian international tertiary education sector. The findings are relevant to students, teaching staff, and administrative stakeholders across Australasia interested in facilitating and improving the international student experience. Ultimately, this study has important implications for the future planning of New Zealand and Australia in relation to the development of a sustainable, first-rate, and innovative international education sector.

1.5 Summary
An increased presence of international students on campus and an increased student engagement with social media represent two important dynamics affecting university campuses across the Western world. The increased presence of international tertiary students across Australasia is set to be of increased significance to the sector and, although controversial, participation in SNSs by tertiary students is set to increase alongside improved connectivity. The current investigation examines the emerging social space created at the crossroads of this dynamic. Despite criticism of SNSs by some scholars, a significant and growing body of research suggests that collaborative learning and the co-creation of knowledge are inherent to the underlying architecture of SNSs. This research implies that the space provided by SNSs may be especially conducive to facilitating institutional integration of student groups experiencing asymmetrical institutional power relationships. Therefore, the examination of international tertiary student interaction with SNSs and associated educational outcomes can be identified as an important new field of study.
CHAPTER 2. LITERATURE REVIEW

The current investigation examines the relationship between demographic factors, institutional integration, FB-related behaviour, academic performance, and goal and institutional commitment in Australasia. The purpose of this literature review is to provide a relevant and up-to-date summary of research in the field and define the scope of the current investigation. To this end, the chapter first provides a definition of SNSs and their functionality, a description of their history, an understanding of user profiles and network connections, and a review of the educational use of SNSs. The chapter then describes the theoretical underpinnings of the current investigation, namely the theories of Astin (1970a, 1970b, 1985, 1991) and Tinto (1975, 1987, 1993). An evaluation of research findings concerning the relationship between demographic factors and SNS use is then carried out, revealing that SNS use may be especially conducive to under-represented groups. The chapter then provides a review of the research concerning the relationship between SNS use and forms of academic and social integration. The review suggests that, while total time spent on FB relates to academic mal-integration, some forms of SNS engagement enable more cooperative connections on campus, an enhanced sense of belonging, and an overall improved social experience. A review of the literature concerning SNS use and academic performance is then conducted, suggesting that total time on FB may be associated with lower student grade point average (GPA). The chapter then looks at the research currently available concerning the relationship between SNS use and student retention, concluding that active forms of FB use may play an important role in tertiary-level retention. A review of the more recent research that has attempted to ascertain a more insightful understanding of SNS-enabled behaviour and associated social outcomes follows. Ellison et al.’s (2011) FB Connection Strategy items, among other discerning FB instruments, are shown to be relevant tools for
assessing FB-enabled behaviour among international university students in Australasia. After a short summary of the literature review, the chapter presents the research questions that the current investigation will attempt to answer.

2.1 SNS Functionality, History, and Education-Related Use

SNSs are part of today’s broadly defined second-generation and more personalised World Wide Web. Today, the recently coined “Web 2.0” context enables enhanced connectivity, active participation, collaboration, and shared knowledge construction for its users (McLoughlin & Lee, 2007). Price (2006) and Richardson (2006) both refer to the Web 2.0 era as the “Read-Write Web” as it enables its users to both read and actively shape the Web 2.0 context (see Glossary A for social media terminology). SNS applications have played an integral role in defining the Web 2.0 landscape along with Twitter, Instagram, blogs, wikis, podcasting, and peer-to-peer media sharing, among other utilities.

The most prominent and universally accepted definition of SNSs comes from Boyd and Ellison (2007). These scholars broadly define SNSs as Internet-based services that allow users to: (a) construct a public or semi-public profile within a bounded system, (b) articulate a list of other users with whom they share a connection, and (c) view and traverse their list of connections and those made by others within the system (Boyd & Ellison, 2007, p. 1). The final point—the ability for users to traverse “friends’ friends”—has been an integral feature of the success of popular SNSs. This function enables connections between people that would otherwise not be made, and, more commonly, the formation of “latent ties” (Haythornthwaite, 2005), where individuals share some form of passive offline affiliation. SNSs also provide the capability for people to connect based on shared interests, views, and hobbies via grouping functionality. Essentially, SNSs are
online infrastructures that facilitate initial, latent, and sustained connections between broader groups of people (Ellison et al., 2009).

According to the definition, the first SNS was SixDegrees, which was founded in 1997. The problem was that, at the time, most SixDegrees users did not have extended groups of friends online. As a consequence, the model turned out to be economically unsustainable and eventually failed in the year 2000. Personal, professional, and dating websites emerged between 1997 and 2001 in the West, Asia, and Europe (Boyd & Ellison, 2007). These sites utilised various functionalities including friend lists, guest books, and diary pages. In 2003, emerging from the initial surge of sites laden with fake profiles operated by ill-equipped servers, several SNSs became mainstream (Boyd & Ellison, 2007). Myspace attracted media attention in the United States, Friendster in the Pacific Islands, Orkut in Brazil and India, Bebo in Australasia, and QQ in China. FB began in 2004 as a Harvard-only SNS (Cassidy, 2006) as users had to have a Harvard.edu email address to join. Unlike the open networks, FB was originally created to support college-only networks. In 2005, building upon the buzz of exclusivity, FB expanded its permitted demographic to include student and corporate groups, and, eventually, in September 2006, everyone (Abram, 2006). The distinguishing feature of FB is that it allows outside developers to build “applications” (or “apps”) that allow users to perform more personal tasks such as “compare movie preferences and travel chart histories” (Boyd & Ellison, 2007). In late 2006, FB changed the presentation of users’ homepages to reveal the activity and updates of all friends and associates via a function entitled “News Feed”. Although initially viewed as an invasion of privacy by some, improved user control over filtering enabled it to become an accepted, popular, and important part of FB participation (Crossley-Holland, 2010).
Although SNSs differ widely in their features, essentially, after a prospective SNS user completes a series of questions, an online profile is generated that contains descriptors pertaining to that user’s age, location, and interests. Photos and video media can also be uploaded to further personalise the site of the individual user. The visibility of a user’s profile and homepage to the public varies depending upon the SNS’s default structural policies and the user’s personalised settings. Often, by default, SNSs are crawled by search engines making user profiles visible to anyone. With regard to social affiliations, generally, bi-directional confirmation between users confirms the status of the relationship usually in terms of “friend” or “contact”, although “fan” generally doesn’t require bi-lateral confirmation. The display of friends, presented on each member’s main page, is a vital part of SNSs as users can traverse the list of friends’ friends, expanding networks of common affiliates. Users can leave comments on walls and partake in private messages; make comments on peoples’ activity, status, photos; and, take part in various interactive computer games, surveys and activities (Boyd & Ellison, 2007).

To date, Selwyn (2009) has conducted the most comprehensive study examining the educationally related use of SNSs. Selwyn (2009) conducted an in-depth quantitative analysis of the FB wall activity of 909 undergraduates at a university in the United Kingdom. Interpretive analysis of this dataset suggested that educational use of FB was generally based around “post-hoc critiquing of learning experiences and events, the exchange of logistical or factual information about teaching and assessment requirements, instances of moral support with regards to assessment or learning, or the promotion of oneself as academically incompetent and/or disengaged” (p. 157). The study suggested that the functional possibilities inherent to FB can complement the tertiary educational experience as students could pick up information pertaining to missed classes and deadlines, reflect upon lessons with other classmates, and receive moral
support across SNS platforms. A detailed discussion of the relationship between SNS engagement and academic engagement and performance appears in subsection 2.6 below.

In New Zealand, the SNSs Myspace and Bebo were the most prominent up to mid-2005 (Boyd & Ellison, 2007). However, as of July 2010, alongside unrivalled growth in Western countries, 70% of New Zealand Internet users, who accounted for 82% of the population, had a FB profile, and most (79%) named FB as their main SNS platform (Nielsen, 2010a). Similarly, in Australia, SNSs Myspace and Bebo were also prominent up to mid-2005 (Boyd & Ellison, 2007). However, as of March 2010, 59% of Australian Internet users, who accounted for 78% of the population, had a FB profile, and most (83%) named FB as their main SNS platform (Nielsen, 2010b).

First emerging in 1997, SNSs grew alongside international web connectivity and have continually evolved in communicative functionality. Today, SNSs represent an unprecedented development in online communication en masse (McLoughlin & Lee, 2007). SNSs and associated applications not only function to broaden and consolidate users’ communal spheres, they also provide a platform for institutional interaction. Thus, the way in which the use of such technology, and for the purposes of this study specifically FB, relates to international tertiary student integration and commitment in Australasia is worthy of investigation.

2.2 Theoretical Perspectives

With SNSs and related Web 2.0 media context explained, the literature review now introduces the conceptual underpinnings of the investigation at hand. The study’s basic foundations are derived from Astin’s (1970a, 1970b, 1984, 1985) Inputs-Environment-Outcome (I-E-O) Model and Theory of Involvement, and Tinto’s (1993) Longitudinal Model and Theory of Student Departure. Although these theories precede the rise of SNSs, they are relevant to the current
study as they recognise that students’ pre-entry attributes, and general academic and social experiences, influence educational outcomes. Despite its simplicity, Astin’s I-E-O Model underscores the simple tenet of this thesis that changes made to the university environment have an important influence on the ultimate retention of university students.

With reference to Astin’s (1970a, 1985) and Tinto’s (1993) models, Pascerella and Terenzini (2005) explain that “the distinctions between a theory and a conceptual model are elusive, and the terms are often used interchangeably” (p. 61). The theoretical influence of both Astin and Tinto in the area of tertiary level persistence literature can be traced back to the early 1970s (Astin, 1970a, 1970b, 1991, 1993; Tinto, 1975, 1982, 1986, 1987, 1993, 1998). As both Astin (1970a, 1970b, 1985) and Tinto’s (1975, 1993) theories are fundamental to this investigation, an explanation of these theories will now be provided. Nonetheless, research since Astin has sought to determine more precisely the mechanisms in the university environment that contribute to a more sophisticated understanding of how student retention can be enhanced and this material will be presented subsequently.

2.2.1 Astin’s I-E-O model and theory of involvement. Astin’s (1970a) I-E-O Model has been a primary descriptor of the tertiary-level student experience for over 40 years and is presented in Figure 1. The basic premise of the model is that educational evaluations are not complete unless the evaluation includes information on student inputs, educational environment, and outcomes (Astin, 1970a).

According to the model, tertiary student experience is conceptualised as a function of three sets of elements; Inputs (I), Environment (E), and Outcome (O). Inputs (I) can be defined as the “demographic characteristics, family backgrounds, and academic and social experiences” that students bring to the tertiary educational context. Environment (E) can be defined as “the
full range of people, programs, policies, cultures and experiences that students encounter on and off campus” during their tertiary experience, and, Outcomes (O) can be defined as students’ “characteristics, knowledge, skills, attitudes, values, beliefs, and behaviors” as they exit after the tertiary experience (Pascarella & Terenzini, 2005, p. 53). As depicted in Figure 1, student Inputs (I) are mediated by the Environment (E) to create Outcomes (O). Although an arrow runs directly from Inputs (I) to Outcomes (O), Astin (1970a) describes the institution-influenced path as being more important as it is the institution that offers students a wide variety of academic and social opportunities. Research that adopts this conceptual approach attempts to explain student change or growth in terms of environmental influences over which teaching staff and university administrators have some form of policy control (Pascarella & Terenzini, 2005).

Drawing on elements of the Freudian notion of cathexis (investment in psychological energy) and consistent with research on quality of student effort (Pace, 1988), Astin (1985) proposed a Theory of Involvement to depict student change via tertiary education. Astin’s (1985)
Theory of Involvement differs from his prior I-E-O Model in which the student is considered to be passively developed by the teaching staff and programmes. Astin’s Theory of Involvement provides for a more balanced view of student change in that it utilises psychological and sociological explanations for student change, and can be summarised simply as “Students learn by becoming involved” (p. 133). The Theory of Involvement is based upon the five following postulates: (a) involvement requires the investment of psychological and physical energy in “objects” of one sort or another (such as tasks, people, or activities), whether specific or general; (b) involvement is a continuous concept; different students will invest different amounts of energy in different objects; (c) involvement has both quantitative and qualitative features; (d) the amount of learning or development is directly proportional to the quality and quantity of involvement; and, (e) educational effectiveness of any policy or practice is related to its capacity to induce student involvement (pp. 135-136). Therefore, Astin’s simple model has been developed to incorporate both student engagement and the capacity of the institution to provide a wide variety of enriching academic and social opportunities as important causal mechanisms in student engagement and commitment.

2.2.2 Tinto’s Longitudinal Model of Student Departure. Tinto’s (1993) Longitudinal Model of Student Departure (Figure 2) is similar to Astin’s I-E-O Model and Theory of Involvement in its underlying dynamics, however it ultimately seeks to describe the student withdrawal process. Tinto’s (1993) model, presented in Figure 2, is a slight modification of Tinto’s 1975 Conceptual Schema for Dropout in College (see Appendix A).

According to Tinto (1993), the Longitudinal Model of Student Departure is loosely based on the sociological theories of Durkheim (1951) and Spady (1970). Durkheim’s (1951) Suicide Theory essentially proposes that suicidal tendencies increase when people are not integrated
socially and normatively into their existing social system. Spady’s (1970) model conceives a parallel process among students who drop out of college. Based on these foundations and his own research, Tinto’s (1993) Longitudinal Model of Student Departure provides a methodological guideline for how tertiary-level academic and social experiences influence students’ decisions to persist (that is, not drop out) and is supported by a large body of research

Figure 2. Tinto’s Longitudinal Model of Student Departure

Note. Adapted from Leaving College: Rethinking the Causes and Cures of Student Attrition (p. 115) by V. Tinto, 1993, Chicago: University of Chicago Press. Copyright 1993 by The University of Chicago. Adapted with permission.
Tinto’s Longitudinal Model of Student Departure expands upon Astin’s (1970a) I-E-O Model to incorporate the following six chronologically arranged categories: (a) Pre-Entry Attributes; (b) Initial Goals/Commitments; (c) Institutional Experiences; (d) Integration into the Academic System and Social System; (e) Subsequent Goals/Commitments; and (f) Outcome. An explanation of each of these categories is provided below.

2.2.3 Defining the constructs in Tinto’s (1993) model. Tinto’s (1993) schematic provides a general conceptual framework for understanding student integration, commitment, and persistence. Therefore, a description of the constructs and processes in the model will now be provided. Because many of the constructs in the Tinto (1993) model are utilised in the current investigation, how these constructs are operationalised is also detailed.

Tinto’s (1993) model depicts a number of variables across six chronologically arranged categories that all, theoretically, contribute to student departure. The first category, Pre-Entry Attributes, includes the student’s family background (e.g., parental education), skills and abilities (e.g., intellectual abilities), and prior schooling (e.g., high school GPA). More generally, the Pre-Entry Attributes category encompasses the economic, social, and academic resources related to educational continuance that students carry with them into the educational context (Tinto, 1993). Although a full assessment of these variables is beyond the scope of the current investigation, international students are assessed in terms of a range of demographic factors such as age, gender, location (New Zealand or Australia), residence (on- or off-campus), and country of origin (whether students are from Islamic- or Confucian-influenced countries).
Directly adjacent to the Pre-Entry Attributes category in the model is the Goal/Commitments category which includes Intentions (e.g., highest expected academic degree), Goal and Institutional Commitments, and External Commitments (commitments to family and work, etc., outside the institution). In the model, both the Pre-Entry Attributes and Goal/Commitments categories “establish the initial conditions for subsequent interactions between the individual and other members of the institution” (p. 115).

Tinto’s model then proposes that a student’s subsequent Institutional Experiences (the third category) in the institution’s academic and social systems are centrally related to integration. The model divides Institutional Experiences in terms of overall academic and social systems, while theorising that some inter-correlation exists between these systems. The fourth category divides student integration into two general categories: Academic Integration and Social Integration. The model posits that overall academic integration is derived from both students’ formal academic performance (or academic standard) and their informal interactions with staff. In the current investigation, an assessment of academic integration is based upon operationalisations by Pascarella and Terenzini (1980): (a) Interaction with Staff, (b) Staff Concern for Student Development and Teaching, and (c) Academic and Intellectual Development. In addition, (d) students’ self-reported academic standard is also used. Tinto’s model also posits that overall social integration is derived from students’ formal and informal interactions with peers. In the current investigation, an assessment of social integration is based upon the operationalisation by Pascarella and Terenzini (1980) called Peer-Group Interaction, in addition to a number of scales representing the on- and offline FB-related behaviour of international students (see subsections 2.5-2.8 for a discussion). Pascarella and Terenzini (2005) provide a general
understanding of how the Integration category is conceived in the model: “Integration is the extent to which the individual shares the normative attitudes and values of peers and faculty in the institution and abides by the formal and informal structural requirements for membership in that community or in subgroups of it” (p. 54).

Positive integration is considered key in Tinto’s model as it “serves to raise one’s goals and strengthens one’s commitments both to those goals and to the institution within which they may be obtained” (Tinto, 1993, p. 116). Therefore, positive integration serves to enhance students’ Goals/Commitments, as depicted in the fifth category, Subsequent Goals/Commitments. It is theorised that students’ subsequent goals and commitments reflect their dedication to the institution and are an all-important precursor to student retention (Pascarella & Terenzini, 2005). The present study examines this category using Pascarella and Terenzini’s (1980) operationalisation of Tinto’s (1980) Goal and Institutional Commitment scale. This scale serves as the ultimate dependent variable in the current study which utilises Pascarella and Terenzini’s (1980) five measures of integration from the Institutional Integration scale (IIS): Interaction with Staff, Staff Concern for Student Development and Teaching, Academic and Intellectual Development, Peer-Group Interaction, and Goal and Institutional Commitment.

In Tinto’s (1993) model, the student’s Departure Decision constitutes the sole and most important outcome stemming from the previous five chronologically arranged dimensions of the student experience. Given the scope of this study and the researcher’s inability to confirm actual re-enrolment from multiple universities, student departure is not measured herein. However, students’ intention to re-enrol, as part of the Goal and Institutional Commitment scale, is measured.
Finally, another important component of Tinto’s (1993) model is the influence of the external community. Tinto argues that events in the external community are an important determining factor in tertiary persistence. His model therefore recognises that students may be provided with valuable support by the external community or, conversely, they may be pulled away by it. In the current study, items pertaining to FB use with others based outside students’ respective universities are used to assess the influence of the external community.

2.2.4 Astin’s and Tinto’s models as a general research framework. Tinto’s (1975, 1988, 1993) series of models of student departure have established what Braxton (2000) terms his almost hegemonic status. A large body of research supports the validity of Tinto’s theories, and the dynamics underlying their conception, in both Western and non-Western contexts (for example, Cabrera et al., 1999; Eimers & Pike, 1997; Nora et al., 1996). Braxton, Sullivan, and Johnson’s (1997) meta-analysis of the previous 30 years of peer-reviewed research concerned with Tinto’s (1993) model provides strong empirical support for the many premises it posits. More recently, Braxton and Lee (2005, pp. 107-127) conducted a meta-analysis concerned with determining reliable knowledge about university student departure. The study made a distinction between findings in residential colleges and universities (where most students live on campus) and commuter colleges (where most students commute between home and campus). This was done because residential colleges and universities have well-defined social communities whereas the social communities of commuter colleges and universities lack structure and clarity (Braxton, Hirschy, & McClendon, 2004). Overall, Braxton and Lee’s meta-analysis found that 10 of the total 11 studies were supportive of the proposition that measures of academic integration contributed significantly to subsequent goal commitment (eight of the eight studies at residential institutions; and, two of the three studies at commuter institutions).
The meta-analysis also found that 18 of a total 22 studies were supportive of the proposition that measures of social integration contributed significantly to subsequent goal commitment (16 of the 19 studies at residential institutions; and, two of the three studies at commuter institutions). Finally, adding validity to the methodological framework in the current study, the meta-study found that overall 24 of a total 35 tests were supportive of the proposition that either goal or institutional commitment predicted actual persistence (17 of the 22 studies at residential institutions; and, seven of 14 studies at commuter universities).

Therefore, much empirical research supports the fundamental propositions proposed in the Tinto (1993) model. However, overall, studies at commuter colleges provide slightly less support for the idea that social and academic integration impacts on students’ goal and institutional commitment, and subsequent re-enrolment. Because the large majority of students attending universities in New Zealand and Australia reside off-campus, especially beyond their first (freshman) year, all universities surveyed in the current study can be defined as commuter colleges. However, to discern possible impacts concerned with the social experience of students in the current study, students are asked whether they reside on- or off-campus.

In Tinto’s (1993) model, it is theorised that informal staff interactions influence academic integration and subsequent commitment. This proposition is supported by a large body of research suggesting that staff contact with students in unstructured informal settings impacts on various indicators of intellectual and personal development (Jacob, 1957; Heath, 1968; Chickering, 1969). Pascarella and Terenzini (1976) found that students who interacted more informally with faculty ranked staff members higher as a source of positive influence on their intellectual development. Wilson, Wood, and Gaff (1974) and Wilson, Gaff, Dienst, Wood, and Bavry (1975) also reported that non-classroom interactions with staff impacted on students’
intellectual skills. This body of research preceded a more recent robust assessment of the conceptual grouping of Pascarella and Terenzini’s (1980) institutional integration scales. French and Oakes (2004) examined the psychometric properties of Pascarella and Terenzini’s (1980) IIS (see Appendix C, section D) among first-year undergraduate students in the United States (sample 1, \( N = 773 \); sample 2, \( N = 1,734 \)). From within a confirmatory factor analysis (CFA) framework, the authors assessed the fit of their data in terms of two competing measurement models, Model 1 and Model 2.

In Model 1, the authors assessed the validity of Tinto’s (1993) proposed distinction between academic and social integration as proposed by Nora (1993). To do this, the authors specified a first-order measurement model with two latent \textit{supra} factors: (1) Social Integration, which included all manifest items pertaining to Interaction with Staff and Peer-Group Interaction, and (2) Academic Integration, which included all manifest items pertaining to Academic and Intellectual Development, Faculty Concern for Student Development and Teaching, and Goal and Institutional Commitment.

In Model 2, the authors proposed a modified first-order measurement model with two \textit{supra} factors: (1) Faculty Integration, which included Interaction with Staff, Staff Concern for Student Development and Teaching, and (2) Student Integration, which included Academic and Intellectual Development, Peer-Group Interaction, and Goal and Institutional Commitment. The authors proposed that the Faculty Integration \textit{supra} factor addresses university students’ social and academic integration with faculty members, whereas the proposed Student Integration \textit{supra} factor addresses social and academic integration as it relates to peers and the university in general.
Results showed that the CFA for Model 1 (sample 1), which included a theoretical distinction between social and academic integration, was not favourable. However, the CFA for Model 2, which specified integration in terms of faculty and student integration, provided for sufficient model fit with S-B $\chi^2(4) = 9.08, p > .05$, RMSEA = .06, GFI = .99, CFI = .99 (sample 1), and S-B $\chi^2(4) = 55.20, p^2 < .05$, RMSEA = .08, GFI = .98, and CFI = .97 (sample 2).

The authors concluded that the validity of Model 2 might be based on the grouping of the Interaction with Staff and Staff Concern for Student Development and Teaching factors and speculated that interaction with staff might enhance students’ perception of staff concern. Beyond this study, no robust research involving the general grouping of Pascarella and Terenzini’s (1980) scales could be found. Nevertheless, the more recent French and Oakes (2004) study provides more robust support for the idea that social interaction with university staff influences academic integration of university students.

The idea that social interaction influences the acquisition of knowledge has a strong theoretical grounding. In general, research in the field of managerial science suggests that relationships are important for acquiring information (Burt, 1992), learning how to work more efficiently (Lave & Wenger, 1991), and solving complex problems (Hutchins, 1991). To measure relationships at the dyadic level (that is, between two people), social network theorists and managerial scientists make use of the concept of “tie strength” (Granovetter, 1973). This scale is comparable to Pascarella and Terenzini’s (1980) Interaction with Staff scale as it measures both the frequency and strength of a relationship between management and employees, ranging from weak ties at one extreme to strong ties at the other. Much research suggests that strong ties are important conduits of useful knowledge (Ghoshal, Korine, & Szlanski, 1994; Hansen, 1999;
Szulanski, 1996; Uzzi, 1996, 1997). To try and understand why strong ties should yield useful knowledge, Levin and Cross (2004) turned to the characteristic of trust. They surveyed 127 employees engaged in knowledge-intensive research within large organisations in the United States. Results from their study suggested that trust, particularly benevolence-based trust, mediated the link between strong ties and employee perception of receipt of useful knowledge. Therefore, it may be the case that Staff Concern for Student Development and Teaching mediates the effect of Interaction with Staff on Academic and Intellectual Development. The potential relationship between these constructs is in need of further assessment.

Tinto’s (1993) model was mainly derived from research concerned with domestic students. However, research concerning international university students suggests that their perception of the academic progress may be an important gauge of academic integration and play an all-important role in the degree to which they are committed to their respective institutions. Rienties, Beausaert, Grohnert, Niemantsverdriet, and Kommers (2012) conducted research concerning the integration of 654 international university students in the Netherlands. Students in the study had Western, mixed, or non-Western origins. The authors used corollary factors of Academic Adjustment and Institutional Attachment (Baker & Siryk, 1999) to measure students’ perception of academic development and institutional commitment, respectively. Other measures of social integration concerning social and personal-emotional adjustment, alongside a host of newly developed integrative scales, were also included in the study. The factor that correlated the strongest to Institutional Attachment was that of Academic Adjustment ($r = .63, p < .01$), suggesting that for international students their perception of academic progress significantly influences the degree to which they are committed to their institutions of study. Interestingly, students’ actual GPA correlated to Academic Adjustment at $r = 0.21 (p < .01)$, whilst the
correlation between GPA and Institutional Attachment was almost negligible at $r = .10 \ (p < .01)$. This suggested that students’ perception of their academic progress was more important than their actual progress for understanding their levels of commitment. Nevertheless, the way in which Australasian international students’ grades and perceived academic progress reflect upon levels of commitment is a new and important field of enquiry.

Another limitation of Tinto’s (1993) model is that operationalisations of its constructs, such as those conceived by Pascarella and Terenzini (1980) over 30 years ago, do not accurately account for the behavioural shift brought about by students being able to communicate online. Beginning in the early 2000s, a sizeable body of research has suggested that computer-mediated interactions have a positive influence on community interaction in geographic-based communities (Hampton & Wellman, 2003, Kavanaugh et al., 2005). Pascarella and Terenzini’s (1980) social integration scales were developed in a pre-Internet era and thus may not accurately reflect the on- and offline reality of students’ social worlds. A more robust assessment of international students’ relationship with staff, perceived academic development, on- and offline relationships, and commitment will be a valuable contribution to the field of international student institutional integration.

2.2.5 Summary. Both Astin (1970a, 1970b, 1985) and Tinto (1975, 1993) have made considerable contributions to understanding the student retention puzzle. Much research supports the validity of Astin’s (1970, 1970b, 1985) and Tinto’s (1975, 1993) general theories and dynamics in both Western and non-Western contexts. Astin’s (1970a, 1985) and Tinto’s (1975, 1993) general conception that student characteristics and tertiary experience reflect upon student commitment and persistence provides an appropriate overarching methodological framework for the current investigation. In addition, a large body of research supports the proposition that
students’ informal interactions with faculty support the academic integration of students in general (French & Oakes, 2004; Pascarella, 1981). Therefore, Astin’s (1970a, 1985) and Tinto’s (1975, 1993) work supplies the general methodological framework for the current investigation, insofar as they recognise that students’ demographic characteristics and academic and social experiences influence commitment and success at university. Now that a review of the methodological premise behind the current study has been provided, attention will now be turned to the literature concerning the relationships between student demographics, SNS use, integration, academic performance, and persistence.

2.3 Student Demographics and SNS Use

A review of research concerning student demographics and SNS use suggests a connection between students of less institutional influence and positive social outcomes such as improved social capital and perceived connection to the campus. Existing studies point to a connection between SNS use and female students, students of a lower socio-economic status, and minority students.

Research conducted by Kolek and Saunders (2008) found that, of a sample of 464 American university students, 88% of women (*n* = 223) had FB accounts compared to 77% of the men (*n* = 241). This result was found to be significant at *p* = .003 (*χ*² = 9.138). Results from Kord’s (2008) doctoral study, which involved 354 residential first-year university students in the United States, extend this finding. In that study, 269 students were female (76%) and 85 male (24%). One of the key findings was that females (*M* = 157, *SD* = 130) spent, on average, 36.5 more minutes per day on SNSs than their male counterparts (*M* = 121, *SD* = 118), with the differences significant at *t*(339) = -.2.267, *p* = .024. Therefore, research suggests that, in the U.S., female university students are significantly more likely to register and participate on FB.
Socio-economic status also featured as a prominent demographic factor in the Kord (2008) study as it was shown to relate significantly to the time students spent on SNSs. In the study, 117 students (33%) were deemed as being part of a lower socio-economic group as they were eligible for a Pell Grant (government financial assistance for undergraduates of low-income families) (Federal Student Aid, 2013). Kord’s analysis showed that such students spent significantly more time on SNSs ($M = 173$ mins, $SD = 143$) than those who were from the higher socio-economic group demographic. This was on average 31.8 more minutes per day more than non-qualifiers ($M = 141$ mins, $SD = 120$) (p. 87), the difference significant at $t(297) = 2.027$, $p = .044$. Kord (2008) cites Rideout, Roberts, and Foehr’s (2005) research concerning Internet access and socio-economic status as a possible reason for the difference, suggesting that “it could be because of the novelty and the open access to the Internet that they may not have had prior to attending college” (Kord, 2008, p. 110).

The Kord (2008) study also assessed whether or not there was any significant difference between the amount of time minority ethnic groups spent on SNSs. The study included 51 ethnic-minority students of whom 37 (72.5%) were African American or of Hispanic descent. Results showed that the minority group, on average, spent nearly 19 minutes more per day than their White American counterparts ($n = 283$). Minorities spent an average of 165 minutes per day on SNSs whereas their White counterparts spent 146 minutes per day. However, given the limited number of minorities in the study, the results were not significant at $t(332) = -.950$, $p = .343$. However, Boogart’s (2006) Master’s-level multi-institutional study of 3,124 students in the United States provides a more definitive answer concerning the relationship between ethnicity and SNS use. Boogart’s sample included 2,397 White Americans (76.6%) and 727 ethnic minorities (23.3%). Of the minorities, 435 (59.8%) were either African American or of
Hispanic origin. Boogart analysed data using a cross tabular approach by categorising his participants into groups. In terms of daily FB use, respondents were classified depending on whether they used FB, on average, for (a) 0-30 minutes, (b) 30-60 minutes, or (c) more than one hour per day. In terms of dichotomous scales, participants were categorised in terms of (a) White American, or, (b) minorities. In terms of five-point ordinal scales pertaining to the degree to which students felt connected to the campus, for example, participants were categorised in terms of (a) those who strongly agreed or agreed, or (b) those who strongly disagreed or disagreed with the prompt. Respondents who selected neutral midpoints were not included in the analysis. Cross tabulations of daily FB use revealed that minority students \((n = 727)\) were more likely to use FB for extended periods of time (more than an hour) than their White American counterparts \((n = 2,397)\) at \(p < .001\) (p. 47). Further cross tabulations revealed that the minority group was more likely than their White counterparts to use FB to make social connections that they would find difficult to make in person, at \(p < .05\) level (p. 49). Therefore, existing research in this area suggests that FB may be particularly important to the integration of ethnic minority groups in the U.S. who may face some type of barrier to integration into the dominant culture of the college or university.

By reviewing research that pertains to SNS use and student demographics, particular patterns begin to emerge. Although the Kord (2008) and Boogart (2006) studies used self-reporting techniques, their results suggest that SNS use may be especially conducive to the social integration of a variety of under-represented social groups including females, persons of lower socio-economic status, and ethnic minorities. Obviously, more research is needed to further examine the processes behind these preliminary findings. Nevertheless, given the existing results that suggest such a connection in the U.S., an examination of the SNS use of the under-
represented international university student group in Australasia is a potential new area of 
enquiry.

2.4 Student Demographics and Institutional Integration

Despite the growing presence of international students on campus, very little research has been 
conducted concerning the influence of international students’ demographic factors on measures 
of institutional integration. Lewthwaite (1996) conducted in-depth interviews with six 
international students of Islamic-influence (Indonesian) and another six of non-Islamic Influence 
enrolled in graduate school at Massey University, New Zealand. In light of the finding that the 
Islamic-influenced students generally only made social connections with other Muslims on 
campus, the author points out, “It was striking how this group of Muslim students settled into the 
academic life” (p. 180). However, with such small numbers, it is difficult to draw conclusions 
about all Islamic-influenced students. The study at hand, drawing upon a large number of 
Islamic-influenced students, provides for a more robust comparative assessment of Islamic-
influence on international student integration.

In another study conducted across several Australian universities, Asmar, Proude, and 
Inge (2004) assessed the levels of academic commitment and satisfaction of 175 Australian 
Muslim students (not international students). The authors then compared these levels to those 
reported in an Australian-wide course experience questionnaire (Graduate Careers Council of 
Australia Ltd & Australian Council for Educational Research, 2002). Findings suggested that 
Muslim students in Australian universities reported high levels of academic commitment to and 
satisfaction with their studies, and that the levels were either in line with those of non-Muslim 
students or, in some instances, exceeded them. However, at the time of this study, no research 
could be found concerning the levels of institutional integration of international students from
Islamic-influenced backgrounds compared to international students not from Islamic-influenced backgrounds. Although research might suggest that students hailing from Islamic-influenced countries integrate well academically, more robust comparative research is necessary to move beyond speculation.

In addition, little is also known about the comparative integration of students from Confucian-influenced countries and non-Confucian-influenced countries. Gutierrez and Dyson (2009) conducted interviews with nine international students from Confucian-influenced countries and just one local student as a comparison. Interview topics centred around the educational experiences of the international students and findings suggested that lecturers’ relationships with the students were crucial to their academic integration and success on campus. However, again, because of a lack of scale, it is difficult to draw conclusions from such results. Clearly, a more robust assessment of comparative levels of institutional integration across Islamic- and Confucian-influenced students in Australasia is needed to provide a more generalised understanding of demographic effects, and on- and offline social integration, within the international student sector in Australasia.

2.5 SNS Use and Social and Academic Integration

Several studies suggest a relationship between university students’ use of SNSs and different forms of social and academic integration. As will be explained, although some studies point to a negative association between SNS use and certain forms of academic integration (e.g., Kord, 2008), a burgeoning number of investigations have pointed to a significant positive relationship between SNS use and forms of social integration. This body of research finds connections between SNS use and university students’ overall institutional experience (Kord, 2008), feeling
of belonging (Walz, 2009), connection to the university campus (Boogart, 2006), and cooperative connections and interactions with different people on campus (Ellison et al., 2007).

Kord’s (2008) study also included an analysis of the relationship between time spent on SNSs and forms of academic and social integration. The participants in the study were 696 domestic residential first-year university students in the United States. The study utilised correlational analyses and multiple regression tests to determine the relationship between the time students spent on SNSs and (a) Pascarella and Terenzini’s (1980) five operationalisations of Tinto’s (1975) Academic and Social Integration scales, and (b) items designed by the author to ascertain the perceived importance of SNSs to the college experience.

Kord (2008) also utilised Pascarella and Terenzini’s (1980) operationalisation of the following five key constructs in Tinto’s (1993) Longitudinal Model of Student Departure: (a) Peer Group Interactions, (b) Interactions with Faculty, (c) Faculty Concern for Student Development and Teaching, (d) Academic and Intellectual Development, and (e) Goal and Institutional Commitment. It should be noted that Pascarella and Terenzini’s nomenclature differs slightly from that in Tinto’s Longitudinal Model of Student Departure: Pascarella and Terenzini’s Interaction with Faculty scale represents Tinto’s Faculty/Staff Interactions; Pascarella and Terenzini’s Faculty Concern for Student Development and Teaching scale also represents Tinto’s Faculty/Staff Interactions; and, Pascarella and Terenzini’s Academic and Intellectual Development scale is used as a general measure of Tinto’s Academic Integration. The five constructs pertain to Pascarella and Terenzini’s (1980) Institutional Integration scales (IISs).

First of all, Kord (2008) assessed correlations between time spent on SNSs and the five dimensions of Academic and Social Integration. Results showed that the independent variable—
time spent on SNSs—was significantly negatively associated with two of Pascarella and Terenzini’s (1980) academically focused integration scales (correlations to the other three scales were not significant). Table 1 illustrates the correlations and significance levels between the variables in question. Analysis revealed that only time spent on SNSs correlated significantly with the students’ perception of Staff Concern for Student Development and Teaching ($r = -.132$, $p = .016$). Therefore, Kord’s results showed that as students spent more time on SNSs they were less likely to positively perceive the degree to which the faculty cares for their development and teaching. Kord also found that the correlation between time spent on SNSs and Academic and Intellectual Development was also approaching significance, at $r = -.10$, $p = .06$. Consequently, Kord used two hierarchical blocked multiple regression models to isolate the predictive relationship between time spent on SNSs to students’ perceived Academic and Intellectual Development. Model 1 controlled for a host of input variables pertaining to student demographic and academic input. Model 2 included the time spent on SNSs item. In Model 2, analysis suggested that percentage of classes per week ($\beta = .39$, $p < .001$) and time spent on SNSs per day ($\beta = .12$, $p = .040$) both contributed significantly to students’ perceived Academic and Intellectual Development. Adjusted change in $R^2$ from Model 1 to Model 2 was significant, with

<table>
<thead>
<tr>
<th>IIS Scale</th>
<th>$n$</th>
<th>$r$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peer-Group Interaction</td>
<td>336</td>
<td>-.07</td>
<td>.23</td>
</tr>
<tr>
<td>Interaction with Staff</td>
<td>337</td>
<td>-.08</td>
<td>.13</td>
</tr>
<tr>
<td>Staff Concern for Student Development and Teaching</td>
<td>334</td>
<td>-.13*</td>
<td>.02</td>
</tr>
<tr>
<td>Academic and Intellectual Development</td>
<td>337</td>
<td>-.10</td>
<td>.06</td>
</tr>
<tr>
<td>Goal and Institutional Commitment</td>
<td>340</td>
<td>-.02</td>
<td>.72</td>
</tr>
</tbody>
</table>

Note. Adapted from Understanding the Facebook Generation: A Study of the Relationship between Online Social Networking and Academic and Social Integration and Intentions to Re-Enroll (p. 90), by J. I. Kord, 2008, Kansas: University of Kansas; Copyright 2008 by The University of Kansas; Adapted with permission; $r$ = Pearson correlation coefficients; $p^* < .05$. 

Consequently, Kord used two hierarchical blocked multiple regression models to isolate the predictive relationship between time spent on SNSs to students’ perceived Academic and Intellectual Development. Model 1 controlled for a host of input variables pertaining to student demographic and academic input. Model 2 included the time spent on SNSs item. In Model 2, analysis suggested that percentage of classes per week ($\beta = .39$, $p < .001$) and time spent on SNSs per day ($\beta = .12$, $p = .040$) both contributed significantly to students’ perceived Academic and Intellectual Development. Adjusted change in $R^2$ from Model 1 to Model 2 was significant, with
$F \Delta (1, 256) = 4.267$, $p = .007$. Consequently, results showed that with demographic and academic input variables held constant, the more time students spent on SNSs, the more negatively they were likely to perceive their academic and intellectual development. While students’ perception of academic and intellectual development was assessed, the Kord (2008) study did not measure students’ actual academic attainment. The lack of this measure could be considered a weakness of the study.

In the Kord (2008) study, although the time students spent on SNSs was negatively associated with two academically related scales, the time scale did correlate positively and significantly to all five subscales designed by the author to assess the perceived importance of SNSs to the college experience. Analysis revealed that the time students spent on SNSs correlated significantly with students’ perception that SNSs (a) are important to the college social experience ($r = .20, p < .01$), (b) allow for staying in contact with high school and college friends ($r = .23, p < .01$), (d) allow for self-expression ($r = .28, p < .01$), and, (e) allow for staying in contact with family ($r = .20, p < .05$). Therefore, overall, the Kord (2008) study suggested that, although time spent on SNSs was related to lower levels of academic integration, it is nevertheless important to many facets of the tertiary social experience.

Research conducted by Walz (2009) on 141 undergraduate students in the United States extends the findings of the Kord (2008) study. As part of a doctoral dissertation, Walz (2009) studied the relationship between college students’ use of SNSs and their sense of belonging. In the study, the Sense of Belonging Instrument (SOBI) was used as a measure of a student’s perceived valued involvement and fit within an institution’s institutional system and environment (Hagerty, Williams, Coyne, & Early, 1996). FB use was measured as time spent on FB and total
FB friends. Analysis revealed a significant correlation between the time students spent on FB and their sense of belonging with $r = .22$ ($p < .01$). Total FB friends also correlated significantly to the SOBI, with $r = .21$ ($p < .05$). Therefore, research conducted by Kord (2008) and Walz (2009) suggests that use of SNS platforms play an important role in student affiliation to the campus and the overall tertiary experience.

The above studies have investigated how time spent on different SNSs relates to different forms of social and academic integration. However, given FB’s unprecedented rise in popularity, more recent research generally centres on activity pertaining solely to the FB platform. As will become clear, studies concerning FB usage both support and build on earlier multi-platform studies concerned with SNS use and tertiary integration.

Boogart (2006) also analysed the relationship between time spent on FB and the extent to which US students felt connected to their campus. Cross tabular analysis suggested that those who spent more than one hour on FB, as opposed to those who spent less, felt significantly more connected to the campus, at $p = .002$. This suggests that time spent using FB, like that of time spent using multiple SNS platforms, may play an important role in student integration on campus.

Junco (2012a) looked at how frequency of FB use (both FB use per day and number of FB checks) and a host of specific FB activities contributed to student engagement; that is, time involvement in co-curricular activities. The Engagement scale (Chen, Lambert, & Guidry, 2010) is an aggregate of 14 items used as a broad measure of social and academic integration into students’ place of study, whilst the Co-curricular Activities scale assesses students’ involvement in campus organisations, clubs, and sports, etc. The study included 2,368 university students from the United States. Junco’s results pertaining to four hierarchical regression models are presented in Table 2 and suggest that use of FB to initiate or take part in a social event or to view
or make comments about friends’ photos appears to play a positive role in student engagement on campus and involvement in co-curricular activities. While FB use per day negatively predicted engagement, it positively predicted involvement in co-curricular activities suggesting that use in general played an especially important social role for students. Interestingly, use of FB to post photos negatively predicted co-curricular activities. Finally, checking up on FB friends and playing FB games consistently negatively predicted engagement and co-curricular activities in all models.

Table 2

FB Activity, Student Engagement, and Participation in Co-Curricular Activity in Junco (2012a)

<table>
<thead>
<tr>
<th>FB Activity Index</th>
<th>Model 1: FB Use per Day and Other Indices on Engagement</th>
<th>Standardised Beta Weight ($\beta$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creating or RSVP’ing to FB events</td>
<td>.14***</td>
<td></td>
</tr>
<tr>
<td>FB commenting</td>
<td>.08*</td>
<td></td>
</tr>
<tr>
<td>Checking up on FB friends</td>
<td>-.07*</td>
<td></td>
</tr>
<tr>
<td>FB use per day</td>
<td>-.09***</td>
<td></td>
</tr>
<tr>
<td>Playing FB games</td>
<td>-.10**</td>
<td></td>
</tr>
<tr>
<td>Model 2: FB Checks per Day and Other Indices on Engagement</td>
<td>.14***</td>
<td></td>
</tr>
<tr>
<td>Creating or RSVP’ing to FB events</td>
<td>.08*</td>
<td></td>
</tr>
<tr>
<td>FB commenting</td>
<td>-.06*</td>
<td></td>
</tr>
<tr>
<td>Checking up on FB friends</td>
<td>-.07**</td>
<td></td>
</tr>
<tr>
<td>FB checks per day</td>
<td>-.12***</td>
<td></td>
</tr>
<tr>
<td>Model 3: FB Use per Day and Other Indices on Co-Curricular Activities</td>
<td>.14***</td>
<td></td>
</tr>
<tr>
<td>Creating or RSVP’ing to FB events</td>
<td>.11**</td>
<td></td>
</tr>
<tr>
<td>FB Commenting</td>
<td>.08**</td>
<td></td>
</tr>
<tr>
<td>Viewing photos on FB</td>
<td>.05*</td>
<td></td>
</tr>
<tr>
<td>FB use per day</td>
<td>-.07**</td>
<td></td>
</tr>
<tr>
<td>Playing FB games</td>
<td>-.09**</td>
<td></td>
</tr>
<tr>
<td>Checking up on FB friends</td>
<td>-.10**</td>
<td></td>
</tr>
<tr>
<td>Model 4: FB Checks per Day and Other Indices on Co-Curricular Activities</td>
<td>.14***</td>
<td></td>
</tr>
<tr>
<td>Creating or RSVP’ing to FB events</td>
<td>.12**</td>
<td></td>
</tr>
<tr>
<td>FB commenting</td>
<td>.09**</td>
<td></td>
</tr>
<tr>
<td>Viewing photos on FB</td>
<td>-.06**</td>
<td></td>
</tr>
<tr>
<td>Playing FB games</td>
<td>-.08**</td>
<td></td>
</tr>
<tr>
<td>Checking up on FB friends</td>
<td>-.10**</td>
<td></td>
</tr>
</tbody>
</table>

Note. Adapted from “The Relationship between frequency of Facebook Use, Participation in Facebook Activities, and Student Engagement,” by R. Junco, 2012, Computers and Education, 58, pp. 166-167. Copyright 2011 by Elsevier Ltd. Adapted with permission; indices ordered from positive to negative influence for each model; *p < .05, **p < .01, ***p < .001.
In order to provide a more robust measure of FB usage beyond simple measures of time, Ellison et al. (2007) created the Facebook Intensity (FBI) scale, which includes eight items in total. The first item measures total FB friends, whilst the second measures average time spent on FB per day. An additional six items are included in the scale to measure the degree to which students value the platform. These six items are on a five-point ordinal agree-disagree scale. Together, all eight items measure the degree to which FB is integrated into the lives of the user, henceforth defined as the degree of FB life integration among individual users. Table 3 presents Total FB Friends, FB Use per Day, and Overall FBI Ordinal Response (for the six items) for the Ellison et al. (2007) study and a recent study carried out by Pettijohn, LaPien, Pettijohn, and Horting (2012) (both studies carried out on local university students in the U.S.).

Table 3

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td>Total FB Friends</td>
<td>205.53</td>
<td>122.86</td>
<td>611.65</td>
</tr>
<tr>
<td>FB Use per Day (hours)</td>
<td>.50</td>
<td>.65</td>
<td>1.22</td>
</tr>
<tr>
<td>Overall FBI Ordinal Response</td>
<td>3.11</td>
<td>.83</td>
<td>3.50</td>
</tr>
</tbody>
</table>

Note. N = 286 for Ellison et al. (2007) study, N = 200 for Pettijohn et al. (2012) study, based on personal communication with T. F. II. Pettijohn (August 12, 2013), values based on personal communication with C. Steinfield (September 1, 2013), adapted with permission from authors; ‘response categories ranged from 1 = strongly disagree to 5 = strongly agree; medium effect sizes (.40 ≤ d < .60) in italics, large effect size (60 ≤ d) in bold.

Ellison et al. (2007) used principal components analysis (PCA) with varimax rotation to establish the FBI scale (Pettijohn et al. 2012 used Cronbach’s alpha only). PCA is a type of data reduction technique and varimax rotation assumes that factors or components are not correlated (see subsections 3.5 & 3.6 concerning data reduction techniques and rotation, respectively).
Cronbach’s alpha value for the FBI construct in the Ellison et al. (2007) study was .83, which the authors use as a suggestion of construct validity (see subsection 3.7.1 for discussion). The correlations between the items and the FBI component are illustrated in Table 4. The lowest-performing item in the scale was Total FB Friends, whilst other items were all above .60. This suggested that the Total FB Friend item was dimensionally most distinct from the composite FBI scale, meaning that the total number of Facebook friends was somewhat less related to the degree to which FB was integrated into users’ lives.

Table 4

*Correlations between Items and FBI Component in Ellison et al. (2007)*

<table>
<thead>
<tr>
<th>Item</th>
<th>Correlations (r) with FBI Component</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Facebook Friends</td>
<td>.581</td>
</tr>
<tr>
<td>I would be sorry if Facebook shutdown</td>
<td>.613</td>
</tr>
<tr>
<td>I am proud to tell people I’m on Facebook</td>
<td>.650</td>
</tr>
<tr>
<td>I feel I am part of the Facebook community</td>
<td>.669</td>
</tr>
<tr>
<td>Facebook Use per Day</td>
<td>.692</td>
</tr>
<tr>
<td>I feel out of touch when I haven’t logged into Facebook for a while</td>
<td>.700</td>
</tr>
<tr>
<td>Facebook has become part of my daily routine</td>
<td>.846</td>
</tr>
<tr>
<td>Facebook is part of my everyday activity</td>
<td>.849</td>
</tr>
</tbody>
</table>

*Note.* Values based on personal communication with C. Steinfield (September 1, 2013), adapted with permission.

The Ellison et al. (2007) study used measures for psychological well-being as control variables. As outcome variables, the study also provided an assessment of social capital, broadly defined as people’s social networks and their associated norms and reciprocity (Putnam, 2000). The study utilised three subscales pertaining to bridging, bonding, and maintained social capital (Williams, 2006). The bridging and bonding capital scales were adapted for the university context in the Ellison et al. (2007) study.

The bridging social capital scale generally assessed “weak ties” which are loose connections between individuals that may provide useful information or a new perspective
(Putnam, 2000). The bonding social capital scale assessed the connection between close friends on campus (Putnam, 2000). Finally, the maintained social capital scale assessed students’ tendency to stay in touch with a social network after becoming physically disconnected from it (Ellison et al., 2007). The maintained social capital scale, although adapted from William’s (2006) research, was originally conceived by Ellison et al. (2007) based on anecdotal evidence that suggested that FB was used to keep in touch with old friends. Controlling for a host of demographic, academic, and psychological input variables, results revealed that FBI contributed significantly to all three forms of social capital. FBI made significant contributions to the bridging ($\beta = .34, p < .00001$), bonding ($\beta = .37, p < .00001$), and maintained ($\beta = .37, p < .0001$) social capital scales. Overall the Ellison (2007) study supports other studies that suggest that SNS use, or more specifically FB use, is positively associated with tertiary-level social integration.

More recently Pettijohn et al. (2012) assessed the relationship between FBI and FB usage off- to online among 200 undergraduate university students in the United States. The FB usage off- to online scale measured use of FB to keep in touch with old friends or learn about fellow students of a social, classroom, or domiciliary connection. Measures for friendship contingent self-esteem, and personality were also included in the study. In terms of FB usage, results showed that FB was more a part of students’ lives than reported by Ellison et al. (2007). The average number of friends had increased to a large degree. The average amount of time students dedicated to active FB use per day had also increased by a medium level. In addition, based on changes to the overall FBI ordinal responses of the two groups, the degree to which FB was integrated into users’ lives also exhibited a medium-level increase across studies.
Results from the Pettijohn et al. (2012) study suggested that FBI did not correlate at any statistically significant level \( (p < .05) \) to any of the personality scales, including narcissism and the Big Five personality domains (see Ames, Rose, & Anderson, 2006; Gosling, Rentfrow, & Swann, 2003), but did correlate significantly to a measure of self-esteem, which measures the importance of relationships to beliefs about the self (Cambron, Acitelli, & Steinberg, 2010). In addition, FBI did correlate to students’ age, at \( r = -.164, p < .05 \), suggesting that FB was more integrated into the lives of younger students, perhaps as they were more familiar with the technology. In the study FBI did correlate strongly to the off- to online scale which included four items that measured use of FB to keep in touch with old friends or learn about fellow students of a social, classroom, or domiciliary connection. A strong and statistically significant correlation was evidenced by \( r = .54, p < .01 \). Although not mentioned by the authors, this result suggests that the more students made connections with acquaintances, the more they integrated FB into their lives to accommodate such connections.

Morris et al. (2009-2010), in their examination of 375 randomly selected freshman students from the United States, provide further insight into the relationship between FB-related behaviour and student integration. The authors examined FB use in terms of the number of (a) FB friends on campus, (b) wall posts, (c) groups affiliations, and (d) photo albums. The authors examined the relationship between these FB usage scales and Tinto’s (1975) Peer-Group Interaction scale, operationalised by Pascarella and Terenzini (1980). The correlation between the number of FB friends and the Peer-Group Interaction scale was highly significant at \( r = .21 \) \( (p < .001) \), whereas the correlations between the number of wall posts \( (r = .16, p < .01) \) and the number of groups \( (r = .10, p < .05) \) were not as strong but still significant. Thus, results from the
Morris et al. (2009-2010) study suggested that active campus-related forms of FB activity might be important behavioural measures for student social integration.

Research by Kim, Yun, and Yoon (2009) suggested that Internet use facilitated international students’ interpersonal relationship management of Asian international students in South Korea. However, research concerning use of SNSs and associated social outcomes among international students is scarce. Nevertheless, research by Lin, Peng, Kim, Kim, and LaRose (2011) provides some level of analysis in this area. Lin et al. (2011) examined the use of FB and on on- and off-line social capital and adjustment among 195 international students studying in the United States. Most of the participants (63%) in the study were of Asian origin. As independent variables, the authors measured FB use in terms of (a) time spent on FB with compatriots (both on campus and in students’ respective home countries), (b) time spent on FB with local American students, and (c) FB usage (a factor encompassing users communicative behaviour including their tendency to send messages, check events, check a friends’ status, and check photos). As dependent variables, the authors measured international students’ social adjustment (Baker & Siryk, 1999), emotional adjustment, college attachment (Hurtado, Carter, & Spuler, 1996), and online and offline bridging and bonding social capital (Williams, 2006).

Controlling for international students’ age, GPA, gender, and length of residence in the U.S., time spent on FB with compatriots did not make a significant contribution to online bridging social capital ($\beta = .18, p < .059$). However, in a separate multiple regression equation, time spent on FB with local American students did make a significant contribution to online bridging social capital ($\beta = .19, p < .05$). In two other separate regression equations, the FB usage factor made a significant contribution to online bridging capital at $\beta = .26, p < .01$, and social adjustment at $\beta = .22, p < .001$. Therefore, results suggested that use of FB to connect with local American
students, and communicative use of the site, might be an important to the overall socialisation of international students studying abroad. Unfortunately, the time that international students spent on FB just with compatriots on campus was not part of the study. It may have been that demographic-based use with compatriots on campus may facilitate social integration of international students. This is a potential area of further research.

In summary, while the Kord (2008) study suggested that time spent on SNSs is negatively associated with forms of academic integration, both the Kord (2008) and Walz (2009) studies suggest that time spent on SNSs is positively associated with students’ overall university experience and sense of connection to the campus. Junco’s (2012a) study contributes to an understanding about what types of FB activities might contribute to overall integration and involvement in co-curricular activities. Results showed that use of FB to create or take part in a social event or to comment on photos of FB represents important integrational behaviours, whilst more trivial use such as playing FB games may represent more mal-integrative behaviours. This idea is supported by Lin et al.’s (2011) study that suggested that FB usage (a measure of active communicative behaviour on FB) contributed to online bridging social capital and social adjustment among international students. More generally, research suggests that use of FB can enable more cooperative connections between students, a stronger sense of belonging and connection to the campus, and an overall improved tertiary social experience. Judging from the trends established by this body of research, an examination of the way in which FB-related behaviour pertains to levels of academic and social integration of international students’ in Australasia is an important new area of research.

2.6 SNS Use and Academic Performance
Some earlier research has suggested that general social integration is strongly associated with academic outcomes among tertiary-level students. Thomas (2000) assessed general forms of social integration not necessarily related to online interaction. Drawing upon 1,200 freshman students in the United States, Thomas conducted research concerning levels of social integration and academic outcomes. Controlling for gender, ethnicity, aptitude, and initial institutional commitment, the results revealed that the number of acquaintances a class member had predicted their year-end GPA at $\beta = .15$ and persistence at $\beta = .14$ (significance levels not reported).

Research concerning SNS use and academic performance has generally focused on the relationship between the time that students spend on SNSs, such as FB, and academic outcome in terms of GPA. The purpose of this subsection is to review such research. The subsection also evaluates the most comprehensive study to date in this particular field of enquiry: Junco (2012b).

One piece of research concerning the relationship between time spent on SNSs and academic outcome generated much media interest in April 2009. An unpublished manuscript composed by Karpinski (2009) related university students’ FB use to lower academic achievement at university. The manuscript was very quickly picked up by hundreds of news outlets and rapidly circulated via mainstream media into the public domain (see Khan, 2009, for a good example). The study utilised a convenience sample of 219 American students that were somewhat unrepresentative of the university. Furthermore, throughout the document, Karpinski (2009) made the assumption that SNSs were used exclusively for recreational use, an assumption debunked by recent studies. As noted previously, Selwyn (2009) established various types of education-related use of FB among university students. The Karpinski (2009) study analysed the correlation between time spent on FB and students’ self-reported university GPA. Although the study utilised only one control variable—status as an undergraduate or graduate—Karpinski
(2009), in her conclusions, suggested that “the negative consequences of use can alert administrators to find ways to limit access [to FB]… resulting in better academic performance” (p. 6). Despite the study’s shortcomings, Karpinski (2009) illogically posited a directional relationship from correlative data, which led to a number of media outlets espousing the same conclusion. Although a re-written version of the 2009 manuscript, authored by Kirschner and Karpinski (2010), acknowledges the error in assuming directionality, the authors maintain their conclusion that FB use reflects negatively on student performance: “This research only exposes the tip of the iceberg, but as with all icebergs—though we cannot see what is under the tip—we know it’s there and we know it can wreak havoc if not heeded” (Kirschner & Karpinski, 2010, p. 1245).

The Boogart (2006) study, as explained previously, analysed the relationship between FB use and several social and academic outcomes. Cross tabular analysis, without the use of any control variables, found a significant negative relationship between the time students spent on FB and students’ self-reported GPA. Similar to the Boogart (2006) study, research conducted by Kord (2008) suggested that the time students spent on SNSs correlated negatively to high school GPA, with $r = -.148 \ (p < .01)$. From this negative correlation, Kord (2008) posited that students with higher GPAs spent less time on SNSs and vice-versa. However, Kord (2008), unlike Karpinski (2009), acknowledged the inability to assume direction in the data. Furthermore, in the Kord (2008) study, time spent on SNSs did not correlate significantly with any other measure of academic commitment, including university entrance score, enrolled credit hours, time spent studying, percentage of classes attended, and intention to re-enrol.

In response to the media hype generated by the Karpinski (2009) study, Pasek, More, and Hargittai (2009) attempted to replicate the results by surveying 1,983 American students (three
samples of \( n = 1022, 658, \) & 303). Like Boogart (2006), Kord (2008), and Karpinski (2009), Pasek et al. (2009) used self-reporting methods to gather data pertaining to student GPA, despite Kuncel, Crede, and Thomas’s (2005) warning that GPA data gleaned via student self-reporting should be viewed with some caution. The Pasek et al. (2009, p. 9) study incorporated a variety of control variables that included age, gender, race/ethnicity, and socio-economic status. Across the three samples, in only one instance did time spent on FB significantly predict GPA, with \( \beta(658) = .051 \) \( (p < .05) \). Results were therefore somewhat inconclusive. In the most definitive study to date, Junco (2012b) conducted research into how time spent on FB, frequency of FB checks per day, and other forms of FB usage contributed to actual GPA among 1,839 university students in the United States. Junco used four hierarchical regression models in the study: (a) FB use per day and other indices on GPA, (b) FB checks per day and other indices on GPA, (c) FB use per day and other indices on class preparation time, and (d) FB checks per day and other indices on GPA. The author controlled for gender, ethnicity, high school GPA, and parents’ education. A summary of the results from the four models is presented in Table 5.

Table 5

<table>
<thead>
<tr>
<th>FB Activity Index</th>
<th>FB Activity</th>
<th>Standardised Beta Weight (( \beta ))</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Checking up on friends on FB</td>
<td>.08*</td>
</tr>
<tr>
<td></td>
<td>Posting status updates on FB</td>
<td>-.08**</td>
</tr>
<tr>
<td></td>
<td>FB use per day</td>
<td>-.19***</td>
</tr>
<tr>
<td>Model 1: FB Use per Day and Other Indices on GPA</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Checking up on friends on FB</td>
<td>.07*</td>
</tr>
<tr>
<td></td>
<td>FB checks per day</td>
<td>-.06*</td>
</tr>
<tr>
<td></td>
<td>FB chatting</td>
<td>-.09**</td>
</tr>
<tr>
<td></td>
<td>Posting status updates on FB</td>
<td>-.09**</td>
</tr>
<tr>
<td>Model 2: FB Checks per Day and Other Indices GPA</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FB use per day</td>
<td>-.06*</td>
</tr>
<tr>
<td></td>
<td>FB chatting</td>
<td>-.09**</td>
</tr>
<tr>
<td>Model 3: FB Use per Day and Other Indices on Time Preparing for Class</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FB checking</td>
<td>-.11***</td>
</tr>
</tbody>
</table>

Note. Adapted from “Too Much Face and Not Enough Books: The Relationship between Multiple Indices of
Results showed that whilst checking up on friends on FB generally contributed to students’ GPA, FB use per day, frequency of site checks, posting status updates, and chatting were generally negative predictors. In Junco’s other study (2012a), FB chatting also featured as a statistically significant negative contributor to time preparing for class, confirming the results of his 2012b study.

Given the shortcomings associated with the Boogart (2006), Kord (2008), Karpinski (2009), Kirschner and Karpinski (2010), and Pasek et al. (2009) studies, the Junco (2012b) investigation provides the strongest evidence that time spent on SNSs has a negative relationship with students’ GPA. As will be discussed in subsection 2.8.1, this negative relationship is likely the result of what Pasek et al. (2009, p. 9) describe as the “time replacement effect”.

2.7 SNS Use and Retention

As noted above, Morris et al. (2009-2010) surveyed 375 entering freshman in order to assess the differences between “persisters” and “non-persisters” in terms of their FB use and social integration. “Persisters” were students whom continued with their studies after their first year whilst “non-persisters” were students whom did not. Results revealed that, of the 375 students, 314 were persisters, while 61 were non-persisters. One of the additional questions in the study asked the student respondents the following question: “Do you mainly use Facebook to connect with people here at [our university] or with people NOT at [our university]?” (p. 317). Results revealed that 70.3% (n = 221) of the persisters, while only 53.4% (n = 32) of the non-persisters, used FB to connect with people inside the university. This suggested that the use of FB to connect with friends and affiliates on campus may be related to student persistence. Morris et
al.’s (2009-2010) study provides independent sample t-tests comparing the FB activity of persisters and non-persisters. Their results are presented in Table 6. Results showed that persisters had significantly more FB friends than non-persisters—an average of 109.5 compared to 81.71 for non-persisters (Cohen’s $d = 0.44$, $p < .001$). Results also revealed that persisters had made significantly more total wall posts than non-persisters, with an average of 182.02 compared to 123.04, respectively (Cohen’s $d = 0.49$, $p < .01$). Therefore, overall, the study suggested that students who had more FB friends (on campus) and made more wall posts were more likely to integrate socially and persist with their studies, further suggesting that activity on FB is an important factor in the persistence puzzle.

Table 6

<table>
<thead>
<tr>
<th>FB Indices</th>
<th>Persisters $(n = 314)$</th>
<th>Non-persisters $(n = 61)$</th>
<th>t-value</th>
<th>$d$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of FB Friends</td>
<td>109.05</td>
<td>81.71</td>
<td>3.59***</td>
<td>0.44</td>
</tr>
<tr>
<td>Number of Groups</td>
<td>30.49</td>
<td>26.97</td>
<td>1.00</td>
<td>0.18</td>
</tr>
<tr>
<td>Number of Wall Posts</td>
<td>182.02</td>
<td>123.04</td>
<td>2.62**</td>
<td>0.49</td>
</tr>
<tr>
<td>Number of Photo Albums</td>
<td>3.84</td>
<td>3.04</td>
<td>1.41</td>
<td>0.21</td>
</tr>
<tr>
<td>Peer-Group Interaction</td>
<td>27.85</td>
<td>26.42</td>
<td>2.47**</td>
<td>0.34</td>
</tr>
</tbody>
</table>


In the Morris et al. (2009-2010) study, the FB friends scale differed from the Ellison et al. (2007) FB friends scale. The Ellison et al. (2007) study measured total number of FB friends at the university in addition to those elsewhere, whereas the Morris et al. (2009–2010) investigation only included FB affiliations from the campus. Therefore, total FB friends can be measured in different ways.
Overall, research concerning the relationship between tertiary students’ use of SNS and student retention, although nascent, shows promise. All preliminary studies, although US based, point to a positive significant relationship between the use of FB, particularly total FB friends on campus and FB wall activity, and student retention at the tertiary level. Therefore, how international students’ FB-related behaviour pertains to their integration commitment is a new and important area of concern.

2.8 A More Detailed Assessment of SNS-Related Behaviour

This section provides a review of recent research that has attempted to establish a more detailed understanding of SNS behaviour and associated social outcomes. The section begins by explicating the limitations associated with earlier instrumentation in the field that focused on simplistic time scales. The section finishes by providing a short review of Ellison et al.’s (2011) definitive study that provides useful instrumentation for the examination of international students’ in the current investigation.

2.8.1 The question of how. In concluding their critique and investigation, Pasek et al. (2009) brought to the fore key issues concerning the limitations of merely assessing the time students spend on SNSs and its correlation to GPA. The authors state that they

Do not intend this study to suggest that Facebook use, writ large, cannot exhibit a negative relationship with academic performance. Individuals, spending more than 30 hours a week on the site will likely suffer from some sort of time replacement effect [Pasek, Kenski, Romer, & Jamieson, 2006]. In that vein we do not suggest that Facebook is some unmitigated good. As with most engaging hobbies and community activities, Facebook use can be an effective means of participating in society as well
as a means from withdrawing from it. The question is not whether individuals are using a particular medium, but how (p. 9)

Pasek et al. (2009, p. 9) argue that those spending more than 30 hours per week on FB are likely to suffer from some form of “time replacement effect”, where media uses that absorb large amounts of time ultimately result in forms of social disengagement. It may simply be that the heavy FB users have less time to focus on principal academic endeavours. However, Pasek et al. (2009) identified the key limitation of the bulk of the research concerning SNS use and any social outcome: the attempt to measure the socially complex world of SNSs in terms of mere “time spent on the platform” is overly simplistic. Pasek et al. (2009) point to the necessity for a more nuanced assessment of SNS behaviour in order to better understand the relationship between patterns of SNS usage and related academic and social outcomes. To this end, attention will now be focused to recent research that has attempted to provide an understanding of how particular SNS-related behaviours relate to different educational and social outcomes.

2.8.2 The development of SNS instrumentation. Early studies of the Internet measured the correlation between time spent online and various social outcomes such as loneliness (Kraut et al., 1998). Later, studies in the field began differentiating between specific sets of online activities resulting in more detailed and specific understanding of online behaviour and associated social outcomes (Kraut, Fussell, Brennan, & Siegel, 2002; Zhao, 2006). Investigations concerning the use of SNSs have evolved in the same way. In order to better understand the relationship between FB use and social capital, Ellison et al. (2007) went beyond the time scale to develop the FBI scale to measure FB life integration. Further to this initial refinement, other
studies analysed particular forms of FB usage. A short discussion of these studies will now be provided.

As shown above, Morris et al.’s (2009-2010) study evaluated the number of FB friends on campus, groups, wall posts, and photo albums. Their analysis revealed that the number of FB friends and the number of wall posts were particularly associated with Pascarella and Terenzini’s (1980) Peer-Group Interaction scale and student persistence. Similarly, as previously explained, Junco (2012a, 2012b) made developments in the assessment of FB behaviours to posit that certain FB-related activities contributed positively to academic and social integration whilst others contributed negatively to forms of integration. In a seminal study, Burke et al. (2010) classified FB behaviour in terms of directed communication (interactions between focal user and another friend) and content consumption (the focal user’s attention to broadcasts). Taking advantage of their access to behavioural data on FB’s servers, the researchers wrote their own software instrument to analyse the actual FB activity of 1,193 respondents from 21 English-speaking countries, including the United States, Great Britain, and New Zealand. The authors performed two blocked multiple regression equations predicting bridging and bonding social capital (Williams, 2006) and loneliness (Russell, 1996). They used age, gender, relationship status, self-esteem, life satisfaction, time spent on FB, total FB friends, and total amount of FB content produced as control variables for their Model 1. Directed communication and content consumption were included in Model 2. In Model 2, results showed that directed communication on FB positively predicted bonding social capital, with $\beta = .11 (p < .05)$, and negatively predicted loneliness, with $\beta = -.11 (p < .05)$. On the other hand, content consumption negatively predicted bridging social capital, with $\beta = -.10 (p < .05)$ and positively predicted loneliness, with $\beta = .15 (p < .001)$. Therefore, results from the Burke et al. (2010) investigation provide evidence
that more pro-active and direct forms of engagement with others on FB contributes to increased emotional support from acquaintances and close friends.

Ellison, Steinfield, and Lampe (2011) conducted a form of behavioural analysis that is of particular relevance to the international tertiary-student context. In their investigation, the researchers assessed the degree to which students used the FB platform to connect with people of varied social proximity and how such strategies related to forms of social capital. As instrumentation from the Ellison et al. (2011) study is utilised in the current investigation, a review of that study will now be provided.

2.8.3 FB-enabled communication strategies. Previous scholarship suggests a relationship between FBI and social capital among undergraduate students (Ellison et al., 2007; Steinfeld, Ellison, & Lampe, 2008; Valenzuela, Park, & Kee, 2009). However, until recently, scholarship in the field had not addressed the strategies that users employ to connect with others and how the use of such strategies relates to positive social capital outcomes. In order to make advancements in this field of enquiry, Ellison et al. (2011) surveyed 450 undergraduate students at a large Midwestern university in the United States. In their study, 62% of respondents were female with an average age of 20.4. Respondents were primarily white (81%) and a little over half of them, 51%, resided off-campus.

Ellison et al. (2011) examined the way in which college student respondents used FB to facilitate connections between individuals of varying social distances. Similar to Ellison et al.’s (2007) study, the investigation adopted scales concerned with student demographics, Rosenberg’s (1989) self-esteem, social capital, and FBI. In addition to the total FB friends data ascertained as part of the FBI scale, respondents were also asked how many of their total friends
were considered *actual friends*. The authors state that they “intentionally did not specify what ‘actual friends’ meant in order to tap individual understandings of friendship” (p. 880).

Central to the Ellison et al.’s (2011) survey instrument was the creation of five types of conceptual others which focused on different degrees of prior offline connection, namely (a) strangers, (b) those with a common interest, (c) those recognisable in students’ resident halls, (d) high school acquaintances, and (e) close friends (N. B. Ellison, personal communication, March 12, 2011). Students were asked how likely they were to “browse the Facebook profile, contact via Facebook, add as a Facebook friend, and ultimately meet face-to-face” (Ellison et al., 2011, p. 880) with each of the five pre-defined others. A further four questions gauging the extent that students to learn about acquaintances and meet new people, were also included in the study.

After the authors performed a PCA with varimax (orthogonal) rotation, and after the removal of cross-loading items, the remaining items factored cleanly into three scales: FB Initiating, Information Seeking, and Maintaining. The FB Initiating scale represented “the use of Facebook to meet strangers or make new friends” (Ellison et al., 2011, p. 882). The FB Information Seeking scale reflected “the use of the site for learning more about people with whom the user has some offline connection” (Ellison et al., 2011, p. 882). The word *proximity* is useful in describing the relationships reflected by the FB Information Seeking scale as the student-to-student relationships are all within physical proximity. Finally, the FB Maintaining scale reflected the use of the site “to maintain existing close ties” (Ellison et al., 2011, p. 882). Table 7 provides a summary of the statistics pertaining to Ellison et al.’s (2011) proposed FB Strategy scales.
Table 7

Correlations between Items and Strategy Components in Ellison et al. (2011)

<table>
<thead>
<tr>
<th>Scales/ Items</th>
<th>M</th>
<th>SD</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Initiating Scale (Cronbach’s α = .86)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I use FB to meet new people</td>
<td>2.13</td>
<td>1.12</td>
<td>.49</td>
<td>-.03</td>
<td>.42</td>
</tr>
<tr>
<td>MSU Stranger: Browse their profile on FB</td>
<td>2.34</td>
<td>1.25</td>
<td>.69</td>
<td>.03</td>
<td>.33</td>
</tr>
<tr>
<td>MSU Stranger: Contact them using FB or by using information from FB</td>
<td>1.62</td>
<td>0.97</td>
<td>.94</td>
<td>-.05</td>
<td>.04</td>
</tr>
<tr>
<td>MSU Stranger: Add them as a FB friend</td>
<td>1.71</td>
<td>1.09</td>
<td>.93</td>
<td>-.02</td>
<td>.04</td>
</tr>
<tr>
<td>MSU Stranger: Meet them face-to-face</td>
<td>1.52</td>
<td>0.92</td>
<td>.90</td>
<td>-.09</td>
<td>-.03</td>
</tr>
<tr>
<td><strong>2. Maintaining (Cronbach’s α = .87)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Close Friend: Browse their profile on FB</td>
<td>4.62</td>
<td>0.76</td>
<td>-.04</td>
<td>.81</td>
<td>.24</td>
</tr>
<tr>
<td>Close Friend: Contact them using FB or by using information from FB</td>
<td>4.57</td>
<td>0.83</td>
<td>.03</td>
<td>.81</td>
<td>.20</td>
</tr>
<tr>
<td>Close Friend: Add them as a FB friend</td>
<td>4.79</td>
<td>0.58</td>
<td>-.06</td>
<td>.90</td>
<td>.10</td>
</tr>
<tr>
<td>Close Friend: Meet them face-to-face</td>
<td>4.73</td>
<td>0.69</td>
<td>-.06</td>
<td>.84</td>
<td>.04</td>
</tr>
<tr>
<td><strong>3. Information Seeking (Cronbach’s α = .77)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I have used FB to check out someone I met socially</td>
<td>3.92</td>
<td>0.91</td>
<td>.01</td>
<td>.26</td>
<td>.70</td>
</tr>
<tr>
<td>I use FB to learn about other people in my classes</td>
<td>3.31</td>
<td>1.08</td>
<td>-.01</td>
<td>.12</td>
<td>.85</td>
</tr>
<tr>
<td>I use FB to learn about other people living near me</td>
<td>2.93</td>
<td>1.16</td>
<td>.12</td>
<td>.06</td>
<td>.78</td>
</tr>
<tr>
<td>Someone in Residence Hall: Browse their profile on FB</td>
<td>3.43</td>
<td>1.18</td>
<td>.28</td>
<td>.21</td>
<td>.61</td>
</tr>
<tr>
<td><strong>Eigenvalue</strong></td>
<td>3.99</td>
<td>3.40</td>
<td>1.56</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Percent of Variance</strong></td>
<td>30.68</td>
<td>26.13</td>
<td>11.99</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note. Adapted from “Connection Strategies: Social Capital Implications of Facebook-Enabled Communication Practices,” by N. B. Ellison, C. Steinfield, and C. Lampe, 2011, New Media & Society, 13(6), p. 881. Copyright 2011 by SAGE Publications. Adapted with permission; loadings for scales 1, 2, and 3 (in bold) from N. Ellison (personal communication, January 2, 2012); M = Mean; SD = Standard Deviation; scale mean and standard deviations in italics.*
The overall mean observed item responses for each scale shown in Table 7 provide insight into the magnitude with which users engage strangers, others of proximity, and close friends as the overall mean responses for the FB Initiating, Information Seeking, and Maintaining scales were 1.87 (SD = 0.88), 3.40 (SD = 0.84), and 4.68 (SD = 0.61), respectively. Cronbach’s alpha (\( \alpha \)) values for each of the three scales were above .70 suggestive of internal consistency of the components. The correlations between the items and the components were generally quite high suggestive of construct validity. However, the correlation between the “I use FB to meet new people” item and the FB Initiating component was comparatively lower. This may have been to do with the fact that the item did not pertain to FB engagement with MSU strangers, unlike other four items of the FB Initiating component. This suggested that use of FB to engage with strangers outside the university context was somewhat qualitatively distinct from initiating behaviours toward strangers inside the university.

Ellison et al.’s (2011) study examined how each of the three communication strategies related to students’ reported levels of bridging social capital (useful loose ties) and bonding social capital (social advantage from close ties). The authors used year of study, Internet use, self-esteem, time spent on FB, total FB friends, and total actual FB friends as controls in Model 1 in a multiple regression equation. In Model 2, the introduction of FB Information Seeking contributed significantly to bridging social capital, with \( \beta = .22 \) (\( p < .0001 \)), and, in a separate multiple regression equation, bonding social capital, with \( \beta = .15 \) (\( p < .0056 \)). In addition, results also suggested that total actual FB friends, as opposed to total FB friends, was a more accurate predictor for both bridging social capital (\( \beta = .41, p < .00009 \)) and bonding social capital (\( \beta = .33, p < .0093 \)) in the two separate multiple regression equations. Total FB friends did not make any significant contribution in either equation. Therefore, results showed that the use of FB to learn about others of proximity, and total actual FB
friends, contribute to the utility of both loose and close ties on campus. Considering these results, Ellison et al. (2011) propose that “Facebook serves as a social lubricant, encouraging individuals to convert latent to weak ties and enabling them to broadcast requests for support or information” (p. 873), providing further evidence in support of Ellison et al.’s (2007 p. 1162) finding that “highly engaged users are using Facebook to crystallize relationships that might otherwise remain ephemeral”.

Research points to the potential of applying the FB Information Seeking strategy to international students in Australasia. Kudo and Simkin (2003) conducted in-depth interviews with six Japanese international undergraduates in Australia for the purpose of gaining insight into the factors and developmental processes involved in the formation of friendships among international students. Results showed that frequent contact with other students was made in the contexts of shared classrooms, accommodation, and social networks and that these frequent contacts enabled students to forge close friendships, predominantly with compatriots and other-country internationals (pp. 97-99). Therefore, it may be that international students use FB to learn about other students of proximity and that this assists them in their general socialisation on campus.

One of the limitations of the Ellison et al. (2011) study is that during the data reduction procedures the authors assumed that no correlation existed between the three principal components. Accordingly, although meaningful relationships may have existed between the strategic constructs, the method of data reduction assumed that there was none. This can be seen as a weakness of the Ellison et al. (2011) study. The Ellison et al. (2011) study used measures of social capital as outcome variables. To date, no studies have looked at how FB strategies might reflect upon the Goal and Institutional Commitment (Pascarella & Terenzini, 1980) of international students. Therefore, a more thorough investigation into international students’ FB-enabled connection strategies and how such strategies reflect upon
forms of student social and academic integration will potentially increase our understanding of international tertiary education.

2.9 Summary

In summary, existing research suggests SNS use contributes to tertiary students’ integration, connectedness to the campus, retention, and overall tertiary experience, and may be of particular relevance to under-represented student groups. However, inconsistent results concerning the relationship between the time that students spend on SNS and academic performance have prompted a more detailed examination of SNS-related behaviour. In this regard, research conducted by Ellison et al. (2011) has provided valuable instrumentation and insight to the field. Results from this recent study suggest that the use of FB to connect with others of proximity makes a significant positive contribution to both bridging and bonding social capital. The current investigation makes use of established Institutional Integration scales (IISs), alongside more recent instrumentation concerned with FB-related behaviour, to provide a systematic understanding of international student integration. Much of the research in the field of SNS use among tertiary students is derived from American contexts. Therefore, an examination of international students’ institutional integration and FB-related behaviour and how it pertains to goal commitment in Australasia will be a valuable contribution to the field of international tertiary education.

2.10 Research Questions

Much change has occurred across university campuses across Australasia in recent decades. International students have become an increasingly important part of university campuses’ social environment. In addition, much of the social environment has shifted online. The general purpose of this study is to understand the process of international student integration from within this new media context. With this broad question in mind, the following four main research questions are proposed:
RQ1: How do the FB-related items function to explain the FB-related behaviour of international university students in Australasia?

RQ1(a): How do the individual FB-related items function to explain the FB-related behaviour of international students?

RQ1(b): How can FB-related behaviour be understood in terms of latent factors?

RQ2: How do the institutional integration items function to explain the integrative behaviour of international university students in Australasia?

RQ2(a): How do the individual institutional integration items function to explain the integrative behaviour of international students?

RQ2(b): How can institutional integration be understood in terms of latent factors?

RQ3: What structural model best represents the role of FB-related and institutional integration factors for international students’ commitment?

RQ4: What role do international student demographic characteristics play in the structural model?
CHAPTER 3. METHODOLOGY

The investigation is descriptive non-experimental research that attempts to infer causal processes based on a large-scale self-report online survey. A pilot study was utilised to help ensure the quality and efficiency of the instrumentation and data collection procedures. The questionnaire employed both categorical and continuous question types. An online response-driven sampling method was used in an attempt to approach random sampling. Careful data preparatory procedures were used prior to analysis. A number of analytical techniques including exploratory and confirmatory factor analysis and structural equation modeling were used to answer the research questions. The study compared sample to population demographics in order to estimate generalisability of results. The material in this chapter provides an overview of the methodological issues underpinning the procedures described in the next chapter. The more experienced reader may wish to move directly to the Procedures chapter and treat this chapter as a reference guide.

3.1 General Methodological Approach

A diverse range of methodologies have been employed in educational research. Of all the methods, random assignment provides a robust means for comparing outcomes of different treatments (Cook & Campbell, 1979). In the context of research concerning SNS use, for example, random assignment might involve the allocation of two groups of student participants to either use FB as a social interface or to the condition of being strictly prohibited from FB use in all its forms over the course of an academic year. However, random assignment, in this manner, might not be feasible or ethically defensible. Even if it were possible to impose such conditions, it may be immoral to forcibly exclude groups of students for one year from social interaction across a popular platform. With the impracticality of such methods in many research contexts, methodologists have widely accepted the view that non-experimental methods can be employed for determining causal
inference (Bollen, 1989; Mark, 1979; Eisenhart, 2005; Eisenhart & Towne, 2003). More recently there has been a push to reinstate experimental quantitative methods as the “gold standard” of educational science (United States Department of Education, 2002). However, Eisenhart’s (2005) helps to legitimise non-experimental methods as a scientifically based approach in pursuing questions about causation. Eisenhart (2005, p. 224) argues that “confidence in identifying the ‘right’ cause or causes requires more than repeated or refined experimentation”. Eisenhart bases her argument on the role of non-experimental studies in the development of theory proposed by Cohen, Raudenbush, and Ball (2003). Cohen et al. (2003) were concerned with understanding why class-size reduction resulted in improved achievement outcomes overall, but large in-class variations. A review of a host of experimental and non-experimental designs enabled Cohen et al. (2003) to develop a theoretical model that may account for achievement variations. The model included the intervening variables—teacher training and modified instruction—as a means of understanding the aforementioned causal relationship. Eisenhart (2005) concluded that “research to identify additional kinds of resource use [such as class-size reduction], and the nuanced conditions and contexts of the use of these resources, will require nonexperimental designs such as… surveys” (p. 255).

Similarly, research presented herein identifies nuanced understandings of the use of social media and how such use might result in improved educational outcomes. The present study does not however make an attempt to determine the causal effect of off- and online behaviour on educational outcomes. With the support of prior research, the current study simply makes a robust exploration of the possible and probable causes of institutional integration among Australasian international students. It is acknowledged that, where possible, future controlled experiments and replication will ultimately determine the validity of the causal propositions and inferences made in the current study.
Thus, the research presented here is non-experimental, while attempting to infer causal processes based on the reports of social phenomena occurring in natural settings. Where non-experimental data is utilised, a range of statistical techniques may be employed to answer both non-causal and causal questions. In terms of non-causal questions, for example, this investigation asks: How can FB-related behaviour be understood in terms of latent factors? The techniques employed to answer non-causal questions include both exploratory and confirmatory factor analytic procedures (EFA and CFA, respectively). In terms of causal questions, for example, this investigation asks: What structural model best represents the role of FB-related and institutional integration factors for international student commitment? The procedures employed to answer this question rely predominantly on structural equation modelling (SEM) techniques. In addition, the current investigation assesses group differences, in terms of gender and location, for example, through the application of sophisticated statistical analysis of factor equivalence. Where model fit is sufficiently equivalent across groups, the study at hand assesses one- and two-way interaction effects of grouping variables on latent factor means from within a CFA framework.

3.2 Sample Survey Methods

This study is afforded two inferential methods of enquiry, namely observation and self-report techniques (Brown, 2008). Passive observational techniques, involving the collection of data in situ (Cohen, Manion, & Morrison, 2005), would be difficult to orchestrate in accordance with the current research objectives; measuring respondent attitudes and even friendship affiliations would be problematic through such a method. Self-report techniques, therefore, provide a pragmatic alternative. Participant self-reports are generally ascertained in three ways: (a) qualitative interviews, (b) focus groups, or, (c) self-administered survey questionnaires, each of which typically involves stimulating participants to give a response to a set of questions (Brown, 2008). Punch (2005) explains that the first two methods, in-person
interviews and focus groups, in conjunction with interpretive data analysis, can be powerful tools in assisting theory development and elucidating new research areas. However, the inherent lack of scale in these two methods means that generalisability or representativeness of results is not assured (Rea & Parker, 2005). In addition, potential interviewer-induced bias, outspoken participants, and group-associated stress for some participants may result in chance artefacts further decreasing the generalisability of results to the wider populations (Rea & Parker, 2005). On the other hand, self-administered survey questionnaires provide a relatively unbiased method to conduct research on a large scale that ultimately enables generalisations and stable parameter estimates of populations of interest and groups within such populations (Rea & Parker, 2005).

Despite the strengths of self-report surveys as a diagnostic tool to glean a wealth of information, the technique is not without its limitations. Cohen et al. (2005) identified several disadvantages of questionnaires: (a) the question set may be limited in scope especially when closed-ended questions are used, (b) problems exist for participants with limited literacy, and (c) it is not possible for researchers to clarify the meaning of question items. However, questionnaires can be piloted and refined for the target sample in terms of content, language, and length in order to mitigate these disadvantages. Nevertheless, such limitations are an inherent trade-off associated with large-scale planned research designs in which generalisations about populations and stable parameter estimates of populations can be made.

Thus, the fixed-form sample survey process is the best method for determining, with a known level of accuracy, descriptive, behavioural, and attitudinal information about large populations and groups within populations (Rea & Parker, 2005). The timely fashion with which the method can be employed provides a snapshot of the population, providing resistance to the natural change in thoughts, attitudes, and opinions over time.
Sample surveys can be administered in several ways including mail out, telephone, in-person, intercept, and online formats. The use of email and web survey services enables educational researchers to conveniently overcome the tyrannies of distance, collect data rapidly and simultaneously, and more seamlessly move that data into statistical software packages (Wright, 2005). The utilisation of such technologies allows investigators the possibility of following-up participants who missed questions, and the potential of quick and efficient identification of further respondents via referrals. However, like traditional mail out procedures, online surveys suffer from a self-selection bias that can lead to lower response rates and weaker generalisability (Rea & Parker, 2005). Variability in participation may result in certain groups of respondents being under- or over-represented in an obtained sample. Therefore, a comparison of sample demographics against population figures can help contribute to the validity of the results (Brown, 2008).

Another issue of concern is that of potential non-equivalence between online and paper-and-pencil surveying. Reviewing research in this area, Epstein and Klinkenberg (2001) conclude that

because previous research has demonstrated that translating a measure into a computerized format does not necessarily change its reliability and validity, new Internet-based investigations need not be so focused on demonstrating equivalency of paper and pencil instruments to computerized versions that are identical in every other way. (p. 310)

Hence, where research seeks to assert generalisations about populations and make comparisons among subgroups, large-scale fixed-form online questionnaire surveys are an appropriate instrument.
In order to ensure the quality and utility of the planned survey, it is important to first conduct a pilot study (Rea & Parker, 2005). A pilot study can reveal deficiencies in the design of questionnaire and these can be addressed prior to investing time and resources in a large-scale study. Pilot survey respondents can be asked to comment on the appropriateness of the questions, leading to important changes in the questionnaire. Pilot respondents may also be asked to make note of the time that it took to complete the survey. This way respondents in the main study can be more accurately advised as to the approximate time that the survey might take. Therefore, researchers are well-advised to make full use of a pilot study.

3.3 Sampling Strategy

The quality of an online sample survey is largely determined by the sampling strategy that has been adopted (Morrison, 1993). In deciding the sampling strategy to be used, Cohen et al. (2005) identify three key factors: (a) the required sample size, (b) method of sampling, (c) the representativeness of the sample. Each of these factors will now be discussed in turn.

3.3.1. The required sample size. Generally, the estimation of a sample size necessary to obtain stable estimates of a population is dependent on what the researcher defines as an acceptable margin of error and the size of the target population. Researchers must first consider the amount of uncertainty they can tolerate, known as the margin of error. Generally, the accepted margin of error is 5% (Cohen et al., 2005). A margin of error of 5% provides a 95% confidence interval giving a ±1.96% standard error range around an observed value. In addition, the size of the target population has an obvious influence on the necessary sample size, although the required sample size does not change much for populations over 20,000. If a researcher were to repeat a random survey of 377 people from that population of 20,000 many times, then 95% of the time the results of that survey would be ± 5% accurate (example from Raosoft, 2013). If the example above used a population of 2,000,000, the recommended sample size to maintain the same margin of error is estimated at 385 participants (Raosoft,
Therefore, insofar as a sample is likely to represent the single-scale attributes of a target population, such as daily use of a media platform, a random sample approaching 400 is recommended.

### 3.3.2. Method of sampling

There are two main methods of sampling: (a) probability sampling (also known as random sampling), (b) and non-probability sampling (also known as purposive sampling) (Cohen et al., 2005). In a probability sample, every member of the eligible population has an equal chance of being included in the sample, whilst in a non-probability sample, bias is introduced whereby some members of the population will be excluded. Unfortunately for researchers, probability sampling is impossible in many research contexts, where open access to an entire target population is uncommon. However, in recent times, the use of the Internet has enabled researchers improved access to participants. One method of non-probability sampling in online contexts is known as Web-Based Response-Driven Sampling (WebRDS), which facilitates successive referral waves of respondents (Wejnert & Heckathorn, 2008). RDS theory is based on the idea that if chains of recruitment, or waves, are sufficiently long, the composition of the final sample will eventually become independent of the seeds with which it began (Wejnert & Heckathorn, 2008). Research suggests that this sampling procedure can be expected to produce good cross-sections of the target population and only a moderate degree of bias—a slight bias generally relating to participant-recruiting processes (Heckathorn, 1997). Because of this inherent self-selection bias, Salganik (2006) recommends that WebRDS samples be at least double that which would be necessary for an equivalent random sample. Therefore, use of WebRDS to sample twice that of the recommended sample size is a good choice for researchers wanting to approach random sampling of large target populations.

### 3.3.3 Representativeness of the sample

As explained above, with regard to single observations, the confidence with which researchers hope to make generalisations about
populations of interest is dependent on (a) the acceptable margin of error, (b) the size of the target population, (c) sample size, and (d) sampling method. However, in studies using factor analysis, research suggests that the characteristics of the factor solutions themselves are most important for asserting generalisations about populations of interest. Hogarty, Hines, Kromrey, Ferrno, and Mumford’s (2005) simulation study found that a sample of 100 was sufficient to represent its target population if the factor solutions exhibited certain robust characteristics. A full discussion concerning the post hoc assessment of factor solutions and their estimated generalisability is given in subsection 3.11.

3.3.4 Consideration for survey timing. Lohr (2010) explains that coverage bias can occur in any study in which the sampling frame, the set of individuals from which the sample is potentially drawn, does not match the target population. Similarly, the timing of a sample survey may also prevent certain individuals from partaking in any given survey. Student surveys fielded at the start of a semester may represent a full spectrum of students, from those not committed to those entirely committed to their studies. However, if a study hopes to draw a connection between students’ online behaviours and commitment, there would be little opportunity at the start of the semester for consequences of online behaviours to be reflected in decisions about student commitment. Conversely, with the natural decline in student numbers from initial enrolment as a result of student attrition, surveys fielded near the end of a university semester may under-represent less committed students. Nevertheless, where cross-sectional surveys are the only option, it is understood that at any one time throughout the latter half of a semester, university students will have engaged in a range of academic and social behaviours likely to reflect upon an overall level of commitment across a student population. In summary, a single cross-sectional survey fielded at any stage throughout the university semester misses the opportunity to investigate students whose status changes.
Ideally, longitudinal surveying methods would better track the effect of changing commitment among university student cohorts over time.

3.4 Design of Questions

Questions within a survey instrument are designed to elicit the characteristics of the population such as gender, academic standard, or minutes spent online. The choice of measurement scale (i.e., nominal, ordinal, or continuous) depends largely on the inherent characteristic of the phenomenon under investigation and the instrumentation often used for measuring such phenomena. In the development of measurement scales, researchers need to make decisions concerning (a) the use of positive- and negative-worded items, and (b) the format in which the questions are presented, for example, four- or five-point rating scales. A discussion concerning such choices is now provided.

3.4.1 Positively and negatively worded items

The Rosenberg (1965) Self-Esteem scale, for example, includes items indicative of high self-esteem, such as “I feel that I have a number of good qualities,” and low self-esteem, for example, “I certainly feel useless at times”. The purpose for including both positive and negatively worded items is to avoid acquiescence, affirmation, or agreement bias (DeVillis, 2012). These three terms can be broadly understood as a respondent’s tendency to agree with items regardless of their content. However, scale-development theorists point to the potential for respondents to become confused with negatively worded items (DeVillis, 2012). Where the construction of latent variables is concerned, Devillis (2012) argues that the disadvantages of including negatively worded items outweigh any benefits. Several studies have found that scales that include positive and negative worded items can potentially confound factor structure (Campbell & Grissom, 1979; Deemer & Minke, 1999; Eggers, 2000; Johanson & Osborn, 2000) and may result in a separate factor for the negatively worded items (Anderson, Anderson & Jenson, 1979; Ibrahim, 2001; Magazine, Williams, & Williams, 1996;
McInerney, McInerney, & Roche, 1994; Motl, Conroy, & Hogan, 2000). Thus, where research seeks to understand social behaviour through factor analysis, the use of positively worded items only is an appropriate method of scale construction.

### 3.4.2 Response format

An important aspect of questionnaire design is the format of response that participants are presented with (Freidman & Amoo, 1999). This is of relevance because questions only provide an inferential look at phenomena very much influenced by the memory capacity or state of mind of the respondent (Schacter, 1999). Therefore, much research has gone into the design format of ordinal questions and how different formats might influence results (see Brown, 2004, for example). Crucially, researchers must consider the optimal number of response points, the use of neutral midpoints, and whether or not to specify balanced or unbalanced scales. Cox’s (1980) review of the literature concluded that five to nine points were optimal but the decision would ultimately depend on the research situation and method. For example, methods of factor analytic estimation such as Mplus’s Weighted Least Square Means and Variance adjusted estimator (WLSMV) have been designed to deal with ordinal data (Muthén & Muthén, 2010). Coupled with the response-point question is the question of whether or not to include neutral midpoints. Research conducted by Preston and Colman (2000) suggested that the difference between five-point rating scales (with a midpoint) and six-point rating scales (without a midpoint, forcing a choice) was negligible across indices concerned with reliability, validity, discriminating power, and user friendliness. Also implicated is the question of whether or not to include unbalanced, or positively or negatively packed rating-scale formats. On this issue, Friedman and Amoo (1999) explain that “the only justification for using an unbalanced rating scale is in a situation where it is known a priori that virtually all respondents are leaning in one direction” (p 117). By “leaning in one direction,” the authors mean that the mean scores from all prior research lie above the
midpoint. It may be the case that previous research suggests distinctly different mean observed responses for different groups of items or scales. Researchers might therefore be encouraged to negatively pack, leave as balanced, and positively pack different sets of items in the same questionnaire. However, doing so would likely cause confusion among survey participants. Therefore, although it may be beneficial to positively or negatively pack item response categories for a scale where the mean consistently lies well above or below the midpoint, multiple item or scale adjustment within the same battery of questions is likely to cause confusion in respondents and is therefore not recommended.

Finally, in addition to the structural elements of such scales, in some cases formatting can also involve a choice between agreement and frequency scale options. Research conducted by Brown (2004, p. 1023) suggests that there were “few significant differences in item psychometric characteristics… of the items responded to in two different response formats—agreement and frequency, suggesting that agreement and frequency scales generate similar responses from students”. However, research by Heine, Lehman, Peng, and Greenholtz (2002) provides some insight into the choice of formats for different cultural contexts. Heine et al.’s (2002) research suggested that respondents’ frame of reference of agreement can be somewhat different dependent upon their cultural setting and that this effect could be minimised by using frequency rather than agreement response formats. Therefore, in studies where respondents are drawn from different cultural settings, and where a choice is available, use of frequency response formats is an acceptable methodological approach.

3.5 Structural Equation Modelling (SEM) in Educational Research

Structural Equation Modelling (SEM) is a general term used to describe a variety of statistical models used to assess the validity of substantive theories with empirical data (Lei & Wu, 2007). Statistically SEM represents an extension of General Linear modelling (GLM) such as multiple regression analysis and analysis of variance (ANOVA) techniques. Lei and Wu
(2007) explain that “the primary advantages of SEM (vs. other applications of GLM) is that it can be used to study the relationships among latent constructs that are indicated by multiple measures [also known as manifest or observed variables]. It is also applicable to... non-experimental data” (p. 33). One thing that all GLM has in common is the assumption that the independent (exogenous) and dependent (endogenous) variables are directly observed with no measurement error (Bollen, 1989). However, this assumption does not hold in educational research. In Measurement Theory (Cronbach, Gleser, Nanda, & Rajaratnam, 1972), measurement error is conceived as being comprised of (a) systematic (or non-random) measurement error, and (b) random measurement error.

Systematic measurement error is associated with characteristics specific to the items or the respondents (Byrne, 2012). If, for example, the systematic error represents item characteristics, it may be that a small measure of the construct is omitted (Byrne, 2012). If, for example, the systematic error represents respondent characteristics, it may be that respondents are more inclined to agree with the terms presented in a specific question item (Byrne, 2012).

On the other hand, random measurement error can be conceived as the unpredictable fluctuations, or random disturbances, in measurement. Random measurement error could be conceived as the result of the interference of the environment on the respondent among other influences over time (DeShon, 1997). DeShon (1997) explains the advantages of SEM, referring to its ability to account for systematic (non-random) measurement error: “If the indicators contain error due to raters and items [systematic error], the relationships will be corrected for these—and only these sources—of error” (p. 4). Thus, whereas GLM is incapable of either assessing or correcting for any form of measurement error, SEM provides explicit estimates of systematic error parameters, enabling for more accurate estimates of relationships between data. Measurement error associated with exogenous-related manifest
variables is identified as “\(\delta\)” (delta) whilst measurement error associated with endogenous-related manifest variables is identified as “\(\epsilon\)” (epsilon).

SEM also enables the specification of independent, mediating, and dependent variables in one model (Byrne, 2001; Hoyle, 1995; Klem, 2000; Lei & Wu, 2007; Maruyama, 1997; Raykov & Marcoulides, 2007; Thompson, 2000). In SEM a variable can serve as both a dependent (endogenous) variable and an independent (exogenous) variable in the same model in a chain of causal hypotheses (Lei & Wu, 2007). This kind of variable is often called a mediator and can function to explain causal relationships. In addition to the specification of mediating variables, researchers are also able to test whether reciprocal paths account for a specific relation in data better than one-way causal flows. The specification of an SEM model with latent variables also allows for a number of tests of model fit not available in multiple regression or similar techniques. Finally, a more comprehensive set of assessment of group equivalence can be made from within an SEM framework.

In its simplest form, a latent variable can be described as a mathematical model that specifies direct effects from a construct to its hypothetical observed measures (Bollen, 1989). This is often termed a “direct reflective model” (Edwards & Bagozzi, 2000, p. 161), where the latent variable is posited as the common cause of a measured response. Rooted in Modern Test Theory (MTT) (Lord & Novick, 1968), latent variables provide a more tenable explanation of how attributes are related to observations than, for example, principal components (Borsboom, 2006).

In addition to latent structures, formative structures can also be modelled using SEM. Formative structures can be described as a mathematical model that specifies direct effects from the observed measures, or causal indicators, to its construct. This is often termed a “direct formative model” (Edwards & Bagozzi, 2000, p. 162) or a Multiple Indicator Multiple Cause-derived (MIMIC-derived) model. Therefore, one of the strengths of SEM is that it can
incorporate and test both latent and formative structures in the same model, enabling a more thorough schematic understanding of relationships between variables (Edwards & Bagozzi, 2000).

Although SEM can account for systematic (non-random) measurement error, it cannot account for specification error; that is, the error associated with equations (Shadish, Cook, & Campbell, 2002). In order for a model to account for specification error, it must first meet the requirements for identification set forth by Bollen (1989, pp. 238-254). At the measurement model level, it is common for models to be identified by meeting the requirements of the Three-Indicator Rule. Put simply, a multifactor measurement model is identified when it has (a) three or more manifest variables per latent factor, (b) sets of manifest variables that pertain strictly to each factor, and (c) no correlations between errors associated with observed variables (Bollen, 1989, p. 247). At the structural level, it is common for models that include mediating factors to meet the requirements of the Recursive Rule (Bollen, 1989, pp. 95-98, 328-331). Put simply, such a structural model is identified if the model contains (a) no reciprocal causation or feedback loops, and (b) no correlations between structural errors. For a complete discussion of exceptions, see Bollen (1989).

In summary, the advantage of SEM over other GLM is that multiple measures for key constructs can be utilised, enabling researchers to explicitly account for systematic measurement error in observed variables. SEM also enables the inclusion of mediating variables to explain causal inferences between exogenous and endogenous variables. In addition, its ability to include both reflective and formative (MIMIC) structures in a single model make it a useful technique in the social sciences. Where SEM models are supported by a strong theoretical framework, meet the requirements for identification, and do not contain specification error, they can be a robust and powerful means of assessing empirical data and developing theories in educational research (Bollen, 1989).
3.6 Exploratory Factor Analysis

Before utilising SEM to test structural relations between variables, researchers can carry out exploratory procedures to help make sense of collected data. This is especially important in new areas of research where construct validity is being developed and new theories are being explored. Exploratory factor analysis (EFA) is a heuristic technique enabling researchers to explore underlying dimensions of a battery of question items for the purpose of generating theory. EFA involves no *a priori* specification concerning the groupings of variables. However, a researcher must specify the degree to which factors themselves can correlate to each other (rotation), and the type of estimation used to carry out the procedure. There are two general types of factor rotations: orthogonal and oblique. In an orthogonal rotation, factors are constrained to be uncorrelated, whilst oblique rotations permit correlations among factors. Oblique rotations are generally more appropriate in social science research where factors are usually related (Beavers et al., 2013). Although no single oblique method of rotation is recommended, the direct oblimin rotational method with default delta (0) is a common choice (Beavers et al., 2013).

When performing EFA (and CFA), researchers must also choose a method of estimation. This is often determined by the software packages available to them and the characteristics of the data being analysed. Maximum Likelihood estimation (ML) is commonly used for factor analytic techniques in the social sciences (Beavers et al., 2013). ML estimator selects model parameters that most likely reflect that of the sampled population. To do this, ML assumes that the observed variables follow a multivariate normal distribution. However, this assumption cannot be held for ordinal data where floor and ceiling effects (known as positive and negative skew for continuous variables) are common. An alternative method for analysing ordinal data is Weighted Least Squares estimation (WLS), which assumes that the observed ordinal data stems from a set of underlying latent continuous
variables (Gaskin & Happell, in press). Simulation studies suggest that, without the assumption of underlying continuous variable, correlations between ordinal variables tend to be attenuated and estimates of factor structures less accurate (Holgado-Tello, Chacón-Moscoso, Barbero-García & Villa-Abad, 2010). However, Hoogland and Boomsma (1998) assessed the performance of ML and WLS to analyse ordinal variables and found a high level of bias for both estimation methods. Muthén, du Toit, and Spisic (1997) introduced the Weighted Least Squares Means and Variance adjusted (WLSMV) estimator as a refinement of the WLS estimator. Beauducel and Herzberg’s (2006) simulation study compared the performance of WLSMV to ML for ordinal data from within a confirmatory framework. Results showed that WLSMV was clearly superior to ML when two to three ordinal response categories were concerned; ML was twice as likely to over-reject correct models. In addition, with four to five response categories, the performance of WLSMV was overall slightly superior to ML in terms of rejection of models and especially superior with regard to the accuracy of factor loadings within a confirmatory framework. Therefore, where the researcher’s ultimate goal is to assess an EFA solution from within a confirmatory framework, EFA with WLSMV estimation (as opposed to the ML estimator) is an appropriate choice. Using the same estimation method for both factor analytic methods provides a more seamless transition from an EFA solution to a CFA one (Linda K. Muthén, personal communication, January 6, 2014).

As a refinement of ML, Muthén and Muthén (1998-2012) proposed the ML method with robust standard errors for the purposes of dealing with item non-normality (based on statistical work by Yuan & Bentler, 1998). Therefore, where ordinal variables are concerned, a choice between Mplus’s WLSMV and Robust Maximum Likelihood (MLR) estimators is generally made as both procedures provide comparably trustworthy outcomes (Muthén, 2009a). This is because both the WLSMV and MLR estimators make adjustments for item
non-normality and also assume that the observed ordinal data stem from an underlying latent continuous variable (Muthén, 2009b). The WLSMV estimator does this by using polychoric correlation coefficients, whilst the MLR uses probit links and assumptions (Muthén, 2009b). In making a choice between WLSMV and MLR, Mplus developer Linda K. Muthén (2009c) explains that (a) MLR is recommended when there are four or fewer factors in a given rotation; and (b) WLSMV is recommended when there are five or more factors in a given rotation. Muthén (2009a) explains that this is because MLR requires numerical integration which is more computationally demanding than WLSMV and, as a result, can take extensive time to perform. In addition, research on WLSMV suggests that when ordinal and continuous variables are concerned, and where sample sizes exceed 200, WLSMV performs very well (Muthén et al., 1997; Flora & Curran, 2004). Therefore, where researchers are concerned with carrying out multiple EFA procedures on ordinal and continuous data, and where five or more factors are expected, WLSMV estimation is an appropriate and pragmatic method of analysis.

The researcher’s decision concerning how many factors to retain in EFA is crucial as this decision has a direct effect on results and subsequent theory development. Both under- and over-extraction adversely affect the efficiency and meaning of an EFA (Zwick & Velicer, 1986). A number of methods have been proposed to determine the number of factors to retain such as Kaiser’s (1960) eigenvalue-greater-than-one rule (K1 rule), Cattell’s (1966) scree test, and model comparison techniques (Fabrigar, Wegener, MacCallum, & Strahan, 1999). However, more extensive simulation research suggests that the use of multiple modern techniques, for the purpose of finding agreement (convergence), is the most judicious approach for determining the number of major factors underlying a battery of measures (Ruscio & Roche, 2012). Ruscio and Roche (2012) demonstrated empirically the advantage of utilising four modern techniques to seek convergence (Table 8). Under simulation, when two techniques converge, accuracy was between 76.9% and 96.3%; when three techniques
converged, accuracy was between 91.5% and 97.0%; and, when all four techniques
congradged, accuracy was 97.0% (J. Ruscio, personal communication, December 23, 2012).

Four of these modern methods have recently become available in Statistical Package for
installations detailed by Basto and Pereira (2012) and Courtney (2013). Table 8 provides a
review of these techniques and how they can be optimised for ordinal data conditions.

Table 8

<table>
<thead>
<tr>
<th>Modern Technique</th>
<th>Abbreviation</th>
<th>Standard for All Data Types</th>
<th>% Accuracy Under Simulation</th>
<th>Bias under Simulation (under- or over-extraction)</th>
<th>Recommended Version for Ordinal Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comparison Data</td>
<td>CD</td>
<td>CD</td>
<td>87.14</td>
<td>Slight under</td>
<td>CD_r</td>
</tr>
<tr>
<td>Parallel Analysis</td>
<td>PA</td>
<td>PA-PCArm</td>
<td>76.42</td>
<td>Unbiased</td>
<td>PA-PCA_Pm</td>
</tr>
<tr>
<td>Optimal Coordinate</td>
<td>OC</td>
<td>OCr</td>
<td>74.03</td>
<td>Slight under</td>
<td>OC_p</td>
</tr>
<tr>
<td>Minimum Avg. Partial</td>
<td>MAP</td>
<td>MAP^2</td>
<td>59.6</td>
<td>Moderate under</td>
<td>MAP_p^2</td>
</tr>
</tbody>
</table>

*Note.* Estimates of % Accuracy Under Simulation and Bias Under Simulation taken from “Determining the Number of Factors to Retain in an Exploratory Factor Analysis Using Comparison Data of a Known Factorial Structure,” by J. Ruscio and B. Roche, *Psychological Assessment,* 24(2), p. 282-292. Copyright 2011 American Psychological Association. Used with permission; the CD_r for ordinal data is based on findings by Ruscio (2012); r = Pearson product moment correlation; PCA = Principal Components Analysis; Avg. = Average; m = mean eigenvalue criterion; r_s = Spearman rank order correlation coefficient; p = polychoric correlation.

Therefore, in light of theoretical considerations, researchers gathering ordinal data are
well advised to explore factor solutions (by inspecting pattern matrices) bracketed by
minimum and maximum estimates provided by the aforementioned four techniques. Where
multiple techniques converge on one estimate, and where subsequent solutions are
theoretically plausible, researchers can be more confident that the appropriate number of
factors have been chosen.

Factor number estimates and subsequent rotations are carried out with the goal of
establishing a theoretically relevant “clean” factor solution. A number of conventions have
been proposed to determine the “cleanliness” of factor solutions when interpreting the output
of an EFA. Item loadings above .30, items with no cross-loadings, and factors with no less
than three items are common conventions (Three-Indicator Rule; Bollen, 1989; Costello & Osborne, 2005). As is often the case in the initial exploration of datasets, loading tables are often messy or uninterpretable. A common approach to dealing with this issue is to drop problematic items from the analysis and re-run the EFA with fewer items and possibly fewer factors required. Costello and Osborne (2005) suggested that this approach is defensible as long as such omission does not compromise the integrity of the data. Bandalos and Finney (2010, pp. 100-101) tempered these guidelines further, suggesting that “ideally, variables should be removed one at a time and analysis rerun after each removal. It may be the case that removal of one variable eliminates problems with others”. Unfortunately, the removal of single items may still result in multiple problematic items. Thus, where multiple problematic items do exist, such guidelines can be taken to mean that the omission of several poorly loading theoretically irrelevant items can be justified as long as such removal is minimised and subsequent alternate factor solutions are explored where possible.

The search for possible factor solutions can be likened to exploring the many possible roots down a decision tree (Zwick & Velicer, 1986). By following the guidelines set forth in this subsection, researchers may be afforded a clean and theoretically plausible factor solution. In such a case, a theoretical and statistical judgment made within a confirmatory framework provides the most robust assessment of the validity of an EFA solution.

3.7 CFA and the Two-Step Approach

From within a confirmatory framework, the model-building task can be conceived as the analysis of two conceptually distinct models (Anderson & Gerbing, 1988; Joreskog & Sorbom, 1984): (a) a measurement model that specifies the relationship from latent factors to observed measures, and covariance relationships between latent factors; and (b) a structural model that specifies causal relationships between latent factors. The specification of separate measurement and structural models provides for a comprehensive two-step approach to
model building (Anderson & Gerbing, 1988). The measurement model provides a comprehensive assessment of construct validity (Bentler, 1978) by assessing both (a) convergent validity, the degree to which observations for a factor correspond to each other, and (b) discriminant validity, the degree to which factors are unrelated to each other (Campbell & Fiske, 1959). Given acceptable model fit at the measurement model stage, the structural model provides a comprehensive assessment of nomological validity, the degree to which factors behave as they should within a proposed system (Campbell, 1960; Cronbach & Meehl, 1955). Both measurement and structural models are assessed in terms of their ability to represent (or fit) their underlying dataset. A discussion of the many indices designed to assess the fit of factor analytic models is now provided.

3.7.1 Model fit indices. The search for absolute cut-off values for fit indices for measurement and structural models has been likened to the search for the mythical Golden Fleece (Marsh, Hau, & Wen, 2004). It is known that no one fit index provides an unbiased estimate of a model’s fit to its data. All fit indices are, some more than others, sensitive to different data conditions such as sample size, model complexity, and model size. In light of the shortcomings associated with each index, a useful approach is to report and consider multiple fit indices in an assessment of model fit in CFA (Fan & Sivo, 2005; Hu & Bentler, 1999). The model fit indices reported herein can be seen as representing two categories of measurement: (1) measures of badness-of-fit where estimates decrease as fit improves, and (2) measures of goodness-of-fit where estimates increase as fit improves. The badness-of-fit measures include the Chi-square ($\chi^2$) and degrees of freedom (df) package ($\chi^2$, df, $\chi^2/df$, $p$), Standardised Root Mean Square Residual (SRMR), and Root Mean Square Error of Approximation (RMSEA). The goodness of fit measures include the Comparative Fit Index (CFI), Tucker-Lewis Index (TLI) and Gamma Hat ($\hat{\gamma}$).
The Chi-square ($\chi^2$) is the basis for many fit indices and is therefore reported despite its sensitivity to larger sample sizes (Byrne, 2001; Kline, 2005; Vandenberg & Lance, 2000). Although the Chi-square test is a reasonable measure for models with 75 to 200 cases, it is almost always statistically significant for samples of 400 or more (Kenny, 2013). Thus, the Chi-square test is widely considered problematic (Jöreskog, 1969). To cope with this shortcoming, Marsh et al. (2004) suggested the non-significant Chi-square to degrees of freedom ratio test where the $\chi^2/df$ ratio value should have a non-significant probability ($p > .05$). Based on calculations of Walker (2013), a $\chi^2/df$ ratio of 3.83 or less is non-significant, i.e., $p > .05$, and thus suggestive of acceptable model fit.

SRMR can be defined as the standardised difference between the observed correlations and the predicted correlations in the model. Research suggests that SRMR is quite resistant to the effect of larger samples, model complexity, and model misspecification (Fan & Sivo, 2007; Hu & Bentler, 1999; Vandenberg & Lance, 2000). A value of less than .08 is considered acceptable, whereas a value of close to .06 is considered good (Hu & Bentler, 1999). The SRMR fit statistic is not reported when there are independent variables in the model (Muthén, 2004), and is only reported when there are solely categorical variables (Muthén, 2007). Another option similar to the SRMR, the Weighted Root Mean Square Residual (WRMR), is sometimes used as a fit index. It has been suggested that WRMR values close to 1 reflect good fit (Yu & Muthén, 2002). However, the indice has more recently been defined as an experimental fit statistic (Muthén, 2010a) and, if all other fit statistics are good, researchers are advised not to be concerned with this statistic (Muthén, 2010). Nevertheless, it is acknowledged that this is a common fit statistic and is reported where possible herein.

RMSEA is an absolute measure of fit that incorporates sample size ($N$), degrees of freedom ($df$), and the Chi-square value ($\chi^2$) (Kenny, 2013). Kenny (2013) notes that the
RMSEA index can be misleading when the model’s $N$ is low and its $df$ is low. Steiger (2000) suggests that an RMSEA value as high as .10 is indicative of an interesting model, whereas Browne and Cudeck (1989, 1992) and Byrne (2001) suggest that a value less than .08 is generally considered acceptable, and a value of less than .05 is considered good (Browne & Cudeck, 1989, 1992; Byrne, 2001). Although confidence intervals (CIs) are often available to evaluate how precisely the RMSEA is being estimated, it has not yet become available for MPlus’s WLSMV estimator.

The CFI and TLI are derived from a comparison of the hypothesised model with an independence model in which all observed indicators are uncorrelated (Byrne, 2001). Although a commonly reported, research by Cheung and Rensvold (2002) suggests that CFI and TLI are sensitive to models with more than three factors or of a hierarchical structure. Scores of .90 or above indicate acceptable fit, whilst scores of .95 or above indicate good fit (Hoyle, 1995).

Gamma hat ($\hat{\gamma}$), proposed by Steiger (1989), utilises the RMSEA value but adjusts for the number of manifest variables and degrees of freedom in a model. Research suggests that it is quite resistant to the effect of larger samples, more complex models, and model misspecification (Fan & Sivo, 2007; Hu & Bentler, 1999; Vandenberg & Lance, 2000). In this case, values greater than .90 are indicative of acceptable fit, whilst values of .95 or above are indicative of good fit (Byrne, 2001).

Another index commonly reported in studies concerning factors is the Cronbach’s alpha ($\alpha$) (Cronbach, 1951; Guttman, 1945). The index is often reported as a measure of an individual factor or principal component’s reliability or internal consistency (Starkweather, 2012). However, it has come under recent criticism based on its inability to account for measurement error, and assumption of equal item-factor loadings (Yang & Green, 2011).
Nevertheless, it is recognised that this is a commonly interpreted index, and it is therefore reported alongside factors in the current study.

When two models are non-nested, meaning that they incorporate different sets of observed variables, overall model fit is often compared by using the Akaike Information Criterion (AIC; Akaike, 1973) and the Bayesian information Criterion (BIC; Schwarz, 1978). However, these estimates are only available when using Maximum Likelihood (ML) estimation. When WLSMV is used, researchers are advised to use the $\chi^2/df$ ratio and associated $p$ value, SRMR, RMSEA, CFI, TLI, for the purpose of making a qualitative comparisons between non-nested models (Muthén, 2001). By extension, the gamma hat ($\hat{\gamma}$) fit index could also be used given its good performance under simulation (Fan & Sivo, 2007).

Therefore, from within a confirmatory framework, researchers are well advised to report and consider multiple-model fit indices including the $\chi^2/df$ ratio and associated $p$ value, SRMR, RMSEA, CFI, TLI, $\hat{\gamma}$ when considering model fit. In addition, based on their popularity, the WRMR fit statistic and Cronbach’s $\alpha$ values for factors’ construct validity are also reported throughout this study.

3.7.2 Building a structural model. When construct validity has been confirmed by multiple adequate model fit indices at the measurement model stage, researchers can move on to providing schematic understandings of data. In accordance with a theoretical framework, researchers must first specify a main dependent (endogenous) factor. Thereafter, the stepwise approach (Menard, 1995) involves determining the order in which the independent (exogenous) factors are introduced into the model. The order in which the plausible factors are introduced into the model can be based on the strength with which latent factors independently predict the main endogenous factor. This criteria provides for a more relevant assessment of the potential contribution of the exogenous factors as correlation coefficients do not represent causal relationships between variables. Therefore, the exposition of a
regression matrix, illustrating all possible individual dependent relationships between factors, provides a useful reference. In accordance with Menard (1995), theoretically plausible exogenous factors can be introduced step by step into the structural model. At each step, as long as factors maintain statistically significant and theoretically relevant contributions to the endogenous factor in the model ($p < .05$), they can maintain their position in the schematic.

Thereafter, in accordance with theory and a pre-established regression matrix, researchers can make use of SEM to specify further exogenous and mediating factors in the model for the purpose of illustrating further plausible schematic relationships. In addition, observed variables, not part of established factors, can also be introduced as formative MIMIC-derived structures, as long as they make theoretically relevant and statistically significant contributions to the model.

Consideration of the overall size of impact of contributing factors and observed variables can be made with reference to the $R$ squared value ($R^2$), which represents the proportion of variance explained in an endogenous factor by contributing factor(s) and/or observed variables. To interpret the scale with which the variance is explained, $R^2$ values can be converted to $f^2$ values via Equation 1 (Cohen, 1992).

$$f^2 = \frac{R^2}{1-R^2}$$

In accordance with Cohen (1992), $f^2$ values of 0.02 to 0.14 represent small effect sizes, whilst values of 0.15 to 0.34 represent medium effect sizes, and values of 0.35 and over represent large effect sizes. The calculation of effect sizes provides an appropriate gauge of the contribution of exogenous variables during the structural model-building process. Consideration for the size of the correlations between exogenous factors can also be made. In accordance with Cohen (1992), correlations between factors, identified by the Greek symbol,
phi (\(\phi\)), between (a) .10 and .29 can be considered small, (b) .30 and .49 can be considered medium, and (c) .50 and over can be considered large.

By following the two-step modelling approach, researchers can confirm the construct validity of the latent factors prior to proposing systematic causal relationships between them. To develop a structural model, the stepwise modelling approach can be employed by researchers to create a schematic understanding of plausible causal relationships between latent factors and observed variables. When done within a strong theoretical framework, alongside careful assessments of multiple fit indices and scales of impact (\(f^2\)), researchers can take advantages of the great potential of SEM for the explication of data and theory development.

### 3.8 Assessment of Measurement Invariance across Groups

The influence of participant demographic on measurement and structural models can also be estimated from within a confirmatory framework. The vast majority of theoretical models and procedures have been developed to test group invariance at the measurement model level, as opposed to the structural level (Mellenbergh, 1989; Meredith, 1993; Millsap & Yun-Tein, 2004; Smeden and Hessen, 2013). Consequently, it is common for researchers to assess measurement invariance at the measurement model level. An examination of measurement invariance (MI) involves a nested hierarchy of tests that constitute several levels of factorial equivalence across groups. The results of the tests provide a robust means of determining the level of defensible group comparisons within a proposed model. Generally, MI tests involve assessments of (a) configural, (b) metric, (c) scalar, and (d) structural invariance at the measurement model stage (Sass, 2011). The strict factorial invariance test, which assesses equivalence of error variance, is considered to be extremely stringent and unnecessary and is therefore not recommended here (Widaman & Reise, 1997). The configural, metric, and scalar, and structural tests of invariance will now be discussed.
Muthén and Muthén (2010) suggest that, prior to performing an assessment of configural invariance, an assessment of model fit should also be carried out separately on each respective group to ensure that model fit estimates for each group can be ascertained without issue. Thereafter, a test of configural invariance can be carried out. The configural invariance test functions as a baseline test and only assesses the extent to which the same pattern (or configuration) exists at the item/factor level across groups, thus no equality constraints are imposed (Byrne, 2012). In accordance with Cheung Rensvold (2002), configural invariance is met when RMSEA is equal to or less than 0.05 (RMSEA ≤ 0.05). Because no formal cross-group comparison of factor estimates is involved, no defensible and substantive quantitative group comparisons can be made at this level (Gregorich, 2006).

Assuming configural invariance is met, the metric invariance test assesses equivalence of factor loadings. Equivalence of factor loadings across groups can be asserted if the absolute change in CFI between groups, with respect to such paths, does not exceed .01 (|Δ| CFI ≤ .01) (Cheung & Rensvold, 2002). With the criteria for metric invariance met, defensible between group comparisons of factor variances and covariances can be made since the meaning of the factors is deemed to be equivalent between groups (Gregorich, 2006).

Assuming metric invariance, scalar invariance requires the constraint that the regression of items onto their associated factors yields a vector of intercepts that are equivalent between groups (Gregorich, 2006). In accordance with Cheung and Rensvold (2002), equivalence is evidenced by |Δ| CFI ≤ .01. Such evidence of scalar invariance suggests that comparison of group differences in estimated latent factor means is defensible (Gregorich, 2006).

Beyond scalar invariance, an overall test for overall structural invariance involves a further assessment of nested equivalence where structural coefficients are held equal across groups (Sass, 2011). Again, equivalence is evidenced by |Δ| CFI ≤ .01 (Sass). An assessment
of general structural equivalence across groups can be carried out at the measurement model level. However, given the theoretical importance attached to each value in the structural model, it is beneficial for researchers to assess the significance of the difference of individual structural values at the structural level. An assessment of the difference between individual structural differences across groups involves approximately half the number of participants and therefore reduces the power with which levels of statistical significance can be asserted. Therefore, although statistically significant results at the $p < .05$ may be reported in the results section, for the purpose of parsimony, researchers are well advised to only consider differences at the $p < .01$ when discussing results.

3.9 Comparison of Latent Factor Means across Groups

Where scalar invariance is met, differences in groups’ latent factor means can be evaluated at the measurement model level (Gregorich, 2006). Group differences among factors are often explored by the computation of observed factor scores in conjunction with $F$ tests in multivariate analysis of variance (MANOVA) in an attempt to ascertain main and interaction effects. However, MANOVA does not take measurement error into account, resulting in biased estimation and ineffective testing of latent factor mean differences across groups (Hancock, 2003). To accommodate this shortcoming, MultiGroup Confirmatory Factor Analysis (MG-CFA) affords two general methods of assessing the effect of a single grouping variable on latent factor means: (a) a MIMIC-derived approach (involving the use of a binary dummy causal indicator), and (b) a Structural Means Modelling approach (SMM). Although both methods account for measurement error, SMM makes a more comprehensive assessment of data and model parameters:

The data for MIMIC models are variances and covariances among measured variables; the model parameters include variances, covariances,
and path coefficients; and the adequacy of the model is assessed using traditional fit indices. In contrast, for SMM a multiple-group model is conducted on means in addition to variances and covariances among measured variables; the model includes intercept parameters as well as variance, covariances, and path coefficients; and the definition of fit must be expanded to permit the reproduction of sample means. (Thompson & Green, 2006, p. 124)

Furthermore, the MIMIC approach relies on the more strict and unrealistic assumption of equal $\Sigma$ matrices, which includes equivalence of structural and error variance, whereas SMM requires just scalar invariance (Thompson & Green, 2006). In addition, simulation research suggests that the SMM approach is more accurate than the MIMIC approach across a range of data conditions such as disparate sample size ratios of, for example, 240:160 and 300:100, making it a more practicable method to assess latent factor mean differences across groups (Hancock, Lawrence, & Nevitt, 2000). Given the results of this simulation study, researchers are well-advised to ensure that sample groups reach a minimum of 100. For example, both males and female groups would need to reach a minimum of 100 cases for a robust assessment of group equivalence of gender.

SMM provides an assessment of standardised latent factor mean differences and associated significance of such differences (two-tailed). To accomplish this, the latent means for one group are constrained to zero. This enables the estimation of the latent factor mean difference exhibited in the other group (Byrne, 2012). With this information, the strength of standardised latent factor mean differences can be assessed in accordance with Cohen’s $d$, as commonly understood through the interpretation of Equation 2.
Where $M_1 - M_2$ represents the standardised latent factor mean difference between the two groups of interest, and $SD$ represents the standard deviation (in this case, 1) across the entire sample. Hattie’s (2009) meta-analysis provides an empirical scale for assessing the strength of $d$ in educational settings. Hattie (2009) suggests a general acceptable band of average effect sizes ($d$) ranging between 0.20 and 0.40, with values above 0.40 identified as above average, and values above 0.60 identified as excellent. Based on this research, investigators are well advised to use the more simplified nomenclature to represent the size of latent factor mean differences: small, $0.20 \leq d < 0.40$; medium, $0.40 \leq d < 0.60$, and large $0.60 \leq d$. An assessment of latent factor means across groups involves approximately half the number of participants and therefore reduces the power with which levels of statistical significance can be asserted. Therefore, although small effect sizes may be reported in results sections, for the purpose of parsimony, researchers are well advised to only consider medium or large effect sizes when discussing results.

3.10 Assessment of Two-Way Interaction Effects on Latent Factor Means

Until recently, MG-CFA was restricted to one-way group comparison on latent factor means. However, Smeden and Hessen (2013) developed a way to test for two-way interaction effects on latent factor means at the measurement model level. Results from Smeden and Hessen’s (2013) simulation study show that their proposed MultiGroup Common Factor Model (MG-CFM) for determining two-way interaction effects significantly outperforms MANOVA (Smeden & Hessen, 2013). The study assessed the accuracy of MG-CFM to detect medium two-way interaction effects on a single latent variable. Using maximum likelihood estimation techniques, Smeden and Hessen proposed a new measure for the total latent variance explained by a two-way interaction, defined as the Greek symbol iota ($\delta$). In line with Cohen
(1988), \( t = 0.10 \) represented a small interaction effect, whilst \( t = 0.26 \) represented a medium interaction effect. Under simulation, the performance of the MG-CFM was determined by its ability to accurately detect interaction effects in generated population data. Under conditions of (a) groupwise scalar invariance, (b) factor loadings between .60 and .80, (c) four to eight indicator variables per factor, and (d) where medium effect sizes \( (t \geq 0.26) \) were detected with sampled subgroup sizes of 75, the accuracy of MG-CFM was between .961 and .996, which can be considered acceptable, comparable to a \( p < .05 \) level. However, under the same conditions described above, but with sample subgroup sizes of 50, the accuracy of MG-CFM dropped to between .851 and .945. Therefore, where researchers wish to determine two-way interaction effects on latent factor means with a general degree of accuracy, it is advisable to perform two-way interaction tests on latent factor means when all four associated subgroup numbers meet a minimum of 75 and only report medium and large effect sizes.

Where researchers are using WLSMV estimation in Mplus, D. Hessen has developed a means of assessing the magnitude and significance of interaction effects by providing appropriate Mplus code (personal communication, February 22, 2013). Use of such code enables researchers to ascertain the standard deviation and significance level \( (p) \) with which subgroup means veer from the sample as a whole (D. Hessen, personal communication, February 22, 2013). Where the deviation due to the interaction effect is significant beyond the \( p < .05 \) level, subgroup comparison, in terms of standardised latent factor mean differences between groups, can be easily calculated. Therefore, researchers can report interaction effects in terms of Cohen’s \( d \) in accordance with the recommendations for small, medium, and large Cohen’s \( d \) values explained in subsection 3.8. An assessment of two-way interaction effects involves much smaller numbers of participants in each group and therefore greatly reduces the power with which levels of statistical significance can be asserted. Therefore, although
medium effect sizes may be reported in results sections, for the purpose of parsimony, researchers are well advised to only consider large effect sizes when discussing results.

3.11 Post Hoc Assessment of Stability of Factor Solution

In the case of factor analysis, much has been written about suggested minimum sample sizes. Research conducted by Boomsma and Hoogland (2001) suggests that improper solutions reduce as $N$ increases, and that at $N = 400$, about 2% of solutions will be improper. Other authors recommend a sample to variable ratio ($N:p$ ratio), where $N$ refers to the total number of respondents in the sample, and $p$ refers to the number of observed variables. Rules of thumb for the $N:p$ ratio have ranged anywhere from 3:1 to 10:1 (Pett, Lackey, & Sullivan, 2003; Everitt, 1975, respectively). However, Hogarty et al. (2005) conducted studies to test the validity of these proposals and concluded that “there was not a minimum level of $N$ or $N:p$ ratio to achieve good factor recovery across conditions examined” (p. 222). In fact, the Hogarty et al. (2005) study suggested that samples of 100 may be sufficient to obtain accurate estimates of associated populations with three factors measured by three to four items each, and if communalities for each item are at least .70. The sum of the squared factor loadings for all factors for a given variable (i.e., row in an EFA solution) is the variance in that variable accounted for by all the factors, and this is the item’s communality (Hogarty et al., 2005). The Hogarty et al. (2005) study demonstrated that the sample size necessary to obtain accurate parameter estimates depends most on the size of the communalities. Of course, the size of item communalities of a factor solution can only be obtained post hoc. Therefore, where factor analysis is concerned, the estimated extent to which the sample size reflects its population can only be thoroughly assessed at a point sometime after the survey has been conducted. A discussion of how this post hoc assessment can be made in factor analytic studies will now be provided.
Hogarty et al.’s (2005) simulation study enables researchers to estimate the general accuracy of an EFA factor rotation to reflect its population. This can be achieved by comparing a researcher’s reported factor rotation to an equivalent rotation’s overall performance under simulation. Although Hogarty et al. (2005) propose a range of indices to assess sample EFA accuracy, the average coefficient of congruence ($\Phi_{K}$) appears most appropriate, given that it is easy to understand and can be understood as a type of correlation (K. Y. Hogarty, personal communication, July 1, 2013). The $\Phi_{K}$ index is a correlation-like index that describes the average relationship between the lambda coefficients ($\lambda$) in pattern matrices of sample solutions and those of generated population matrices. Equation 3 provides the formula for a single measure of congruence between a sample solution and its population.

$$\Phi_{K} = \frac{\sum_{j} \hat{\lambda}_{jk} \lambda_{jk}}{\sqrt{\sum_{j} \hat{\lambda}_{jk}^{2} \lambda_{jk}^{2}}}$$

The average coefficient of congruence ($\Phi_{K}$), however, combines all coefficients ($\Phi_{K}$) for a given rotation and reflects the overall general accuracy of the estimated values in a pattern matrix ($\hat{\lambda}$) of a sample rotation compared to true values in its population ($\lambda$).

An assessment of the ability of an EFA rotation to reflect its population can be carried out in the following way. First, parameters pertaining to the investigation’s EFA rotation must be ascertained. Thereafter, an equivalent solution can be found in the Hogarty et al.’s (2005, p. 220) study. As an example, the following parameters in a study’s EFA solution might be similarly expressed as: communalities ($h^{2}$) ranging between .20 and .80, three total factors, 10 total manifest variables, and a sample size of $N = 400$. Under simulation, with these sampling conditions the mean value of congruence ($\Phi_{K}$) is .97. An assessment of the level of congruence can be made in accordance with MacCullum, Widaman, Zhang, & Hong (1999) who suggest that .98 to 1.00 = excellent, .92 to .98 = good, .82 to .92 = borderline, .68
to .82 = poor, and less than .68 = terrible. Therefore, it is reasonable to expect that such an EFA solution with similar parameters may provide for a similar good level of congruence.

For the purposes of estimating the generalisability of the results of a factor solution to target populations then, researchers are well advised to carry out a post hoc assessment of the characteristics of their factor solutions in accordance with the methods presented above.

3.12 Data Preparation

The sophistication and power of modern correlational and causal analyses such as factor analysis and SEM depend largely on the quality of data being used. Dealing in real-world contexts, participants may not be well engaged or perhaps provide disingenuous responses (Brown & Farruggia, 2012). No matter how sophisticated the analytical technique, if the quality of the data is “garbage”, then the resultant findings are also likely to be “garbage”; as the old adage goes, “garbage in, garbage out” (Babbage, 1864). Therefore, prior to performing any multivariate data analysis, researchers should be careful to ensure the quality of their datasets in the context of factor analytic studies involving ordinal and continuous observed variables. This involves (a) data cleaning, (b) dealing with non-normality, (c) procedures to create scale consistency, (d) missing value analysis and imputation, (e) restoring whole numbers for univariate reporting, and (f) an assessment of and adjustment for a lack of ordinal response categories. The following subsections describe each of these in turn.

3.12.1 Data cleaning. As a first step, researchers can clean their initial dataset by (a) checking for respondent eligibility, (b) contacting respondents who miss questions items, and (c) identifying and adjusting for anomalous responses.

3.12.1.1 Checking for respondent eligibility. In terms of eligibility, it may be the case that respondents misinterpret the criteria necessary to complete the survey. Researchers are therefore well advised to clearly stipulate the demographic, or other, requirements for participants to take part. Researchers should also carefully check the responses and omit
ineligible cases if necessary. An assessment of respondent eligibility should also involve checking for respondents who miss a large number of responses, or repeat the survey perhaps in the hope of receiving some type of monetary benefit. In this instance, responses to the second set of questions would have to be removed.

3.12.1.2 Contacting respondents who miss question items. If a respondent has missed questions, researchers should endeavour to contact the respondent directly to obtain an authentic value. This is feasible when respondents are asked to provide a contact email address. By emailing respondents directly, researchers can easily and efficiently improve the authenticity of their datasets. Such procedures should take priority over imputation techniques for the purpose of dealing with missing values. A discussion concerning the multiple imputation is provided in subsection 3.12.5.

3.12.1.3 Identifying and adjusting for anomalous responses. Researchers are well advised to identify and adjust for anomalous responses. To do this, the researcher should first carefully consider the logical, statistical, and theoretical limits associated with any given question and make adjustments where necessary. Thereafter, an assessment of item repeatedness, percentage of missing values, and patterned responses ultimately helps ensure the validity of each case in a dataset prior to analysis.

Logical limits are associated with questions where there is a clear reasoned limit. For example, if a respondent is asked how much time, on average, they watch TV per day, the response could not logically exceed 18 hours. It is reasonable to think a person needs at least six hours sleep per day. Logical limits also pertain to questions of duration. If a respondent is asked how many years they have used the Internet, the response could not logically exceed 55 years, given the earliest derivation of the Internet was invented in the mid-1960s. In addition, series of questions provide inherent logical limits. If a respondent is asked, how many bathrooms they have in their house, a response of 3 might be given. If the same respondent is
then asked how many of those bathrooms include a bathtub, the answer could not logically exceed 3.

Feasible limits, on the other hand, pertain to open questions. Where responses are open, outliers can be identified as values lying more than three standard deviations above or below the mean (Brown & Furruggia, 2012). For example, if a respondent purports to have membership in 80 clubs and associations, while his colleagues report a mean of 10 ($SD = 20$), it is reasonable to “Winsorise” (Tukey, 1962) the extreme value to three standard deviations above the mean. This would entail changing the value of 80 to 70 in the dataset before any meaningful data analysis takes place. However, it may be that after normalisation procedures (see subsection 3.12.3), the continuous variable in question may exhibit acceptable levels of skewness and kurtosis and therefore be well suited to forms of analysis, such as that involved with the WLSMV estimation. Where confirmatory methods are concerned, Curran, West, and Finch (1996) suggest moderate normality thresholds of 2.0 and 7.0 for skewness and kurtosis, respectively. Nevertheless, where normalisation of continuous variables is conducted as part of data preparation, an assessment of the feasibility of the reported values is paramount. Where raw values are feasible and don’t represent an extreme deviation from other values of the variable, researchers are well advised to maintain such raw values prior to normalisation procedures.

Adjusting for anomalous responses also involves checking for the repeatedness of item responses, percentage of missing values, and patterned responses. Walton (2008) deleted approximately 3% of respondents who gave the same response to 75% of the survey questions. However, an assessment of the permissible limit in any study will depend on the nature of the questions. If questions are highly related to each other, as in those intended to form a factor, higher degrees of repeatedness become more acceptable. Therefore, researchers are advised to consider the likelihood of repetitions in their surveys when considering
permissible levels of repeatedness. In addition, total percentage of missing values for each case should also be assessed. Ideally, the percentage of missing values in the set of responses from any case should be small. Brown and Furruggia (2012) suggest that cases be removed that exhibit more than 10% missing values, on the assumption that so much missing data is not likely to be missing at random. Finally, patterned responses that form the shape of zigzagged or other shapes in datasets should also be assessed (Brown & Furruggia, 2012). A look at the entire dataset in tabular form will enable such an assessment.

Ultimately, the threat of anomalous responses varies according to the research context and battery of questions. Therefore, researchers are well advised to introduce a tailored systematic approach to casewise deletion. A systematic approach to identify and adjust for anomalous responses should involve (a) the establishment of logical, statistical, and theoretical limits alongside thresholds for repeated missing and patterned responses, (b) the allocation of an appropriate demerit point associated with each level of threat (e.g., 0 = negligible, 1 = moderate, 2 = high), (c) the tallying of demerit points casewise, (d) the setting of a permissible total demerit threshold, and (e) the deletion of cases that exceed that threshold.

3.12.1.4 Maximising responses for levels of analysis. Brown and Furruggia (2012) suggest it may be beneficial for researchers to delete participants only for sections where their response is missing or irrelevant. This means that if a respondent happens to miss or provide an irrelevant response to a dependent item in a survey, but provides useful responses to all independently assessed items, they should be included in the analysis and reporting of independent variables. This principle can be extended to studies that involve several measurement models and a structural model. In this case, it may be that measurement models utilise more cases than their associated structural model.
3.12.2 Dealing with non-normality of continuous items. After adjusting for threats to the validity of a dataset, researchers are well advised to carry out an assessment of the normality of continuous variables. This assessment is important because continuous items that exhibit similar levels of skewness and kurtosis are more likely to form artificially high correlations and therefore distort consequent analysis (Bandalos & Finney, 2010). Therefore, multivariate normality has important implications for both missing values analysis (MVA) and factor analytic procedures. In the context of MVA, deviation from non-normality results in a loss of efficiency across various methods of data imputation, including the expectation maximisation algorithm (EM) (Graham, Hofer, & MacKinnon, 1996). Therefore, in order to improve the efficiency of the EM procedure, data normalisation procedures should be adopted. Where categorical data is concerned, issues of non-normality (or floor and ceiling effects) are less relevant as WLSMV estimator (Muthén & Muthén, 2010) is designed to deal with non-normal categorical data. However, although the WLSMV estimator can incorporate ordinal and continuous variables in the same analysis, it is not robust to non-normal continuous variables (Muthén, 2013). Therefore, it is also in the interest of researchers to normalise continuous variables prior to performing factor analyses with the WLSMV estimator.

Although researchers may be familiar with traditional power transformations, such as such as square root, log, and inverse, for improving normality, the Box-Cox transformation (Box & Cox, 1964) represents the best practice where normalisation of continuous data is concerned (Osborne, 2010). The Box-Cox transformation first involves an assessment of a variable to find the optimal power transformation (lambda, λopt). This can be carried out in accordance with online software produced by Wessa (2013). Once the optimal exponent has been identified, it can be applied to each value of a given variable. The exponentiation, applied to each value of the continuous variable, enables the resultant variable to approach
normality (Osborne, 2010). The formula for applying the Box-Cox transformation is given in Equation 4.

\[(x + c)^{\lambda_{\text{opt}}} = x\]  \hspace{1cm} (4)

In Equation 4, \(x\) = the value on the original non-normal scale, \(c\) = the constant to anchor lowest value of the variable (\(x_1\)) at 1.00 (could be positive or negative), \(\lambda_{\text{opt}}\) = the optimal lambda power transformation, and \(x\) = value on resultant normalised scale. A constant is applied to anchor \(x_1\) at 1.00 as the efficacy of some transformations are severely degraded as the minimum deviates above or below 1.00 (Osborne, 2010). The constant can be obtained mathematically by \(c = 1 - x_1\).

Thus, prior to performing MVA and factor analytic procedures, the normalisation of continuous variables by way of the Box-Cox transformation represents a potential best practice for researchers.

3.12.3 Procedures to create scale consistency. Research suggests that inconsistency of scales has an adverse effect on covariate analysis (Kim & Mueller, 1978). Therefore, researchers are well advised to adjust inconsistent scales so that all scales in a given dataset fall within the same or similar range. For example, a raw dataset may include mostly five-point ordinal scales and several open-ended scales of various ranges. Adjustments to items, such as power transformations, may further accentuate the disparity between five-point ordinal scales and continuous scales. In this example, ideally continuous scales should be adjusted so that they fall within the 1.00 to 5.00 range, in line with the ordinal variables in the battery. To adjust such scales, Equation 5 may be applied.

\[\left[\left(x - x_1\right)\left(4 \times \frac{x}{x_n - x_1}\right)\right] + 1 = x_{1.5}\]  \hspace{1cm} (5)
In Equation 5, $x = \text{the normalised value to be rescaled}, x_1 = \text{the sample minimum of that scale}, x_n = \text{the sample maximum of that scale}, x_{1.5} = \text{the normalised value on a 1.00 to 5.00 scale},$ and the value, 4, is used in the equation as it is the range of the required resultant $x_{1.5}$ scale. The alignment of all scales in a dataset is advised as this ensures optimal results will be achieved in subsequent analytic procedures.

3.12.4 Missing value analysis and imputation. Assuming that a planned missing data design (Graham, Taylor, & Cumsille, 2001) was not implemented, an initial dataset will almost always contain missing values. One way to deal with missing data is to delete cases listwise that miss any number of responses to a battery of questions. However this could be costly if such a procedure substantially reduces the sample size. In the event of occasional random missing data, multiple imputation (MI) can be used to estimate the most likely value a respondent might have given had they answered every item.

One approach to multiple imputation is to carryout separate random data tests and imputation procedures on sets of variables that are relatively highly correlated to each other (Graham, 2009). Graham (2009) explains that this approach will “generally help the analysis to have less bias and more power” (p. 565). Graham notes that the splitting of the dataset need not be complicated, and that a general assessment of the intercorrelations in thematic sets of questions could be useful in determining the split.

A useful method of determining intercorrelations between sets of ordinal and continuous variables involves using the Pearson, polychoric, and polyserial correlation coefficients in one analysis, where (a) Pearson correlations represent relationships between continuous variables, (b) polychoric correlations represent relationships between ordinal variables, and (c) polyserial correlations represent relationships between ordinal and continuous variables. An analysis of this type can be referred to as a heterogeneous analysis.
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(Courtney, 2013) and is more applicable in research contexts where it is assumed that the observed ordinal data stem from an underlying latent continuous variable (see subsection 4.6). Two estimation methods are available for the estimation of heterogeneous correlations: ML and the two-step estimator (see instructions by Courtney, 2013). Because ML is computationally demanding and research suggests negligible differences between these two estimation methods (Olsson, 1979), two-step estimation is a good choice. In addition, at this point in the analysis, for the purpose of maximising the power of correlational estimates, pairwise estimation is a good choice. Therefore, pairwise heterogeneous correlational analysis (two-step) between all variables of interest provides an appropriate method to identify sets of variables that are highly correlated with each other, and thus increase the power of imputation procedures.

In order to meet the assumption of random missing data, Little’s (1988) Missing Completely at Random test (MCAR) can be utilised (Graham, 2009). Where $p$ values associated with this test are over .05, the assumption of random missing data is met (Little, 1988). Thereafter, the use of the MI approach for continuous data, and categorical data (combined with rounding of imputed values), appears robust (Finch, 2010). Of the various forms of MI, the use of the Expectation Maximisation algorithm (EM) appears to perform well (Dempster, Laird, & Ruben, 1977). The EM algorithm is an iterative procedure that produces the ML estimates for the missing values. Graham (2009) explains that the method “reads in the raw data, with missing values, and reads out a maximum likelihood variance-covariance matrix and vector of means” (p. 555). Graham goes on to explain that “the best guess [for the missing values] is based on regression-based single imputation with all other variables in the model used as predictors” (p. 555). Therefore, EM is a powerful method of imputation because it makes the assumption that the sample mean, standard deviation, and
 covariance matrix are the best indicators of the population values and so seeks to impute missing values that maintain these already established parameters in the dataset.

However, it is mathematically possible for MI procedures to legitimately impute extreme values, such as 0.85 and 5.12, that exceed an original 1 to 5 ordinal scale. By performing MI before factor analysis, it is possible to check for logically impossible values and round appropriately to ensure that the imputed values are consistent with the design of the rating scales. This may also include the rounding of imputed values such as 1.50 to 2, on a 1-5 ordinal response scale. The rounding of such imputations is necessary if the factor analytic estimator is WLSMV, which is designed to deal with complete ordinal values. It is also advantageous for researchers to deal with missing values prior to performing factor analysis as model fit output, in some software applications (e.g., AMOS, Mplus), will also, where possible, include the SRMR of model fit, which is quite robust to the impact of large sample sizes, complex models, and model misspecification (Fan & Sivo, 2007).

Finally, it may be the case that missing values are imputed for responses that do not necessarily need to be imputed. For example, in an assessment of familial ties, a respondent might be asked how often they meet with brothers and sisters per year. If the respondent was already identified as a single child, his or her missing response to the item would be an appropriate response and should be treated as missing. In the event that such a value is imputed to replace the supposed missing value, it should be removed, and the response treated as missing. Unfortunately online survey applications do not always provide functionality to deal with such situations.

Therefore, the use of MVA and MI techniques, such as EM, provide a robust way of dealing with missing data where planned missing data designs are not implemented. In addition, appropriate rounding of imputed values and careful consideration for the relevance of such values provide a robust approach to preparing data for subsequent factor analysis.
3.12.5 **Restoring whole numbers for univariate reporting.** Power transformations, such as the Box-Cox transformation, and rescaling techniques, such as those demonstrated in subsections 3.11.2, and 3.11.3, provide optimum conditions for the imputation of missing values. Such procedures increase the validity of the imputed values and the validity of its associated variable. It is common practice for researchers to report overall univariate statistics, such as a $M$ and $SD$ of any given scale. To report such statistics in their entirety, imputed values of transformed rescaled variables must be restored to their original whole number to be consistent with the other original values. Equations 6 and 7 provide a sequential course for such a restoration: Equation 6 provides course for the restoration of the value prior to scale transformation, whilst Equation 7 provides subsequent restoration of the value to its original whole number prior to the Box-Cox transformation.

\[
\left(\frac{\hat{x}_{1.5} - 1}{4}\right) = \hat{x} \tag{6}
\]

\[
\left[\hat{x}^{\frac{1}{\lambda_{opt}}}\right] - c = \hat{x} \tag{7}
\]

In Equations 6 and 7, $\hat{x}_{1.5}$ = the imputed variable on normalised 1-5 scale, $\hat{x}$ = the imputed variable on a normalised scale (not 1-5 scale), $\lambda_{opt}$ = the original optimal lambda power transformation for that variable, $c$ = the original constant to anchor $x_1$ at 1.00, and $\hat{x}$ = the imputed variable of the original non-normalised scale.

The preparatory procedures pertaining to data cleaning, normalisation, scale consistency, and missing value imputation are beneficial to researchers about to embark on factor analytic techniques, while the application of Equations 6 and 7 to such transformed
3.12.6 Assessment of and adjustment for a lack of ordinal response categories.

Researchers interested in assessing group differences from within a confirmatory framework may want to carry out assessments of measurement invariance and latent factor mean differences, among other procedures. In this case, researchers must be careful to assess and make adjustments for a lack of ordinal responses for specific questions by specific groups. An initial assessment might involve descriptive analysis of all ordinal response values in the entire dataset. This will help determine items with low levels of response categories prior to groupwise analyses. Pertaining to a groupwise assessment of a lack of ordinal response categories, it may be the case that no females in the sample chose response option 1 on a five-point question item. If this were the case, several adjustments would need to be made to ensure equivalence of data across groups, necessary for WLSMV estimation (Muthén, 2009d). Female response values of 2, 3, 4, and 5, would need to be recoded to 1, 2, 3, and 4, respectively. In addition, male response values of 2, 3, 4, and 5 would need to be recoded as 1, 2, 3, and 4, respectively. Such adjustments, conducted to ensure data equivalence across groups, are an essential part of the data preparatory procedures for researchers about to embark on an assessment of group differences within a confirmatory framework with WLSMV estimation (Muthén, 2009d). For the purpose of maintaining the integrity of data, researchers should make such adjustments only insofar as adjustments enable tests of equivalence across specific groups. For example, if a researcher is concerned with assessing group differences in terms of (a) male versus female, and (b) undergraduate versus graduate students, two additional datasets, modified only insofar as necessary, should be created.

Where an assessment of data equivalence concerns subgroups, as in the examination of two-way interaction effects on latent factor means (see subsection 3.10), data equivalence
would need to be ascertained across all four subgroups. After determining the minimum required subgroup size (see subsection 3.10), researchers would then need to determine which sets of subgroups meet the minimal criteria. Thereafter, an assessment of and adjustment for a lack of ordinal response variables across all four subgroups would need to be carried out. Where researchers are concerned with multiple assessments of group and subgroup differences, a number of minimally modified supplementary datasets may need to be generated.

3.13 Describing Populations of Interest

It is important that researchers describe the makeup of their sample in sufficient detail so that readers can determine the extent to which the results might generalise to populations of interest to the reader. If the sample’s demographic profile is fairly similar to the population’s, then generalisations are more tenable. Generally, this is done by comparing sample to population data. Where sample versus population data is concerned with proportions of a population, for example males versus females, researchers can ascertain the effect of sampling through the two-by-two χ² ratio test (Quantitative Skills, 2013). This test can be extended to assess effect of sampling of demographic data such as country of origin. For example, an assessment of the representativeness of New Zealand Maori in a survey of New Zealanders would involve ascertaining sample Maori and non-Maori n values, and population Maori and non-Maori N values to assess the effect of sampling. In this case, a statistically significant effect of sampling is evidenced when the results of χ² ratio test are significant at $p < .05$.

Where sample versus population data is concerned with means and standard deviations, and where sample n and population N are known, the one-way analysis of variance (ANOVA) from summary data (Puzzullo, 2013) is a powerful means of assessing
the effect of sampling. In this case, a statistically significant effect of sampling is evidenced when the associated \( F \) value of the ANOVA test is significant at \( p < .05 \).

Sometimes, however, population data is reported in terms of grouped frequency distribution. In order to overcome this issue, estimated population means (\( \bar{M} \)) and standard deviations (\( \bar{SD} \)) can be ascertained from grouped frequency distributions by way of Equations 8 and 9 (Mathematics Learning Center, n.d.),

\[
\bar{M} = \frac{\sum fx}{\sum f} \quad (8)
\]

\[
\bar{SD} = \sqrt{\frac{\sum f x^2 - (\sum fx)^2}{\sum f}} \quad (9)
\]

In Equations 8 and 9, \( x \) values are all equal to the midpoint of their respective intervals. In Equation 2, \( \sum fx \) represents the sum of all frequencies of \( x \) values. Once estimated sample and population means and standard deviations are ascertained, the effect of sampling can be estimated by techniques such as a one-way ANOVA from summary data (Pezzullo, 2013).

3.14 Summary

Research presented here is non-experimental and attempts to answer non-causal and causal questions based on non-experimental data. The techniques employed to answer non-causal questions include EFA and CFA procedures, respectively. Techniques employed to answer causal questions rely predominantly on SEM. Sophisticated assessments of data equivalence are also utilised to assess differences among groups of interest. In an attempt to prevent confusion among international students, the survey instrument employs postively worded question items only. Based on prior research, the response format for ordinal items employs balanced five-point agreement and frequency response formats where appropriate. The current investigation employs the Web-RDS sampling method in an attempt to approximate
random sampling. However, ultimately, the extent to which the sample represents its population is determined by a comparison of sample and population demographics, and the nature of the sample factor solution and its estimated mean level of congruence. Finally, careful data preparatory procedures are employed to clean, scale, impute missing values, and prepare the dataset for factor analytic procedures. In accordance with the methodological principles outlined in this chapter, all procedures carried out in the current investigation are presented in the following chapter.
CHAPTER 4. PROCEDURES

The procedures applied in the current investigation were carried out in accordance with the arguments presented in the methodology chapter. This chapter first presents the participants in the current study, the instrumentation and adaption of inventories, the pilot and main study, data preparation, and the procedures used to describe FB-related and institutional integration items. Thereafter, procedures pertaining to the use of factor analysis are presented. This includes exploratory procedures, two-step modelling procedures, assessment of measurement invariance, assessment of latent factor means differences, assessment of interaction effects, assessment of group differences in individual structural relations, post hoc assessment of stability of factor solutions. The chapter concludes by discussing the ethical considerations relevant to the current investigation.

4.1 Participants

The main study involved a sample of 491 full-time degree-seeking international student participants. All respondents were studying at universities in their second semester throughout Australasia in late 2011. Of the 491 respondents, 218 (44.4%) were studying at New Zealand universities while a further 273 (55.6%) were studying at Australian universities. The 491 participants represented 0.19% of the total eligible population of 255,035 students across Australasia. (A total 20,723 students from New Zealand according to Education Counts, 2011b; a total 234,312 students from Australia according to DEEWR, 2011). As demonstrated in subsection 3.3.1, if random sampling had been employed, the sample of 491 would have provided a univariate margin of error of 4.42% (Raosoft, 2013). However, because the Web-RDS method is not random, an adjustment needed to be made. In accordance with Rasoft (2013), at the acceptable margin of error of 5%, and a total estimated population of 255,035, the minimum required sample size was estimated at 384. In accordance with subsection 3.3.2, this figure was doubled (to 768) to account for Web-RDS
sampling. Therefore, the sample of 491 participants accounted for 63.9% of the adjusted minimum required sample size. This was the result of financial restrictions associated with data collection and should be considered a limitation of the study. Nonetheless, the sample size is still large enough for the statistical analyses carried out which would normally require samples of 400 or more.

In accordance with subsection 3.13, an assessment of the effect of sampling was undertaken. In terms of gender (see Table 9), there was a statistically significant effect of sampling, with more females being represented in the sample compared to the population (DEEWR, 2011; Education Counts, 2011b).
Table 9

New Zealand and Australian Samples by Gender and Age

<table>
<thead>
<tr>
<th></th>
<th>New Zealand</th>
<th>Australia</th>
<th>Total</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sample</td>
<td>Population</td>
<td>Sample</td>
<td>Population</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>142</td>
<td>20,622</td>
<td>182</td>
<td>117,563</td>
</tr>
<tr>
<td>Male</td>
<td>76</td>
<td>25,016</td>
<td>91</td>
<td>116,749</td>
</tr>
<tr>
<td>Total</td>
<td>218</td>
<td>45,638</td>
<td>273</td>
<td>234,312</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>M</td>
<td>SD</td>
<td>n</td>
</tr>
<tr>
<td>Age</td>
<td>218</td>
<td>23.44</td>
<td>4.73</td>
<td>45,638</td>
</tr>
</tbody>
</table>

*Note.* New Zealand population gender data based on all tertiary level international student enrolments; Australian population gender estimates based on university level international student enrolments; New Zealand population age estimates pertain to all tertiary level enrolments; values in bold pertain to effect of sampling calculations; Demo. = Demographic; \( \bar{M} \) = estimated population mean calculated in accordance with Equation 8; \( \bar{SD} \) = estimated population standard deviation calculated in accordance with Equation 9; cells with an em dash (—) indicate that data is not available; ***\( p < .001 \).
In terms of the age of the New Zealand participants (see Table 9; Australian population age data not available), there was a statistically significant effect of sampling with relatively more younger students being represented in the sample compared to the population (Education Counts, 2011b). In terms of region of origin (see Table 10), there was a statistically significant effect of sampling for three groups: whilst Asian students were over-represented by the sample, Middle Eastern and African students were under-represented.
### Table 10

**New Zealand and Australian Samples by Region of Origin and Level of Study**

| Region of Origin | New Zealand Sample | | | Australia Sample | | | Total Sample | | | Effect |
|------------------|-------------------|---|---|------------------|---|---|-------------------|---|---|
|                  | $n$ | % | $N$ | % | $n$ | % | $N$ | % | $n$ | % | $N$ | % | $\chi^2(1)$ |
| Asia             | 193 | 88.5 | 12,803 | 61.8 | 233 | 81.43 | 260,714 | 81.4 | 426 | 86.7 | 273,517 | 80.2 | 13.16*** |
| Middle East      | 10 | 4.6 | 1,137 | 5.5 | 1 | 4.12 | 13,176 | 4.1 | 11 | 2.2 | 14,313 | 4.2 | 4.68*** |
| North America    | 6 | 2.8 | 2,908 | 14.0 | 10 | 3.75 | 12,011 | 3.8 | 16 | 3.3 | 14,919 | 4.4 | 1.47 |
| Africa           | 4 | 1.8 | 272 | 1.3 | 3 | 3.94 | 12,618 | 3.9 | 7 | 1.4 | 12,890 | 3.8 | 7.49*** |
| Europe           | 4 | 1.8 | 2,686 | 13.0 | 22 | 4.86 | 15,554 | 4.9 | 26 | 5.3 | 18,240 | 5.4 | .00 |
| Central and South America | 1 | 0.5 | 365 | 1.8 | 3 | 1.28 | 4,102 | 1.3 | 4 | .8 | 4,467 | 1.3 | 0.95 |
| Pacific          | 0 | 0 | 552 | 2.7 | 1 | 0.62 | 1,982 | 0.6 | 1 | .2 | 2,534 | .7 | 1.94 |
| **Total**        | 218 | 100 | 20,723 | 100 | 273 | 100 | 320,157 | 100 | **491** | 100 | **340,880** | 100 |

| Level of Study   | New Zealand Sample | | | | Australia Sample | | | Total Sample | | | **Effect** |
|------------------|-------------------|---|---|------------------|---|---|-------------------|---|---|
|                  | $n$ | % | $N$ | % | $n$ | % | $N$ | % | $n$ | % | $N$ | % | $\chi^2(1)$ |
| Undergraduate    | 175 | 80.7 | 12,823 | 61.9 | 234 | 85.7 | 183,057 | 61.4 | **409** | 83.5 | **195,880** | 61.0 | **100.48*** |
| Graduate/Postgraduate | 42 | 19.4 | 7900 | 38.1 | 39 | 14.3 | 115,182 | 38.6 | 81 | 16.5 | 123,082 | 39.0 | |
| **Total**        | 217 | 100 | 20,723 | 100 | 273 | 100 | 298,239 | 100 | **490** | 100 | **318,962** | 100 |

**Note.** New Zealand population region-of-origin data based on university level enrolments; Australian region-of-origin data based on all international tertiary enrolments; values in bold pertain to effect of sampling calculations; one New Zealand participant did not report level of study, hence $n = 217$ (not 218); *$p < .05$, **$p < .01$ ***$p < .001$. 

\[ \chi^2(1) \]
However, there was no statistically significant effect of sampling for participants from Central and South America, Europe, North America, and the Pacific (totals from DEEWR, 2011; Education Counts, 2011c). A full breakdown of the students by country of origin and Confucian- and Islamic influence is available in Appendix B. There was a statistically significant effect of sampling in terms of level of study (see Table 10), with undergraduates over-represented in the sample compared to the population (DEEWR, 2011; Education Counts, 2011c). Of the 409 undergraduates, first- \( (n = 132) \), second- \( (n = 141) \), and third- \( (n = 113) \) year students were quite equally represented, whereas fourth and fifth year undergraduates \( (n = 23) \) made up a smaller proportion of the sample (see Table 11).
## Table 11

**New Zealand and Australian Sample by Undergraduate Year and Residency**

<table>
<thead>
<tr>
<th>Undergraduate Year</th>
<th>New Zealand Sample</th>
<th>Australian Sample</th>
<th>Total Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>First</td>
<td>67</td>
<td>38.3</td>
<td>65</td>
</tr>
<tr>
<td>Second</td>
<td>48</td>
<td>27.4</td>
<td>93</td>
</tr>
<tr>
<td>Third</td>
<td>51</td>
<td>29.1</td>
<td>62</td>
</tr>
<tr>
<td>Fourth</td>
<td>7</td>
<td>4</td>
<td>12</td>
</tr>
<tr>
<td>Fifth</td>
<td>2</td>
<td>1.1</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>175</td>
<td>100</td>
<td>234</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Residence (specific)</th>
<th>New Zealand Sample</th>
<th>Australian Sample</th>
<th>Total Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off-Campus Housing (shared)</td>
<td>97</td>
<td>44.7</td>
<td>156</td>
</tr>
<tr>
<td>University Dormitory/Flat</td>
<td>78</td>
<td>35.9</td>
<td>53</td>
</tr>
<tr>
<td>Off-Campus Housing (single)</td>
<td>22</td>
<td>10.1</td>
<td>32</td>
</tr>
<tr>
<td>Other</td>
<td>16</td>
<td>7.4</td>
<td>17</td>
</tr>
<tr>
<td>Homestay</td>
<td>4</td>
<td>1.8</td>
<td>14</td>
</tr>
<tr>
<td>Total</td>
<td>217</td>
<td>100</td>
<td>272</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Residence</th>
<th>New Zealand Sample</th>
<th>Australian Sample</th>
<th>Total Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Residing at University</td>
<td>78</td>
<td>35.9</td>
<td>53</td>
</tr>
<tr>
<td>Total not Residing at University</td>
<td>139</td>
<td>64.1</td>
<td>219</td>
</tr>
<tr>
<td>Total</td>
<td>217</td>
<td>100</td>
<td>272</td>
</tr>
</tbody>
</table>

*Note.* Students who selected “other” were classified as residing off-campus; one participant from New Zealand and one from Australia did not report residency, hence $N = 489$. 
Just over a quarter of the sample resided at university, whilst the most form of residency was shared off-campus housing (see Table 11). Table 12 presents the sample participants classified in terms of Confucian- and Islamic-influenced country of origin.

Table 12

<table>
<thead>
<tr>
<th>Country</th>
<th>New Zealand</th>
<th>Australia</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>Confucian Influenced Countries</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>China</td>
<td>8</td>
<td>25</td>
<td>46</td>
</tr>
<tr>
<td>Singapore</td>
<td>6</td>
<td>18.8</td>
<td>41</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>4</td>
<td>12.5</td>
<td>17</td>
</tr>
<tr>
<td>South Korea</td>
<td>7</td>
<td>21.9</td>
<td>6</td>
</tr>
<tr>
<td>Japan</td>
<td>0</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>Vietnam</td>
<td>2</td>
<td>6.3</td>
<td>6</td>
</tr>
<tr>
<td>Taiwan</td>
<td>5</td>
<td>15.6</td>
<td>1</td>
</tr>
<tr>
<td>Macau</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>32</td>
<td>100</td>
<td>126</td>
</tr>
<tr>
<td>Islamic Influenced Countries</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Malaysia</td>
<td>123</td>
<td>91.3</td>
<td>53</td>
</tr>
<tr>
<td>Indonesia</td>
<td>1</td>
<td>.7</td>
<td>30</td>
</tr>
<tr>
<td>Brunei</td>
<td>7</td>
<td>5.1</td>
<td>0</td>
</tr>
<tr>
<td>Saudi Arabia</td>
<td>2</td>
<td>1.4</td>
<td>0</td>
</tr>
<tr>
<td>Maldives</td>
<td>1</td>
<td>.7</td>
<td>0</td>
</tr>
<tr>
<td>Turkey</td>
<td>1</td>
<td>.7</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>135¹</td>
<td>100</td>
<td>83</td>
</tr>
</tbody>
</table>

Of the 158 students from the Confucian-influenced countries, most originated from China. Of the 221 students from the Muslim-majority countries, most originated from Malaysia (see Table 12). Countries were identified as Confucian-influenced based on work by Nguyen, Griffin, and Nguyen (2006), whilst countries identified as Islamic-influenced were those recognised as having a more than 50% Muslim population (Pew Research Center, 2011). Therefore, readers should be aware that the link between country of origin and Islamic- and Confucian-influence is a statistical assumption and not based on direct responses to such questions by students. In addition, it should also be noted that religiosity varies across and within countries (Pew Research Center, 2008) and levels of religiosity was also not measured.

It should also be noted that, of the total 135 Islamic-influenced students in New
Zealand, 55 were Malaysian scholarship students from the University of Auckland. Therefore, subsection 5.4.4 provides an assessment of sample bias for findings pertaining to that group.

New Zealand sample participants were drawn from a total of nine university campuses (representing a total seven universities), whilst Australian sample participants were drawn from a total of 18 university campuses (representing a total 16 universities) (see Table 13).

Table 13

Participants by University, Campus, Visits, and Completed Surveys

<table>
<thead>
<tr>
<th>University</th>
<th>Campus</th>
<th>Visits</th>
<th>Completed</th>
<th>Completion Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Zealand</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The University of Auckland</td>
<td>City Campus</td>
<td>336</td>
<td>90</td>
<td>26.8</td>
</tr>
<tr>
<td>Massey University</td>
<td>Palmerston North</td>
<td>130</td>
<td>45</td>
<td>34.6</td>
</tr>
<tr>
<td>Otago University</td>
<td>Dunedin</td>
<td>121</td>
<td>44</td>
<td>36.4</td>
</tr>
<tr>
<td>Canterbury University</td>
<td>Christchurch</td>
<td>107</td>
<td>33</td>
<td>30.8</td>
</tr>
<tr>
<td>Massey University</td>
<td>Albany</td>
<td>27</td>
<td>3</td>
<td>11.1</td>
</tr>
<tr>
<td>Auckland University of Technology</td>
<td>City Campus</td>
<td>28</td>
<td>2</td>
<td>7.1</td>
</tr>
<tr>
<td>Lincoln University</td>
<td>Lincoln</td>
<td>17</td>
<td>1</td>
<td>5.9</td>
</tr>
<tr>
<td>Massey University</td>
<td>Wellington</td>
<td>3</td>
<td>1</td>
<td>33.3</td>
</tr>
<tr>
<td>Victoria University of Wellington</td>
<td>Kelburn</td>
<td>11</td>
<td>1</td>
<td>9.1</td>
</tr>
<tr>
<td>The University of Waikato</td>
<td>Hamilton</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Australia</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>University of Melbourne</td>
<td>Parkville</td>
<td>109</td>
<td>56</td>
<td>51.4</td>
</tr>
<tr>
<td>University of Queensland</td>
<td>St. Lucia</td>
<td>171</td>
<td>54</td>
<td>31.6</td>
</tr>
<tr>
<td>Australian National University</td>
<td>Acton</td>
<td>100</td>
<td>37</td>
<td>37.0</td>
</tr>
<tr>
<td>The University of New South Wales</td>
<td>Kensington</td>
<td>52</td>
<td>23</td>
<td>44.2</td>
</tr>
<tr>
<td>University of Western Australia</td>
<td>Perth</td>
<td>88</td>
<td>23</td>
<td>26.1</td>
</tr>
<tr>
<td>Southern Cross University</td>
<td>Lismore</td>
<td>46</td>
<td>19</td>
<td>41.3</td>
</tr>
<tr>
<td>University of Adelaide</td>
<td>North Terrace</td>
<td>40</td>
<td>16</td>
<td>40.0</td>
</tr>
<tr>
<td>Southern Cross University</td>
<td>Tweed Gold Coast</td>
<td>41</td>
<td>12</td>
<td>29.3</td>
</tr>
<tr>
<td>Newcastle University</td>
<td>Newcastle</td>
<td>44</td>
<td>11</td>
<td>25.0</td>
</tr>
<tr>
<td>Macquarie University</td>
<td>Macquarie Park</td>
<td>25</td>
<td>7</td>
<td>28.0</td>
</tr>
<tr>
<td>Royal Melbourne Institute of Technology</td>
<td>RMIT City</td>
<td>30</td>
<td>5</td>
<td>16.7</td>
</tr>
<tr>
<td>University of Technology, Sydney</td>
<td>City Campuses</td>
<td>27</td>
<td>6</td>
<td>22.2</td>
</tr>
<tr>
<td>University of Wollongong</td>
<td>Wollongong</td>
<td>19</td>
<td>4</td>
<td>21.1</td>
</tr>
<tr>
<td>Southern Cross University</td>
<td>Coff’s Harbour</td>
<td>27</td>
<td>3</td>
<td>11.1</td>
</tr>
<tr>
<td>Curtin University of Technology</td>
<td>Bentley</td>
<td>6</td>
<td>2</td>
<td>33.3</td>
</tr>
<tr>
<td>Monash University</td>
<td>Clayton</td>
<td>31</td>
<td>2</td>
<td>6.5</td>
</tr>
<tr>
<td>University of Sydney</td>
<td>Sydney</td>
<td>8</td>
<td>2</td>
<td>25.0</td>
</tr>
<tr>
<td>Murdoch University</td>
<td>South Street</td>
<td>1</td>
<td>1</td>
<td>100</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>1,645</td>
<td>491</td>
<td>29.8</td>
</tr>
</tbody>
</table>

Note. None of the three visits to the University of Waikato survey resulted in a completed survey.

Therefore a total 27 campuses (27 universities) were represented in the sample. Otago University had the highest completion rate among the New Zealand universities, whilst the
University of Melbourne had the highest completion rate among the Australian universities (Table 13).

Given that the sample is biased in terms of gender, age, region of origin, and level of study, provisions have been made in the analysis of groups and subgroups. In line with suggestions for best practice, all groups and subgroups are restricted to instances in which groups meet a minimum \( n = 100 \) and \( n = 75 \), respectively (see section 3.9). Future studies could aim to fill sampling gaps.

### 4.2 Instrumentation and Adaption of Inventories

The entire survey instrument including the Participant Information Sheet (PIS), Consent Form (CF), and question items is presented in Appendix C. The survey instrument is made up of the following four sections: (A) participant information, consent, and eligibility, (B) basic demographic, (C) FB-related questions, and (D) institutional integration questions. With reference to the aforementioned sections, a description of the instruments and how they were adapted for the current investigation is now provided.

#### 4.2.1 Participant information, consent, and eligibility

In accordance with University of Auckland policy, after students read the PIS they were presented with the CF and asked whether they would like to receive a summary of the research findings (Section A, Question 1). Questions 2-3 confirm that each respondent is a full-time degree-seeking international student and a member of FB, and therefore eligible to participate in the survey. Question 4 determines whether respondents are in their final semester of study, which is important for data analysis as intention to re-enrol is an important measured outcome (see subsection 4.4.1). Question 5 ascertains participants’ student identification numbers for the purpose of providing them with a book voucher incentive (see subsection 4.3.2), whilst Question 6 asks for students’ email addresses for the purpose of referral sampling and follow-up online communication (see subsection 4.3.2). Finally, Question 7 confirms that students
have provided their consent and agreed to the terms and conditions described earlier in Section A.

4.2.2 Basic demographics. Section B of the questionnaire pertains to demographic characteristics of the respondents. Question 8 determines whether students believe that they are sole students, that is, the only student from their home country studying at their campus (see subsection 4.4.1). For the purpose of demographic analyses, Questions 9 to 13 elicit students’ gender, age, country of origin, year of study, and residence, respectively. Finally, Question 14 provides for a self-reported estimate of academic performance.

4.2.3 FB-related questions. Section C of the questionnaire pertains to FB usage and FB strategy items. Questions 15 and 16 pertain to average Internet use per day and years on FB, respectively. Question 17 is taken from Ellison et al.’s (2007) FBI scale and is concerned with the average amount of time students actively spend on FB per day.

Concerned with geographic-based FB use, Morris et al. (2009-2010) used the dichotomous item, “Do you mainly use Facebook to connect with people here at [this university] or not at [this university]?” (p. 317). Questions 18i-iii extend this item to examine the degree to which the respondents use FB to connect with people based at university, outside university (but in country of location), and in their respective home countries.

Concerned with demographic-based FB use, Lin, Peng, Kim, Kim, and LaRose (2011) measured international students’ local- and compatriot-based FB use, where compatriot-based FB use encompassed engagement with compatriots on campus and in their respective home countries. Questions 19i-iii make a more discerning assessment of demographic-based use by examining the frequency that international students use FB to connect with local, compatriot, and other-country international students on campus. In accordance with subsection 3.4.2, both Questions 18i-iii and 19i-iii use five-point frequency response formats.
Thereafter, Question 20 is also adapted from the work of Morris et al. (2009-2010), whose original FB Group scale was used in 2006 when FB affiliations were only able to be made between users of the same university domain name. To account for the current lack of this restriction, Question 20 asks participants how many university-affiliated FB groups they belong to.

Questions 21i-vi are taken directly from Ellison et al.’s (2007) FBI scale to provide an assessment of FB life integration. In accordance with subsection 3.4.2, the six ordinal items are presented in a five-point agreement scale format (i.e., 1 = strongly disagree to 5 = strongly agree). Frequency response formats were not possible for several of these items. For example, a frequency response format would be inappropriate for Question 21vi, which states, “I would be sorry if Facebook shutdown”.

Question 22 is also taken directly from Ellison et al.’s (2007) FBI scale to measure FB use per day. Question 23 borrows directly from Ellison et al.’s (2011) measure of total actual FB friends, whilst Questions 24 and 25 measure total FB friends on campus and total actual FB friends on campus, respectively.

To finish Section C, the following five question sets: 26i-iv, 27i-iv, 28i-iv, 29i-iv, 30i-iv, and 31i-iv assess the FB-enabled communicative strategies. The original survey instrument used in the Ellison et al.’s (2011) study used five prompts for respondents to conceptualise five types of student “others” (N. B. Ellison, personal communication, July 20, 2011). Several modifications were made to the five prompts in the current study for the purpose of distribution to international students. The modifications are presented in Table 14.

The prompt for question set 26i-iv was adapted to more explicitly identify FB as the platform where the respondent might come across a fellow student identified as a stranger. The prompt also uses capitalisation and the word “SEEN” to more clearly and overtly identify the person as a stranger (Table 14). The prompt for question set 27i-iv is identical to the
Table 14

*Original and Adapted Connection Strategy Prompts*

<table>
<thead>
<tr>
<th>Item Sets</th>
<th>Original Prompt (Ellison et al., 2011)</th>
<th>Adapted Prompt Used in Current Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>26i-iv</td>
<td>Imagine a [university name] student you've never met in real life or had a face-to-face conversation with.</td>
<td>Imagine coming across a [university name] student on FB that you HAVE NEVER SEEN OR MET.</td>
</tr>
<tr>
<td>27i-iv</td>
<td>Imagine a [university name] student you’ve never met in real life. You find out through Facebook that you share a common interest.</td>
<td>Imagine a [university name] student you’ve never met in real life. You find out through Facebook that you SHARE A COMMON INTEREST.</td>
</tr>
<tr>
<td>28i-iv</td>
<td>Imagine someone at [university name] who lives in your residence hall who you would recognize but have never spoken to.</td>
<td>Imagine coming across a student on Facebook who ATTENDS THE SAME CLASS AS YOU who you would recognize but have never spoken to.</td>
</tr>
<tr>
<td>29i-iv</td>
<td>Imagine a person you knew in high school but were not close friends with.</td>
<td>Imagine coming across a [university name] student on Facebook who you’ve never met in real life. You find out through Facebook that you ARE IN THE SAME FACEBOOK GROUP.</td>
</tr>
<tr>
<td>30i-iv</td>
<td>Think about one of your close friends.</td>
<td>Think about one of your CLOSE FRIENDS at [university name].</td>
</tr>
</tbody>
</table>

original prompt in terms of language but introduces capitalisation to emphasise the proposed common interest. The prompt for question set 28i-iv was modified to include students in the same class based on the premise that not all respondents would be residing at a residence hall. The prompt for question set 29i-iv originally referred to students’ past high school acquaintances and was designed for local students—29iv originally measured students’ tendency to meet old high school acquaintances face to face, an unlikely event for international students studying abroad. Therefore, the prompt for the question set in the current study explores international student engagement with fellow students who happen to be in the same FB group. The modification also brought the prompt in line with the three prior prompts so that all four measured FB connection strategies towards fellow students (Table 14). The prompt for question set 30i-iv was also modified to bring it in line with the context of the four others by asking respondents how likely they were to use FB to engage with close friends on campus. These modifications meant that all five prompts pertained to fellow students of various social proximity on campus, keeping all such strategy items...
contextually consistent. After each of the five prompts, none of the wording was changed to elicit international students’ tendency to browse, contact, add, and meet the conceptualised others on campus. In addition, none of the wording in the extra question set, 31i-iv, designed by Ellison et al. (2011) to gauge the extent that students used FB to meet new people and learn about acquaintances, were modified in the current study.

4.2.4 Institutional integration questions. Section D of the questionnaire consists of 30 institutional integration questions. The current investigation utilises Pascarella and Terenzini’s (1980) operationalisation of Tinto’s (1975) institutional integration constructs. Several modifications were made to the question items necessary for international circulation. In accordance with subsection 3.4.1, ten negatively worded items in the original scale were re-worded positively. Table 15 illustrates the original and adapted items in the current investigation.

Throughout the survey, the word *faculty* was replaced with the word *staff* as it was thought that the word *staff* was a more general term and more understandable to the international audience. The word *staff* also more broadly includes pastoral staff, who have been shown to be especially important to the integration of international students (Butcher & McGrath, 2004). In addition, where possible, the actual university name was included in the question (see adapted Question 36iv, Table 15, for example). It was hoped that use of the name would elicit a more genuine response concerning participants’ attitudes towards their institution.


Table 15

<table>
<thead>
<tr>
<th>Item</th>
<th>Original Items (Pascerella &amp; Terenzini, 1980)</th>
<th>Adapted Items Used in Current Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>32v</td>
<td>It has been difficult for me to meet and make friends with other students.</td>
<td>It has been easy for me to make friends with other students.</td>
</tr>
<tr>
<td>32vi</td>
<td>Few of the students I know would be willing to listen to me and help me if I had a personal problem.</td>
<td>Many of the students I know would be willing to listen to me and help me if I had a personal problem.</td>
</tr>
<tr>
<td>32vii</td>
<td>Most students at this university have values and attitudes different from my own.</td>
<td>Most students at this university have values and attitudes similar to my own.</td>
</tr>
<tr>
<td>34i</td>
<td>Few of the faculty members I have had contact with are generally interested in students.</td>
<td>Many of the staff members I have had contact with are generally interested in students.</td>
</tr>
<tr>
<td>34ii</td>
<td>Few of the faculty members I have had contact with are generally outstanding or superior teachers.</td>
<td>Many of the staff members I have had contact with are generally outstanding or superior teachers.</td>
</tr>
<tr>
<td>34iii</td>
<td>Few of the faculty members I have had contact with are willing to spend time outside of class to discuss issues of interest and importance to students.</td>
<td>Many of the staff members I have had contact with are willing to spend time outside of class to discuss issues of interest and importance to students.</td>
</tr>
<tr>
<td>35iv</td>
<td>Few of my courses this year have been intellectually stimulating.</td>
<td>Many of my courses this year have been intellectually stimulating.</td>
</tr>
<tr>
<td>36iv</td>
<td>It is not important to me to graduate from this university.</td>
<td>It is important for me to graduate from [university name].</td>
</tr>
<tr>
<td>36v</td>
<td>I have no idea at all about what I want to major in.</td>
<td>I have a good idea about what I want to major in.</td>
</tr>
<tr>
<td>36vi</td>
<td>Getting good grades is not important to me.</td>
<td>Getting good grades is important to me.</td>
</tr>
</tbody>
</table>

Note. Underlined words highlight adaptions made.

4.3 Pilot and Main Study

Both a pilot and a main study were conducted. As is explained below, general comments made by participants in the pilot study helped improve questions in the main study.

4.3.1 Pilot study. In accordance with subsection 3.2, a pilot study was conducted in May 2011. The pilot study was first distributed to 25 international students at the University of Auckland via an invitation mentioned in the university’s international student newsletter, iSpace (University of Auckland, 2011). The invitation in the newsletter included an online link to the pilot study on the survey platform www.Zoomerang.com. Comments made by three pilot participants led to improvements in the main study. A review of these comments and associated changes made will now be provided.
Pilot participant 7 made the following statement in the comments section: “I’m in my final semester so I don’t plan on re-enrolling. Does it matter?” To accommodate this issue, Question 4 was added to the main survey: Does the completion of your current classes in 2011 entitle you to a degree? If Yes, please DO NOT complete this survey”. It was hoped that this eligibility question would stop such students from completing the main survey as their intention to re-enrol could not be logically assessed.

In the comments section, Pilot participant 6 wrote, “You might want to take into account that… I’ve been the only student from my country for most of the time”. To account for this issue, Question 8 was added: “Are you the only person from your country studying at UoA?” The inclusion of this question meant that, although sole students were eligible to complete the survey, they would not be included in analyses that involved an assessment of their compatriot friendship (Question 19ii).

Participant 17 mentioned, “I’m part of the conjoint program with University of Auckland so even though I’m leaving Auckland uni next year, I’m not dropping out!” To accommodate this concern, Question 36iii included the following parenthesised note: “It is likely that I will register at UoA next semester (or at a subsequent uni as part of a joint-degree programme).” It was hoped that the inclusion of this note would accommodate such students and therefore provide more interpretative validity to the item.

As part of the pilot study, the initial survey was distributed to a convenience sample of four additional international university students for the purpose of estimating an approximate time to complete the survey. Each of the four timed themselves, resulting in different reported completion times ranging from 11:50 to 14:54 minutes (\(M = 13:09, SD = 1.32\)). As a result, it was decided that the survey should take 10-15 minutes for participants to complete. This was stated in Section A of the questionnaire, after Question 7.
4.3.2 Main study. In accordance with subsection 3.3.2, international student respondents were recruited through the WebRDS referral method during October 9-24, 2011, which was near the end of the study leave period prior to final exams throughout Australasia. Therefore, all data were collected within three weeks and thus provided a robust snapshot of attitudes at one time. The total 491 completed surveys represented 29.8% of the total visits made to the online survey (Table 13). This could be considered quite a reasonable response rate considering many visitors may not have met the demographic requirements (i.e., full-time degree seeking international students) making them eligible to partake in the study. To carry out the Web-RDS sampling method, a list of the 41 recognised universities in Australasia was compiled. The list did not include online universities. A list of New Zealand’s eight universities was compiled from the New Zealand Vice-Chancellors’ Committee (2011). A list of Australia’s 33 universities was compiled from the Australian Education Network (2011).

Each of the 41 university websites was visited for the purpose of compiling a large list of international student clubs and contact email addresses for club presidents. The Google search function was also used to search for respective international student clubs. However, it became apparent that 17 Australian universities did not publically provide international student club contact information. Therefore, contact email addresses for international student club presidents were ultimately derived from 24 total universities (a total 28 campuses).

With reference to this list of 28 campuses, a total 28 online surveys were worded to suit each campus. Each of the 28 surveys were created using the online survey platform www.Zoomerang.com (now www. Surveymonky.com). Thereafter, each of the respective 28 campus bookshop managers were contacted in early October. Credit card details and agreements were made via email concerning the distribution of $10 in-house book vouchers to students who participated in the forthcoming survey.
Emails were then sent to international student club presidents at the 28 campuses requesting that they forward the embedded invitation to their eligible international student club members (reproduced in Appendix D). One email was also sent to a university colleague in charge of a large group of Malaysian scholarship students (at the University of Auckland) requesting that he forward the same invitation to eligible international students (see note on Table 12 for Malaysian scholarship student respondent numbers). As students started to complete their respective surveys, they were sent a follow-up email pertaining to the collection of their $10 book voucher (reproduced in Appendix E). The letter also included a request for them to forward an embedded invitation to their eligible friends. Throughout the survey period, daily lists of respondents’ student identification numbers were emailed to bookshop managers. Upon inspection of a student’s corresponding student identification (ID) number, bookshop staff gave that student one $10 voucher. Given financial considerations, the sampling process finished when the survey platform reported that a total 503 respondents had completed the survey. At this juncture a series of data preparatory procedures were undertaken.

4.4 Data Preparation

In accordance with subsection 3.12, a series of data preparatory techniques was carried out on the initial 503-case dataset. This included (a) data cleaning, (b) dealing with non-normality, (c) procedures to create scale consistency, (d) missing value analysis and imputation, (e) restoring whole numbers for univariate reporting, and (f) an assessment of and adjustment for lack of ordinal response categories. The following subsections describe each of these in turn.

4.4.1 Data cleaning. In accordance with Section 3.12.1, a series of data cleaning procedures were carried out. This involved (a) checking for respondent eligibility, (b) contacting respondents who missed question items, (c) identifying and adjusting for anomalous responses, and (d) maximising responses for levels of data analysis.
4.4.1.1. Checking for respondent eligibility. In accordance with subsection 3.12.1.1, six cases were immediately removed from the initial reported sample of 503 respondents: one respondent was not a full-time international student studying towards a degree; three were not members of FB; one had missed over 50% of the questions; and one had completed the survey twice (resulting in his second response being removed). As a result, the initial dataset was reduced to 497 cases.

4.4.1.2. Contacting respondents who missed questions. In accordance with subsection 3.12.1.2, an assessment of missing data was undertaken. Using SPSS 19 (IBM, 2010), it was determined that 81 respondents (16.30%) had missed one or more question items. An individually tailored email, including the question(s) missed, was sent to each respondent requesting that they complete the missed questions and send the email back. Of the 81 emails sent out, 45 participants (55.6%) responded, enabling zero missing data for an additional 45 cases. Therefore, missing data only existed for 36 (7.2%) of the initial 497 participants. See subsection 4.4.4 concerning the imputation of missing values in the current study.

4.4.1.3 Identifying and adjusting for anomalous responses. In accordance with subsection 3.12.1.3, anomalous responses were identified and adjusted for. To do this, (a) a total 13 logical and feasible limits and thresholds were established, (b) an appropriate demerit point associated with each level of threat was determined (0 = negligible, 1 = medium, 2 = high), (c) demerit points were tallied casewise, (d) an overall permissible demerit threshold was set, and (e) cases that exceeded a total demerit point threshold were deleted. Details concerning each of the 13 limits will now be provided.

4.4.1.3.1. Internet use beyond 18 hours. Question 15 asked “Approximately, on average, how many HOURS do you spend actively using the Internet per day?” It was determined that the logical maximum for this question should be set at 18 hours a day as six
hours sleep was considered minimal. It was also determined that responses over 18 hours might be the result of respondents’ misinterpretation of the scale of the question, resulting in a response pertaining to one week’s average usage. Descriptive analysis revealed that one participant gave a response of 20 hours per day. This value was scaled back to the more realistic value of 18. Because the response was abnormal and unrealistic, it was determined that the violation would be allocated one demerit point, representing a medium level of threat to the data (see Table 16).

4.4.1.3.2 Over five years purported FB membership. Question 16 asks, “Approximately how many years have you been using Facebook?” FB has only been available to the general public from late September 2006 (Abram, 2006). As the survey was launched in October 2011, participants’ claims to being members for more than five years were not possible. Therefore, the logical maximum of five years was set. Although responses beyond five years were not possible, it is understandable given the nature of human memory (Schachter, 1999) that the students had overestimated their length of use by up to several years. Therefore, it was determined that responses over five, but no more than 10, years would be considered a negligible level of threat. Descriptive analysis revealed that a total 34 participants gave responses between 6 and 8 years, whilst none gave responses of 10 or more. Therefore, 34 responses were scaled back to five years and no demerit points were allocated.

4.4.1.3.3 FB use per day beyond 18 hours. Question 17 asks, “In the past week, on average, approximately how much time PER DAY have you spent actively using Facebook?” Like Internet usage, it was determined that responses to this question should not feasibly be greater than 18 hours a day and any such answers may be a function of scale misinterpretation or by drawing on recall of a specific recent “all nighter”. Analysis determined that four respondents reported erroneous values over 18 hours (45, 45, 84, & 84 hours). Considering that each of these four respondents’ reported average time spent on the Internet was far less
than their reported daily FB use, it was assumed that they had mistakenly reported average FB use of the week. Consequently, their purported values were each divided by 7. Because the question was simple, it was determined that the each of the four cases would be allocated one demerit point, representing a medium level of threat to the data (Table 16).

4.4.1.3.4 Anomalous FB group membership. Question 20 asks, “How many Facebook groups do you belong to that are affiliated with [university name]?” Descriptive statistics revealed that, beyond a reported value of 32, only two respondents reported values of 80 and
150, respectively. Although anomalous, these reported values were considered feasible—perhaps among some highly sociable students. Therefore, no respondents were allocated a demerit point for this variable.

4.4.1.3.5 Total FB friends. Question 22 asks, “Approximately, how many TOTAL Facebook friends do you have?” Descriptive statistics revealed that a total 38 participants reported 1,000 or more total FB friends and that responses climbed to the highest reported value of 1,898. Considering the distribution, these reported high values were considered feasible and therefore no respondents were allocated a demerit point.

4.4.1.3.6 Total actual FB friends. Question 23 asks, “Approximately, how many of your TOTAL Facebook friends do you consider actual friends?” Descriptive statistics revealed that a total 81 respondents reported 500 or more total actual friends and that such values climbed steadily to a total 1,200 total actual friends. Considering the distribution, and the subjective nature of friendships, the reported high values were considered feasible. Therefore, no respondents were allocated a demerit point.

4.4.1.3.7 Total FB friends on campus. Question 24 asks, “Approximately, how many TOTAL Facebook friends do you have on campus?” Descriptive statistics revealed that 83 participants reported 200 or more total FB friends on campus, and that such reported values climbed steadily to 750. Given the nature of the higher values reported, and the potential for some highly sociable student to accumulate many FB friends on campus, no respondents were allocated a demerit point.

4.4.1.3.8 Total actual FB friends on campus. Question 25 asks, “Approximately, how many TOTAL Facebook friends, considered actual friends, do you have on campus?” Descriptive statistics revealed that 31 participants reported 200 or more total actual FB friends and that these values climbed steadily to 500. Again, given the distribution and the
subjective nature of actual friendships, the reported higher values were considered feasible and no respondents were allocated a demerit point.

4.4.1.3.9 *Illogical friendship count.* Questions 22, 23, 24, and 25 all pertain to different friendship counts on FB. In accordance with subsection 3.12.1.3, the four questions provide for three natural limits: (a) Total FB Friends must be equal to or higher than each of the other three FB friendship categories, (b) Total FB Friends on Campus must be equal to or higher than Total Actual FB Friends on Campus, and (c) Total Actual FB Friends must be equal to or higher than Total Actual FB Friends on Campus. It is suggested that responses that violated these natural limits are suggestive of carelessness or confusion, therefore such violations were allocated a demerit point. Analysis revealed that 13 total respondents violated one or more of the three natural limits. Therefore, each of the 13 respondents was allocated a demerit point (see Table 16). Values associated with each violation were scaled back to their respective natural limits.

4.4.1.3.10 *Over 90% repeatedness.* There are 66 five-point rating scale questions in the main part of the survey (not including questions pertaining to demographics in Section A). Respondents who gave the same response value for over 90% of the rating scale questions (60 or more of the 66 total scales) were considered a serious threat to validity. Descriptive analysis revealed that four respondents gave 60 or more repeated ordinal scale responses. Therefore, four cases were allocated two demerit points each (see Table 16).

4.4.1.3.11 *100% repeated FB connection strategy values.* In accordance with subsection 3.12.1.3, an assessment of repeated responses took into consideration the plausibility of responses within sets of questions. Although many items and scales in the entire inventory theoretically covary (for example, the many items in the survey pertaining to institutional integration), research conducted by Ellison et al. (2011) suggests that users are far more inclined to engage with others of closer social proximity. For example, FB users
tended to engage with close friends more than strangers. Although it is feasible for students to socially engage heavily with a spectrum of others ranging from strangers to close friends, this is clearly strange and socially inefficient behaviour. Therefore, respondents who gave the same values in response to all 24 FB Connection Strategy items were considered a medium-level threat to validity. Descriptive analysis revealed that seven respondents gave 100% repeated responses for the 24 items. Therefore, each of these cases was allocated a demerit point (see Table 16).

4.4.1.3.12 Over 10% missing values. There were a total 81 question items in the survey (Sections B-D) concerning demographic, FB-related, and institutional integration matters. The percentage of missing values was identified for each case across all 81 items. In accordance with subsection 3.12.1.3, respondents who miss more 10% of the questions should be removed. Therefore, it was deemed that respondents who gave 72 or less responses represented a serious threat to validity and should be allocated two demerit points. Analysis revealed that one respondent provided only 70 total responses and this case was therefore allocated two demerit points (Table 16).

4.4.1.3.13 Patterned responses. Brown and Farruggia (2012) report that study participants may, rarely, respond in a zigzag fashion or fill in response boxes by creating pictures of monsters, for example, and should be removed. After visually inspecting the entire dataset in SPSS 19, it was apparent that no patterned responses existed, therefore no participants were allocated a demerit point. Based on the results presented in Table 16, six cases were deemed as having a major threat and thus deleted from further analysis. Thus, the final dataset consisted of a total of 491 cases.

4.4.1.4 Maximising responses for levels of data analysis. In accordance with subsection 3.12.1.4, the dataset was maximised for different levels of analysis. Three students self-identified as about to graduate (Question 4). Therefore, these students were earmarked as
not to be included in the analysis of institutional integration. As a result, \( N = 488 \). However, the three respondents could be included in the assessment of FB-related items. A further seven student respondents identified themselves as the sole student from their country. These students were earmarked as not being included in an analysis of FB-related items and as a result \( N = 484 \). However, the seven respondents could be included in the assessment of institutional integration. Taken together, where modelling included variables pertaining to institutional integration and FB usage, compounding omissions meant that \( N = 481 \).

**4.4.2 Dealing with non-normality of continuous items.** In accordance with 3.12.2, normalisation procedures were carried out on the eight continuous variables: Questions 15, 16, 17, 20, 22, 23, 24, and 25. Using SPSS 19, raw skewness and kurtosis values, optimal lambda (\( \lambda_{opt} \)) and, after the application of Equation 4, post \( \lambda_{opt} \) skewness and kurtosis values, were calculated and these are reported in Table 17. Optimal lambda values were ascertained to two decimal places in accordance with Wessa (2013). After exponentiation, all eight continuous variables exhibited optimal levels of normality prior to procedures to create scale consistency, and after normalisation all eight skewness and kurtosis values were below the recommended 2.0 and 7.0, respectively (Curran et al., 1996).

<table>
<thead>
<tr>
<th>Table 17</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Normalisation of Continuous Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Question Item</strong></td>
</tr>
<tr>
<td>FB Group Membership</td>
</tr>
<tr>
<td>Total Actual FB Friends on Campus</td>
</tr>
<tr>
<td>Total FB Friends on Campus</td>
</tr>
<tr>
<td>FB Use per Day</td>
</tr>
<tr>
<td>Total Actual FB Friends</td>
</tr>
<tr>
<td>Total FB Friends</td>
</tr>
<tr>
<td>Net Use per Day</td>
</tr>
<tr>
<td>Years on FB</td>
</tr>
</tbody>
</table>

*Note.* All skewness values incorporate a standard error of .110, whilst all kurtosis values incorporate a standard error of .220.
4.4.3 Procedures to create scale consistency. In accordance with subsection 3.12.3, procedures were carried out on the normalised dataset for the purpose of creating scale consistency. After the application of Equation 5, all values on all eight continuous variables ranged between 1.00 and 5.00.

4.4.4 Missing value analysis and imputation. In accordance with subsection 3.12.4, an assessment of total missing values was carried out on the two thematically associated FB-related and institutional integration batteries. The FB-related battery included 44 items (Section C), and the institutional integration battery included 30 items (Section D). With the assistance of SPSS 19’s missing value analysis function, it was determined that a total 81 values were missing from the 491-case dataset. This included three missing values pertaining to three soon-to-graduate students and seven missing responses from seven sole students (see subsection 4.4.1.4). The total 81 missing values represented just 0.22% of the total 36,334 values in Sections C and D of the dataset (74 variables x 491 cases = 36,334). Seventy-nine of the 81 missing values were ordinal, whilst only two were continuous.

In accordance with subsection 3.12.4, an assessment of the intercorrelations in the FB usage and institutional integration batteries was carried out. Using the SPSS 19 R-Menu version 2.0 (Courtney, 2013; IBM, 2010), an assessment of the heterogeneous correlations between the 44 items in the FB usage battery was carried out using pairwise deletion and two-step estimation. Review of the correlation matrix revealed that 38 of the 44 items correlated at 0.50 or better with at least one other item on that scale. Using the same procedure on the 30 institutional integration items, results revealed that 23 of the 30 items correlated at .50 or better with at least one other item on that scale. In addition, when the 44 FB usage items were correlated with the 30 institutional integration items, no correlations over .50 or over were found. Thus, in accordance with subsection 3.12.4, the splitting of the dataset into two 44-
and 30-item batteries provided a more powerful and less biased method for imputing missing values.

SPSS 19 was utilised to carry out EM procedures on the FB usage battery. The results of Little’s Missing Completely at Random (MCAR) test were: $\chi^2 = 591.74$, $df = 657$, $p = .97$. The result for the institutional integration battery was $\chi^2 = 320.89$, $df = 312$, $p = .35$. Therefore, it was determined that the missing values were missing at random and that EM procedures could be carried out separately on both batteries.

With the assistance of SPSS 19’s impute missing data values function, missing values were imputed for each battery. Inspection of the 81 imputed values revealed that two values fell outside the conceptual range of the scales (1.00-5.00). Therefore, one value of .99 was adjusted to 1.00, whilst another value of 5.11 was adjusted to 5.00.

Finally, in accordance with subsection 3.12.4, values pertaining to the three soon-to-graduate students’ intention to re-enrol (item 36iii) were not imputed. The three values were coded as missing (-999). Likewise, values pertaining to the seven believed-to-be sole students’ degree of compatriot friendship (item 19ii) were also not imputed. These values were also coded as missing (-999).

4.4.5 Restoring whole numbers for univariate reporting. In accordance with subsection 3.12.5, Equations 6 and 7 were applied to the two imputed continuous values for the purpose of providing estimated values consistent with their original scale. In the current investigation, the following two estimated values were restored: (a) for the missing value in item 16, total years spent on FB, the resultant raw value was 2.79 years; (b) for the missing value in item 22, Total FB friends, the resultant value was 263 friends (rounded to the nearest whole number).

4.4.6 Assessment of and adjustment for lack of ordinal response categories. In accordance with subsection 3.12.6, an assessment of the lack of ordinal response options was
first carried out on the 67 ordinal variables in the 491-case complete dataset. The 67 ordinal variables pertained to Questions 14, 18i-iii, 19i-iii, 21i-vi, 26i-iv, 27i-iv, 28i-iv, 29i-iv, 30i-iv, 31i-iv, 32i-vii, 33i-v, 34i-v, 35i-vii, & 36i-vi. Descriptive analysis revealed that there was no lack of response options 1 to 5 across all 67 variables, meaning that each of the available response options in the entire 67-item question battery was selected at least once.

Data equivalence was assessed across the following six groups: (a) location (New Zealand and Australia), (b) gender (male and female), (c) age group (21-and-under and 22-and-over), (d) residence (on- and off-campus), (e) Islamic influence (Islamic-influenced and non-Islamic influenced), and (f) Confucian influence (Confucian-influenced and non-Confucian influenced). For all groups, \( n = 481 \), with the exception of the residence dataset, where \( n = 479 \), because two participants missed the residence demographic question. An assessment of the lack of ordinal response categories was carried out with the assistance of SPSS 19’s split file function. Six duplicate datasets were each split in accordance with the six aforementioned categories. An assessment of ordinal data equivalence ensued concerning each of the 67 ordinal variables in each of the six datasets. Upon inspection of the equivalence of 402 total ordinal variables (6 x 67 = 402), it became apparent that a total 13 (3.2%) needed adjusting. Adjustments were therefore made in accordance with subsection 3.12.6, creating ordinal data equivalence for each of the six supplementary datasets.

The same approach was extended to an assessment of subgroups. However, in accordance with subsection 3.12.6, an assessment of the sets of subgroups with minimum size of 75 was first undertaken. With the assistance of SPSS 19, cross tabular analysis of the subgroups provided the results presented in Table 18.

Results from Table 18 show that \( n \geq 75 \) for subgroup sets concerned with the following two-way interactions: (a) location and gender, (b) location and age group, (c) location and Islamic influence, and (d) age group and Islamic influence. In accordance with subsection 3.12.6, four
duplicate 481-case datasets were created. Thereafter, an assessment of the lack of ordinal response categories was carried out with the assistance of SPSS 19’s split file function (layered by two demographic variables). An assessment of ordinal data equivalence ensued concerning each of the 67 ordinal variables in each dataset. Upon inspection of the equivalence of 268 total ordinal variables (4 x 67 = 268), it became apparent that 23 (8.5%) needed adjusting. Thereafter, all non-equivalent ordinal variables were adjusted in accordance with subsection 3.12.6.

Table 18

Cross-Tabular Analysis of Demographic Groups of Interest

<table>
<thead>
<tr>
<th>Demographic Characteristics</th>
<th>Location</th>
<th>Gender</th>
<th>Age Group</th>
<th>Residence</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NZ</td>
<td>Aus.</td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>Location</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Australia</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Gender</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Male</td>
<td>75</td>
<td>88</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Female</td>
<td>138</td>
<td>178</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Age Group</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>≤ 21</td>
<td>99</td>
<td>163</td>
<td>68</td>
<td>194</td>
</tr>
<tr>
<td>&gt; 21</td>
<td>114</td>
<td>103</td>
<td>95</td>
<td>122</td>
</tr>
<tr>
<td>Residence</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>@Uni</td>
<td>76</td>
<td>52</td>
<td>39</td>
<td>89</td>
</tr>
<tr>
<td>Not @Uni</td>
<td>137</td>
<td>214</td>
<td>124</td>
<td>227</td>
</tr>
<tr>
<td>Islamic Influence</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Islamic</td>
<td>135</td>
<td>83</td>
<td>70</td>
<td>148</td>
</tr>
<tr>
<td>Non-Islamic</td>
<td>78</td>
<td>183</td>
<td>93</td>
<td>168</td>
</tr>
<tr>
<td>Confucian Influence</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Confucian</td>
<td>31</td>
<td>125</td>
<td>41</td>
<td>115</td>
</tr>
<tr>
<td>Non-Confucian</td>
<td>182</td>
<td>141</td>
<td>122</td>
<td>201</td>
</tr>
</tbody>
</table>

Note. Emboldened values represent sub-group sets ≥ 75 cases per subgroup; NZ = New Zealand; Aus. = Australia; ≤ 21 = 21-and-Under; ≥ 21 = 22-and-Over; @Uni = At University; Not @Uni = Not at University.

An assessment of ordinal data equivalence across groups and subgroups afforded six and four supplementary datasets, respectively. Table 19 provides a summary of these dataset and their relevance to analytical techniques used in the current investigation.
With the data preparatory procedures complete, a description of the various analytical techniques carried out in the current investigation will now be provided.

4.5 Procedures to Describe FB-Related and Institutional Integration Items

RQ1(a) of this study is: How do the FB-related items function to explain the FB-related behaviour of international students?, whilst RQ2a is: How do the institutional integration items function to explain the integrative behaviour of international students? To answer these questions, SPSS 19 was used to ascertain FB usage and institutional integration item means (\(M\)) and standard deviations (\(SD\)). In addition, Cohen’s \(d\) values representing the difference between the highest and lowest values in item sets of interest were ascertained with the assistance of Soper (2013).

4.6 Exploratory Procedures

RQ1(b) of this study is: How can the individual FB-related items be understood in terms of latent factors?, whilst RQ2b is: How can the institutional integration items be understood in
terms of latent factors? In accordance with subsection 3.5, exploratory procedures were carried out separately on the 44-item FB-related and the 30-item institutional integration batteries.

With the assistance of SPSS 19’s R-Menu version 2.0 (Basto & Pereira, 2012; Courtney, 2013), estimations for the appropriate number of factors to retain in the FB-related and institutional integration batteries were carried out using CDr, PA-PCAp, OCp, and MAP procedures (see Table 8). Bracketed by these estimations, ongoing EFAs using WLSMV estimation and oblimin (0) rotation were carried with the assistance of Mplus 6.0 (Muthén & Muthén, 2010). In accordance with subsection 3.5, pattern matrices of solutions were examined and minimal deletions of poor-performing, less theoretically relevant items were made. These steps were ongoing until well-fitting, theoretically plausible EFA factor solutions were found for each battery. Mplus code for the final EFA procedure for the institutional integration and FB-related batteries is provided in Appendices F and G, respectively.

4.7 Two-Step Modelling Procedure

In accordance with subsection 3.6, EFA solutions for the FB-related and institutional integration batteries were each placed within a confirmatory framework. Mplus code for the institutional integration and FB-related batteries is provided in Appendices H and I, respectively. With the assistance of Mplus 6.0, two thematic measurement models for the FB-related and institutional integration batteries were specified and assessed across model fit criteria established in subsection 3.6.1: $\chi^2/df$ ratio and associated $p$ value, SRMR, RMSEA, CFI, TLI, and $\tilde{g}$. As discussed in section 3.4, each thematic measurement model met the identification requirements associated with Bollen’s (1989) Three-Indicator Rule.

A structural model was then built in accordance with the guidelines described in subsection 3.6.2. This first involved establishing a latent factor regression matrix to ascertain
significant contributors to the final endogenous factor of interest, Goal and Institutional Commitment. After plausible mediating and exogenous latent factors were modelled, plausible MIMIC structures were added to the factor model to provide further explication of integrational processes. In accordance with subsection 3.4, the final structural model met the identification requirements associated with Bollen’s (1989) Recursive Rule.

In accordance with Equation 1, associated $f^2$ effect size values were ascertained at each step of the analysis to assist with ongoing evaluations of scale of impact. Finally, several plausible structural regressions and cross-lags were tested resulting in a final structural model of international student integration. Mplus code for the structural model at the final two phases of construction is presented in Appendix J.

As a final form of assessment, observed means for each of the observed variables and factors in the final structural model were compared with observed means in recent studies. This provides a way to judge how different this sample’s responses were to American university students.

**4.8 Assessment of Measurement Invariance**

In accordance with subsection 3.7, the factors included in the proposed structural model were placed into a measurement model format. The measurement model also met the identification requirements associated with Bollen’s (1989) Three-Indicator Rule as detailed in subsection 3.4. With the assistance of Mplus 6.0 and using WLSMV estimation, an assessment of model fit was carried out on the 481 dataset (the Mplus code is provided in Appendix K). Model fit was also ascertained for datasets 481a, 481b, 481c, 481d, 481e, and 479f (see data note in Appendix K). Thereafter, assessments of measurement invariance for each of the six datasets included (a) assessments of model fit carried out separately on each group, and (b) configural, metric scalar, and structural tests of invariance.
4.8.1 **Assessment of model fit carried out separately on each group.** An assessment of model fit was carried out separately for each group in accordance with the code provided in Appendix L. The *Useobservations* option was used to test each group separately (see Appendix L). Therefore, two tests were carried out for each of the six datasets (481a, 481b, 481c, 481d, 481e, and 479f), providing for a total 12 tests of model fit.

4.8.2 **Configural, metric, scalar, and structural tests of invariance.** An assessment of configural, metric, and scalar invariance was carried out on datasets 481a, 481b, 481c, 481d, 481e, and 479f. The three levels of tests were carried out using the MPlus code by Koziol (2010, p. 119). The MPlus code for the three levels of testing is provided in Appendices M, N, and O, respectively. An assessment of structural invariance was also carried out in accordance with Mplus code confirmed by Hoffman (personal communication, February 16, 2013) (provided in Appendix P).

4.9 **Assessment of Latent Factor Mean Differences**

In accordance with subsection 3.8, an assessment of latent factor mean differences across groups was carried out on datasets 481a, 481b, 481c, 481d, 481e, and 479f in terms of gender, age-group, location, Confucian influence, Islamic influence, and residence, respectively. This was performed with the assistance of Mplus 6.0 using WLSMV estimation (Mplus code confirmed by Hoffman, personal communication, February 16, 2013) (provided in Appendix Q).

4.10 **Assessment of Two-Way Interaction Effects on Latent Factor Means**

Datasets 481g, 481h, 481i, and 481j were utilised to assess two-way interactions on latent factor means with respect to (a) location and gender, (b) age-group and location, (c) Islamic influence and location, and (d) Islamic influence and age-group, respectively. Two-way interactions were assessed in accordance with Mplus code provided by D. Hessen (personal...
communication, February 22, 2013) (provided in Appendix R). Effect sizes were then ascertained and judged in accordance with Hattie (2009).

4.11 Assessment of Group Differences in Individual Structural Relations

Datasets 481a, 481b, 481c, 481d, 481e, and 479f were assessed in terms of differences in individual structural relations at Phase 4 of the measurement model. Phase 4 only included latent factors as MIMIC structures were included at Phase 5. Structural relations examined included: (a) exogenous to exogenous ($\phi$), (b) exogenous to endogenous ($\gamma$), and (c) endogenous to endogenous ($\beta$) relations (see Appendix S for notation for structural relations in the Phase 4 model). Mplus code was confirmed by Hoffman (personal communication, February 16, 2013) (provided in Appendix T). Thereafter, significance of the difference between the structural correlations and regressions across the six groups of interest was ascertained via the online software application provided by Lowry (2013).

4.12 Post Hoc Assessment of Stability of Factor Solutions

In accordance with subsection 3.11, the EFA factor solutions for the FB usage and institutional integration batteries were assessed in terms of their ability to reflect their population. Equivalent factor solutions were sought in tables 5, 6, and 7 in Hogarty et al. (2005). Each EFA solution was given an estimated mean value of congruence and assessed according to MacCullum et al. (1999).

4.13 Ethical Considerations

Of course, any research project should adhere to the ethical guidelines of its associated institution. Therefore, the current research project was carried out in accordance with the University of Auckland Ethical Guidelines. The University of Auckland ethical approval reference number for this study is 2011/198. After gaining ethical approval, international student respondents were sought in both the pilot and main study. Ethical approval for the
pilot study can be found in Appendix U, whilst ethical approval for the main study can be found in Appendix V.
CHAPTER 5. RESULTS

The general purpose of this study is to understand international university student integration within the new social media environment. To do this, an assessment of FB-related behaviour and general institutional integration was undertaken for the purpose of answering the following four main research questions:

**RQ1: How do the FB-related items function to explain the FB-related behaviour of international university students in Australasia?**

RQ1(a): How do the individual FB-related items function to explain the FB-related behaviour of international students?

RQ1(b): How can FB-related behaviour be understood in terms of latent factors?

**RQ2: How do the institutional integration items function to explain the integrative behaviour of international university students in Australasia?**

RQ2(a): How do the individual institutional integration items function to explain the integrative behaviour of international students?

RQ2(b): How can institutional integration be understood in terms of latent factors?

**RQ3: What structural model best represents the role of FB-related and institutional integration factors for international students’ commitment?**

**RQ4: What role do international student demographic characteristics play in the structural model?**

This chapter presents the results pertaining to the four research questions with respect to (a) FB-related behaviour of international students, (b) institutional integration behaviour of international students, (c) development of structural model, and (d) an assessment of group equivalence.
5.1 FB-Related Behaviour of International Students

To answer RQ1, this section provides a description of (a) the individual FB-related items, and (b) the FB usage and strategies factor solution.

5.1.1 Description of individual FB-related items. RQ1(a) asks, How do the individual FB-related items function to explain the FB-related behaviour of international students?

Interpretation of Tables 20 and 21 provides an answer to this question. With respect to general Internet usage, Table 20 shows that, on average, the student sample used the Internet

Table 20

FB Usage Items for International Australasian University Students

<table>
<thead>
<tr>
<th>#</th>
<th>Question item</th>
<th>x_{(1)}</th>
<th>x_{(n)}</th>
<th>M</th>
<th>SD</th>
<th>Cohen’s d</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>Internet Use per Day (hours)</td>
<td>0.25</td>
<td>18.00</td>
<td>5.82</td>
<td>3.28</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Years Using FB</td>
<td>0.04</td>
<td>5.00</td>
<td>3.38</td>
<td>1.19</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>FB Use per Day (hours)</td>
<td>0.00</td>
<td>16.50</td>
<td>2.98</td>
<td>2.89</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>General Media Usage</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18iii</td>
<td>FB Use Home Country</td>
<td>1.00</td>
<td>5.00</td>
<td>4.09</td>
<td>1.17</td>
<td>0</td>
</tr>
<tr>
<td>18i</td>
<td>FB Use University-Based</td>
<td>1.00</td>
<td>5.00</td>
<td>3.90</td>
<td>1.13</td>
<td>.017</td>
</tr>
<tr>
<td>18ii</td>
<td>FB Use Outside University (in Country)</td>
<td>1.00</td>
<td>5.00</td>
<td>3.44</td>
<td>1.23</td>
<td>0.54</td>
</tr>
<tr>
<td></td>
<td><strong>Geographic-Based FB Use</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19ii</td>
<td>FB Use with Compatriots</td>
<td>1.00</td>
<td>5.00</td>
<td>3.93</td>
<td>1.16</td>
<td>0</td>
</tr>
<tr>
<td>19iii</td>
<td>FB Use with Other-Country Internation</td>
<td>1.00</td>
<td>5.00</td>
<td>3.58</td>
<td>1.19</td>
<td>0.30</td>
</tr>
<tr>
<td>19</td>
<td>FB Use with Locals</td>
<td>1.00</td>
<td>5.00</td>
<td>3.33</td>
<td>1.28</td>
<td>0.49</td>
</tr>
<tr>
<td></td>
<td><strong>Demographic-Based FB Use</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>FB Group Affiliations</td>
<td>0.00</td>
<td>150</td>
<td>3.75</td>
<td>8.22</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>FB Group Affiliations</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Overall FBI Value Response</td>
<td>1.00</td>
<td>5.00</td>
<td>3.66</td>
<td>1.11</td>
<td></td>
</tr>
<tr>
<td>21i</td>
<td>FBI1: FB part of everyday life</td>
<td>1.00</td>
<td>5.00</td>
<td>3.98</td>
<td>1.06</td>
<td></td>
</tr>
<tr>
<td>21iii</td>
<td>FBI3: FB part of daily routine</td>
<td>1.00</td>
<td>5.00</td>
<td>3.96</td>
<td>1.08</td>
<td></td>
</tr>
<tr>
<td>21vi</td>
<td>FBI6: Sorry if FB shutdown</td>
<td>1.00</td>
<td>5.00</td>
<td>3.58</td>
<td>1.20</td>
<td></td>
</tr>
<tr>
<td>21v</td>
<td>FBI5: Part of FB community</td>
<td>1.00</td>
<td>5.00</td>
<td>3.52</td>
<td>1.05</td>
<td></td>
</tr>
<tr>
<td>21ii</td>
<td>FBI2: Proud to tell on FB</td>
<td>1.00</td>
<td>5.00</td>
<td>3.47</td>
<td>1.05</td>
<td></td>
</tr>
<tr>
<td>21iv</td>
<td>FBI4: Out of touch when not logged in</td>
<td>1.00</td>
<td>5.00</td>
<td>3.44</td>
<td>1.21</td>
<td>.471</td>
</tr>
<tr>
<td></td>
<td><strong>FB Group Affiliations</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total FB Friends</td>
<td>1.00</td>
<td>1898</td>
<td>480</td>
<td>336</td>
<td>0</td>
</tr>
<tr>
<td>23</td>
<td>Total Actual FB Friends</td>
<td>0.00</td>
<td>1200</td>
<td>235</td>
<td>236</td>
<td>0.84</td>
</tr>
<tr>
<td>24</td>
<td>Total FB Friends on Campus</td>
<td>0.00</td>
<td>750</td>
<td>98</td>
<td>99</td>
<td>1.54</td>
</tr>
<tr>
<td>25</td>
<td>Total Actual FB Friends on Campus</td>
<td>0.00</td>
<td>500</td>
<td>56</td>
<td>75</td>
<td>1.74</td>
</tr>
</tbody>
</table>

Note. Geographic- and demographic-based items based on frequency scales ranging from 1 = never, to 5 = almost always; FBI value items based on agreement scales ranging from 1 = strongly disagree to 5 = strongly agree; for demographic-based use items, N = 484; for all other items, N = 4910; x_{(1)} = sample minimum; x_{(n)} = sample maximum; values for items 15-17 transformed to decimals, e.g., 1 hour, 30 minutes = 1.5 hours; Cohen’s d values calculated between items in blocks of interest; *Cohen’s d values only calculated between highest and lowest mean of FBI value Items.
close to six hours per day, and had been members of FB for close to 3.5 years. In addition, on average, the students used FB for close to three hours per day.

The geographic-based FB usage items (questions 18i-iii) showed a small to moderate difference between means. On average, international students used FB to communicate with people based (a) in their home countries, (b) in their universities, and (c) outside their universities between “every once and a while” and “sometimes”.

The demographic-based FB usage items (questions 19i-iii) had a small to moderate difference between means. On average, international students used FB with (a) compatriots, (b) other-country internationals, and (c) locals between “every once and a while” and “sometimes”.

In terms of FB group affiliations (question 20), on average, students were members of 3.75 FB groups on campus. The highest value for the scale was 150 reported FB group affiliations. The overall FBI value response was 3.66, suggesting that international students generally valued the role of FB in their lives. Overall, the six FBI value items (questions 21i-vi) exhibited only a small to moderate level of difference in means, with the maximum difference being just $d = 0.47$: on average, question 21i (FB is part of my everyday life) had the highest value (close to 4), suggestive of general agreement. This value was greater than question 21iv (Out of touch when not logged in), with a medium effect size.

In terms of FB friendship counts (questions 22-25), each of the three drops in friendship counts were of a medium to large effect size. This suggests that, on average, total actual FB friends was distinctly lower than total FB friends; total FB friends on campus was distinctly lower than total actual FB friends; and total actual FB friends on campus was distinctly lower than total FB friends on campus.

The FB connection strategy items are each presented in Table 21 in order of highest to lowest reported mean values. Items relating to engagement with close friends exhibited the
Table 21

<table>
<thead>
<tr>
<th>#</th>
<th>Item</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>30iv</td>
<td>Close Friend: Meet them face-to-face.</td>
<td>4.53</td>
<td>.70</td>
</tr>
<tr>
<td>30iii</td>
<td>Close Friend: Add them as a FB friend.</td>
<td>4.52</td>
<td>.76</td>
</tr>
<tr>
<td>30ii</td>
<td>Close Friend: Contact them by using FB or by using information from FB.</td>
<td>4.31</td>
<td>.86</td>
</tr>
<tr>
<td>30i</td>
<td>Close Friend: Browse their profile on FB.</td>
<td>4.31</td>
<td>.85</td>
</tr>
<tr>
<td>31iv</td>
<td><strong>FB Strategy 4: I have used Facebook to check out someone I met socially.</strong></td>
<td>3.88</td>
<td>.94</td>
</tr>
<tr>
<td>28i</td>
<td>Same Class: Browse their profile on FB.</td>
<td>3.65</td>
<td>1.12</td>
</tr>
<tr>
<td>31ii</td>
<td><strong>FB Strategy 2: I use Facebook to learn more about other people in my classes.</strong></td>
<td>3.26</td>
<td>1.17</td>
</tr>
<tr>
<td>31iii</td>
<td><strong>FB Strategy 3: I use Facebook to learn more about other people living near me.</strong></td>
<td>3.23</td>
<td>1.17</td>
</tr>
<tr>
<td>27i</td>
<td>Common Interest: Browse their profile on FB.</td>
<td>3.21</td>
<td>1.25</td>
</tr>
<tr>
<td>29i</td>
<td>Same FB Group: Browse their profile on FB.</td>
<td>3.20</td>
<td>1.22</td>
</tr>
<tr>
<td>26i</td>
<td>Stranger: Browse their profile on FB.</td>
<td>3.07</td>
<td>1.26</td>
</tr>
<tr>
<td>28iii</td>
<td>Same Class: Add them as a FB friend.</td>
<td>2.93</td>
<td>1.29</td>
</tr>
<tr>
<td>28iv</td>
<td>Same Class: Meet them face-to-face.</td>
<td>2.81</td>
<td>1.25</td>
</tr>
<tr>
<td>28ii</td>
<td>Same Class: Contact them by using FB or by using information from FB.</td>
<td>2.80</td>
<td>1.25</td>
</tr>
<tr>
<td>31i</td>
<td><strong>FB Strategy 1: I use Facebook to meet new people.</strong></td>
<td>2.59</td>
<td>1.13</td>
</tr>
<tr>
<td>29ii</td>
<td>Same FB Group: Contact them by using FB or by using information from FB.</td>
<td>2.44</td>
<td>1.16</td>
</tr>
<tr>
<td>29iii</td>
<td>Same FB Group: Add them as a FB friend.</td>
<td>2.43</td>
<td>1.21</td>
</tr>
<tr>
<td>27ii</td>
<td>Common Interest: Contact them by using FB or by using information from FB.</td>
<td>2.41</td>
<td>1.21</td>
</tr>
<tr>
<td>27iii</td>
<td>Common Interest: Add them as a FB friend.</td>
<td>2.39</td>
<td>1.28</td>
</tr>
<tr>
<td>26ii</td>
<td>Stranger: Contact them by using FB or by using information from FB.</td>
<td>2.23</td>
<td>1.14</td>
</tr>
<tr>
<td>29iv</td>
<td>Same FB Group: Meet them face-to-face.</td>
<td>2.21</td>
<td>1.11</td>
</tr>
<tr>
<td>26iii</td>
<td>Stranger: Add them as a FB friend.</td>
<td>2.18</td>
<td>1.19</td>
</tr>
<tr>
<td>27iv</td>
<td>Common Interest: Meet them face-to-face.</td>
<td>2.12</td>
<td>1.15</td>
</tr>
<tr>
<td>26iv</td>
<td>Stranger: Meet them face-to-face.</td>
<td>2.02</td>
<td>1.10</td>
</tr>
</tbody>
</table>

Note. $N = 491$; $M =$ Mean; $SD =$ Standard Deviation; generally, items range from 1 = very unlikely to 5 = very likely; however, items 31i, 31ii, 31iii, & 31iv (in bold) range from 1 = strongly disagree to 5 = strongly agree.

Items pertaining to learning about others of a social, classroom, or domiciliary connection featured after that (31iv, 28i, 31ii, 31iii). Thereafter, values declined as students’ tendency to use FB to browse, contact, add, and meet others on campus pertained to more socially distant others. This decline was in the general order of others (a) in the same class, (b) in the same FB group, (c) with a common interest, and (d) of no prior connection; that is, strangers. This suggests that students were less and less likely to engage with others as they became more socially distal.

5.1.2 FB usage and strategies factors. RQ1(b) asks, How can FB-related behaviour be understood in terms of latent factors? To answer this question, the factorability of the following 44 FB usage items was assessed: 15, 16, 17, 18i-iii, 19i-iii, 20, 21i-vi, 22, 23, 24, 25, 26i-iv, 27i-iv, 28i-iv, 29i-iv, 30i-iv, 31i-iv. (Full item-level correlation matrix available...
from author upon request.) Exploratory procedures resulted in the rejection of 18 non-fitting items resulting in an acceptable six factor, 26 item (6k-26p) solution. Table 22 presents the pattern matrix and communalities ($h^2$) of this solution alongside the observed means ($M$),

<table>
<thead>
<tr>
<th>Table 22</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pattern Matrix and Communalities of FB-Related EFA Solution</td>
</tr>
<tr>
<td>Factor/ Item</td>
</tr>
<tr>
<td>FB Usage Factors</td>
</tr>
<tr>
<td>FBI-international ($M = 3.54$, $SD = 0.85$, $\alpha = .89$)</td>
</tr>
<tr>
<td>17. FB Use per Day</td>
</tr>
<tr>
<td>21i. FBI: FB part of everyday life</td>
</tr>
<tr>
<td>21ii. Proud to tell on FB</td>
</tr>
<tr>
<td>21iii. FB part of daily routine</td>
</tr>
<tr>
<td>21iv. Out of touch when not logged in</td>
</tr>
<tr>
<td>21v. Part of FB community</td>
</tr>
<tr>
<td>21vi. Sorry if FB shutdown</td>
</tr>
<tr>
<td>FB Affiliations ($M = 2.84$, $SD = 0.60$, $\alpha = .86$)</td>
</tr>
<tr>
<td>20. FB Group Affiliation</td>
</tr>
<tr>
<td>22. Total FB Friends</td>
</tr>
<tr>
<td>23. Total Actual FB Friends</td>
</tr>
<tr>
<td>24. Total FB Friends on Campus</td>
</tr>
<tr>
<td>25. Total Actual FB Friends on Campus</td>
</tr>
<tr>
<td>FB Connection Strategy Factors</td>
</tr>
<tr>
<td>SFBG Engagement ($M = 2.36$, $SD = 1.08$, $\alpha = .91$)</td>
</tr>
<tr>
<td>29ii. SFBG: Contact</td>
</tr>
<tr>
<td>29iii. SFBG: Add</td>
</tr>
<tr>
<td>29iv. SFBG: Meet</td>
</tr>
<tr>
<td>FB Initiating-international ($M = 2.15$, $SD =1.01$, $\alpha = .86$)</td>
</tr>
<tr>
<td>26ii. Stranger: Contact</td>
</tr>
<tr>
<td>26iii. Stranger: Add</td>
</tr>
<tr>
<td>26iv. Stranger: Meet</td>
</tr>
<tr>
<td>FB Maintaining ($M = 4.42$, $SD = 0.65$, $\alpha = .84$)</td>
</tr>
<tr>
<td>30i. Close Friend: Browse</td>
</tr>
<tr>
<td>30ii. Close Friend: Contact</td>
</tr>
<tr>
<td>30iii. Close Friend: Add</td>
</tr>
<tr>
<td>30iv. Close Friend: Meet</td>
</tr>
<tr>
<td>FB Information Seeking-international ($M = 3.50$, $SD = 0.85$, $\alpha = .77$)</td>
</tr>
<tr>
<td>28i. Same Class: Browse</td>
</tr>
<tr>
<td>31ii. Other people in my classes: Learn (Strat 2)</td>
</tr>
<tr>
<td>31iii. Other people living near me: Learn (Strat 3)</td>
</tr>
<tr>
<td>31iv. Someone I met socially: Check out (Strat 4)</td>
</tr>
<tr>
<td>Eigenvalues</td>
</tr>
</tbody>
</table>

Note. $N = 484$; $M =$ Mean; $SD =$ Standard Deviation; $\alpha =$ Cronbach’s alpha; $h^2 =$ item communalities (italicised); relevant item-factor loadings emboldened; SFBG = Same FB Group.

standard deviations ($SD$), and Cronbach’s alpha ($\alpha$) of each factor. All six Cronbach’s alpha values were above .70 suggesting coherence in each factor.
The FB usage and strategies EFA factor solution consisted of two usage factors (Facebook Intensity-international & FB Affiliations) and four strategy factors (FB Maintaining, FB Information-Seeking-international, Same FB Group Engagement, & FB Initiating-international).

In accordance with section 3.11, an assessment of the stability of the FB-related EFA solution was undertaken. The communalities ($h^2$) ranged from .20 to .91 ($M = .68$), identifying the solution more closely with Hogarty et al.’s (2005) simulated wide communality level where $h^2$ ranged from .20 to .80. Under such data conditions, the solution ($N = 484$) solution fell between the following two simulated data conditions: (1) the five factor, 30 item solution where $N = 600$, and (2) the seven factor, 30 item solution where $N = 600$ (Hogarty et al., 2005, p. 220). The estimated average level of factor congruence ($\bar{\Phi}_K$) was .98 for data condition 1 and .99 for condition 2. Therefore, the estimated level of congruence for the FB-related EFA solution is considered excellent at $\bar{\Phi}_K = .98.5 \ (\{.99 + .98\} / 2)$. This suggested that the FB-related factor solution is likely to be a strong reflection of the international student population parameters.

The solution, assessed within a confirmatory framework, is presented as a schematic in Figure 3. The solution provides the following good fit indices: $\chi^2 = 959.54$, $df = 284$, $\chi^2/df = 3.38$, $p = .066$, CFI = .96, TLI = .96, RMSEA = .07, WRMR = 1.36, $\hat{\gamma} = .903$. Figure 4 presents the FB usage and strategies factors as a schematic. Figure 5 presents the FB strategy factors and item-factor loadings of the six-factor FB-related measurement model.
5.1.2.1 FB usage factors. The item-factor loadings for the FB usage factors are presented in Figure 4. The first FB usage factor was named Facebook Intensity-international (FBI-i), as it reflected the tendency for international students to integrate FB into their lives. The FBI-i factor included seven of the eight items originally conceived in Ellison et al.’s (2007) FBI scale. Unlike Ellison et al.’s (2007) original FBI scale, however, the Total FB Friend item was not included in the FBI-i factor due to its low loading with the FBI-i factor during exploratory procedures (see Table 22). The item was conceived as a manifest item of the the second FB usage factor, which was named the FB Affiliations factor as it reflected
the tendency for international students to befriend individuals and join groups.

Results revealed a large and statistically significant correlation between the FBI-i and FB Affiliations factors, suggesting the factors, although sufficiently distinct, both measure the general magnitude of FB usage among international students.

5.1.2.2 FB connection strategy factors. The four FB connection strategy factors and item-factor loadings are presented in Figure 5. The factors are illustrated in accordance with the social distance of the international students’ conceived communicative others: socially proximal others are placed at the top of the diagram whilst socially distal others are placed at the bottom.
The first strategic factor, FB Maintaining, uses the same items as Ellison et al.’s (2011) scale, so the name was not modified. Therefore, the FB Maintaining factor reflects international students’ use of the FB platform to maintain existing close ties. The factor includes all four on- and offline behaviours pertaining to close friends.

The second strategic factor was named FB Information Seeking-international (i). The factor is identical to Ellison et al.’s (2011) FB Information Seeking scale except that item 28i pertains to other students in the same class as opposed to the same residence hall (see subsection 4.2.3). The FB Information Seeking-i factor reflected international students’ tendency to learn about fellow students of proximity, that is of a social, classroom, or domiciliary connection.

The third strategy factor was named Same FB Group (SFBG) Engagement as it reflected international students’ tendency to actively engage with other students on- and offline who happened to be in the same FB group—the passive browsing of others who happen to be in the same FB group was not a feature of the factor. The fourth factor, FB Initiating-international, omits the two lowest performing items originally conceived in Ellison
et al.’s (2011) original FB Initiating scale: “Stranger: Browse” and “I use FB to connect with new people” (see Table 7). Therefore, the FB Initiating-i factor reflects international students’ tendency to actively engage with strangers both on- and offline.

Of the FB connection strategy factors, FB Maintaining had the highest observed overall mean followed by the FB Information Seeking-i factor. Thereafter, the Same FB Group Engagement factor and FB Initiating-i factors represented two lower levels of international students’ strategic engagement with the FB platform (see Table 22).

With respect to the FB strategy factor inter-correlations (Figure 5), confirmatory analysis revealed there was two large, two medium, and two near zero correlations. There was a very large and statistically significant correlation between SFBG Engagement and FB Initiating-i, suggesting that these two factors, both pertaining to socially distal others, were conceptually related. There was also a large and statistically significant correlation between FB Maintaining and FB Information Seeking-i, suggesting that the two factors, both relating to socially proximal others, were conceptually related. Moderate correlations existed between (a) FB Information Seeking-i and Same FB Group Engagement, and (b) FB Information Seeking-i and FB Initiating-i suggesting that these strategies were more independent of each other. The two near zero correlations between FB Maintaining and the two socially distal factors suggests that, in general, use of FB to connect with close friends on campus was a strategy distinct from use of the site to connect with more socially distal others on campus. The FB Information Seeking-i factor, reflecting international students’ tendency to learn about others of proximity, potentially filled the dimensional and behavioural space between international students’ use of the site to connect with close friends and more distal others.

5.2 Institutional Integration Behaviour of International Students

To answer RQ2, this section provides (a) a description of institutional integration items, and (b) the institutional integration EFA solution.
5.2.1 Description of institutional integration items. RQ2(a) asks, How do the institutional integration items function to explain the integrative behaviour of the international students? Interpretation of Table 23 provides an answer to this question.
### Table 23

**Institutional Integration EFA Solution: Pattern Matrix and Communalities**

<table>
<thead>
<tr>
<th>Factor/ Item</th>
<th>M</th>
<th>SD</th>
<th>( h^2 )</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Scale 1: Peer-group Interactions</strong> (Cronbach’s ( \alpha = .88 ))</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>32.i. Since coming to [university name], I have developed close personal relationships with other students.</td>
<td>3.86</td>
<td>.85</td>
<td>.76</td>
<td><strong>.88</strong></td>
<td>-.06</td>
<td>.08</td>
<td>-.12</td>
<td>.11</td>
</tr>
<tr>
<td>32.ii. The student friendships I have developed at [university name] have been personally satisfying.</td>
<td>3.81</td>
<td>.89</td>
<td>.79</td>
<td><strong>.88</strong></td>
<td>-.08</td>
<td>.05</td>
<td>-.01</td>
<td>.05</td>
</tr>
<tr>
<td>32.iii. My interpersonal relationships with other students have had a positive influence on my intellectual growth and interest in ideas.</td>
<td>3.91</td>
<td>.78</td>
<td>.81</td>
<td><strong>.85</strong></td>
<td>.08</td>
<td>-.11</td>
<td>.11</td>
<td>.04</td>
</tr>
<tr>
<td>32.iv. My interpersonal relationships with other students have had a positive influence on personal growth, values, and attitude.</td>
<td>3.98</td>
<td>.75</td>
<td>.81</td>
<td><strong>.82</strong></td>
<td>-.17</td>
<td>-.08</td>
<td>.09</td>
<td>.04</td>
</tr>
<tr>
<td>32.v. It has been easy for me to make friends with other students.</td>
<td>3.49</td>
<td>.95</td>
<td>.51</td>
<td><strong>.69</strong></td>
<td>.11</td>
<td>-.01</td>
<td>.04</td>
<td>-.13</td>
</tr>
<tr>
<td>32.vii. Most students at [university name] have values and attitudes similar to my own.</td>
<td>3.18</td>
<td>.90</td>
<td>.41</td>
<td><strong>.56</strong></td>
<td>-.13</td>
<td>.14</td>
<td>.15</td>
<td>-.23</td>
</tr>
<tr>
<td><strong>Scale 2: Interaction with Staff</strong> (Cronbach’s ( \alpha = .88 ))</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>33.i. My non-classroom interactions with staff have had a positive influence on personal growth, values and attitudes.</td>
<td>3.54</td>
<td>.85</td>
<td>.82</td>
<td>.02</td>
<td><strong>.85</strong></td>
<td>.11</td>
<td>.00</td>
<td>-.02</td>
</tr>
<tr>
<td>33.ii. My non-classroom interactions with staff have had a positive influence on my intellectual growth and interest in ideas.</td>
<td>3.55</td>
<td>.85</td>
<td>.93</td>
<td>.03</td>
<td><strong>.94</strong></td>
<td>.03</td>
<td>-.01</td>
<td>.05</td>
</tr>
<tr>
<td>33.iii. My non-classroom interactions with staff have had a positive influence on my career goals and aspirations.</td>
<td>3.55</td>
<td>.87</td>
<td>.78</td>
<td>.01</td>
<td><strong>.85</strong></td>
<td>.01</td>
<td>.02</td>
<td>.09</td>
</tr>
<tr>
<td>33.v. Since coming to [university name], I have developed a close personal relationship with at least one staff member.</td>
<td>3.08</td>
<td>1.17</td>
<td>.49</td>
<td>-.03</td>
<td><strong>.62</strong></td>
<td>.14</td>
<td>.04</td>
<td>-.15</td>
</tr>
<tr>
<td>33.v. I am satisfied with the opportunities to meet and interact informally with staff members.</td>
<td>3.46</td>
<td>1.00</td>
<td>.60</td>
<td>-.04</td>
<td><strong>.55</strong></td>
<td>.30</td>
<td>.13</td>
<td>-.15</td>
</tr>
<tr>
<td><strong>Scale 3: Staff Concern for Student Development and Teaching</strong> (Cronbach’s ( \alpha = .89 ))</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>34.i. Many of the staff members I have had contact with are genuinely interested in students.</td>
<td>3.73</td>
<td>.84</td>
<td>.66</td>
<td>.09</td>
<td>.18</td>
<td><strong>.67</strong></td>
<td>.00</td>
<td>.04</td>
</tr>
<tr>
<td>34.ii. Many of the staff members I have had contact with are generally outstanding or superior teachers.</td>
<td>3.69</td>
<td>.87</td>
<td>.68</td>
<td>.00</td>
<td>.15</td>
<td><strong>.71</strong></td>
<td>.00</td>
<td>.13</td>
</tr>
<tr>
<td>34.iii. Many of the staff members I have had contact with are willing to spend time out of class to discuss issues of interest.</td>
<td>3.70</td>
<td>.90</td>
<td>.68</td>
<td>.05</td>
<td>.08</td>
<td><strong>.75</strong></td>
<td>.03</td>
<td>.02</td>
</tr>
<tr>
<td>34.iv. Most of the staff members I have had contact with are interested in helping students grow in more than just academic areas.</td>
<td>3.51</td>
<td>.87</td>
<td>.70</td>
<td>.00</td>
<td>.08</td>
<td><strong>.78</strong></td>
<td>.05</td>
<td>-.05</td>
</tr>
<tr>
<td>34.v. Most of the staff members I have had contact with are genuinely interested in teaching.</td>
<td>3.76</td>
<td>.86</td>
<td>.79</td>
<td>.00</td>
<td>-.02</td>
<td><strong>.85</strong></td>
<td>.08</td>
<td>.03</td>
</tr>
<tr>
<td><strong>Scale 4: Academic and Intellectual Development</strong> (Cronbach’s ( \alpha = .85 ))</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>35.i. I am satisfied with the extent of my academic development since enrolling at [university name].</td>
<td>3.69</td>
<td>.81</td>
<td>.62</td>
<td>.15</td>
<td>.16</td>
<td>-.16</td>
<td><strong>.74</strong></td>
<td>-.06</td>
</tr>
<tr>
<td>35.ii. My academic experience has had a positive influence on my intellectual growth and interest in ideas.</td>
<td>3.91</td>
<td>.75</td>
<td>.75</td>
<td>.12</td>
<td>.11</td>
<td>-.02</td>
<td><strong>.73</strong></td>
<td>.11</td>
</tr>
</tbody>
</table>

*Note.* \( N = 488; \alpha = \) Cronbach’s alpha; \( M = \) Mean; \( SD = \) Standard Deviation (scale values underlined and emboldened); \( h^2 = \) item communalities (italicised); relevant item-factor loadings emboldened.
Table 23

**Institutional Integration EFA Solution: Pattern Matrix and Communalities**

<table>
<thead>
<tr>
<th>Factor/ Item</th>
<th>M</th>
<th>SD</th>
<th>$h^2$</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>35iii. I am satisfied with my academic experiences at [university name].</td>
<td>3.78</td>
<td>.86</td>
<td>.71</td>
<td>-.01</td>
<td>.03</td>
<td>.06</td>
<td>.78</td>
<td>.06</td>
</tr>
<tr>
<td>35iv. Many of the courses this year have been intellectually stimulating.</td>
<td>3.80</td>
<td>.83</td>
<td>.72</td>
<td>-.06</td>
<td>-.16</td>
<td>.20</td>
<td>.81</td>
<td>.02</td>
</tr>
<tr>
<td>35v. My interest in ideas and intellectual matters has increased since coming to [university name].</td>
<td>3.89</td>
<td>.87</td>
<td>.70</td>
<td>-.01</td>
<td>-.08</td>
<td>.14</td>
<td>.75</td>
<td>.11</td>
</tr>
<tr>
<td>35vi. I am more likely to attend a cultural event (for example, a concert, lecture, or art show) now than I was before coming to [university name].</td>
<td>3.61</td>
<td>1.01</td>
<td>.20</td>
<td>-.05</td>
<td>.04</td>
<td>.11</td>
<td>.30</td>
<td>.16</td>
</tr>
<tr>
<td>35vii. I have performed academically as well as I anticipated I would.</td>
<td>3.42</td>
<td>.91</td>
<td>$.41$</td>
<td>.05</td>
<td>.22</td>
<td>-.10</td>
<td>.57</td>
<td>-.04</td>
</tr>
</tbody>
</table>

**Scale 5: Goal and Institutional Commitments** (Cronbach’s $\alpha = .77$)

<table>
<thead>
<tr>
<th>Item</th>
<th>M</th>
<th>SD</th>
<th>$h^2$</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>36i. It is important for me to graduate from an institute of higher education.</td>
<td>4.54</td>
<td>.66</td>
<td>.65</td>
<td>.17</td>
<td>-.05</td>
<td>.10</td>
<td>-.04</td>
<td>.75</td>
</tr>
<tr>
<td>36ii. I am confident that I made the right decision in choosing to attend [university name].</td>
<td>4.16</td>
<td>.81</td>
<td>.55</td>
<td>.16</td>
<td>.01</td>
<td>.19</td>
<td>.23</td>
<td>.46</td>
</tr>
<tr>
<td>36iii. It is likely that I will register at [this university] next semester (or at a subsequent university as part of a joint degree program).</td>
<td>4.13</td>
<td>.97</td>
<td>.42</td>
<td>-.04</td>
<td>.01</td>
<td>.02</td>
<td>.14</td>
<td>.59</td>
</tr>
<tr>
<td>36iv. It is important to me to graduate from [this university].</td>
<td>4.36</td>
<td>.85</td>
<td>.67</td>
<td>-.07</td>
<td>.06</td>
<td>-.06</td>
<td>.05</td>
<td>.82</td>
</tr>
<tr>
<td>36v. I have a good idea about what I want to major in.</td>
<td>4.22</td>
<td>.87</td>
<td>$.41$</td>
<td>.03</td>
<td>.07</td>
<td>.06</td>
<td>.15</td>
<td>.53</td>
</tr>
<tr>
<td>36vi. Getting good grades is important to me.</td>
<td>4.42</td>
<td>.73</td>
<td>$.37$</td>
<td>-.04</td>
<td>.00</td>
<td>.04</td>
<td>.05</td>
<td>.59</td>
</tr>
</tbody>
</table>

Eigenvalues

|       | 10.57 | 3.46 | 2.88 | 1.68 | 1.58 |

*Note.* $N = 488$; $\alpha =$ Cronbach’s alpha; $M =$ Mean; $SD =$ Standard Deviation (scale values underlined and emboldened); $h^2 =$ item communalities (italicised); relevant item-factor loadings emboldened.
International students’ responses to the Goal and Institutional Commitment scale were the highest, a value representing high general agreement and suggesting that the students ($N = 488$) were generally quite committed to studying and graduating at their respective universities. The highest-scoring item on that scale was question 36i reflecting the importance that the international students attached to gaining a degree. The observed mean on the Goal and Institutional Commitment scale was higher than the observed mean of the lowest-scoring Interaction with Staff scale with a large effect size (Cohen’s $d =$1.27) suggesting that students were more committed to their goals and institutional commitment than their interaction with staff warranted.

The other observed means of the remaining four institutional integration scales were between 3.44 ($SD = 0.79$) and 3.73 ($SD = 0.63$), suggestive of ambivalence to relatively weak positive endorsement of the other integrational scales. The highest-scoring item on the Interaction with Staff scale was questions 33ii and 33iii reflecting students’ weak endorsement of the idea that their non-classroom interactions with staff had a positive influence on their intellectual growth, goals, and career aspirations. The highest scoring item on the Staff Concern for Student Development and Teaching Scale was question 34v reflecting students’ weak general endorsement of the idea that influential staff members were genuinely interested in teaching. The highest scoring item on the Academic and Intellectual Development scale was question 35ii reflecting students’ moderately positive agreement that their academic experience had had a positive influence on their intellectual growth.

### 5.2.2 Institutional integration factor solution.

RQ2(b) asks, How can institutional integration be understood in terms of latent factors? To answer this question, the factorability of the following 30 institutional integration items was assessed: 32i-vii, 33i-v, 34i-v, 35i-v, 36i-vii, and 37i-vi. (Full item-level correlation matrix available from the author upon request.) Exploratory procedures carried out in accordance with subsection 4.6 resulted in the
omission of zero low-performing and irrelevant items. In line with previous studies (Pascarella & Terenzini, 1980), these procedures provided an acceptable five-factor, 30-item \((5k-30p)\) solution. The solution included the following five factors: (a) Peer-Group Interactions, (b) Interaction with Staff, (c) Staff Concern for Student Development and Teaching, (d) Academic and Intellectual Development, and (e) Goal and Institutional Commitment. Therefore, the institutional integration factor was inline with previous theory—a description of these factors can be found in subsection 2.2.3. Table 23 presents the means, standard deviations, Cronbach’s \(\alpha\), communalities, and item-factor loadings for the solution.

Following the procedures set out in subsection 5.1.2, an assessment of the stability of the factor solution was undertaken in accordance with Hogarty et al. (2005, p. 220). The resultant estimated level of factor congruence \(\Phi_{K}\) was .99 and thus considered excellent. This suggested that the institutional integration factor solution is likely to be a strong reflection of the international student population parameters.

The five factor solution was placed into a confirmatory framework and assessed as a measurement model. The results had good fit indices: \(\chi^2 = 1195.26, \text{df} = 395, \chi^2/\text{df} = 3.03, p = .082, \text{CFI} = .96, \text{TLI} = .95, \text{RMSEA} = .06, \text{WRMR} = 1.41, \hat{\theta} = .903\) (see Figure 6).
Figure 6. Institutional Integration Measurement Model

Note. $N = 488$; *$p < .05$, **$p < .01$, ***$p < .001$. 
Inline with previous findings (French & Oakes, 2004), all factor inter-correlations were significant. Results showed that there were three large, two medium, and five small factor inter-correlations. The strongest factor inter-correlations was between the Staff Concern for Student Development and Teaching factor and the Academic and Intellectual Development factor suggesting that staff care and professionalism is especially important to international students’ perceived academic progress. The second strongest factor inter-correlation was between the Academic and Intellectual Development factor and the Goal and Institutional Commitment factor suggesting that international students’ perceived academic progress is particularly important to their commitment to staying the course at university. A comparison of the factor inter-correlations in the current study to the factor inter-correlations in the French and Oakes (2004) study is provided in subsection 5.3.7.

5.3 Development of Structural Model to Explain Goal and Institutional Commitment

RQ3 asks, What structural model best represents the role of FB-related and institutional integration factors for international students’ commitment? For the purpose of modelling, an assessment of the structural regressions between the latent factors established in the six-factor FB-related and five-factor institutional integration measurement models was carried out. Table 24 illustrates the structural regressions involving the six FB-related factors and the five institutional integration factors.
Table 24

**Latent FB-Related and Institutional Integration Factor Regression Matrix**

<table>
<thead>
<tr>
<th>Latent Factor</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FB-Related Factors</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. FBI-international</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. FB Affiliations</td>
<td>.556***</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. FB Initiating</td>
<td>.054</td>
<td>-.070</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Same FB Group Engagement</td>
<td>.073</td>
<td>.004</td>
<td>.727***</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. FB Maintaining</td>
<td>.470***</td>
<td>.338***</td>
<td>-.018</td>
<td>.040</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. FB Info-Seeking</td>
<td>.488***</td>
<td>.311***</td>
<td>.481***</td>
<td>.459***</td>
<td>.506***</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Institutional Integration Factors</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Peer-Group Interactions</td>
<td>.237***</td>
<td>.287***</td>
<td>.004</td>
<td>.058</td>
<td>.256***</td>
<td>.220***</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Interaction with Staff</td>
<td>.134**</td>
<td>.089</td>
<td>.322***</td>
<td>.250***</td>
<td>.115*</td>
<td>.142**</td>
<td>.287***</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Staff Concern for Student Dev.</td>
<td>.122***</td>
<td>.141**</td>
<td>.159***</td>
<td>.127***</td>
<td>.232***</td>
<td>.156**</td>
<td>.351***</td>
<td>.651***</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Academic and Intellectual Dev.</td>
<td>.185***</td>
<td>.193***</td>
<td>.128**</td>
<td>.104*</td>
<td>.195***</td>
<td>.227***</td>
<td>.479***</td>
<td>.493***</td>
<td>.609***</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11. Goal and Inst. Commitment</td>
<td>.351***</td>
<td>.326***</td>
<td>.016</td>
<td>.066</td>
<td>.476***</td>
<td>.358***</td>
<td>.320***</td>
<td>.283***</td>
<td>.456***</td>
<td>.591***</td>
<td>1</td>
</tr>
</tbody>
</table>

*Note.* Values represent regression weights from individual two-factor regression analysis carried out with MPlus 6.0 (Muthén & Muthén, 2010) using WLSMV estimation, *p < .05, **p < .01, ***p < .001.
With reference to Table 24, and in accordance with prevailing theory, a structural model was built stepwise in the six phases presented in subsections 5.3.1 to 5.3.6. A discussion concerning the decisions made to build the model to predict international students’ Goal and Institutional Commitment is now provided.

**5.3.1 Phase 1.** In Phase 1, a one-factor confirmatory model concerning the main dependent factor, Goal and Institutional Commitment, was specified. The Phase 1 Model is illustrated in Figure 7 and its model fit indices are presented in Table 29.

![Phase 1 Model](image)

*Figure 7. Phase 1 Model*

*Note. N = 488. *p < .05, **p < .01, ***p < .001.*

**5.3.2 Phase 2.** In line with Tinto’s (1993) Longitudinal Model of Student Departure (see Figure 2) and Braxton and Lee’s (2005) meta-analysis, the strongest predictor of Goal and Institutional Commitment, Academic and Intellectual Development (Table 24), was considered a plausible independent factor. Therefore, Academic and Intellectual Development was included as the first exogenous factor in the model. The second strongest predictor of Goal and Institutional Commitment, FB Maintaining, was considered a plausible contributor insofar as it can be considered a form of peer-group interaction as theorised by Tinto’s (1993) model, and also because it reflected a form of social integration in line with
Braxton and Lee’s (2005) meta-analysis. Because FB Maintaining made a statistically significant unique contribution to Goal and Institutional Commitment, it was also included in the Phase 2 model. Thereafter, stepwise inclusion of other plausible factors provided no additional statistically significant unique contribution to Goal and Institutional Commitment, thus Phase 2 resulted in the specification of a total three factors: The Academic and Intellectual Development factor and the FB Maintaining factor, correlated with each other, both predicted the dependent factor, Goal and Institutional Commitment. The Phase 2 Model is illustrated as a schematic in Figure 8 and its model fit indices are presented in Table 29.

![Figure 8. Phase 2 Schematic](image)

*Note. N = 481. Variance explained ($R^2$) in factor the Goal and Institutional Commitment factor is placed after the name of that factor. *$p < .05$, **$p < .01$, ***$p < .001$.

### 5.3.3 Phase 3.

In Phase 3, other plausible factors were introduced into the model. Academic and Intellectual Development’s strongest predictor, Staff Concern for Student Development and Teaching (Table 24), was considered a plausible precursor based on research by Levin and Cross (2004), suggesting that institutional learning is directly facilitated by learner perception of teacher (or managerial) care. Therefore, Staff Concern for Student Development and Teaching was specified as a significant contributing factor to
Academic and Intellectual Development. Thereafter, stepwise inclusion of other plausible factors provided no statistically significant unique contribution to Academic and Intellectual Development. In Phase 3, FB Maintaining was also specified as a mediating factor for Goal and Institutional Commitment. The strongest predictor of FB Maintaining, FB Information Seeking-i, was considered a plausible contributor based on the research by Kudo and Simkin (2003) that suggests that international students’ close friendships are derived from the three social contexts of proximity reflected in the FB Information Seeking-i factor (social, classroom, or domiciliary connection). Therefore, the Information Seeking-i factor was included as an exogenous factor in the model. Thereafter, FB Maintaining’s second strongest predictor, FBI-i was also considered a plausible contributor based on the research by Ellison et al. (2007) suggesting that FB life integration was an important predictor of the value of close friends. Because FBI-i made a statistically significant contribution to FB Maintaining beyond that of FB Information Seeking-i, it was also included in the model. Thereafter, the stepwise inclusion of other plausible factors provided no further statistically significant unique contribution to the FB Maintaining factor. The phase 3 model is presented as a schematic in Figure 9. Model fit indices can be found in Table 29.

![Figure 9. Phase 3 Schematic](image)

*Note. N = 481. Variance explained ($R^2$) in factors is placed after the name of that factor. *$p < .05$, **$p < .01$, ***$p < .001$. 
**5.3.4 Phase 4.** In Phase 4, the remaining plausible factors were introduced into the model. Based on the research by Levin and Cross (2004) suggesting that learner perception of teacher care mediates the effect of staff interaction on institutional learning, the Interaction with Staff factor was included as an exogenous factor. Stepwise inclusion of other remaining plausible factors revealed no significant unique contribution to Staff Concern for Student Development and Teaching. In Phase 4, FBI-i was also specified as mediating factor. In this case, the results shown in Table 24 suggest that the FB Affiliations factor could potentially act as an exogenous variable on the FBI-i factor. However, it was decided that each of the friendship items should be included individually in Phase 5 for the purpose of providing a more specific understanding of how different friendship affiliations might impact on FB life integration (FBI-i). In Phase 4, FB Information Seeking-i was also specified as a mediating factor. In this case, the results in Table 24 suggest that FB Affiliations, FB Initiating, and SFBG Engagement could potentially act as exogenous variables. However, it was decided that these factors also made no real plausible theoretical contribution to an understanding of international student integration. The Phase 4 model is illustrated as a schematic in Figure 10. The model fit indices for the Phase 4 model are provided in Table 29.

![Figure 10. Phase 4 Schematic](image)

*Note.* *N* = 481. Variance explained (R²) in factors is placed after the name of that factor. *p < .05, **p < .01, ***p < .001.
5.3.5 Phase 5. Phase 5 involved the inclusion of MIMIC-derived structures. Of the 44 initial items in the FB usage EFA, only 26 were included in the final FB-related measurement model. Of the 18 items omitted from the initial 44-item battery, 10 pertained to FB strategy items. Because the Phase 4 model already specified a theoretically plausible relationship between FB Information Seeking-i and FB Maintaining strategies, it was decided that the inclusion of further strategic items as MIMIC structures was theoretically unnecessary. However, all of the eight other items were considered as potential plausible contributors to FB-related factors in the Phase 4 model and thus included in the analysis: item 15 (Internet Use per Day) was included as a potential contributor based on research by Kim, Yun, and Yoon (2009) suggesting that Internet use facilitated the social integration of international university students abroad. Item 16 (Years on FB) was also included based on research suggesting that SNS use might contribute to social integration (Kim et al., 2009). Items 18i-iii, the geographic-based FB use items, and items 19i-iii, the demographic-based FB use items, were included as potential contributors based on the work by Lin et al. (2011) suggesting that such use might contribute to the social adaption of international students abroad. Item 14 (Academic Standard) was also introduced as a potential contributor based on the work of Tinto (1993) suggesting that academic performance was an important facet of academic integration (see Figure 2). Items 22-25 were also analysed as potential contributors in Phase 5 (as discussed in subsection 5.3.4). Therefore, a total 13 potential observed variables were assessed as potential MIMIC contributors to factors in Phase 4 model. Table 25 presents the results of that analysis with the observed variables specified as exogenous and the seven factors in the Phase 4 Model specified as endogenous variables.
Table 25  

*Regression Matrix of Phase 4 Factors and 13 Potential Observed Contributors*

<table>
<thead>
<tr>
<th>Items</th>
<th>FBI-i</th>
<th>FB</th>
<th>FB</th>
<th>Interaction with Staff</th>
<th>Staff Concern for Student Development</th>
<th>Academic and Intellectual Development</th>
<th>Goal and Institutional Commitment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demographic Contributors</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. Academic Standard</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Online Behaviour</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. Net Use per Day</td>
<td>.235***</td>
<td></td>
<td></td>
<td></td>
<td>.066</td>
<td>.001</td>
<td>.101</td>
</tr>
<tr>
<td>16. Years on FB</td>
<td>.270***</td>
<td>.053</td>
<td></td>
<td></td>
<td>-.051</td>
<td>-.001</td>
<td>.024</td>
</tr>
<tr>
<td>Geographic FB Use</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18i. FB Use University-Based</td>
<td>.530***</td>
<td></td>
<td></td>
<td></td>
<td>.058</td>
<td>.157**</td>
<td>.280***</td>
</tr>
<tr>
<td>18ii. FB Use Outside University</td>
<td>.426***</td>
<td></td>
<td></td>
<td></td>
<td>.067</td>
<td>.044</td>
<td>.117*</td>
</tr>
<tr>
<td>18iii. FB Use Home Country</td>
<td>.371***</td>
<td></td>
<td></td>
<td></td>
<td>.012</td>
<td>.056</td>
<td>.102*</td>
</tr>
<tr>
<td>Demographic FB Use</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19i. FB Use with Locals</td>
<td>.375***</td>
<td></td>
<td></td>
<td></td>
<td>.077</td>
<td>.114*</td>
<td>.189***</td>
</tr>
<tr>
<td>19ii. FB Use with Compatriots</td>
<td>.506***</td>
<td></td>
<td></td>
<td></td>
<td>.019</td>
<td>.074</td>
<td>.185***</td>
</tr>
<tr>
<td>19iii. FB Use Other-Country Inter.</td>
<td>.419***</td>
<td></td>
<td></td>
<td></td>
<td>.050</td>
<td>.043</td>
<td>.208**</td>
</tr>
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<td>FB Affiliation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22. Total FB Friends</td>
<td>.478***</td>
<td></td>
<td></td>
<td></td>
<td>.016</td>
<td>.070</td>
<td>.141**</td>
</tr>
<tr>
<td>23. Total Actual FB Friends</td>
<td>.391***</td>
<td></td>
<td></td>
<td></td>
<td>.086</td>
<td>.117*</td>
<td>.115*</td>
</tr>
<tr>
<td>24. Total FB Friends on Campus</td>
<td>.411***</td>
<td></td>
<td></td>
<td></td>
<td>.073</td>
<td>.104*</td>
<td>.196***</td>
</tr>
<tr>
<td>25. Total Actual FB Friends on Campus</td>
<td>.343***</td>
<td></td>
<td></td>
<td></td>
<td>.138**</td>
<td>.174***</td>
<td>.179***</td>
</tr>
</tbody>
</table>

*Note.* Items specified as observed causal indicators for each of the seven factors at Phase 4. *p < .05, **p <.01, ***p < .001.
Testing of the contribution of the observed variables on the seven factors was arranged in the order with which the latent factors were introduced; that is, starting with the potential contribution of the items on the Goal and Institutional Commitment factor. This was done based on the idea that an item’s contribution to the factors at the dependent end of the model would provide for a more pertinent understanding of international student integration.

An assessment of the contribution of plausible observed variables on Goal and Institutional Commitment was undertaken first. Results showed that no observed variables made any unique statistically significant contribution to Goal and Institutional Commitment beyond that of the already modelled factors. An assessment of the contribution of plausible observed variables on Academic and Intellectual Development was then undertaken. Stepwise introduction of observed variables on that factor resulted in the specification of the Academic Standard as an exogenous variable. This was in line with Tinto’s (1993) model. None of the plausible observed variables made any unique statistically significant contribution to the FB Maintaining factor. Thereafter, none of the plausible observed variables made any unique statistically significant contribution to the Staff Concern for Student Development and Teaching factor. However, the stepwise introduction of the observed variables on the FBI-i factor resulted in a total seven plausible contributors: Net Use per Day, all three geographic-based uses of FB, demographic-based use of FB with compatriots and other-country internationals, and Total FB Friends on Campus all made statistically significant contributions to the FBI-i factor ($p < .05$). The Phase 5 Model is presented in Figure 11. Fit indices for the model were good, with $\chi^2 = 1735.76$, $df = 952$, $\chi^2/df = 1.82$, $p = .177$, CFI = .96, TLI = .96, RMSEA = .04, WRMR = 1.50, and $\hat{\gamma} = .94$.

Compared to the Phase 4 model of only latent factors, the Phase 5 model fits the data better by a small margin: whilst CFI and TLI remained the same, the associated $p$, RMSEA, and $\hat{\gamma}$ values showed a marked improvement. In the Phase 5 model, all effect sizes were large
(\(f^2 \geq .35\)) suggesting that the independent variables in the model have a real-world influence on each of the dependent factors. In accordance with Equation 1, effect sizes (\(f^2\)) for each of the five dependent factors were estimated as follows: (a) Staff Concern for Student Development and Teaching \(f^2 = 0.89\), (b) Academic and Intellectual Development \(f^2 = 0.92\), (c) Facebook Intensity-i \(f^2 = 0.89\), (d) FB Maintaining \(f^2 = 0.35\), and (e) Goal and Institutional Commitment \(f^2 = 1.04\).

The grouping of the factors in the top half of the schematic was named the Staff-Academic System because it suggests that engagement with staff impacts on international students’ integration into the academic system. The grouping of factors in the lower half of the model was named the Student-Social Networking Site System (Student-SNS System) because it suggests that strategic integration of the FB platform to connect with others on campus contributes to students on- and offline relations with close friends. Factor inter-correlations (\(\phi\)) between the three fully independent factors in the model were all statistically significant: there were two small and one medium correlation coefficient between the three factors. This suggested that there was some type of general relationship between the fully independent factors in the model, perhaps relating to international students’ general social posture toward both staff and peers. In summary, the Phase 5 model constitutes two quasi-independent, mediated streams of influence upon student goal and institutional commitment and, especially, intention to re-enrol.
Figure 11. Phase 5 Model

Note. The amount of variance explained in factors by predicting variables is placed after the name of each factor; Inter. w/ Staff = Interaction with Staff; Dev. = Development; Intell. = Intellectual; *p < .05, **p < .01, ***p < .001.
5.3.6 Phase 6. Alternative nested models were tested at Phase 6. In each model, an additional alternative path was added to the default Phase 5 model. If the new path had a statistically significant standardized beta weight, the change in $\chi^2$ DIFFTEST was noted. If a statistically significantly improved Chi-square was noted, the theoretical plausibility and relevance of the additional path was evaluated by consideration of previous studies and theories of engagement. Further, inclusion of the additional path was examined with respect to its effect on the total variance explained in (a) dependent factors in the Staff-Academic System, (b) dependent factors in the Student-SNS System, and (c) the Goal and Institutional Commitment factor. Where the inclusion of the relevant path caused no drop in overall variance explained in these three facets of the model, proposed nested models were assessed in terms of model fit indices.

5.3.6.1 Assessment of Potential Factor-to-Factor Cross-lag Paths Table 26 represents the results of the inclusion of each nested path grouped by dependent variable and ordered by most significant to the least significant improvement in overall Chi-square DIFFTEST. Paths 1, 2, 3, 4, and 5, representing paths from the Staff-Academic system to the Student-Social Network Site System, were deemed theoretically difficult to explain. It is difficult to understand how improved student-staff relations and perceived academic development would result in improved on- and off-line social relations with ‘peers’ on campus. Improved peer relationships may be a function of students’ personality—more extroverted (Bendig, 1962) and culturally open students (Yashima, 2002) may be more inclined engage socially with both staff and students.
Table 26

Tests of the Inclusion of Factor-to-Factor Paths (Alternate Nested Models) in the Phase 5 Model

<table>
<thead>
<tr>
<th>Path</th>
<th>Exogenous Variable (Independent)</th>
<th>Beta Weight ($p$)</th>
<th>Endogenous Variable (Dependent)</th>
<th>Chi Square DIFFTEST ($df$)</th>
<th>$p$</th>
<th>Theoretically Plausible?</th>
<th>Theoretically Relevant?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Faceook Information Seeking-i as Dependent Variable</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Staff Concern for Student Dev. &amp; Teaching</td>
<td>.25 (.002)</td>
<td>FB Info-Seeking-i</td>
<td>9.05(1)</td>
<td>.0026</td>
<td>No</td>
<td>—</td>
</tr>
<tr>
<td>2</td>
<td>Academic and Intel. Development</td>
<td>.16 (.003)</td>
<td>FB Info-Seeking-i</td>
<td>8.90(1)</td>
<td>.0029</td>
<td>No</td>
<td>—</td>
</tr>
<tr>
<td>3</td>
<td>Goal and Institutional Commitment</td>
<td>.16 (.013)</td>
<td>FB Info-Seeking-i</td>
<td>6.131(1)</td>
<td>.0133</td>
<td>No</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>Facebook Maintaining as Dependent Variable</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Staff Concern for Student Dev. &amp; Teaching</td>
<td>.12 (.018)</td>
<td>FB Maintaining</td>
<td>6.530(1)</td>
<td>.0106</td>
<td>No</td>
<td>—</td>
</tr>
<tr>
<td>5</td>
<td>Academic and Intel. Development</td>
<td>.11 (.040)</td>
<td>FB Maintaining</td>
<td>5.230(1)</td>
<td>.0222</td>
<td>No</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>Academic and Intellectual Development as Dependent Variable</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>FB Info-Seeking-i</td>
<td>.10 (.015)</td>
<td>Academic &amp; Intellectual Development</td>
<td>7.180(1)</td>
<td>.0074</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>7</td>
<td>Interaction with Staff</td>
<td>.12 (.019)</td>
<td>Academic &amp; Intellectual Development</td>
<td>5.640(1)</td>
<td>.0176</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>8</td>
<td>FB Maintaining</td>
<td>.09 (.041)</td>
<td>Academic &amp; Intellectual Development</td>
<td>5.031(1)</td>
<td>.0249</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Staff Concern for Student Development and Teaching as Dependent Variable</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>FB Maintaining</td>
<td>.16 (.001)</td>
<td>Staff Concern for Student Dev. &amp; Teaching</td>
<td>11.69(1)</td>
<td>.0006</td>
<td>No</td>
<td>—</td>
</tr>
<tr>
<td>10</td>
<td>Goal and Institutional Commitment</td>
<td>.18 (.001)</td>
<td>Staff Concern for Student Dev. &amp; Teaching</td>
<td>8.77(1)</td>
<td>.0031</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>11</td>
<td>FB Info-Seeking-i</td>
<td>.13 (.005)</td>
<td>Staff Concern for Student Dev. &amp; Teaching</td>
<td>8.14(1)</td>
<td>.0043</td>
<td>No</td>
<td>—</td>
</tr>
</tbody>
</table>

Note. All possible individual factor-to-factor paths were tested but only paths where Beta weight $p$ value $< .05$, and Chi-Square DIFFTEST where $p$ value $< .05$ are included in the table.
However, Path 6, from FB Information Seeking-i to Academic and Intellectual Development, was considered both feasible and relevant. This link was in line with research conducted by Kord (2008) and Irwin, Ball and Desbrow (2012) suggesting that use of social network sites are useful to peer-to-peer collaboration and the overall university academic experience. Use of FB to learn and engage with proximal others on campus may enable such collaboration and improved academic engagement. Therefore, Path 6 was examined in terms of its effect on the total variance explained in the Phase 5 model.

Path 7, representing the direct path from Interaction with Staff to Academic and Intellectual Development, was also considered feasible and relevant based on the large body of research by Tinto (1993), which says that students’ informal interactions with faculty directly predicts their academic development. In addition, Path 8, representing the path from FB Maintaining to Academic and Intellectual Development, was also considered feasible and relevant based on research by Kord (2008) and Irwin, Ball, & Desbrow (2012), which suggests that SNSs may be useful for peer-to-peer academic collaboration. These paths were also assessed in terms of their effect on variance in dependent factors in the Phase 5 model.

Path 9 involves the link between FB Maintaining and improved perceived Staff Concern for Student Development and Teaching. Like paths 1 to 5, it seems likely that this path is a function of student personality (Bendig, 1962; Yashima, 2002).

Path 10, from Goal and Institutional Commitment to Staff Concern for Student Development and Teaching, was considered both plausible and relevant based on the research by Tinto (1993), which suggests that students’ goal and institutional commitment reflects upon their perception of staff concern for their development and teaching. Therefore, Path 10 was subjected to further testing in terms of variance explained in the Phase 5 model.

Finally, Path 11 was considered not theoretically plausible because it is difficult to see how international students’ tendencies to learn about others on Facebook would logically
result in an improved perception of staff concern for their development. The interaction of Facebook effects between peers and academic staff, while possible, is difficult to understand and is removed lacking adequate explanation, though this is a potential future research angle.

Table 27 presents the tests of the inclusion of single Facebook usage items regressed onto each factor in the Phase 5 default model. Path 12, from FB Use Uni-Based to FB Maintaining, was considered theoretically plausible but not theoretically relevant. It is understandable that the more international students used FB with others based at university in general, the more likely they would be using the platform to engage with close friends on campus. Therefore, because the link provides for little improvement in theory, the path was not subjected to further testing.

Similarly, Paths 13 to 16 represent plausible relationships but do not provide any relevant and substantial contribution to theory. Independent item numbers 13 to 16 represent measures of magnitude of FB use, whereas the dependent variable, FB Information Seeking-i represents strategic use of the platform to engage in with others of social proximity on campus. Therefore, making causal inferences about the relationships between measures of magnitude and strategy represented by these four paths is problematic.

Path 17, from FB Use with Compatriots to Academic and Intellectual Development, was considered plausible and relevant. This was based on the work by Kord (2008) and Irwin, Ball, & Desbrow (2012) who found that university students considered that engagement with classmates over Facebook could result in positive academic outcomes. Therefore, Path 17 was examined in terms of its effect on variance explained in the three facets of the Phase 5 model.
Table 27

Tests of the Inclusion of Item-to-Factor Paths (Alternate Nested Models) in the Phase 5 Model

<table>
<thead>
<tr>
<th>Path</th>
<th>Exogenous Variable(s) (Independent)</th>
<th>Beta Weight (p)</th>
<th>Endogenous Variable(s) (Dependent)</th>
<th>Chi Square DIFFTEST (df)</th>
<th>p</th>
<th>Theoretically Plausible?</th>
<th>Theoretically Relevant?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Facebook Maintaining as Dependent Variable</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>FB Use Uni-Based</td>
<td>.21 (.003)</td>
<td>FB Maintaining</td>
<td>9.844(1)</td>
<td>.0017</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Facebook Information Seeking-i as Dependent Variable</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>FB Use Uni-Based</td>
<td>.23 (.002)</td>
<td>FB Info-Seeking-i</td>
<td>9.518(1)</td>
<td>.0020</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>14</td>
<td>Net Use Per Day</td>
<td>.18 (.003)</td>
<td>FB Info-Seeking-i</td>
<td>9.215(1)</td>
<td>.0024</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>15</td>
<td>FB Use with Compatriots</td>
<td>.17 (.024)</td>
<td>FB Info-Seeking-i</td>
<td>6.130(1)</td>
<td>.0133</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>16</td>
<td>Total FB Friends on Campus</td>
<td>.14 (.035)</td>
<td>FB Info-Seeking-i</td>
<td>5.558(1)</td>
<td>.0184</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Academic and Intellectual Development as Dependent Variable</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>FB Use with Compatriots</td>
<td>.13 (.034)</td>
<td>Academic and Intel. Development</td>
<td>4.549(1)</td>
<td>.0329</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Note. All possible individual factor-to-factor paths were tested but only paths where Beta weight p value < .05, and Chi-Square DIFFTEST where p value < .05 are included in the table.
5.3.6.2 Effect of Potential Path on Variance Explained Phase 5 Model. The effect of potential new pathways on the total variance explained in (a) the factors in the dependent variables in the Staff-Academic System, (b) the factors in the dependent variables in the Student-Social Network Site System, and (c) the ultimate dependent factor, Goal and Institutional Commitment, was assessed. For a plausible and relevant cross-lag path to be accepted in Phase 6, it was determined that its inclusion should not result in less variance explained by the dependent factors in any of the dependent latent factors of the Phase 5 model. Table 28 details the total effect, in terms of change in variance explained ($R^2$), across the three facets of the model for paths 6, 7, 8, 10, and 17, respectively. The total effect row indicates the change in variance explained in the five dependent factors in the phase 5 model created by the addition of the five paths. Only the addition of Path 17 (emboldened) produced neutral to positive effects on variance explained across all five dependencies.

Table 28

Effect of Paths on Variance Explained in Staff-Academic and Student-SNS Systems, and Goal Commitment

<table>
<thead>
<tr>
<th>Factors</th>
<th>Phase 5 Model</th>
<th>Potential New Path</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Staff Concern for Student Dev. &amp; Teaching</td>
<td>.47</td>
<td>.47</td>
</tr>
<tr>
<td>Academic and Intel. Development</td>
<td>.48</td>
<td>.49</td>
</tr>
<tr>
<td>Total Effect</td>
<td>+.01</td>
<td>-.06</td>
</tr>
<tr>
<td>Facebook Intensity-i</td>
<td>.47</td>
<td>.47</td>
</tr>
<tr>
<td>Total Effect</td>
<td>-.01</td>
<td>.00</td>
</tr>
<tr>
<td>Goal and Institutional Commitment</td>
<td>.51</td>
<td>.49</td>
</tr>
<tr>
<td>Total Effect</td>
<td>-.02</td>
<td>.00</td>
</tr>
</tbody>
</table>

*Note. All values presented in the table pertain to variance explained in the five dependent factors in the phase 5 model; the Total Effect row pertains to overall summative difference in variance explained in the model with the additional path compared to the phase five model; Path 17 (emboldened) did not produce any total negative effects.*

5.3.6.3 Effect of Potential Path on Model Fit Indices. Based on the results in Table 3, it was proposed that Path 17, from FB Use Compatriots to Academic and Intellectual
Development, be included in the Phase 6 model. However, inclusion depended on an evaluation of overall model fit indices to determine if this path should be included in the Phase 5 model. Table 29 presents the model fit indices across the six phases of construction, including the proposed Phase 6.

Table 29

Model Fit Indices across Six Phases of Construction

<table>
<thead>
<tr>
<th>Modelling Phase</th>
<th>N</th>
<th>( \chi^2 )</th>
<th>df</th>
<th>( \chi^2/df )</th>
<th>( p )</th>
<th>CFI</th>
<th>TLI</th>
<th>RMSEA</th>
<th>( \hat{\beta} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>488</td>
<td>63.16</td>
<td>9</td>
<td>7.02</td>
<td>.008</td>
<td>.97</td>
<td>.95</td>
<td>.11</td>
<td>.96</td>
</tr>
<tr>
<td>2</td>
<td>481</td>
<td>436.46</td>
<td>116</td>
<td>3.76</td>
<td>.05</td>
<td>.96</td>
<td>.95</td>
<td>.08</td>
<td>.93</td>
</tr>
<tr>
<td>3</td>
<td>481</td>
<td>1109.33</td>
<td>487</td>
<td>2.28</td>
<td>.13</td>
<td>.96</td>
<td>.96</td>
<td>.05</td>
<td>.92</td>
</tr>
<tr>
<td>4</td>
<td>481</td>
<td>1458.90</td>
<td>656</td>
<td>2.22</td>
<td>.14</td>
<td>.96</td>
<td>.96</td>
<td>.05</td>
<td>.92</td>
</tr>
<tr>
<td>5</td>
<td>481</td>
<td>1735.76</td>
<td>952</td>
<td>1.82</td>
<td>.18</td>
<td>.96</td>
<td>.96</td>
<td>.04</td>
<td>.93</td>
</tr>
<tr>
<td>6</td>
<td>481</td>
<td>1732.55</td>
<td>951</td>
<td>1.82</td>
<td>.18</td>
<td>.96</td>
<td>.96</td>
<td>.04</td>
<td>.93</td>
</tr>
</tbody>
</table>

Note. Phase 1 was a one factor measurement model, therefore not subject to the same model fit criterion; values in bold meet standards for good fit, in italics meet standards for acceptable fit; CFI=comparative fit index; TLI=Tucker-Lewis Index; RMSEA=root mean square error of approximation; \( \hat{\beta} \)=gamma hat.

With the inclusion of Path 17, general model fit indices were equally good. However, the DIFFTEST (Table 2, Path 17) suggested that the inclusion provided for a significant improvement in \( \chi^2 \) (4.549, 1 df, \( p = 0.0329 \)). Taken together, it was determined that Path 17 could be included at Phase 6 of the model building process. The Phase 6 model is presented in Figure 12. Nonetheless, despite the addition of this cross-lagged path between the Social Network system and the Academic-Integration system, the overwhelming message is that these two mechanisms function almost independently of each other.

Because the final Phase 6 model illustrates two general paths to improved commitment, it was named the Dual-Path Model of International Student Integration (Dual-Path Model, for short). The Dual-Path Model explains the processes through which international students integrate into academic and on- and offline social worlds. This model is presented with all manifest items and relationships in Figure 12.
Figure 12. Dual-Path Model of International Student Integration in Australasia

Note. The amount of variance explained in factors by predicting variables is placed after the name of each factor; Inter. w/ Staff = Interaction with Staff; Dev. = Development; Intell. = Intellectual; *p < .05, **p < .01, ***p < .001.
### 5.3.7 Comparison of scale averages to previous studies.

Table 30 presents an analysis of the difference between items and scales in the Dual-Path model to items and scales reported in other previous studies. Results showed that international students’ observed levels of integration into the Staff-Academic System were generally higher than reported by domestic American students in the Kord (2008) study, though with small to moderate effect sizes. Notably, international students’ perceived Staff Concern for Student Development and Teaching was higher than the students in the Kord (2008) study by just over half an effect size.

#### Table 30

**Levels of Integration into Staff-Academic System and Goal Commitment for Kord (2008) and Current Study**

<table>
<thead>
<tr>
<th>System/Scale</th>
<th>Kord (2008)</th>
<th>Current Study</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Staff-Academic System</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interaction with Staff</td>
<td>3.28</td>
<td>.70</td>
</tr>
<tr>
<td>Staff Concern for Student Development and Teaching</td>
<td>3.34</td>
<td>.55</td>
</tr>
<tr>
<td>Academic and Intellectual Development</td>
<td>3.52</td>
<td>.56</td>
</tr>
<tr>
<td>Goal and Institutional Commitment</td>
<td>4.22</td>
<td>.66</td>
</tr>
</tbody>
</table>

*Note: Medium effect sizes (0.40 ≤ d < 0.60) in italics.*

Three of the comparable factors of integration into the Student-SNS System differed with moderate to large effect sizes compared to values reported in the Ellison et al. (2011) and Pettijohn et al. (2012) studies (see Table 31). Internet Use per Day and FB Use per Day among the international students was much higher than that reported by American students. The degree to which international students valued FB (Overall FBI Ordinal Response) and FB information-seeking behaviour remained relatively the same. However, Use of FB to maintain on- and offline relations with close friends (FB Maintaining) was lower than reported by Ellison et al. (2011) by a medium effect size.
### Table 31

**Levels of Integration into Student-SNS System for Previous Studies and Current Study**

<table>
<thead>
<tr>
<th>Scale</th>
<th>Previous Study</th>
<th>Current Study</th>
<th>$d$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$M$</td>
<td>$SD$</td>
<td>$M$</td>
</tr>
<tr>
<td>FB Use per Day (hours)</td>
<td>1.22</td>
<td>1.63</td>
<td>2.98</td>
</tr>
<tr>
<td>Overall FBI Value Response</td>
<td>3.50</td>
<td>.83</td>
<td>3.66</td>
</tr>
<tr>
<td>Internet Use per Day</td>
<td>4.01</td>
<td>2.36</td>
<td>5.82</td>
</tr>
<tr>
<td>FB Information Seeking/ FB Information Seeking-i\textsuperscript{1}</td>
<td>3.40</td>
<td>.84</td>
<td>3.50</td>
</tr>
<tr>
<td>FB Maintaining</td>
<td>4.68</td>
<td>.61</td>
<td>4.42</td>
</tr>
</tbody>
</table>

*Note.* For Pettijohn et al. (2012) study, $N = 200$; For Ellison et al. (2011) study, $N = 450$; Cohen’s $d$ values pertain to difference exhibited in current study; \textsuperscript{1} see subsections 4.2.3 & 5.1.2.2 for slight modification to scales across studies; medium effect sizes ($0.40 \leq d < 0.60$) in italics; large effect sizes ($0.60 \leq d$) in bold.

#### 5.3.8 Comparison of factor inter-correlations to French and Oakes (2004)

A comparison can be made between factor inter-correlations in the current study to factor inter-correlations in the French and Oakes’ (2004) study. The factor inter-correlations between the integrational factors in the current study were quite different from those reported by French and Oakes (2004) concerning American students at a large state university in the Midwestern United States ($N = 1,734$). In French and Oakes (2004) main study they use oblique confirmatory procedures ($N = 1,734$) to determine correlations between the same five factors. The authors utilised MLR estimation to account for ordinal data (Jöreskog & Sorbom, 1993). Considering that MLR and WLSMV estimation produce equally trustworthy results (Muthén, 2009a), results could be considered comparable. Of the 10 comparable factor inter-correlations, five were significantly different across the two studies.

The most significant difference concerned the relationship between the Academic and Intellectual Development factor and the Goal and Institutional Commitment factor: $\phi = .44$ for the American students; and, $\phi = .60$ for the current international students. According to Lowry (2013), the difference between these correlations is significant that the $p < .0001$ level.
The factor inter-correlation between Staff Concern for Student Development and Teaching and Goal and Institutional Commitment was also significantly different: $\phi = .31$ for the American students; and, $\phi = .46$ for the current international students ($p < .001$, Lowry).

The factor inter-correlation between the Staff Concern for Student Development and Teaching factor and the Academic and Intellectual Development factor was also significantly different: $\phi = .49$ for the American students; and, $\phi = .61$ for the current international students ($p < .001$, Lowry).

Therefore, taken together, it could be speculated that, for international students, staff professionalism and perceived care, their perceived academic progress, and their commitment were all particularly tied together, more so than American students. This points to a qualitative difference between the two groups of students, perhaps pointing to the idea that Eastern students academic integration and commitment is more teacher-directed and perhaps more closely associated with student sentiment toward staff than in Western contexts.

In addition, the factor inter-correlation between Peer-Group Interaction and Goal and Institutional Commitment was significantly different: $\phi = .45$ for the American students; and, $\phi = .34$ for the current international students ($p < .01$, Lowry). Finally, the factor inter-correlation between Peer-Group Interaction and Interaction with Staff was significantly different: $\phi = .42$ for the American students; and, $\phi = .29$ for the current international students ($p < .01$, Lowry).

Therefore, taken together, it could be speculated that, for international students, Peer-Group Interaction, has less to do with their connection with staff and their overall commitment to university. This may be related to the idea that international students feel more socially isolated and place less emphasis on peer relations than their Western counterparts.

Of course, comparing factor inter-correlations in the French and Oakes (2004) study
to factor inter-correlations in the current study should be seen as speculative as different estimation methods were used, and configural and metric invariance could not be tested between the two samples in each study. Moreover, data concerning local Australasian students was not available in the literature therefore students in the United states were used as a comparison. It should be noted that, it would be incorrect to assume that local students in Australasia would respond in the same way as the local students in the US thus these results should be viewed with caution. Nevertheless, the results point to potential qualitative differences between international students in Australasia and local students in Western contexts. Clearly more research is needed to substantiate these claims.

5.4 An Assessment of Group Equivalence

An assessment of group equivalence involved (a) tests of measurement invariance, (b) an assessment of latent factor mean group differences, (c) an assessment of two-way group effects on latent factor means, and (d) assessment of structural equivalence across groups. Results for each of these levels of assessment are now presented.

5.4.1 Tests of measurement invariance. RQ4 asks, What role do international student demographic characteristics play in the structural model? To assess this, the Phase 4 SEM model (factors only) was redefined as a measurement model (see schematic in Figure 13).
In accordance with subsection 3.8, this was done prior to performing assessments of measurement invariance. Fit indices for the model were good, comparable to the Phase 4 SEM model with $\chi^2 = 1406.90$, $df = 644$, $\chi^2/df = 2.19$, $p = .14$, CFI = .97, RMSEA = .05, WRMR = 1.38, and $\hat{g} = .92$ ($N = 481$). An assessment of measurement invariance was carried out with respect to gender, age-group, location, Confucian- and Islamic influence, and residence, respectively. Table 32 summarises the results of the six levels of invariance testing (full results are provided in Appendix W, Tables W1-6). For each of the six contrasts, males, younger, New Zealand, Confucian, Islamic, and university resident groups are identified as...
Table 32

Measurement Invariance between Groups

<table>
<thead>
<tr>
<th>Focal Group</th>
<th>N</th>
<th>Reference Group</th>
<th>N</th>
<th>Total N</th>
<th>Configural RMSEA</th>
<th>Metric Δ CFI</th>
<th>Scalar Δ CFI</th>
<th>Structural Δ CFI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>163</td>
<td>Female</td>
<td>318</td>
<td>481a</td>
<td>.05</td>
<td>.97</td>
<td>-0.00</td>
<td>.00</td>
</tr>
<tr>
<td>21-and-Under</td>
<td>263</td>
<td>22-and-Over</td>
<td>218</td>
<td>481b</td>
<td>.05</td>
<td>.97</td>
<td>0.00</td>
<td>.01</td>
</tr>
<tr>
<td>New Zealand</td>
<td>214</td>
<td>Australian</td>
<td>267</td>
<td>481c</td>
<td>.05</td>
<td>.96</td>
<td>0.00</td>
<td>-0.00</td>
</tr>
<tr>
<td>Confucian</td>
<td>157</td>
<td>Non-Confucian</td>
<td>324</td>
<td>481d</td>
<td>.05</td>
<td>.96</td>
<td>-0.00</td>
<td>.01</td>
</tr>
<tr>
<td>Islamic</td>
<td>219</td>
<td>Non-Islamic</td>
<td>262</td>
<td>481e</td>
<td>.05</td>
<td>.96</td>
<td>0.00</td>
<td>.01</td>
</tr>
<tr>
<td>At University</td>
<td>128</td>
<td>Not at Uni.</td>
<td>351</td>
<td>479f</td>
<td>.05</td>
<td>.96</td>
<td>-0.00</td>
<td>.01</td>
</tr>
</tbody>
</table>

Note. Confucian = group from Confucian-influenced countries, Islamic = group from Islamic-influenced countries, Uni. = University, RMSEA = Root Mean Square Error of Approximation, CFI = Comparative Fit Index.

the focal group, while the contrasting females, older, Australian, non-Confucian, non-Islamic, and non-university resident groups are identified as the reference group.

Results show that all six groupings meet the requirements for configural invariance, with RMSEA values equal to or less than .05 (RMSEA ≤ .05). Results also show that all six groupings met the requirements for metric, scalar, and structural invariance as absolute changes in CFI were equal to or less than .01 (|ΔCFI| ≤ .01). This suggests that an assessment of equivalence between structural relationships and latent factor means is robustly defensible.

With regard to structural differences across groups, subsection 5.4.4 provides a more discerning assessment of the significance of the difference between individual structural values in the Phase 4 structural model. Nonetheless, this analysis demonstrates that the questionnaire functioned in a similar way for all groups of participant and thus comparison of group means for the factors is possible.

**5.4.2 Assessment of latent factor mean group differences.** As in section 5.4.1, for each of the six contrasts, the males, younger, New Zealand, Confucian, Islamic, and university resident groups are all defined as focal groups, while the contrasting females, older, Australian, non-Confucian, non-Islamic, and non-university resident groups are defined as reference groups. Results of the analysis of latent factor mean differences for these six contrasts are presented in Table 33 (see Appendix X, Tables X1-6, for full reports). Results
indicated 18 of a possible 42 comparisons (six contrasts for seven factors) were statistically significant. However, there were only two contrasts which had medium effect sizes (i.e., $d \geq .40$); that is, age-group and Islamic-influence. Specifically, the 21-and-under group had a higher degree of FB Maintaining than their older counterparts, while students from Islamic-influenced countries exhibited a higher degree of Goal and Institutional Commitment than students from non-Islamic-influenced countries.
Table 33

Standardised Latent Factor Mean Differences between Groups

<table>
<thead>
<tr>
<th>Contrast</th>
<th>Focal Group</th>
<th>Reference Group</th>
<th>Interaction with Staff (d)</th>
<th>Staff Concern for Student Dev. &amp; Teaching (d)</th>
<th>Aca. and Intel. Dev. (d)</th>
<th>FB Maintaining (d)</th>
<th>FB Info Seek-i (d)</th>
<th>FBI-i (d)</th>
<th>Goal Commit. (d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Gender</td>
<td>Male</td>
<td>Female</td>
<td>-0.02</td>
<td>-0.31**</td>
<td>-0.04</td>
<td>-0.28*</td>
<td>-0.12</td>
<td>-0.30**</td>
<td>-0.28*</td>
</tr>
<tr>
<td>2. Age-group</td>
<td>21-and-Under</td>
<td>22-and-Over</td>
<td>-0.24*</td>
<td>0.01</td>
<td>0.09</td>
<td><strong>0.40</strong></td>
<td>0.20</td>
<td>0.33***</td>
<td>0.33**</td>
</tr>
<tr>
<td>3. Location</td>
<td>New Zealand</td>
<td>Australian</td>
<td>0.20*</td>
<td>0.25*</td>
<td>0.09</td>
<td>-0.13</td>
<td>-0.16</td>
<td>-0.18*</td>
<td>0.05</td>
</tr>
<tr>
<td>4. Confucian</td>
<td>Confucian-Influenced</td>
<td>Non-Confucian Influenced</td>
<td>-0.10</td>
<td>-0.23*</td>
<td>-0.14</td>
<td>0.14</td>
<td>0.26*</td>
<td>-0.03</td>
<td>-0.22</td>
</tr>
<tr>
<td>5. Islamic</td>
<td>Islamic-Influenced</td>
<td>Non-Islamic Influenced</td>
<td>0.18</td>
<td>0.36***</td>
<td>0.35***</td>
<td>0.17</td>
<td>0.32**</td>
<td>0.29**</td>
<td><strong>0.51</strong>*</td>
</tr>
<tr>
<td>6. Residence</td>
<td>Residing at University</td>
<td>Residing Outside University</td>
<td>0.02</td>
<td>0.10</td>
<td>0.13</td>
<td>0.23</td>
<td>0.07</td>
<td>0.14</td>
<td>0.18</td>
</tr>
</tbody>
</table>

Note. Dev. = Development, Cohen’s $d$ values pertain to those exhibited in Focal group; emboldened values represent medium effect sizes ($0.40 \leq d < 0.60$); $p* < .05$, $p** < .01$, $p*** < .001$. 
5.4.3 Assessment of two-way group effects on latent factor means. Table 34 summarises the two-way interactions on latent factor means in terms of (a) location by gender, (b) location by age group, (c) location by Islamic influence, and (d) age group by Islamic influence (see Appendices Y-BB for full reports). Effect size values ($d$) represent standardised latent factor mean differences exhibited in subgroup 1. Given that each contrast cell had to have just 75 members, it was decided to report just those contrasts with medium to large effect sizes.
Table 34

Large and Medium Two-Way Interaction Effects on Latent Factor Means (n ≥ 75)

<table>
<thead>
<tr>
<th>Interaction</th>
<th>Focal Group</th>
<th>Reference Group</th>
<th>Staff Concern for Student Development (d)</th>
<th>Academic and Intellectual Development (d)</th>
<th>Goal Commitment (d)</th>
<th>FBI-international (d)</th>
<th>FB Information Seeking (d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location by Gender</td>
<td>NZ Male</td>
<td>NZ Female</td>
<td>-0.42</td>
<td>-</td>
<td>-0.51</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>NZ Male</td>
<td>Aus. Male</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-0.42</td>
</tr>
<tr>
<td>Location by Age Group</td>
<td>NZ 21-&amp;-Under</td>
<td>NZ 22-&amp;-Over</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.51</td>
</tr>
<tr>
<td></td>
<td>Aus. 21-&amp;-Under</td>
<td>Aus. 22-&amp;-Over</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Location by Islamic Influence</td>
<td>NZ Islamic</td>
<td>NZ non-Islamic</td>
<td>0.70</td>
<td>0.63</td>
<td>1.10</td>
<td>0.73</td>
<td>0.57</td>
</tr>
<tr>
<td></td>
<td>NZ Islamic</td>
<td>Aus. Islamic</td>
<td>0.59</td>
<td>-</td>
<td>0.46</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>NZ non-Islamic</td>
<td>Aus. Not Islamic</td>
<td>-</td>
<td>-</td>
<td>-0.54</td>
<td>-</td>
<td>-0.47</td>
</tr>
<tr>
<td>Age Group by Islamic Influence</td>
<td>22-&amp;-Under Islamic</td>
<td>22-&amp;-Over non-Islamic</td>
<td>0.55</td>
<td>0.43</td>
<td>0.69</td>
<td>0.51</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>21-&amp;-Under non-Islamic</td>
<td>22-&amp;-Over non-Islamic</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.50</td>
<td>-</td>
</tr>
</tbody>
</table>

Note. Analysis found no large or medium interaction effects concerning demographic interaction on Interaction with Staff and FB Maintaining factors (see Appendices Y1 to BB4 for full results); Cohen’s d values represent standardised latent factor mean differences exhibited in Subgroup 1. Values in bold represent large effect sizes (d ≥ .60) in accordance with Hattie (2009), other values represent medium effect sizes, cells with an em dash (—) represent small or negligible effect sizes.
An assessment of the two-way interaction effects on latent factor means for each of the four interaction effects revealed five large interaction effects involving Islamic students. A further 13 medium interaction effects were also revealed. In New Zealand, the Islamic-influenced group, when compared to the non-Islamic influenced group, exhibited largely higher perceptions of Staff Concern for Student Development and Teaching, Academic and Intellectual Development, Goal and Institutional Commitment, and FBI-i (effect sizes, $d \geq .60$). There was also one other large interaction effect between age-group and Islamic influence whereby, among the older students, the Islamic group, when compared to the non-Islamic group, exhibited largely higher Goal and Institutional Commitment. Overall, most of the interaction effects involved students’ location (i.e., 4 of 5 large; & 9 of 13 medium). International students Islamic influence also played a role whereby all of the five large interaction effects and nine of the 13 medium interaction effects were concerned with Islamic influence. Therefore, more broadly, location and Islamic influence appear to matter when it comes to international students’ social and academic integration. It is noted that 53 of the 135 Islamic influenced group (39.3%) in New Zealand were scholarly students from Malaysia. Therefore, these effects may be slightly confounded by this quite large proportion of students. It may be that being selected by their home country as scholarship students, and being part of a relatively large group of students on campus, produces statistically significant results which do not apply to all Muslim students but rather apply to Malaysian students specifically.

Overall, results suggest that location and Islamic-influence has the greatest influence on international student integration in Australasia: all medium and large two-way interaction effects in the study included one or both of these demographic characteristics. Moreover, when the interaction of both location and Islamic-influence were taken together, the results on latent factor means were dramatic: Islamic-influenced students in New Zealand exhibited
much better integration into the Staff-Academic System than non-Islamic influenced counterparts in New Zealand.

5.4.4 Assessment of Sample Bias of Malaysian Scholarship Students in New Zealand. According to Table 34, the New Zealand Islamic-influenced cohort is largely better integrated than the New Zealand non-Islamic influenced cohort in terms of (a) Staff Concern for Student Development and Teaching, (b) Academic and Intellectual Development, (c) Goal and Institutional Commitment, and (d) Facebook Intensity-international; and, moderately better integrated in terms of (e) Facebook Information Seeking. In addition, the New Zealand Islamic cohort is moderately better integrated than the Australian Islamic students in terms of (a) their Staff Concern for Student Development and Teaching, and (b) Goal and Academic Commitment.

It was considered that the seven findings presented above may be a function of sampling bias: 53 of the 136 total Islamic-influenced cohort in New Zealand were Malaysian government picked scholarship students and, thus, potentially more academically integrated. To test this, the 53 student cases were removed from the analysis and re-analysis of interaction effects on latent factor means was undertaken. Table 35 includes (a) the aforementioned seven latent factor mean differences for full 481i dataset, and (b) the same seven latent factor mean differences for the same dataset, minus the 53 Malaysian scholarship students (in brackets after each effect size value).

With the removal of the 53 cases, the difference dropped from large to medium levels between the New Zealand Islamic-influenced cohort and the New Zealand’s non-Islamic influenced cohort’s (a) perception of staff concern for student development and (b) intellectual development. However, the difference between the two cohort’s goal commitment and Facebook Intensity-i remained large for both factors. Therefore, it was determined that the inclusion of the Malaysian scholarship students exacerbated the New
Table 35

Large and Medium Two-Way Interaction Effects on Latent Factor Means \( (n \geq 75) \)

<table>
<thead>
<tr>
<th>Interaction</th>
<th>Focal Group</th>
<th>Reference Group</th>
<th>Staff Concern for Student Development ( (d) )</th>
<th>Academic and Intellectual Development ( (d) )</th>
<th>Goal Commitment ( (d) )</th>
<th>FBI-international ( (d) )</th>
<th>FB Information Seeking ( (d) )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location by Islamic Influence</td>
<td>NZ Islamic</td>
<td>NZ non-Islamic</td>
<td>0.70 (0.47)</td>
<td>0.63 (0.43)</td>
<td>1.10 (0.97)</td>
<td>0.73 (0.77)</td>
<td>0.57 (0.52)</td>
</tr>
<tr>
<td></td>
<td>NZ Islamic</td>
<td>Aus. Islamic</td>
<td>0.59 (0.35)</td>
<td>—</td>
<td>0.46 (0.34)</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

*Note.* Cohen’s \( d \) values represent standardised latent factor mean differences exhibited in Focal Group; values in bold represent large effect sizes \( (d \geq .60) \); values in regular text represent medium level effect sizes \( (40 \leq d < .60) \); values in italics represent small effect sizes \( (20 \leq d < .40) \) in accordance with Hattie (2009); values in brackets pertain to re-analysis of dataset without 53 Malaysian scholarship students; cells with an em dash (—) represent small or negligible effect sizes for full 481i dataset and, therefore, not subject to re-analysis.
Zealand Islamic-influenced students’ high degree of integration into the New Zealand Staff-Academic system and Student-Social Network Site Systems. However, the differences remained moderate to large across both Staff-Academic and Student-Social Network Site Systems suggestive of real-world differences between the Islamic and non-Islamic influenced groups inside New Zealand. Therefore, findings suggest that Islamic-influenced students, in general, integrate particularly well into the New Zealand Staff-Academic and Student Social Network Site Systems.

With the removal of the 53 cases, the difference between the New Zealand Islamic-influenced and the Australian Islamic-influenced cohorts’ (a) Staff Concern for Student Development and Teaching, and (b) Goal Commitment dropped from the moderate to small levels. Therefore, it was determined that the inclusion of the Malaysian scholarship students probably artificially increased the distinction between these two cohorts and that real world differences were likely small and less statistically significant than the original analysis suggested. Thus, re-analysis suggests that location plays little role in the academic and social integration of Islamic-influenced students across Australasia.

5.4.5 Assessment of structural equivalence across groups. In addition to comparing factor means, it is also possible to compare the strength of correlations and regressions in the model according to group membership. Results pertaining to the significance of the difference between individual structural regression weights (β) and correlations (φ) are presented in Table 36. Only statistically significant differences (p < .05) are reported (see Appendix CC for full report).

At the more parsimonious p < .01 level (see subsection 3.8), results show four significant differences in structural relations in the model. The standardised regression coefficient from Academic and Intellectual Development to Goal and Institutional Commitment was stronger for (a) students living in New Zealand compared to those living in
Table 36

Statistically Significant Group Differences in Structural Relations in Phase 4 Model

<table>
<thead>
<tr>
<th>Demographic Comparison</th>
<th>( \beta_1 ) (Regression from Staff Concern to AID.)</th>
<th>( \beta_2 ) (Regression from AID to Commitment)</th>
<th>( \phi_3 ) (Correlation between FB Information Seeking-i and FBI-international)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New Zealand</td>
<td>ns</td>
<td>0.65***</td>
<td>ns</td>
</tr>
<tr>
<td>Australia</td>
<td>ns</td>
<td>0.48***</td>
<td>ns</td>
</tr>
<tr>
<td>Age Group</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21-and-under</td>
<td>ns</td>
<td>0.41**</td>
<td>0.52*</td>
</tr>
<tr>
<td>22-and-over</td>
<td>ns</td>
<td>0.63**</td>
<td>0.41*</td>
</tr>
<tr>
<td>Residence</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>At University</td>
<td>0.74*</td>
<td>0.66**</td>
<td>0.58**</td>
</tr>
<tr>
<td>Not University</td>
<td>0.66*</td>
<td>0.55**</td>
<td>0.45**</td>
</tr>
<tr>
<td>Country</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Islamic Influenced</td>
<td>0.61*</td>
<td>0.70*</td>
<td>ns</td>
</tr>
<tr>
<td>Not Islamic</td>
<td>0.70*</td>
<td>0.51*</td>
<td>ns</td>
</tr>
</tbody>
</table>

Note. AID = Academic and Intellectual Development, Staff Concern = Staff Concern for Students Development and Teaching, Commitment = Goal and Institutional Commitment, cells replaced with “ns” represent statistically insignificant differences, *\( p < .05 \), **\( p < .01 \), ***\( p < .001 \).

Australia, (b) the 22-and-over group compared to the 21-and-under group, and (c) students residing at university compared to those residing off campus. The correlation between FB Information Seeking-i and FBI-i was stronger for those residing at university compared to those residing off campus.

At the less parsimonious \( p < .05 \) level, there were four more differences in structural relations in the model. The standardised regression coefficient from Staff Concern for Student Development and Teaching to Academic and Intellectual Development was stronger for (a) students residing at university, and (b) students from Islamic-influenced countries.

The regression coefficient from Academic and Intellectual Development to Goal and Institutional Commitment was also stronger for students from Islamic-influenced countries than those not from such countries. Finally, the correlation between FB Information Seeking-i and FBI-i was stronger for the 21-and-under group than it was for the 22-and-over group.
A full summary of the results are provided in the following chapter.
CHAPTER 6. DISCUSSION

The international university student sector is a competitive, dynamic, and increasingly important sector in Australasia. It is therefore imperative for university administrators, teaching staff, and stakeholders to consider developments in the field and make appropriate changes in policy and practice for the long-term benefit of the sector. This study contributes to our understanding of international student integration by empirically developing and confirming scales designed to assess integration and by detailing and testing a systematic model of international university student integration for the region. To put these findings in perspective, this chapter provides (a) a short summary of results, (b) a discussion of this study's major findings, (c) recommendations for university policy and practice, (d) suggestions for the directions of future research, and (e) a summary of the contribution made by this dissertation.

6.1 Summary of Results

6.1.1 RQ1: How do the FB-related items function to explain the FB-related behaviour of international university students in Australasia? Results showed that international students spent close to six hours actively engaged in online activities ($M = 5.82$, $SD = 3.28$) and close to three hours actively engaged in FB ($M = 2.98$, $SD = 2.89$). FB was used as a tool to connect broadly with others within the university, country, and home-country contexts. Within the university context, international students made use of the platform to connect with a wide variety of others including compatriot, other-country international, and local students. FB appeared to play an important part in the lives of the international students, with respondents reporting, on average, general agreement with the FBI-i ordinal questions, several group affiliations, close to 100 campus-bound FB friendships, and 75 campus-bound actual FB friends.
Facebook usage was reduced to two factors: FBI-i, reflecting Facebook life integration, and FB Affiliations, reflecting the general accumulation of Facebook friends and group membership. In terms of connection strategies, in line with previous research, results showed a spectrum of four factors including (a) FB Maintaining, reflecting high levels of engagement with the socially proximal close friends, (b) FB Information Seeking-i, reflecting moderate use of Facebook to learn about others of proximity on campus, (c) SFBG Engagement, reflecting quite low levels of active engagement with coincidental Facebook group affiliates, and (d) FB Initiating-i, reflecting even lower levels of engagement with strangers on campus. Analysis suggested that the Facebook-related factor solution was an excellent representation of the target population making generalisations about Facebook-related behaviour tenable.

6.1.2 RQ2: How do the institutional integration items function to explain the integrative behaviour of international university students in Australasia? In line with previous research (Pascarella & Terenzini, 1980), institutional integration was reduced to five factors, namely Peer-Group Interactions, Interaction with Staff, Staff Concern for Student Development and Teaching, Academic and Intellectual Development, and Goal and Institutional Commitment. A look at the observed scores of these scales suggested that, on average, international students were highly committed to their places of study and the goal of graduation, whilst the observed scores of the other four forms of institutional integration were suggestive of more moderate levels of institutional integration. Analysis revealed that the institutional integration factor solution was an excellent representation of the target population making generalisations about institutional integration tenable.

6.1.3 RQ3: What structural model best represents the role of Facebook-related and institutional integration factors for international students’ commitment? In terms of a systematic understanding of integration, results showed two important paths to student success. The first path, named the Staff-Academic System, illustrates Staff Concern for
Student Development and Teaching as mediating the effect of Interaction with Staff on Academic and Intellectual Development. The second path, named the Student-SNS System, specifies FBI-i and FB Information Seeking-i as important precursors to FB Maintaining, a dimension that reflects use of the site to maintain on- and offline ties with close friends on campus. Together, Academic and Intellectual Development, and FB Maintaining make robust and significant contributions to international students’ Goal and Institutional Commitment.

With regard to the factors pertinent to the Staff-Academic system, comparisons of scale with the Kord (2008) study showed that the international students exhibited slightly better levels of Interaction with Staff and Academic and Intellectual Development, and moderately higher levels of their perception of Staff Concern for Student Development and Teaching. Comparison to other studies generally revealed higher levels of integration into the Student-SNS System. International students spent largely more time on FB than their American counterparts, whilst the degree to which students valued FB (Overall FBI Ordinal Response) was comparable across studies. Comparisons also showed similar levels of FB information-seeking behaviour, and lower levels of FB Maintaining in the system at the medium effect size level. Finally, levels of Goal and Institutional Commitment were comparable.

6.1.4 RQ4: What role do international student demographic characteristics play in the structural model? Generally, with regard to the Dual-Path Model, analysis showed that direct comparisons could be made between groups for levels of gender, age-group, location, region of origin, and residence. Comparisons revealed that younger students exhibited moderately higher levels of FB Maintaining, and students from Islamic-influenced countries exhibited moderately higher levels of Goal and Institutional Commitment.

Results also showed that, in New Zealand, students hailing from Islamic-influenced countries were largely better integrated into the Staff-Academic System and also were largely
more inclined to integrate FB into their lives than students not hailing from Islamic-influenced countries. In addition, of the older students, those from Islamic-influenced countries exhibited largely higher levels of Goal and Institutional Commitment compared to students not from Islamic-influenced countries.

Findings also suggested that the effect of students’ Academic and Intellectual Development on their Goal and Institutional Commitment was significantly stronger for students living in New Zealand, older students, and students residing at university. In addition, the correlation between FB Information Seeking-i and FBI-i was stronger for those residing at university.

6.2 Discussion of Results

The discussion section first provides an interpretation of the Dual-Path Model and how it contributes to theory concerning international student integration in higher education. Attention is then drawn to international students’ levels of integration into the Dual-Path Model. Levels of integration into factors are discussed with reference to levels reported in previous studies. FBI-i and AID contributors (Figure 12) are also referenced for the purpose of interpreting international students’ FBI-i and Academic and Intellectual Development. Thereafter, the difference between factor intercorrelations in the current study to factor intercorrelations in the French and Oakes (2004) study are discussed. Finally, a discussion concerning the role of demographics and why certain groups might be represented differently in the model rounds off the section.

6.2.1 An interpretation of the Dual-Path Model. Three fundamental factors form the foundation of the Dual-Path Model: Interaction with Staff, FB Information Seeking-i, and FBI-i. The Interaction with Staff factor provides a general assessment of the frequency of quality informal interactions with faculty, whilst the FB Information Seeking-i factor reflects the strategic use of FB to learn about others of offline proximity, and the FBI-i factor reflects
integration of FB into the lives of students. The statistically significant correlations between all three exogenous factors may reflect a general coherence between international students’ on- and offline psychosocial behaviour towards other people in general. It may be that some as-yet-to-be-included psychosocial variable may be causally linked to all three forms of social engagement represented by the factors. Extroversion (Bendig, 1962) is one candidate—research suggests that it positively predicts general FB use among international students (Lin et al., 2011). International posture (McCroskey, 1992), capturing a general non-xenophobic attitude, is another candidate—research suggests that it positively predicts integrative motivations of second-language users (Yashima, 2002). The effect of other such personality-type variables is an area needing further research. Findings also suggested a statistically significant medium-level correlation between international students’ FB life integration (FBI-i) and their use of the site to learn about other students of proximity. This finding supports previous research by Pettijohn et al. (2012) who also found a strong statistically significant correlation between the two very similar scales, FBI and FB Usage Off to Online. Although Pettijohn et al. do not speculate on the meaning behind the correlation, it may be that the more university students make use of FB to connect with others of social proximity, the more FB becomes integrated into their lives for the purpose of accommodating such connections.

The Academic System in Tinto’s (1993) Longitudinal Model of Student Departure (Figure 2) suggests that students’ academic performance and interaction with staff reflect upon their academic integration which, in turn, impacts their goal and institutional commitment. The Staff-Academic System in the Dual-Path Model supports much of the processes theorised by Tinto (1993); international students’ reported Academic Standard reflects upon their Academic and Intellectual Development, which, in turn, impacts upon their Goal and Institutional Commitment. However, unlike in Tinto’s (1993) model, the Staff-Academic System introduces the idea that students’ perception of Staff Concern for Student
Development and Teaching operates as a mediator between the influence of Interaction with Staff and Academic and Intellectual Development. Research in the field of management science suggests that managerial concern for employees mediates the influence of managerial–employee interaction on the perception useful knowledge. Findings in the current study support this conception insofar as staff concern for students mediates the effect of staff–student interactions on students’ perception of academic progress. In addition, results from the current study provide empirical support for the findings of an in-depth study of international university students in Australia. Wong’s (2009) interviews with 15 Asian international students of various origin reported that face-to-face interaction with lecturers during office hours enabled students to build rapport which, in turn, played a key role in assisting students with their studies. Wong (2009) reports that “Rapport between lecturer and student plays a very important role in helping students cope with their studies. Many Asian students testified that it was this close relationship with their lecturers that enabled them to overcome their initial frustrations” (p. 45). Findings of the current study provide robust evidence in support of these students’ attestations that close relations emphasising care and concern for students and their learning are pivotal to international students’ perceived academic progress and success throughout Australasia.

Analogous to the findings in the Rienties et al. (2012) study of international students in the Netherlands, international students’ perception of their academic development, as opposed to their actual reported Academic Standard, was closely associated with their levels of commitment. This finding supports the body of research that suggests that the extent to which students believe that they have developed academically is integral to their commitment and success at university (Braxton & Lee, 2005; Thomas, 2000).

The second path to improved Goal and Institutional Commitment from within the Dual-Path Model involves international student engagement in the Student-SNS System. The
system suggests that international students use of FB to learn about others of proximity, alongside FB life integration, contributes to use of FB to maintain on- and offline interactions with existing close friends on campus, and, ultimately, institutional commitment and success.

Before discussing the system itself, attention is drawn to the nature of the FBI-i factor. The Total FB Friends item was not a part of the FBI-i factor as originally conceived (Ellison et al., 2007). In the Ellison et al. (2007) study, the Total FB Friends item was the lowest-performing item of the FBI scale (Table 4) suggesting that the mere accumulation of FB friends may have been slightly less relevant to FB life integration at the time. Further research conducted by Ellison et al. (2011) suggested that the Total FB Friends item itself made no significant contribution to either bridging or bonding social capital (pp. 884-885). Ellison and colleagues speculate that this discrepancy may have stemmed from users’ more recent ability to configure FB to disassociate from non-actual friends in their News Feed. The omission of any total FB friend counts from the FBI-i factor in the current study certainly lends credence to this claim. Therefore, fundamentally, results from the current study support the notion that the total number of FB friends may have less relevance to the degree to which FB is integrated into students’ lives and institutional integration in general. Rather, results here suggest that international students’ total FB friend counts might be associated with a general tendency to join groups, defined in this study as FB Affiliations. This tendency may be related to what Abram and Pearlman (2012) define as *friending*.

The Student-SNS System expands upon earlier findings in the field concerned with the socialisation of international students in Australasia. Kudo and Simkin (2003) found that international students made frequent face-to-face contact with other students in the context of shared classrooms, accommodation, and social networks, and that these interactions provided the opportunity for them to make close friends (pp. 97-99). The Student-SNS System explains this socialisation process empirically but does so by acknowledging on- and offline
communicative behaviour as “deeply integrated communicative spheres” (Ellison et al., 2011, p. 887). The Student-SNS System reflects the integrational process established by Kudo and Simkin (2003) but incorporates the ubiquity of social media in international students’ lives. The system itself represents an evolved social ecosystem where peer-to-peer institutional relations develop within on- and offline communicate realms. Although further research is necessary, it is likely that the technical attributes of FB provide an online infrastructure that supports international students’ natural bonding process. As Ellison et al. (2011) speculate, “Facebook provides a rich collection of context clues, such as mutual friends or shared interests, which can guide conversations to socially relevant topics and better enable participants to find common ground” (p. 887). In light of the findings of the current study, this appears to be a logical explanation for the way in which FB might facilitate the all-important formation of close friends on campus.

In his review of the literature concerning university students’ social integration, Bean (2005) establishes that “social support and close friendships form the core component of social integration” and defines close friendship as “those that contain care, empathy, concern, affect, spending time and so on” (p. 228). Findings here suggest that international students receive such social support within both on- and offline social contexts and this, in turn, improves their commitment.

6.2.2 Levels of integration into the Dual-Path Model. The international students’ generally agreed more with the scales in the Staff-Academic System than the local American students reported in the Kord (2008) study. Although difficult to interpret, these slightly higher levels suggest that Australasian international students’ relations with staff and perceived academic progress could be considered fair. However, a comprehensive comparison between international and local students in Australasia would provide a more definitive understanding. Nevertheless, international students’ levels of integration provide
much scope for development in this area, especially in terms of staff interaction. Likewise, levels of Staff Concern for Student Development and Teaching, and Academic and Intellectual Development provide space for improvement in the sector.

With respect to the Student-SNS System, international students were generally more integrated than university students in other studies. Compared to local students in America, international students throughout Australasia devoted much more time to FB usage. The degree to which the international students valued the site was, although negligibly, even higher than the American-centric sample in the Ellison et al. (2011) study. This is quite remarkable, considering the propensity for international students to make use of other home-grown SNSs in addition to the fact that FB was conceived in the West. Three and a half years separate the student samples in the Ellison et al. (2011) and the current study (Ellison et al.’s 2011 study was fielded in April 2008 and the current study was fielded in October 2011). Therefore, it may be that international students’ high levels of use FB use is related to a general upward trend in connectivity, perhaps in part due to the recent burgeon of mobile computing during the 2008 to 2011 period (Australian Bureau of Statistics, 2012). The Dual-Path Model provides some support to this claim: Internet Use per Day does contribute to the degree to which FB was integrated into students’ lives, suggesting that increased connectivity does in fact translate into increased FB life integration.

Findings also show that use of FB at the campus, national, and transnational levels contributes to the degree to which international students integrate FB into their lives. This finding supports previous research in the field by Lee, Lee, and Jang (2011) who established the following four motivational factors for international students’ use of the Internet: (a) homeland orientation, (b) local social interaction, (c) entertainment, and (d) local information seeking. Therefore, high FB use by international students in the current study may be associated with students’ motivations to straddle and stay engaged with both the local
Australasian and homeland social contexts. Although campus, national, and transnational FB communication all appear to be important determiners of FB life integration, the strength and significance of their contributions were made in the order of physical proximity of communication partners. This adds to research by Ellison et al. (2007) that suggests that university students use FB to connect more with people with whom they share an offline connection. In the current study, as international students’ communication partners became more physically proximal, FB became more relevant to international students’ lives. In further support of this notion, Total FB Friends on Campus, as opposed to the more broad FB friendship counts encompassing off-campus relationships, also contributed to the degree to which FB was integrated into the lives of international students.

Findings showed that the cultural proximity of FB communication partners also determined the degree to which FB was integrated into international students’ lives. FB use with compatriots and other-country internationals contributed to the degree with which FB was integrated into the students’ lives, whilst FB use with locals did not. This adds to previous research in the field. Lin et al. (2011) found that FB use with compatriots (including those on campus and in international students’ countries of origin) contributed significantly to social adjustment, a factor including items pertaining to close social ties and satisfaction with social life. Findings in the current study pertain specifically to the role of FB use with compatriots and other-country internationals on campus. Results here suggest that FB Use with Compatriots and Other-Country Internationals on campus contributes to an increased integration of FB into the lives of internationals, which, in turn, increases students tendency to engage in on- and offline social behaviours with close friends.

It should be noted here that the scarcity of research concerning geographic- and demographic-based FB use makes it difficult to speculate about possible direction and indeed causal inferences; it may be the case that FB life integration facilitates FB communication on
campus, national, and transnational levels. It may also be that FB life integration also facilitates FB communication with compatriot and other-country international students, and campus-bound FB friendships. Although relationships appear to exist between these constructs of interest, more research is needed to explain their nature and potential direction.

The lack of relevance of FB use with locals from the Dual-Path Model extends previous research in the field. Research conducted by Lin et al. (2011) also found that international students’ FB use with local American friends made no significant contribution ($p < .05$) to social adjustment, emotional adjustment, or college attachment. On the topic of student social integration across cultures, Kuh and Love (2000) proposed that “students who traverse a long cultural distance must become acclimated to dominant cultures of immersion or join one or more cultural enclave” (p. 201). Although the international students reported using FB to communicate with locals, on average, approximately “every once in a while”, the lack of relevance of this form of communication in the Dual-Path Model suggests that international students throughout Australasia use FB as a means of integration into cultural enclaves. The fact that international student numbers in Australasia are proportionally very high adds credence to this claim (see Chapter 1).

International students’ general likelihood of exhibiting FB information-seeking behaviour was equivalent to the levels reported by Ellison et al. (2011). This result indicated that FB is used in a similar way by students across the world to learn about others of proximity, such as those with a social, classroom, or domiciliary connection. Like in the Ellison et al. (2011) study, the likelihood that international students exhibit FB Maintaining behaviours was also very high, suggestive of similar strategic use among local and international students. However, the international students were moderately less likely to engage in FB Maintaining behaviours than the local students reported in the Ellison et al. (2011) study. It is difficult to speculate why there was such a difference, although use of
home-grown SNS services, or perhaps relatively new media platforms such as Twitter, may slightly moderate the use of FB to connect with close friends for some groups. Age may also be a factor. The average age of students in the current study was 22.74, whilst the average age of students in the Ellison et al. (2011) study was 20.4. Research suggests that younger students are likely to integrate FB more into their lives (Pettijohn et al., 2012), so it may be that older students in the current study are less likely to use FB as a means to engage with close friends. Nevertheless, strategic use of the site appears to be much the same across studies.

In summary, international students’ level of integration into the Staff-Academic System, although slightly higher than that reported by Kord (2008), provides much room for improvement for the sector, especially in terms of improving the degree and quality of informal interactions with staff. International students’ level of integration into the Student-SNS System appears to be generally quite high in many regards. On many levels FB has become a large part of international students’ lives, although usage tends to be campus-bound and associated with compatriots and other-country international students.

6.2.3 Comparison of factor inter-correlations to French and Oakes (2004).

Compared to the French and Oakes (2004) study, there were several significant differences in factor inter-correlations among the current international student sample. First and foremost, the three factor inter-correlations between the Staff Concern for Student Development and Teaching, Academic and Intellectual Development, and Goal and Institutional Commitment factors were all significantly higher for international students. Conversely, the factor inter-correlations between Peer-Group Interaction and Interaction with Staff, and Goal and Institutional Commitment appeared to be significantly weaker. Put simply, staff care and professionalism, and students’ perceived academic progress appears especially important to international student commitment, while peer-group interaction, at least in the way that it is
measured in the current study, matters less. The stronger relationship between the three factors may be related to the socio-cultural context with which international students find themselves in: facing barriers to integrating with much of the local student body, students may place much value on affinity with staff. Indepth research by Wong (2009) supports the idea that student-lecturer rapport plays a key role in international student progress. Findings here provide some empirical support for this idea, however more research is needed to discern the different points of focus, if any, for international university students studying throughout Australasia.

6.2.4 The role of demographics. International student demographics play an important role in the interpretation of the proposed Dual-Path Model. First, analysis suggests that the model is generally applicable across all subsets of age, gender, location, residence, and country of origin, making comparisons between groups tenable.

Results showed that the 21-and-under group exhibited a higher level of FB Maintaining than the 22-and-over group. This finding is in line with previous research that suggests that in general younger adults integrate FB more into their lives than older adults (Pettijohn et al., 2012). More extensive use of FB to engage with close friends may be the result of increased use of the platform, or similar media, during students’ more formative years. As a result, the younger group may be more comfortable with and savvier at using the FB platform to maintain connections with close friends on campus.

Results also showed that students of Islamic-influenced countries exhibited a higher degree of Goal and Institutional Commitment. This finding provides empirical support for earlier speculation by Lewthwaite (1996) that Islamic-influenced students settle into academic life better than non-Islamic influenced students (p. 180), and research by Asmar et al. (2004) that Muslim students in general exhibit higher levels academic commitment and satisfaction with their studies.
Among older students, the Islamic-influenced group, when compared to the non-Islamic influenced group, exhibited largely higher Goal and Institutional Commitment. Therefore, the older Islamic-influenced students appeared largely more committed to their institutions than their older non-Islamic counterparts. Although speculative, the role of Islamic-influence in increased institutional commitment may be a function of the comparatively large economic advantage afforded to students of Islamic-influenced countries in the current study. Of the 76 Islamic-influenced students in the older bracket, 66 (87%) originated from Malaysia, a country where a Western degree provides much opportunity for upward mobility (Sin, 2006). Therefore, although speculative, increased institutional commitment among the older Islamic-influenced group may be the result of the perceived high utility of an Australasian education in their respective countries.

Findings suggested that the structural relation between Academic and Intellectual Development and Goal and Institutional Commitment was not equivalent in terms of location, age-group, and residence. Academic and Intellectual Development was a stronger predictor of Goal and Institutional Commitment for the New Zealand group than the Australian group. It is difficult to identify possible contextual factors that might be responsible for stronger impact in New Zealand. However, based on the arguments of Kolig and Kabir (2008), it may be that New Zealand’s more open acceptance of culturally distinct others extends beyond students of Islamic influence to international students in general. Relatively higher feelings of alienation and stigmatisation experienced by international students in Australia may mitigate the influence of international students’ perception of academic progress on their goals and commitment to their respective institutions (for a discussion see White, 2008). Such speculation warrants further investigation.

Results showed that Academic and Intellectual Development was a stronger predictor of Goal and Institutional Commitment for the 22-and-over group than the 21-and-under group.
This finding adds to previous research concerning the influence of age on international student integration. Research by Metzner and Bean (1987), for example, suggested that for older university students, attending university is more frequently a matter of economic need than it is a youthful rite of passage. The authors argue that it is for this reason that older students’ increased institutional commitment can often be a function of the perceived utility of their education for future employment. Research by Senyshyn, Warford, and Zhan (2000) suggested that as international students moved towards their final year, they adapted and their institutional adjustment improved. Results here extend such conceptions by revealing that perceived academic progress is especially important to the institutional commitment of older international students—students closer to course completion and employment or otherwise engaged in postgraduate study.

Results showed that Academic and Intellectual Development was a stronger predictor of Goal and Institutional Commitment for those residing at university than those not. This finding adds to the literature concerning the experiences of on- versus off-campus university students. Of course, on-campus living provides more extended opportunities for students to interact with peers and staff (Hughes, 1994), and a large body of research suggests that living on campus, as opposed to commuting from home, is related to students’ increased tolerance and openness to diversity (Astin, 1993; Pascarella, Edison, Nora, Hagedorn, & Terenzini, 1996; Whitt, Edison, Pascarella, Terenzini, & Nora, 2001). Therefore, it may be that the increased impact of academic development on commitment among international students living on campus is the result of more open relationships and better rapport with peers and staff. However, the differences in the strength of predictions clearly warrants further investigation.

Results also showed that the correlation between FBI-i and FB Information Seeking-i was stronger for the group residing at university. In subsection 6.4.3.1, it was speculated that
the correlation, in general, was related to the idea that the more students make use of FB to connect with others of online proximity, the more FB becomes integrated into their lives for the purpose of accommodating such connections. Thus, this accommodating function might be especially relevant to on-campus living arrangements where students likely engage in increased levels of social interaction.

In summary, international student demographics appear to play an important role in the Dual-Path Model. Higher levels of FB Maintaining among younger students is likely a function of them being more comfortable and savvy with using the FB platform. Higher levels of Goal and Institutional Commitment among the Islamic-influenced group may be partly explained by the potential for upward social mobility for the group in general. The difference in structural regressions in the model suggests that any university intervention or policy change aimed at improving integration into the Staff-Academic System might be especially relevant to older international students, those who happen to reside on campus, and those studying in New Zealand. The difference in structural correlations suggests that university policy aimed at promoting the integration of FB into international students’ lives might be beneficial to students residing on campus who are attempting to manage more dynamic and broad sets of social relations. A discussion concerning the implications for policy and practice and potential interventions now follows.

6.3 Implications for Policy and Practice

The Dual-Path Model hopes to provide some guidance to university policy in the sense that it might be employed by university administrators, teaching staff, and other stakeholders as a guide for institutional actions to improve the institutional commitment of international students. The Staff-Academic System could be used to identify elements of staff–student relations which may facilitate the commitment and retention of international students, whilst the Student-SNS System could be used to promote certain aspects of FB-related behaviour.
that might also aid international student commitment. Possible implications for policy and practice are now provided with reference to each of these pathways to student success.

6.3.1 Enhancing integration into Staff-Academic System. Findings suggested that informal staff–student relationships form the basis by which international students integrate into a university’s academic system. Therefore, university administration and teaching staff looking to improve upon students’ perceived academic and intellectual development are well advised to consider ways in which informal staff–student interactions might be enhanced. For lecturers, allocating accessible office hours and adhering to them is a must. Of course, the simple allocation of office hours to such a heterogeneous group needs to be made with an understanding of various cultural mores. For example, a lecturer might expect to devote on-on-one office hours to a Western-educated international student of the opposite sex. However, such interaction may not be possible for international students hailing from Islamic-majority countries. To work around this, teaching staff should be cognisant that such students might like to bring a friend to such consultations. Australasian university educators should also consider the relational expectations of Confucian-influenced international students. Similarly, in-depth research suggests that understanding the collective social expectations of international students of Confucian heritage would also be advantageous. In-depth studies suggest that, based on previous cultural and educational experiences, Confucian-influenced international students often experience insufficient emotion bonds with Western academic staff (McClure, 2007). The Australian Council for Education Research (n.d.) provides a list of useful strategies for developing informal engagement with international students of all backgrounds. The report suggests that teaching staff might (a) invite groups of students for coffee to discuss career options, (b) arrange for several students to have lunch with a visiting scholar of relevant expertise, or (c) arrange an afternoon revision session during study week, finishing the session with delivered pizzas. Of course, excessive staff–student interactions are
not promoted here. If teaching staff were to meet such expectations, perhaps even once a semester, it would likely enhance staff–student relations, build rapport, and enhance informal relations between lecturers and international students.

Teaching staff, administrators, and other stakeholders are advised to improve upon the degree to which international students perceive that they care for their well-being and success at university. Here, again, cognisance of heterogeneous learner types is also important. Gutierrez and Dyson (2009) suggest that Confucian-influenced students in Australia are more likely to contribute in class when teachers make explicit the fact that mistakes can be a good way to learn. In addition, teachers may consider providing more time for international students to collaborate with peers to construct a contribution to class discussion. This approach has been shown to increase the contribution of second-language users, particularly those of Confucian heritage (Bretag, Horrocks, & Smith, 2002), and could be easily implemented. Patience should also be shown to international students struggling in certain formal academic areas. It may be useful for lecturers to assess international students’ academic writing separately, determine key stylistic and formatting issues associated with it, and arrange appropriate workshops to address issues of concern. Interest in and consideration for international students’ educational background, cultural mores, alongside the use of strategies to improve their contributions to class and academia, will likely improve international students’ perception of staff professionalism and care.

More generally, the Staff-Academic System places emphasis on informal staff–student relations and the promotion of a professional body of teachers and administrators genuinely interested in the academic and social plight of the international student body. Ongoing training pertaining to the cultural traditions and behavioural mores of a diverse student group should be made a priority prior to matriculation of groups of internationals. Finally, from an administrative perspective, findings here suggest that semester-ending
assessments of international students’ perceived academic progress should be made carefully alongside assessments of staff–student interaction and perceived care and professionalism.

6.3.2 Enhancing integration into Student-SNS System. Findings here suggest that international students across Australasia spend a large portion of their time engaged in FB-related activities and that strategic implementation of the site into users’ lives enables on- and offline interactions with close friends on campus, and, in turn, institutional commitment. Consequently, university administrators, teaching staff, and stakeholders should conceive of international student integration as a broader on- and offline social phenomenon. Steps could be taken to promote strategic use of FB and to improve FB literacy and efficiency. This could involve (a) promoting use of the site to engage with other students of proximity on campus, (b) educating international students about the implication about maintaining a public profile, (c) keeping students informed about FB functionality and user options, and (d) promoting specific forms of FB usage that have been associated with more positive social outcomes. Each of these four topics will be discussed in turn.

Teaching staff, resident hall managers, and other stakeholders should promote use of FB to engage with other students of proximity on campus. It is hoped that such steps might enhance international student socialisation on campus. This might be done by teachers on the first day of a lecture, residence hall managers during induction, or by administrative staff during orientation. One approach to facilitating student socialisation across the site from an administrative level is to set up a central body of international student FB clubs as first points of call for new international sojourners. Clubs could include clear contact details for club presidents, lists of members, and goals. Importantly, just as excessive levels of informal staff–student interaction are not promoted here, excessive levels of FB use are also not endorsed. The latest research suggests that heavy use of FB might be associated with lower grades. Of course, use should not be endorsed where FB use might interfere with
concentration during lectures. Research suggests that such efforts to multitask might be related to lower grades (Junco & Cotten, 2012).

Educating international students about the implications attached to maintaining a public or semi-public profile should be considered an imperative alongside any form of promotion of the FB’s use. It should be made clear that any activity posted on a social media site, even if deleted soon after, may be retrievable. As reported in previous studies (e.g., Vitak, 2008), FB users at university may experience unforeseen offline consequences from online profiles. International students should be cognisant that no information posted online is truly private, regardless of international students’ account settings, and therefore be encouraged to display vigilance when using FB and other media.

Of course, with the adoption of any means of communication, literacy is a must. Departments of international student affairs are advised to keep up with developments concerning FB use functionality, and perhaps give users tips as to the usability of the site. For example, the “super-logoff” function (Sutter, 2010b) enables users to deactivate their FB accounts, meaning that when they are not logged in no one can see their profile, post on their wall, mention them, or tag them in a photo. Another example is the improved filterability options enabling users to control the material in their News Feeds (Facebook, 2013).

Chowdhry (2013) provides useful tips concerning privacy settings. International student administration should consider such information and provide use tips to international students. Tips might also be introduced and illustrated in weekly or monthly international newsletters, which might serve to improve the efficiency with which users engage with others over the platform, ultimately empowering international students to take more control over their social lives.

Finally, university teaching staff, administrators, and stakeholders should consider promoting specific forms of FB usage that have been associated with more positive social
outcomes. For the purpose of improving general engagement and involvement in co-curricular activities, international students should be encouraged to use FB to create and partake in social events on campus (Junco, 2012a) and post comments about photos for the purpose of supportive dialogue, whilst reframing from using FB for trivial activities such as games. For the purpose of improving academic performance, international students should be encouraged to refrain from extensive FB chatting and status updates, especially during exam periods (Junco, 2012b). More generally, FB should be promoted as a tool for international students to organise themselves en masse, supplement and support face-to-face social activities, and improve feelings of social support through public dialogue.

6.4 Future Research Directions
Future studies could make improvements methodologically. In terms of future research designs, quantitative studies in the field should employ a planned missing data design. If a similar survey is launched online, it would be best to make use of an online survey platform that only permits respondents to proceed to the next question once they have completed the question at hand. This functionality would likely reduce missing data and add validity to the initial dataset. Larger sample sizes would also enable more robust generalisations to international student populations in Australasia, in addition to improving the variability in data. In terms of factor analytic techniques, future studies in the field should consider the use of propensity scores to ensure maximal generalisation of the results of the study to populations of interest. The use of Bayesian factor analytic estimation could also be considered given its sound performance under simulation (Muthén, 2010b). Another methodological limitation of the current study pertains to concerns regarding self-reported survey data, especially with reference to FB-related behaviour. With the support of the platforms themselves, future research on SNS use should endeavour to make use of server-
level data. Burke et al.’s (2010) access to FB servers provided an unprecedentedly accurate understanding of active and passive FB behaviours and impact on social outcomes. Access to actual behaviour on FB and other social media services would enable researchers to make accurate assessments of SNS activity. Finally, actual re-enrolment data, although difficult to obtain on a large scale, would provide for a more appropriate measure of social outcome.

The propositions in the Dual-Path Model represent several sets of probable and plausible relations between international students’ institutional experiences and social behaviours and require further confirmation. The finding that staff concern for international students mediates the impact of staff–student interaction on students’ perceived academic progress, although theoretically plausible, will ultimately require further quasi-experimental and experimental testing. Likewise, the set of propositions concerning international students’ strategic integration of FB into their lives will also require additional confirmation. Future in-depth studies concerned with the enhancement of informal staff–student interactions and staff professionalism in international student relations will help to evaluate the findings of the current study. Likewise, in-depth research concerning the supportive social mechanisms of specific SNS-related activity will help provide a more rich understanding of the proposed on- and offline social system.

One of the limitations of the current study is that only FB-related behaviour was studied and therefore the results cannot be generalised to other platforms. The role of other media platforms such as Twitter, Snapchat, and other country-centric platforms such as QQ in the integration of international students in Australasia is yet to be explored. Investigations into the use of such platforms represent an important new field of research. Early work by Madianou and Miller (2013) concerning the concurrent use of media platforms suggests that, where multiple media options exist, use of a particular media platform represents a social act in and of itself. How international-student communicative behaviours over multiple platforms
might reflect upon integration is an important area of future research. Ultimately, how international students might best make use of multiple utilities without compromising the social advantages associated with face-to-face communication is likely to be an important new field of enquiry. Theorists such as Turkle (2012) suggest that shifts in social behaviour online leave users less connected with people and more connected with simulations of them. On the other hand, more empirical research by Hampton and colleagues suggests the opposite, that social media use augments face-to-face interactions without imposing upon them (Hampton, Livio, & Sessions Goulet, 2010). The Dual-Path Model may provide an initial illustration of how strategic online social behaviour might augment face-to-face interactions in other institutions such as companies or groups. New theories and models will need to be further developed to accommodate this new on- and offline social landscape.

The social media landscape is a fast-evolving field of enquiry. By the time a research project has been designed, launched, and reported, findings may be less relevant to the population under investigation. Ultimately, researchers in the field should endeavour to carry out prompt experimental and quasi-experimental experiments concerning international students’ FB use and strategies. Strategic use of the platform should include assessments that measure international students’ (a) tendency to engage with others of social proximity, and (b) tendency to use FB as a tool for augmenting face-to-face social interactions, as opposed to intruding upon them. Such an approach, alongside server-based behavioural insights made by in-house sociologists and academics, will enable the field to move more in pace with both social and technological change, ultimately providing the sector with a more pertinent understanding of international student socialisation.

6.5 Contribution of Thesis

More generally, the current study provides an original and substantive contribution to the fields of social media, higher education, and international student integration. The Dual-Path
Model provides an important iteration of Tinto’s long-established Longitudinal Model of Student Departure (Figure 2). The Staff-Academic System adds a degree of discernment by postulating that only through staff concern for student development does informal staff–student interaction impact upon international students’ perceived academic integration. The Dual-Path Model also provides for a more systematic understanding of the international student socialisation in the era of social media, from which it is theorised that strategic integration of FB into international students’ lives enhances on- and offline ties with close friends, which, in turn, impacts upon students’ institutional commitment. Thus, the contribution of this thesis is twofold. First, the study underscores the pivotal role of academic and support staff in the educational success of international students in the Australasia. University staff’s professionalism and genuine concern for international students’ welfare and overall development is pivotal to the educational success of international students across Australasia. Second, the study represents an important first step towards conceptualising international student commitment, and by association, departure, as a function of social integration into deeply interconnected on- and offline social spheres. The model suggests that social media strategies can be a positive factor for the integration of international students.

Beyond the study’s unique and substantial contribution to theory, the investigation shows how advanced statistical methods can be used to understand social media engagement and associated outcomes. The application of methodological rigour, including thorough data preparation and advanced data estimation techniques, can be seen as part and parcel of the results herein and show how such methodologies can be successfully employed in the research area.
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FACEBOOK AND INTERNATIONAL TERTIARY INTEGRATION


FACEBOOK AND INTERNATIONAL TERTIARY INTEGRATION


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Figure A1. A Conceptual Schema for Dropout from College


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### Table B1

**Country of Origin by New Zealand, Australia, Total, and Cultural Influence**

<table>
<thead>
<tr>
<th>Country-of-Origin</th>
<th>New Zealand</th>
<th>Australia</th>
<th>Total</th>
<th>Cultural Influence</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
</tr>
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<td>3</td>
<td>.6</td>
</tr>
<tr>
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<td>.5</td>
<td>1</td>
<td>.2</td>
</tr>
<tr>
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<td>3.2</td>
<td>7</td>
<td>1.4</td>
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<tr>
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<td>.0</td>
<td>1</td>
<td>.4</td>
</tr>
<tr>
<td>Canada</td>
<td>3</td>
<td>1.4</td>
<td>4</td>
<td>1.5</td>
</tr>
<tr>
<td>Chile</td>
<td>0</td>
<td>.0</td>
<td>1</td>
<td>.4</td>
</tr>
<tr>
<td>China</td>
<td>8</td>
<td>3.7</td>
<td>46</td>
<td>16.8</td>
</tr>
<tr>
<td>Denmark</td>
<td>0</td>
<td>.0</td>
<td>1</td>
<td>.4</td>
</tr>
<tr>
<td>England</td>
<td>0</td>
<td>.0</td>
<td>1</td>
<td>.4</td>
</tr>
<tr>
<td>France</td>
<td>2</td>
<td>.9</td>
<td>5</td>
<td>1.8</td>
</tr>
<tr>
<td>Germany</td>
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<td>.5</td>
<td>4</td>
<td>1.5</td>
</tr>
<tr>
<td>Ghana</td>
<td>0</td>
<td>.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hong Kong</td>
<td>4</td>
<td>1.8</td>
<td>17</td>
<td>6.2</td>
</tr>
<tr>
<td>India</td>
<td>3</td>
<td>1.4</td>
<td>3</td>
<td>1.1</td>
</tr>
<tr>
<td>Indonesia</td>
<td>1</td>
<td>.5</td>
<td>30</td>
<td>11.0</td>
</tr>
<tr>
<td>Ireland</td>
<td>0</td>
<td>.0</td>
<td>2</td>
<td>.7</td>
</tr>
<tr>
<td>Israel</td>
<td>0</td>
<td>.0</td>
<td>1</td>
<td>.4</td>
</tr>
<tr>
<td>Italy</td>
<td>0</td>
<td>.0</td>
<td>1</td>
<td>.4</td>
</tr>
<tr>
<td>Japan</td>
<td>0</td>
<td>.0</td>
<td>8</td>
<td>2.9</td>
</tr>
<tr>
<td>South Korea</td>
<td>7</td>
<td>4.2</td>
<td>6</td>
<td>2.2</td>
</tr>
<tr>
<td>Macau</td>
<td>0</td>
<td>.0</td>
<td>1</td>
<td>.4</td>
</tr>
<tr>
<td>Malaysia</td>
<td>126</td>
<td>57.8</td>
<td>53</td>
<td>19.4</td>
</tr>
<tr>
<td>Maldives</td>
<td>1</td>
<td>.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mauritius</td>
<td>0</td>
<td>.0</td>
<td>1</td>
<td>.4</td>
</tr>
<tr>
<td>Mexico</td>
<td>0</td>
<td>.0</td>
<td>1</td>
<td>.4</td>
</tr>
<tr>
<td>Myanmar</td>
<td>0</td>
<td>.0</td>
<td>2</td>
<td>.7</td>
</tr>
<tr>
<td>Nepal</td>
<td>0</td>
<td>.0</td>
<td>1</td>
<td>.4</td>
</tr>
<tr>
<td>Norway</td>
<td>0</td>
<td>.0</td>
<td>1</td>
<td>.4</td>
</tr>
<tr>
<td>Pakistan</td>
<td>26</td>
<td>11.9</td>
<td>26</td>
<td>5.3</td>
</tr>
<tr>
<td>Papua New Guinea</td>
<td>0</td>
<td>.0</td>
<td>1</td>
<td>.4</td>
</tr>
<tr>
<td>Philippines</td>
<td>1</td>
<td>.5</td>
<td>1</td>
<td>.4</td>
</tr>
<tr>
<td>Saudi Arabia</td>
<td>2</td>
<td>.9</td>
<td>2</td>
<td>.4</td>
</tr>
<tr>
<td>Serbia</td>
<td>1</td>
<td>.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Singapore</td>
<td>6</td>
<td>2.8</td>
<td>41</td>
<td>15.0</td>
</tr>
<tr>
<td>Sri Lanka</td>
<td>2</td>
<td>.9</td>
<td>4</td>
<td>1.5</td>
</tr>
<tr>
<td>Sweden</td>
<td>0</td>
<td>.0</td>
<td>1</td>
<td>.4</td>
</tr>
<tr>
<td>Switzerland</td>
<td>0</td>
<td>.0</td>
<td>1</td>
<td>.4</td>
</tr>
<tr>
<td>Taiwan</td>
<td>5</td>
<td>2.3</td>
<td>1</td>
<td>.4</td>
</tr>
<tr>
<td>Thailand</td>
<td>1</td>
<td>.5</td>
<td>12</td>
<td>4.4</td>
</tr>
<tr>
<td>Turkey</td>
<td>1</td>
<td>.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>United Kingdom</td>
<td>0</td>
<td>.0</td>
<td>5</td>
<td>1.8</td>
</tr>
<tr>
<td>United States</td>
<td>3</td>
<td>1.4</td>
<td>6</td>
<td>2.2</td>
</tr>
<tr>
<td>Venezuela</td>
<td>0</td>
<td>.0</td>
<td>1</td>
<td>.4</td>
</tr>
<tr>
<td>Vietnam</td>
<td>2</td>
<td>.9</td>
<td>6</td>
<td>2.2</td>
</tr>
<tr>
<td>Zimbabwe</td>
<td>1</td>
<td>.5</td>
<td>1</td>
<td>.4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>218</td>
<td>100</td>
<td>273</td>
<td>100</td>
</tr>
</tbody>
</table>

**Note.** Values in bold pertain to students originating in Confucian influenced countries, values italicised pertain to students originating from Islamic influenced countries. Countries identified as Confucian influenced based on work by Chaney (2013). Countries identified as Islamic influenced those recognised as having more than 50% Muslim population (Pew Research Center, 2011).
APPENDIX C

Survey Instrument

INTERNATIONAL STUDENT SURVEY 2011

A. Participant Information, Consent, and Eligibility

PARTICIPANT INFORMATION SHEET

For International Students

Project Title: International Students' use of Facebook, Academic and Social Integration, and Achievement in New Zealand.

Name of Researcher: Matthew Courtney

My name is Matthew Courtney and I am a PhD student at the University of Auckland. International students are a vital part of our university and my research project aims to better understand your overall tertiary experience. My research project examines the way in which the use of Facebook among international tertiary students reflects upon academic and social integration, academic achievement, and re-enrollment. As you are an international degree-seeking student, I kindly ask you to participate in my survey.

Should you choose to take part in this survey, your identifying email address, your student ID number, a record of your consent, and your survey responses will be kept in digital format and held in a secure location for six years. All such information will be kept confidential.

You have the right to withdraw your contribution to the project. However, this will not be possible four weeks or more after today's date as overall results will have already been finalised.

The survey should take approximately 10-15 minutes.

Should you have any questions, feel free to contact any of the following parties:

Researcher: Matthew Courtney, ph: +64 21 0823 1933, mcou045@aucklanduni.ac.nz

Supervisor: Dr John Hope, ph: +64 9 623 8899 ext. 87515, j.hope@auckland.ac.nz

HOD: Dr Frances Langdon, ph: +64 9 623 8899 ext. 48769, flangdon@auckland.ac.nz

For queries regarding ethical concerns, you may contact the Chair, The University of Auckland Human Participants Ethics Committee, ph: +64 9 373 7599 ext. 83711

APPROVED BY THE UNIVERSITY OF AUCKLAND PARTICIPANTS ETHICS COMMITTEE ON 27 September, 2011 for 3 years, reference number 2011/198.

Click SUBMIT to continue
CONSENT FORM and ELIGIBILITY

From International Student

Project title: International Students' use of Facebook, Academic and Social Integration, and Achievement in New Zealand

Name of researcher: Matthew Courtney

- I have read the Participant Information Sheet, have understood the nature of the research and why I have been selected. I have had the opportunity to ask questions and have them answered to my satisfaction.
- I understand that the contribution I make will remain confidential.
- I understand that I am free to withdraw my contribution to the project up to four weeks after today's date.
- I understand that the data will be kept for six years, after which they will be destroyed.

APPROVED BY THE UNIVERSITY OF AUCKLAND HUMAN PARTICIPANTS ETHICS COMMITTEE ON 9 September, 2011 for 3 years, reference number 2011/198.

1. I would like to receive a summary of the findings
   - [ ] Yes
   - [ ] No

2. Are you a full-time "international" student studying toward an undergraduate or graduate degree? ("International" means that you are not a resident or citizen of New Zealand or Australia).
   If No, please DO NOT complete this survey
   - [ ] Yes
   - [ ] No

3. Are you a member of Facebook?
   If No, please DO NOT complete this survey
   - [ ] Yes
   - [ ] No
4 Does the completion of your current classes in 2011 entitle you to a degree?
   If Yes, please DO NOT complete this survey
   ○ Yes
   ○ No

5 My student ID number, needed to pick up my $10 book voucher from Level 0 UoA UBS, is: (leave blank if you don’t want this incentive)
   
6 My EMAIL ADDRESS for confirmation of voucher and/or summary of results is:
   
7 I agree with the terms and conditions described above
   ○ Yes
   ○ No

Click NEXT to start survey
(37 question groups in total; 10-15 mins)
INTERNATIONAL STUDENT SURVEY 2011

B. Basic Demographics

8  Are you the only person from your country studying at UoA?
   ○ Yes
   ○ No

9  What is your gender?
   □ Male
   □ Female

10 How old are you? (Western age)

11 What is your country of origin?

12 What is your current year at UoA?
   □ 1st year undergraduate student
   □ 2nd year undergraduate student
   □ 3rd year undergraduate student
   □ 4th year undergraduate student
   □ 5th year undergraduate student (or more)
   □ Graduate student

13 What is your living arrangement?
   □ UoA Dormitory / flat
   □ Homestay
   □ Off-campus housing (shared)
   □ Off-campus housing (single)
   □ Other
14 In 2011, what standard has your academic work reached so far?

☐ An excellent standard
☐ A very good standard
☐ A good standard
☐ A just passing standard
☐ A failing standard
C. Facebook-Related Questions

15 Approximately, on average, how many HOURS do you spend actively using the Internet PER DAY?

Hours
Minutes

16 Approximately, how many YEARS have you been using Facebook?

Years
Months

17 In the past week, on average, approximately how much time PER DAY have you spent actively using Facebook?

Hours
Minutes

18 How often do you use Facebook to communicate with:

<table>
<thead>
<tr>
<th></th>
<th>Never</th>
<th>Rarely</th>
<th>Every once in a while</th>
<th>Sometimes</th>
<th>Almost always</th>
</tr>
</thead>
<tbody>
<tr>
<td>i. People based at UoA?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ii. People based outside UoA but in NZ?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>iii. People based in your home country?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

19 How often do you use Facebook to communicate with:

<table>
<thead>
<tr>
<th></th>
<th>Never</th>
<th>Rarely</th>
<th>Every once in a while</th>
<th>Sometimes</th>
<th>Almost always</th>
</tr>
</thead>
<tbody>
<tr>
<td>i. Local students at UoA?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ii. International students (from the same country as you) at UoA?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>iii. International students (from other countries) at UoA?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
How many Facebook groups do you belong to that are affiliated with UoA? (E.g., 2)

Select the most appropriate answer:

<table>
<thead>
<tr>
<th>i. Facebook is part of my everyday activity</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>ii. I am proud to tell people I’m on Facebook</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>iii. Facebook has become part of my daily routine</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>iv. I feel out of touch when I haven’t logged onto Facebook for a while</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>v. I feel I am part of the Facebook community</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>vi. I would be sorry if Facebook shutdown</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Approximately how many TOTAL Facebook friends do you have?

Approximately, how many of your TOTAL Facebook friends do you consider actual friends?

Approximately, how many TOTAL Facebook friends do you have on campus?

Approximately, how many TOTAL Facebook friends, considered ACTUAL FRIENDS, do you have on campus?
Imagine coming across a UoA student on Facebook that you HAD NEVER SEEN OR MET. How likely are you to do the following?

<table>
<thead>
<tr>
<th>i. Browse their profile on Facebook</th>
<th>Very unlikely</th>
<th>Unlikely</th>
<th>Neither likely nor unlikely</th>
<th>Likely</th>
<th>Very likely</th>
</tr>
</thead>
<tbody>
<tr>
<td>ii. Contact them using Facebook, or by using information from Facebook</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>iii. Add them as a Facebook friend</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>iv. Meet them face-to-face</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Imagine coming across a UoA student on Facebook who you’ve never met in real life. You find out through Facebook that you SHARE A COMMON INTEREST. How likely are you to do the following?

<table>
<thead>
<tr>
<th>i. Browse their profile on Facebook</th>
<th>Very unlikely</th>
<th>Unlikely</th>
<th>Neither likely nor unlikely</th>
<th>Likely</th>
<th>Very likely</th>
</tr>
</thead>
<tbody>
<tr>
<td>ii. Contact them using Facebook, or by using information from Facebook</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>iii. Add them as a Facebook friend</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>iv. Meet them face-to-face</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Imagine coming across a student on Facebook who ATTENDS THE SAME CLASS AS YOU who you would recognise but have never spoken to. How likely are you to do the following?

<table>
<thead>
<tr>
<th>i. Browse their profile on Facebook</th>
<th>Very unlikely</th>
<th>Unlikely</th>
<th>Neither likely nor unlikely</th>
<th>Likely</th>
<th>Very likely</th>
</tr>
</thead>
<tbody>
<tr>
<td>ii. Contact them using Facebook, or by using information from Facebook</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>iii. Add them as a Facebook friend</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Imagine coming across a UoA student on Facebook who you’ve never met in real life. You find out through Facebook that you ARE IN THE SAME FACEBOOK GROUP. How likely are you to do the following?

| iv. Meet them face-to-face |  |  |  |  |  |  |
|---------------------------|---|---|---|---|---|

29

Think about one of your CLOSE FRIENDS at UoA. How likely are you to do the following?

<table>
<thead>
<tr>
<th></th>
<th>Very unlikely</th>
<th>Unlikely</th>
<th>Neither likely nor unlikely</th>
<th>Likely</th>
<th>Very likely</th>
</tr>
</thead>
<tbody>
<tr>
<td>i. Browse their profile on Facebook</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ii. Contact them using Facebook, or by using information from Facebook</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>iii. Add them as a Facebook friend</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>iv. Meet them face-to-face</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

30

Please indicate the extent to which you agree with each of the following statements:

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>i. I use Facebook to meet new people</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ii. I use Facebook to learn more about other people in my classes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>iii. I use Facebook to learn more about other people living near me</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>iv. I have used</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Facebook to check out someone I met socially
### D. Institutional Integration Questions

32. Select the most appropriate answer:

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>i.</td>
<td>Since coming to UoA, I have developed close personal relationships with other students</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ii.</td>
<td>The student friendships I have developed at UoA have been personally satisfying</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>iii.</td>
<td>My interpersonal relationships with other students have had a positive influence on my intellectual growth and interest in ideas</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>iv.</td>
<td>My interpersonal relationships with other students have had a positive influence on my personal growth, values and attitudes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>v.</td>
<td>It has been easy for me to make friends with other students</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>vi.</td>
<td>Many of the other students I know would be willing to listen to me and help me if I had a personal problem</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>vii.</td>
<td>Most of the students at UoA have values and attitudes similar to my own</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Select the most appropriate answer:

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>i. My non-classroom interactions with staff have had a positive influence on my personal growth, values and attitudes</td>
<td><img src="262" alt="Circle" /></td>
<td><img src="262" alt="Circle" /></td>
<td><img src="262" alt="Circle" /></td>
<td><img src="262" alt="Circle" /></td>
<td><img src="262" alt="Circle" /></td>
</tr>
<tr>
<td>ii. My non-classroom interactions with staff have had a positive influence on my intellectual growth and interest in ideas</td>
<td><img src="262" alt="Circle" /></td>
<td><img src="262" alt="Circle" /></td>
<td><img src="262" alt="Circle" /></td>
<td><img src="262" alt="Circle" /></td>
<td><img src="262" alt="Circle" /></td>
</tr>
<tr>
<td>iii. My non-classroom interactions with staff have had a positive influence on my career goals and aspirations</td>
<td><img src="262" alt="Circle" /></td>
<td><img src="262" alt="Circle" /></td>
<td><img src="262" alt="Circle" /></td>
<td><img src="262" alt="Circle" /></td>
<td><img src="262" alt="Circle" /></td>
</tr>
<tr>
<td>iv. Since coming to UoA, I have developed a close personal relationship with at least one staff member</td>
<td><img src="262" alt="Circle" /></td>
<td><img src="262" alt="Circle" /></td>
<td><img src="262" alt="Circle" /></td>
<td><img src="262" alt="Circle" /></td>
<td><img src="262" alt="Circle" /></td>
</tr>
<tr>
<td>v. I am satisfied with the opportunities to meet and interact informally with staff members</td>
<td><img src="262" alt="Circle" /></td>
<td><img src="262" alt="Circle" /></td>
<td><img src="262" alt="Circle" /></td>
<td><img src="262" alt="Circle" /></td>
<td><img src="262" alt="Circle" /></td>
</tr>
</tbody>
</table>
Select the most appropriate answer:

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>i. Many of the staff members I have had contact with are genuinely interested in students</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>ii. Many of the staff members I have had contact with are generally outstanding or superior teachers</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>iii. Many of the staff members I have had contact with are willing to spend time out of class to discuss the issues of interest and importance to students</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>iv. Most of the staff members I have had contact with are interested in helping students grow in more than just academic areas</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>v. Most of the staff members I have had contact with are genuinely interested in teaching</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>
Select the most appropriate answer:

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>i. I am satisfied with the extent of my intellectual development</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ii. My academic experience has had a positive influence on my intellectual growth and interest in ideas</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>iii. I am satisfied with my academic experiences at UoA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>iv. Many of my courses this year have been intellectually stimulating</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>v. My interest in ideas and intellectual matters has increased since coming to UoA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>vi. I am more likely to attend a cultural event (for example, a concert, lecture, or art show) now than I was before coming to UoA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>vii. I have performed academically as well I anticipated I would</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
36. Select the most appropriate answer:

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>i.</td>
<td>It is important for me to graduate from an institute of higher education</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ii.</td>
<td>I am confident that I made the right decision in choosing to attend UoA</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>iii.</td>
<td>It is likely that I will register at UoA next semester (or at a subsequent uni as part of a joint-degree programme)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>iv.</td>
<td>It is important to me to graduate from UoA</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>v.</td>
<td>I have a good idea about what I want to major in</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>vi.</td>
<td>Getting good grades is important to me</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

37. The End. Thank you for completing the survey!

If you have any comments, please feel free to make them below. They will be read by the researcher.
Dear [international student club presidents’ name],

My name is Matthew. I am a PhD researcher from The University of Auckland. I have a survey for your international student members to complete. Every participant gets a $10 voucher from [the arranged bookshop]. The survey is about students' on- and off-line experiences. You can preview the survey here:

http://www.zoomerang.com/Survey/WEB22DD26ND9Y2/Preview

If you like, you could paste the following survey invitation in an email to your members:

Attention international students,

Help PhD researcher understand your experience by completing online survey and pick up FREE $10 VOUCHER from UBS AUT.

Just click on link: http://www.zoomerang.com/Survey/WEB22DD26ND9Y2/

Feel free to contact me anytime if you have any questions.

I would really appreciate your support.

Sincerely,

Matthew Courtney (PhD, Candidate)
Dear [participant’s first and last name],

Thanks so much for participating in my online survey. You can now pick up your $10 voucher from Bennett's at [the arranged bookshop]. You have two weeks to pick it up [date two weeks after the current email].

Also, please pass on the following link to your [university’s name] international student friends. They, of course, will also receive a $10 voucher for participating.

http://www.zoomerang.com/Survey/WEB22DD4X5EXYK/

All the best for your upcoming exams and assignments.

Kind regards,

Matthew Courtney (PhD, Candidate)
Institutional Integration EFA Code in Mplus

Title:
Institutional Integration EFA

Data: File is C:\data\488.csv;

Variable: Names are Case PG1 PG2 PG4 PG5 PG6 PG7 IS1 IS2 IS3 IS4 IS5 SC1 SC2 SC3 SC4 SC5 AID1 AID2 AID3 AID4 AID5 AID6 AID7 GC1 GC2 GC3 GC4 GC5 GC6;

Categorical are PG1 PG2 PG3 PG4 PG5 PG6 PG7 IS1 IS2 IS3 IS4 IS5 SC1 SC2 SC3 SC4 SC5 AID1 AID2 AID3 AID4 AID5 AID6 AID7 GC1 GC2 GC3 GC4 GC5 GC6;

Missing are all (-999);

Analysis:
Type=EFA 5 6;
rotation=oblimin;

output: sampstat;

plot: type = plot1 plot2;
APPENDIX G

Facebook-Related EFA Code in Mplus

Title:
Facebook Usage EFA

Data: File is C:\data\484.csv;

Variable: Names are Case FBUpD15 FBGrp15 FBI_1 FBI_2 FBI_3 FBI_4 FBI_5 FBI_6 TFBF15 TAFBF15 TAFBFOC5 ST_Con ST_Add ST_Met SC_Bro SFBG_Con SFBG_Ad SFBG_mt CF_Bro CF_Con CF_Add CF_Met FBSTRAT2 FBSTRAT3 FBSTRAT4;

Categorical are FBI_1 FBI_2 FBI_3 FBI_4 FBI_5 FBI_6 TFBF15 TAFBF15 TAFBFOC5 ST_Con ST_Add ST_Met SC_Bro SFBG_Con SFBG_Ad SFBG_mt CF_Bro CF_Con CF_Add CF_Met FBSTRAT2 FBSTRAT3 FBSTRAT4;

Missing are all (-999);

Analysis:
Type=EFA 5 6;
rotation=oblimin;

output: sampstat;

plot: type = plot1 plot2;
APPENDIX H

Institutional Integration Measurement Model Code in Mplus

Title:
Institutional Integration Measurement Model

Data: File is C:\data\484.csv;

Variable: Names are Case PG1 PG2 PG3 PG4 PG5 PG6 PG7 IS1 IS2 IS3 IS4 IS5 SC1 SC2 SC3 SC4 SC5 AID1 AID2 AID3 AID4 AID5 AID6 AID7 GC1 GC2 GC3 GC4 GC5 GC6;

Categorical are PG1 PG2 PG3 PG4 PG5 PG6 PG7 IS1 IS2 IS3 IS4 IS5 SC1 SC2 SC3 SC4 SC5 AID1 AID2 AID3 AID4 AID5 AID6 AID7 GC1 GC2 GC3 GC4 GC5 GC6;

Missing are all (-999);

Model:
f1 by PG1 PG2 PG3 PG4 PG5 PG6 PG7;
f2 by IS1 IS2 IS3 IS4 IS5;
f3 by SC1 SC2 SC3 SC4 SC5;
f4 by AID1 AID2 AID3 AID4 AID5 AID6 AID7;
f5 by GC1 GC2 GC3 GC4 GC5 GC6;

Output: Standardized;
APPENDIX I

Facebook-Related Measurement Model Code in Mplus

Title:
Facebook-Related Measurement Model

Data: File is C:\data\484.csv;

Variable: Names are Case FBUpD15 FBGrp15 FBI_1 FBI_2 FBI_3 FBI_4 FBI_5 FBI_6 TFBF15 TAFBF15 TFBFOC15 ST_Con ST_Add ST_Met SC_Bro SFBG_Con SFBG_Ad SFBG_mt CF_Bro CF_Con CF_Add CF_Met FBSTRAT2 FBSTRAT3 FBSTRAT4;

Categorical are FBI_1 FBI_2 FBI_3 FBI_4 FBI_5 FBI_6 TFBF15 TAFBF15 TFBFOC15 TAFBFOC5 ST_Con ST_Add ST_Met SC_Bro SFBG_Con SFBG_Ad SFBG_mt CF_Bro CF_Con CF_Add CF_Met FBSTRAT2 FBSTRAT3 FBSTRAT4;

Missing are all (-999);

Model:

f1 BY FBUpD15 FBI_1 FBI_2 FBI_3 FBI_4 FBI_5 FBI_6;
f2 BY FBGrp15 TFBF15 TAFBF15 TFBFOC15 TAFBFOC5;
f3 BY ST_Con ST_Add ST_Met;
f4 BY SFBG_Con SFBG_Ad SFBG_mt;
f5 BY CF_Bro CF_Con CF_Add CF_Met;
f6 BY SC_Bro FBSTRAT2 FBSTRAT3 FBSTRAT4;

Output:

Standardized;
APPENDIX J

Phase 4 and Phase 5 Model Code in Mplus

Title: Missing are all (-999);

Phase 4 and 5 Structural Models;

Model:

Data: File is C:\data\481.csv;

AcaInt by AID1 AID2 AID3 AID4 AID5 AID6 AID7;

Maintain by CFBro CFCon CFAdd CFMet;

Variable: Names are Case AID1 AID2 AID3 AID4

AID5 AID6 AID7 GC1 GC2 GC3 GC4 GC5 GC6;

CFBro CFCon CFAdd CFMet SC1 SC2 SC3 SC4

SC5 SCBro Strat2 Strat3 Strat4 FBUpDBC15 FBI1

FBI2 FBI3 FBI4 FBI5 FBI6 IS1 IS2 IS3 IS4 IS5;

GoalCom by GC1 GC2 GC3 GC4 GC5 GC6;

The eight variables above are included in the Phase 5

Dual-Path’s variable list.

Categorical are AID1 AID2 AID3 AID4 AID5 AID6

AID7 GC1 GC2 GC3 GC4 GC5 GC6 CFBro CFCon

CFAdd CFMet SC1 SC2 SC3 SC4 SC5 SCBro Strat2

Strat3 Strat4 FBI1 FBI2 FBI3 FBI4 FBI5 FBI6 IS1

IS2 IS3 IS4 IS5;

InterStf with FBI InfoSeek;

FBI with InfoSeek;

The above three lines of code are included in the

Phase 5 Dual-Path Model’s code.

Analysis:

Type=general; Output: Standardized;
APPENDIX K

Dual-Path Model as Measurement Model Code in Mplus

**Title:**
Dual-Path Model as Measurement Model

**Data:** File is C:\data\____.csv;
! Dataset 481 placed in space above.
! Datasets 481a, 481b, 481c, 481d, 481e, & 479f
! also placed in space above prior to commencing
! assessment of model fit for each group as detailed in
! Appendix L.

**Variable:** Names are Case AID1 AID2 AID3 AID4 AID5 AID6 AID7 CFBro CFCon CFAdd CFMet SC1 SC2 SC3 SC4 SC5 SCBro Strat2 Strat3 Strat4 FBUpDBC15 FBI1 FBI2 FBI3 FBI4 FBI5 FBI6;

Categorical are AID1 AID2 AID3 AID4 AID5 AID6 AID7 GC1 GC2 GC3 GC4 GC5 GC6 CFBro CFCon CFAdd CFMet SC1 SC2 SC3 SC4 SC5 SCBro Strat2 Strat3 Strat4 FBUpDBC15 FBI1 FBI2 FBI3 FBI4 FBI5 FBI6;

**Model:**
AcaInt by AID1 AID2 AID3 AID4 AID5 AID6 AID7;
Maintain by CFBro CFCon CFAdd CFMet;
StaffCon by SC1 SC2 SC3 SC4 SC5;
InfoSeek by SCBro Strat2 Strat3 Strat4;
GoalCom by GC1 GC2 GC3 GC4 GC5 GC6;
FBI by FBUpDBC15 FBI1 FBI2 FBI3 FBI4 FBI5 FBI6;
InterStf by IS1 IS2 IS3 IS4 IS5;

**Analysis:**
Type=general;

**Output:** Standardized;
APPENDIX L

Dual-Path Model as Measurement Model Code in Mplus: Assessment of Model Fit for Each Group

Title: Dual-Path Model as Measurement Model: Model Fit for Each Group; ! assessments of model fit for age-group only.

Data: File is C:\data\____.csv;
! Datasets 481a, 481b, 481c, 481d, 481e, & 479f placed in space above to assess model fit for each group as an initial assessment of measurement invariance prior to tests of configural invariance

Variable: Names are Case AID1 AID2 AID3 AID4 AID5 AID6 AID7 GC1 GC2 GC3 GC4 GC5 GC6 CFBro CFCon CFAdd CFMet SC1 SC2 SC3 SC4 SC5 SCBro Strat2 Strat3 Strat4 FBI1 FBI2 FBI3 FBI4 FBI5 FBI6 IS1 IS2 IS3 IS4 IS5; Categorical are AID1 AID2 AID3 AID4 AID5 AID6 AID7 GC1 GC2 GC3 GC4 GC5 GC6 CFBro CFCon CFAdd CFAdd CFMet SC1 SC2 SC3 SC4 SC5 SCBro Strat2 Strat3 Strat4 FBUpDBC15 FBI1 FBI2 FBI3 FBI4 FBI5 FBI6; Missing are all (-999);

Model:
AcaInt by AID1 AID2 AID3 AID4 AID5 AID6 AID7;
Maintain by CFBro CFCon CFAdd CFMet;
StaffCon by SC1 SC2 SC3 SC4 SC5;
InfoSeek by SCBro Strat2 Strat3 Strat4;
GoalCom by GC1 GC2 GC3 GC4 GC5 GC6;

Analysis: Type=general;

Output: Standardized;

Useobservations are (a21nUn1 = EQ 1):
! “EQ 1” for 21-and-Under Group only.
! “EQ 2” for 22-and-Over Group only.
! (The Useobservations code above is an example for
APPENDIX M

Configural Invariance Test Code in Mplus (1)

Title: Gender Configural Invariance Test

Data: (see Appendix L)

Variable: Names are AID1 AID2 AID3 AID4 AID5 AID6 AID7 GC1 GC2 GC3 GC4 GC5 GC6 CFBro CFCon CFAdd CFMet SC1 SC2 SC3 SC4 SC5 SCBro Strat2 Strat3 FBUpDBC15 FBI1 FBI2 FBI3 FBI4 FBI5 FBI6 IS1 IS2 IS3 IS4 IS5; Categorical are AID1 AID2 AID3 AID4 AID5 AID6 AID7 GC1 GC2 GC3 GC4 GC5 GC6 CFBro CFCon CFAdd CFMet SC1 SC2 SC3 SC4 SC5 SCBro Strat2 Strat3 FBUpDBC15 FBI1 FBI2 FBI3 FBI4 FBI5 FBI6 IS1 IS2 IS3 IS4 IS5;

Grouping is m1f2  (1 = Male, 2 = Female);

Missing are all (-999); Analysis: Type = general;

Estimator = WLSMV;

Parameterization = theta;

Model:

AID1-AID7* (A1-A7); [AID3$4] (D4); [CFMet$1] (L1);

[AID4$1] (E1); [CFMet$2] (L2);

[AID4$2] (E2); [CFMet$3] (L3);

[AID4$3] (E3); [CFMet$4] (L4);

[AID4$4] (E4); CFBro-CFMet@1;

[AID5$1] (F1); Maintain@1;

[AID5$2] (F2); [Maintain@0];

[AID5$3] (F3);

[AID5$4] (F4); StaffCon by

AID7 GC1 GC2 GC3 Type = general;

[AID6$1] (G1); SC1-SC5* (M1-M5);

[AID6$2] (G2); [SC1$1] (N1);

[AID6$3] (G3); [SC1$2] (N2);

[AID6$4] (G4); [SC1$3] (N3);

CFCon CFAdd CFMet Parameterization = theta;

[CFBro$1] (I1); [CFCon$3] (J3);

CFCon$4] (J4);

[CFAdd$1] (K1);

[CFAdd$2] (K2);

[CFAdd$3] (K3);

[CFAdd$4] (K4);

[SC2$1] (O1);

[SC2$2] (O2);

[SC2$3] (O3);

[SC2$4] (O4);

[SC2$5] (O5);

Maintain@1;

AcaInt@1; [SC$1] (P1);

AcaInt@0]; [SC$2] (P2);

AcaInt@0]; [SC$3] (P3);

AcaInt@0]; [SC$4] (P4);

AcaInt@0]; [SC$5] (P5);

CFBro-CFMet* (H1-H4); SC3$1 (P1);

[CFBro$1] (I1); [SC3$2] (P2);

[CFBro$2] (I2); [SC3$3] (P3);

[CFBro$3] (I3); [SC3$4] (P4);

[CFBro$4] (I4); [SC3$5] (P5);

[CFCon$1] (J1); [SC4$1] (Q1);

[CFCon$2] (J2); [SC4$2] (Q2);

[CFCon$3] (J3); [SC4$3] (Q3);

[CFCon$4] (J4); [SC4$4] (Q4);

[CFCon$5] (J5); [SC4$5] (Q5);

[CFAdd$1] (K1); [SC$1] (R1);

[CFAdd$2] (K2); [SC$2] (R2);

[CFAdd$3] (K3); [SC$3] (R3);

[CFAdd$4] (K4); [SC$4] (R4);

[CFAdd$5] (K5); [SC$5] (R5);
APPENDIX M

Configural Invariance Test Code in Mplus (2)

[SC5S2] (R2); [Strat4S4] (W4); [GC6S3] (DD3); [FBI4S3] (OO3);
[SC5S3] (R3); SCBro-Strat4@1; [GC6S4] (DD4); [FBI4S4] (OO4);
[SC5S4] (R4); InfoSeek@1; GC1-GC6@1; [FBI5$1] (PP1);
SC1-SC5@1; [InfoSeek@0]; GoalCom@1; [FBI5$2] (PP2);
StaffCon@1; [GoalCom@0]; [FBI5$3] (PP3);
[StaffCon@0]; GoalCom by GC1-GC6* (X1-X6) FBI by [FBI5$4] (PP4);
InfoSeek by [GC1$1] (Y1); FBUpDBC15* (EE) [FBI6$1] (QQ1);
SCBro* (S1) [GC1$2] (Y2); FBI1* (FF) [FBI6$2] (QQ2);
Strat2* (S2) [GC1$3] (Y3); FBI2* (GG) [FBI6$3] (QQ3);
Strat3* (S3) [GC2$1] (Z1); FBI3* (HH) [FBI6$4] (QQ4);
Strat4* (S4) [GC2$2] (Z2); FBI4* (II) FBUpDBC15@1
[SCBro$1] (T1); [GC2$3] (Z3); FBI6* (KK) FBI1-FBI6@1;
[SCBro$2] (T2); [GC3$1] (AA1); [FBI1$1] (LL1); FBI@ 1; [FBI@0];
[SCBro$3] (T3); [GC3$2] (AA2); [FBI1$2] (LL2);
[SCBro$4] (T4); [GC3$3] (AA3); [FBI1$3] (LL3); InterStf by
[Strat2$1] (U1); [GC3$4] (AA4); [FBI1$4] (LL4); IS1-IS5* (RR1-RR5);
[Strat2$2] (U2); [GC4$1] (BB1); [FBI2$1] (MM1); [IS1$1] (SS1);
[Strat2$3] (U3); [GC4$2] (BB2); [FBI2$2] (MM2); [IS1$2] (SS2);
[Strat2$4] (U4); [GC4$3] (BB3); [FBI2$3] (MM3); [IS1$3] (SS3);
[Strat3$1] (V1); [GC4$4] (BB4); [FBI2$4] (MM4); [IS1$4] (SS4);
[Strat3$2] (V2); [GC5$1] (CC1); [FBI3$1] (NN1); [IS2$1] (TT1);
[Strat3$3] (V3); [GC5$2] (CC2); [FBI3$2] (NN2); [IS2$2] (TT2);
[Strat3$4] (V4); [GC5$3] (CC3); [FBI3$3] (NN3); [IS2$3] (TT3);
[Strat4$1] (W1); [GC5$4] (CC4); [FBI3$4] (NN4); [IS2$4] (TT4);
[Strat4$2] (W2); [GC6$1] (DD1); [FBI4$1] (OO1); [IS3$1] (UU1);
[Strat4$3] (W3); [GC6$2] (DD2); [FBI4$2] (OO2); [IS3$2] (UU2);
Configural Invariance Test Code in Mplus (3)

\[
\begin{align*}
\text{IS3S3 (UU3);} & \quad \text{AID2S4}; \quad \text{CFConS1}; \quad \text{SC3S2}; \\
\text{IS3S4 (UU4);} & \quad \text{AID3S1}; \quad \text{CFConS2}; \quad \text{SC3S3}; \\
\text{IS4S1 (VV1);} & \quad \text{AID3S2}; \quad \text{CFConS3}; \quad \text{SC3S4}; \\
\text{IS4S2 (VV2);} & \quad \text{AID3S3}; \quad \text{CFConS4}; \quad \text{SC4S1}; \\
\text{IS4S3 (VV3);} & \quad \text{AID3S4}; \quad \text{CFAddS1}; \quad \text{SC4S2}; \\
\text{IS4S4 (VV4);} & \quad \text{AID4S1}; \quad \text{CFAddS2}; \quad \text{SC4S3}; \\
\text{IS5S1 (WW1);} & \quad \text{AID4S2}; \quad \text{CFAddS3}; \quad \text{SC4S4}; \\
\text{IS5S2 (WW2);} & \quad \text{AID4S3}; \quad \text{CFAddS4}; \quad \text{SC5S1}; \\
\text{IS5S3 (WW3);} & \quad \text{AID4S4}; \quad \text{CFMetS1}; \quad \text{SC5S2}; \\
\text{IS5S4 (WW4);} & \quad \text{AID5S1}; \quad \text{CFMetS2}; \quad \text{SC5S3}; \\
\text{IS1-IS5@1;} & \quad \text{AID5S2}; \quad \text{CFMetS3}; \quad \text{SC5S4}; \\
\text{InterStf@1;} & \quad \text{AID5S3}; \quad \text{CFMetS4}; \quad \text{SC1-SC5@1}; \\
\text{[InterStf@0];} & \quad \text{AID5S4}; \quad \text{CFBro-CFMet@1}; \quad \text{StaffCon@1}; \\
\text{SCBro-Strat4@1;} & \quad \text{AID6S1}; \quad \text{Maintain@1}; \quad \text{[StaffCon@0]}; \\
\text{InfoSeek@1;} & \quad \text{AID6S2}; \quad \text{[Maintain@0]}; \\
\text{[InfoSeek@0];} & \quad \text{AID6S3}; \quad \text{InfoSeek by} \\
\text{AID6S4}; & \quad \text{StaffCon by} \quad \text{SCBro*} \\
\text{Model Male:} & \quad \text{AID1-AID7@1}; \quad \text{SC1-SC5*}; \quad \text{Strat2*} \\
\text{AcaInt by} & \quad \text{AcaInt@1}; \quad \text{SC1S1}; \quad \text{Strat3*} \\
\text{AID1-AID7*;} & \quad \text{[AcaInt@0]}; \quad \text{SC1S2}; \quad \text{Strat4*}; \\
\text{[AID1S1]}; & \quad \text{SC1S3}; \quad \text{[SCBroS1]}; \\
\text{[AID1S2]}; & \quad \text{Maintain by CFBro-} \quad \text{SC1S4}; \quad \text{[SCBroS2]}; \\
\text{[AID1S3]}; & \quad \text{CFMet*}; \quad \text{SC2S1}; \quad \text{[SCBroS3]}; \\
\text{[AID1S4]}; & \quad \text{[CFBroS1]}; \quad \text{SC2S2}; \quad \text{[SCBroS4]}; \\
\text{[AID2S1]}; & \quad \text{[CFBroS2]}; \quad \text{SC2S3}; \quad \text{[Strat2S1]}; \\
\text{[AID2S2]}; & \quad \text{[CFBroS3]}; \quad \text{SC2S4}; \quad \text{[Strat2S2]}; \\
\text{[AID2S3]}; & \quad \text{[CFBroS4]}; \quad \text{SC3S1}; \quad \text{[Strat2S3]}; \\
\end{align*}
\]
APPENDIX M

Configural Invariance Test Code in Mplus (4)

[Strat2S4]; [GC4S4]; [FBI2S3]; [IS1S3];
[Strat3S1]; [GC5S1]; [FBI2S4]; [IS1S4];
[Strat3S2]; [GC5S2]; [FBI3S1]; [IS2S1];
[Strat3S3]; [GC5S3]; [FBI3S2]; [IS2S2];
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[Strat4S3]; [GC6S3]; [FBI4S2]; [IS3S2];
[Strat4S4]; [GC6S4]; [FBI4S3]; [IS3S3];
SCBro-Strat4@1; GC1-GC6@1; [FBI4S4]; [IS3S4];
InfoSeek@1; GoalCom@1; [FBI5S1]; [IS4S1];
[InfoSeek@0]; [GoalCom@0]; [FBI5S2]; [IS4S2];
GoalCom by [FBI5S3]; [IS4S3];
GC1-GC6*; FBI by [FBI5S4]; [IS4S4];
[GC1S1]; FBUpDBC15* [FBI6S1]; [IS5S1];
[GC1S2]; FBI1* [FBI6S2]; [IS5S2];
[GC1S3]; FBI2* [FBI6S3]; [IS5S3];
[GC2S1]; FBI3* [FBI6S4]; [IS5S4];
[GC2S2]; FBI4* FBUpDBC15@1 IS1-IS5@1; InterStf@1;
[GC2S3]; FBI5* FBI1-FBI6@1; [InterStf@0];
[GC3S1]; FBI6*; FBI@1; [InterStf@0];
[GC3S2]; [FBI1S1]; [FBI@0];
[GC3S3]; [FBI1S2];
[GC3S4]; [FBI1S3]; InterStf by DIFFTEST=MFCconfigM
[GC4S1]; [FBI1S4]; IS1-IS5*; measure.dat;
[GC4S2]; [FBI2S1]; [IS1S1];
[GC4S3]; [FBI2S2]; [IS1S2]; Output: Standardized;

Savedata:
APPENDIX N

Metric Invariance Test Code in Mplus (1)

**Title:** Gender Metric Invariance Test

**Data:** (see Appendix L) Missing are all (-999);

**Variable:** Names are Case m1f2 AID1 AID2 AID3 AID4 AID5 AID6 AID7 GC1 GC2 GC3 GC4 GC5 GC6 CFBro CFCon CFAdd CFMet SC1 SC2 SC3 SC4 SC5 SCBro Strat2 Strat3

**Analysis:**
- Type = general;
- Estimator = WLSMV;
- Parameterization = theta;
- DIFFTEST = MFconfigMeasure.dat;
- StaffCon by SC1 SC3 SC4 SC5

**Model:**
- AcaInt by AID1-AID7* (A1-A7);
- Maintain by SC1-SC5* (M1-M5);
- [AID1$1] (B1);
- [AID1$2] (B2);
- [AID1$3] (B3);
- [AID1$4] (B4);
- [AID2$1] (C1);
- [AID2$2] (C2);
- [AID2$3] (C3);
- [AID2$4] (C4);
- [AID3$1] (D1);
- [AID3$2] (D2);
- [AID3$3] (D3);
- [AID3$4] (D4);
- [AID4$1] (E1);
- [AID4$2] (E2);
- [AID4$3] (E3);
- [AID4$4] (E4);
- [AID5$1] (F1);
- [AID5$2] (F2);
- [AID5$3] (F3);
- [AID5$4] (F4);
- [AID6$1] (G1);
- [AID6$2] (G2);
- [AID6$3] (G3);
- [AID6$4] (G4);
- [CFBro$1] (I1);
- [CFBro$2] (I2);
- [CFBro$3] (I3);
- [CFBro$4] (I4);
- [CFCon$1] (J1);
- [CFCon$2] (J2);
- [CFCon$3] (J3);
- [CFCon$4] (J4);
- [CFAdd$1] (K1);
- [CFAdd$2] (K2);
- [CFAdd$3] (K3);
- [CFAdd$4] (K4);
- [CFMet$1] (L1);
- [CFMet$2] (L2);
- [CFMet$3] (L3);
- [CFMet$4] (L4);
- [CFBro-CFMet@1];
- [Maintain@0];
- [AcaInt@0];
- [SC1$1] (N1);
- [SC1$2] (N2);
- [SC1$3] (N3);
- [SC1$4] (N4);
- [SC2$1] (O1);
- [SC2$2] (O2);
- [SC2$3] (O3);
- [SC2$4] (O4);
- [SC3$1] (P1);
- [SC3$2] (P2);
- [SC3$3] (P3);
- [SC3$4] (P4);
APPENDIX N

Metric Invariance Test Code in Mplus (2)

[SC4S2] (Q2); [Strat3S4] (V4); [GC5S3] (CC3); [FBI3S3] (NN3);
[SC4S3] (Q3); [Strat4S1] (W1); [GC5S4] (CC4); [FBI3S4] (NN4);
[SC4S4] (Q4); [Strat4S2] (W2); [GC6S1] (DD1); [FBI4S1] (OO1);
[SC5S1] (R1); [Strat4S3] (W3); [GC6S2] (DD2); [FBI4S2] (OO2);
[SC5S2] (R2); [Strat4S4] (W4); [GC6S3] (DD3); [FBI4S3] (OO3);
[SC5S3] (R3); SCBro-Strat4@1; [GC6S4] (DD4); [FBI4S4] (OO4);
[SC5S4] (R4); InfoSeek@1; GC1-GC6@1; [FBI5S1] (PP1);
SC1-SC5@1; [InfoSeek@0]; GoalCom@1; [FBI5S2] (PP2);
StaffCon@1; [GoalCom@0]; [FBI5S3] (PP3);
[StaffCon@0]; GoalCom by

GC1-GC6* (X1-X6) FBI by

InfoSeek by

[GC1S1] (Y1); FBUpDBC15* (EE) [FBI6S1] (QQ1);
SCBro* (S1)

[GC1S2] (Y2); FBI1* (FF) [FBI6S2] (QQ2);
Strat2* (S2)

[GC1S3] (Y3); FBI2* (GG) [FBI6S3] (QQ3);
Strat3* (S3)

[GC2S1] (Z1); FBI3* (HH) FBUpDBC15@1
Strat4* (S4)

[GC2S2] (Z2); FBI4* (II) FBI1-FBI6@1;
[SCBroS1] (T1);

[GC2S3] (Z3); FBI6* (KK); FBI1@1; [FBI1@0];
[SCBroS2] (T2)

[GC3S1] (AA1); [FBI1S1] (LL1);
[SCBroS3] (T3)

[GC3S2] (AA2); [FBI1S2] (LL2); InterStf by
[SCBroS4] (T4)

[GC3S3] (AA3); [FBI1S3] (LL3); IS1-IS5* (RR1-RR5);
[Strat2S1] (U1)

[GC3S4] (AA4); [FBI1S4] (LL4); [IS1S1] (SS1);
[Strat2S2] (U2)

[GC4S1] (BB1); [FBI2S1] (MM1); [IS1S2] (SS2);
[Strat2S3] (U3)

[GC4S2] (BB2); [FBI2S2] (MM2); [IS1S3] (SS3);
[Strat2S4] (U4)

[GC4S3] (BB3); [FBI2S3] (MM3); [IS1S4] (SS4);
[Strat3S1] (V1)

[GC4S4] (BB4); [FBI2S4] (MM4); [IS2S1] (TT1);
[Strat3S2] (V2)

[GC5S1] (CC1); [FBI3S1] (NN1); [IS2S2] (TT2);
[Strat3S3] (V3)

[GC5S2] (CC2); [FBI3S2] (NN2); [IS2S3] (TT3);
APPENDIX N

Metric Invariance Test Code in Mplus (3)

[IS2S4] (TT4); [AID2$4]; [CFCon$1]; [SC3$2];
[IS3S1] (UU1); [AID3$1]; [CFCon$2]; [SC3$3];
[IS3S2] (UU2); [AID3$2]; [CFCon$3]; [SC3$4];
[IS3S3] (UU3); [AID3$3]; [CFCon$4]; [SC4$1];
[IS3S4] (UU4); [AID3$4]; [CFAdd$1]; [SC4$2];
[IS4S1] (VV1); [AID4$1]; [CFAdd$2]; [SC4$3];
[IS4S2] (VV2); [AID4$2]; [CFAdd$3]; [SC4$4];
[IS4S3] (VV3); [AID4$3]; [CFAdd$4]; [SC5$1];
[IS4S4] (VV4); [AID4$4]; [CFMet$1]; [SC5$2];
[IS5S1] (WW1); [AID5$1]; [CFMet$2]; [SC5$3];
[IS5S2] (WW2); [AID5$2]; [CFMet$3]; [SC5$4];
[IS5S3] (WW3); [AID5$3]; [CFMet$4]; [SC1-SI5@1];
[IS5S4] (WW4); [AID5$4]; CFBro-CFMet@1; StaffCon*;
IS1-IS5@1; [AID6$1]; Maintain*; [StaffCon@0];
InterStf@1; [AID6$2]; [Maintain@0];
[Interstf@0]; [AID6$3]; InfoSeek by

Model Male:

AID1-AID7@1; SC1-SI5*; Strat2*
Acalnt by Acalnt*; [SC1$1]; Strat3*
AID1-AID7*; [Acalnt@0]; [SC1$2]; Strat4*;
[AID1$1]; [SC1$3]; [SCBro$1];
[AID1$2]; Maintain by CFBro-
[AID1$3]; CFMet*; [SC2$1]; [SCBro$2];
[AID1$4]; [SC2$4]; [SCBro$3];
[AID2$1]; [CFBro$1]; [SC2$2]; [SCBro$4];
[AID2$2]; [CFBro$2]; [SC2$3]; [Strat2$1];
[AID2$3]; [CFBro$3]; [SC2$4]; [Strat2$2];
[AID2$4]; [CFBro$4]; [SC3$1]; [Strat2$3];
APPENDIX N

Metric Invariance Test Code in Mplus (4)

[Strat2$4]; [GC4$3]; [FB12$3]; [IS1$3];
[Strat3$1]; [GC4$4]; [FB12$4]; [IS1$4];
[Strat3$2]; [GC5$1]; [FB13$1]; [IS2$1];
[Strat3$3]; [GC5$2]; [FB13$2]; [IS2$2];
[Strat3$4]; [GC5$3]; [FB13$3]; [IS2$3];
[Strat4$1]; [GC5$4]; [FB13$4]; [IS2$4];
[Strat4$2]; [GC6$1]; [FB14$1]; [IS3$1];
[Strat4$3]; [GC6$2]; [FB14$2]; [IS3$2];
[Strat4$4]; [GC6$3]; [FB14$3]; [IS3$3];
SCBro-Strat4@1; [GC6$4]; [FB14$4]; [IS3$4];
InfoSeek*; GC1-GC6@1; [FB15$1]; [IS4$1];
[InfoSeek@0]; GoalCom*; [FB15$2]; [IS4$2];
[GoalCom@0]; [FB15$3]; [IS4$3];
GoalCom by FBI by [FB15$4]; [IS4$4];
GC1-GC6*; FBUpDBC15* [FB16$1]; [IS5$1];
[GC1$1]; FBI1* [FB16$2]; [IS5$2];
[GC1$2]; FBI2* [FB16$3]; [IS5$3];
[GC1$3]; FBI3* [FB16$4]; [IS5$4];
[GC2$1]; FBI4* FBUpDBC15@1 IS1-IS5@1; IS1-IS5@1;
[GC2$2]; FBI5* FB11-FBI6@1; InterStf*;
[GC2$3]; FBI6*; FBI*; [Interstf@0];
[GC3$1]; [FB11$1]; [FB1@0];
[GC3$2]; [FB11$2];
[GC3$3]; [FB11$3]; InterStf by DIFFTEST=MFinmetricMeasure.dat;
[GC3$4]; [FB11$4]; IS1-IS5*;
[GC4$1]; [FB12$1]; [IS1$1];
[GC4$2]; [FB12$2]; [IS1$2];

Savedata:

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</tr>
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</tr>
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<td>Grouping is m1f2</td>
<td>(1 = Male, 2 = Female);</td>
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<td>Parameterization = theta;</td>
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<td>DIFFTEST =</td>
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<td>SC1 SC2 SC3 SC4 SC5</td>
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APPENDIX O

Scalar Invariance Test Code in Mplus (2)

[SC4S2] (Q2); [Strat3$4] (V4); [GC5$3] (CC3); [FBI3$3] (NN3);
[SC4S3] (Q3); [Strat4$1] (W1); [GC5$4] (CC4); [FBI3$4] (NN4);
[SC4S4] (Q4); [Strat4$2] (W2); [GC6$1] (DD1); [FBI4$1] (OO1);
[SC5$1] (R1); [Strat4$3] (W3); [GC6$2] (DD2); [FBI4$2] (OO2);
[SC5$2] (R2); [Strat4$4] (W4); [GC6$3] (DD3); [FBI4$3] (OO3);
[SC5$3] (R3); [SCBro-Strat4@1; [GC6$4] (DD4); [FBI4$4] (OO4);
[SC5$4] (R4); InfoSeek@1; GC1-GC6@1; [FBI5$1] (PP1);
SC1-SC5@1; [InfoSeek@0]; GoalCom@1; [FBI5$2] (PP2);
StaffCon@1; [GoalCom@0]; [FBI5$3] (PP3);
[StaffCon@0]; GoalCom by GC1-GC6* (X1-X6) FBI by [FBI5$4] (PP4);
InfoSeek by [GC1$1] (Y1); FBUpDBC15* (EE) [FBI6$1] (QQ1);
SCBro* (S1) [GC1$2] (Y2); FBI1* (FF) [FBI6$2] (QQ2);
Strat2* (S2) [GC1$3] (Y3); FBI2* (GG) [FBI6$3] (QQ3);
Strat3* (S3) [GC2$1] (Z1); FBI3* (HH) FBUpDBC15@1
Strat4* (S4) [GC2$2] (Z2); FBI4* (II) FBI1-FBI6@1;
[SCBro$1] (T1); [GC2$3] (Z3); FBI6* (KK) FBI@1; [FBI@0];
[SCBro$2] (T2); [GC3$1] (AA1); [FBI1$1] (LL1);
[SCBro$3] (T3); [GC3$2] (AA2); [FBI1$2] (LL2); InterStf by
[SCBro$4] (T4); [GC3$3] (AA3); [FBI1$3] (LL3); IS1-IS5* (RR1-RR5);
[Strat2$1] (U1); [GC3$4] (AA4); [FBI1$4] (LL4); [IS1$1] (SS1);
[Strat2$2] (U2); [GC4$1] (BB1); [FBI2$1] (MM1); [IS1$2] (SS2);
[Strat2$3] (U3); [GC4$2] (BB2); [FBI2$2] (MM2); [IS1$3] (SS3);
[Strat2$4] (U4); [GC4$3] (BB3); [FBI2$3] (MM3); [IS1$4] (SS4);
[Strat3$1] (V1); [GC4$4] (BB4); [FBI2$4] (MM4); [IS2$1] (TT1);
[Strat3$2] (V2); [GC5$1] (CC1); [FBI3$1] (NN1); [IS2$2] (TT2);
[Strat3$3] (V3); [GC5$2] (CC2); [FBI3$2] (NN2); [IS2$3] (TT3);
APPENDIX O

Scalar Invariance Test Code in Mplus (3)

[IS2$4] (TT4);  [GC2$3] (Z3);  FBI5* (JJ)  FBI1-FBI6@1;
[IS3$1] (UU1);  [GC3$1] (AA1);  FBI6* (KK)  FBI@1; [FBI@0];
[IS3$2] (UU2);  [GC3$2] (AA2);  FBI1$1 (LL1);
[IS3$3] (UU3);  [GC3$3] (AA3);  FBI1$2 (LL2);  InterStf by
[IS3$4] (UU4);  [GC3$4] (AA4);  FBI1$3 (LL3);  IS1-IS5* (RR1-RR5);
[IS4$1] (VV1);  [GC4$1] (BB1);  FBI1$4 (LL4);  [IS1$1] (SS1);
[IS4$2] (VV2);  [GC4$2] (BB2);  FBI2$1 (MM1);  [IS1$2] (SS2);
[IS4$3] (VV3);  [GC4$3] (BB3);  FBI2$2 (MM2);  [IS1$3] (SS3);
[IS4$4] (VV4);  [GC4$4] (BB4);  FBI2$3 (MM3);  [IS1$4] (SS4);
[IS5$1] (WW1);  [GC5$1] (CC1);  FBI2$4 (MM4);  [IS2$1] (TT1);
[IS5$2] (WW2);  [GC5$2] (CC2);  FBI3$1 (NN1);  [IS2$2] (TT2);
[IS5$3] (WW3);  [GC5$3] (CC3);  FBI3$2 (NN2);  [IS2$3] (TT3);
[IS5$4] (WW4);  [GC5$4] (CC4);  FBI3$3 (NN3);  [IS2$4] (TT4);
[IS1-] (IS5@1);  [GC6$1] (DD1);  FBI3$4 (NN4);  [IS3$1] (UU1);
InterStf@1;  [GC6$2] (DD2);  FBI4$1 (OO1);  [IS3$2] (UU2);
[Interstf@0];  [GC6$3] (DD3);  FBI4$2 (OO2);  [IS3$3] (UU3);
SCBro-Strat4@1;  [GC6$4] (DD4);  FBI4$3 (OO3);  [IS3$4] (UU4);
InfoSeek@1;  GC1-GC6@1;  [FBI5$4] (OO4);  [IS4$1] (VV1);
[InfoSeek@0];  GoalCom@1;  [FBI5$1] (PP1);  [IS4$2] (VV2);
[GoalCom@0];  [FBI5$2] (PP2);  [IS4$3] (VV3);
GoalCom by  [FBI5$3] (PP3);  [IS4$4] (VV4);
GC1-GC6* (X1-X6);  FBI by  [FBI5$4] (PP4);  [IS5$1] (WW1);
[GC1$1] (Y1);  FBUpDBC15* (EE)  [FBI6$1] (QQ1);  [IS5$2] (WW2);
[GC1$2] (Y2);  FBI1* (FF)  [FBI6$2] (QQ2);  [IS5$3] (WW3);
[GC1$3] (Y3);  FBI2* (GG)  [FBI6$3] (QQ3);  [IS5$4] (WW4);
[GC2$1] (Z1);  FBI3* (HH)  [FBI6$4] (QQ4);  IS1-IS5@1;
[GC2$2] (Z2);  FBI4* (II)  FBUpDBC15@1  InterStf@1;
APPENDIX O
Scalar Invariance Test Code in Mplus (4)

[Interstf@0];
[AID6$3]; StaffCon by SCBro*
[AID6$4]; SC1-SC5*; Strat3*

Model Male:
AID1-AID7@1; [SC1$1]; Strat3*
AcaInt by AcaInt*; [SC1$2]; Strat4*
AID1-AID7*; [AcaInt*]; [SC1$3]; [SCBro$1];
[AID1$1]; [SC1$4]; [SCBro$2];
[AID1$2]; Maintain by CFBro-CFMet@1; [SC2$1]; [SCBro$3];
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[AID2$3]; [CFBro$4]; [SC3$2]; [Strat2$4];
[AID2$4]; [CFCon$1]; [SC3$3]; [Strat3$1];
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[AID3$2]; [CFCon$3]; [SC4$1]; [Strat3$3];
[AID3$3]; [CFCon$4]; [SC4$2]; [Strat3$4];
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[AID4$4]; [CFMet$1]; [SC5$3]; SCBro-Strat4@1;
[AID5$1]; [CFMet$2]; [SC5$4]; InfoSeek*;
[AID5$2]; [CFMet$3]; SC1-SC5@1; [InfoSeek*];
[AID5$3]; [CFMet$4]; StaffCon*; GoalCon by
[AID5$4]; CFBro-CFMet@1; [StaffCon*]; GC1-GC6*;
[AID6$1]; Maintain*; [GC1$1];
[AID6$2]; [Maintain*]; InfoSeek by [GC1$2];
APPENDIX O

Scalar Invariance Test Code in Mplus (5)

\[ \text{Savedata: DIFFTEST=MFscalarMeasure.dat; Output: Standardized;} \]
APPENDIX P

Structural Invariance Test Code in Mplus (1)

Title: Gender Structural Invariance Test

Data: (see Appendix L) Missing are all (-999);

Variable: Names are Case m1f2 AID1 AID2 AID3 AID4 AID5 AID6 AID7 GC1 GC2 GC3 GC4 GC5 GC6 CFBro CFCon CFAdd CFMet SC1 SC2 SC3 SC4 SC5 SCBro Strat2 Strat3

Grouping is m1f2 (1 = Male, 2 = Female);

Missing are all (-999);

Analysis: Type = general;

Estimator = WLSMV;

Parameterization = theta;

DIFFTEST = MFscalarMeasure.dat;

Model:

AcaInt by [AID1-AID7* (A1-A7); [AID1$1] (B1); [AID1$2] (B2); [AID1$3] (B3); [AID1$4] (B4);

[AID2$1] (C1); [AID2$2] (C2); [AID2$3] (C3); [AID2$4] (C4);

[AID3$1] (D1); [AID3$2] (D2); [AID3$3] (D3); [AID3$4] (D4);

[AID4$1] (E1); [AID4$2] (E2); [AID4$3] (E3); [AID4$4] (E4);

[AID5$1] (F1); [AID5$2] (F2); [AID5$3] (F3); [AID5$4] (F4);

[AID6$1] (G1); [AID6$2] (G2); [AID6$3] (G3); [AID6$4] (G4);

[AID7$1] (H1); [AID7$2] (H2); [AID7$3] (H3); [AID7$4] (H4);

[AID8$1] (I1); [AID8$2] (I2); [AID8$3] (I3); [AID8$4] (I4);

[AID9$1] (J1); [AID9$2] (J2); [AID9$3] (J3); [AID9$4] (J4);

[AID10$1] (K1); [AID10$2] (K2); [AID10$3] (K3); [AID10$4] (K4);

CFBro-CFMet* (H1-H4); StaffCon by SC1 SC2 SC3 SC4 SC5 SCBro Strat2 Strat3

Model: AID1-AID7@1; SC1-SC5* (M1-M5);

Maintain@1; [Maintain@0];

[SC1$1] (N1); [SC1$2] (N2); [SC1$3] (N3);

[SC1$4] (N4); [SC2$1] (O1); [SC2$2] (O2); [SC2$3] (O3); [SC2$4] (O4);

[SC3$1] (P1); [SC3$2] (P2); [SC3$3] (P3); [SC3$4] (P4);

[SC4$1] (Q1); [SC4$2] (Q2); [SC4$3] (Q3); [SC4$4] (Q4);
APPENDIX P

Structural Invariance Test Code in Mplus (2)

[SC4$2] (Q2); [Strat3$4] (V4); [GC5$3] (CC3); [FBI3$3] (NN3);
[SC4$3] (Q3); [Strat4$1] (W1); [GC5$4] (CC4); [FBI3$4] (NN4);
[SC4$4] (Q4); [Strat4$2] (W2); [GC6$1] (DD1); [FBI4$1] (OO1);
[SC5$1] (R1); [Strat4$3] (W3); [GC6$2] (DD2); [FBI4$2] (OO2);
[SC5$2] (R2); [Strat4$4] (W4); [GC6$3] (DD3); [FBI4$3] (OO3);
[SC5$3] (R3); SCBro-Strat4@1; [GC6$4] (DD4); [FBI4$4] (OO4);
[SC5$4] (R4); InfoSeek@1; GC1-GC6@1; [FBI5$1] (PP1);
SC1-SC5@1; [InfoSeek@0]; GoalCom@1; [FBI5$2] (PP2);
StaffCon@1; [GoalCom@0]; [FBI5$3] (PP3);
[StaffCon@0]; GoalCom by
GC1-GC6* (X1-X6) FBI by [FBI5$4] (PP4);
InfoSeek by [GC1$1] (Y1); FBUpDBC15* (EE) [FBI6$1] (QQ1);
SCBro* (S1) [GC1$2] (Y2); FBI1* (FF) [FBI6$2] (QQ2);
Strat2* (S2) [GC1$3] (Y3); FBI2* (GG) [FBI6$3] (QQ3);
Strat3* (S3) [GC2$1] (Z1); FBI3* (HH) FBUpDBC15@1
Strat4* (S4) [GC2$2] (Z2); FBI4* (II) FBI1-FBI6@1;
[SCBro$1] (T1); [GC2$3] (Z3); FBI6* (KK) FBI@1; [FBI@0];
[SCBro$2] (T2); [GC3$1] (AA1); [FBI1$1] (LL1);
[SCBro$3] (T3); [GC3$2] (AA2); [FBI1$2] (LL2); InterStf by
[SCBro$4] (T4); [GC3$3] (AA3); [FBI1$3] (LL3); IS1-IS5* (RR1-RR5);
[Strat2$1] (U1); [GC3$4] (AA4); [FBI1$4] (LL4); [IS1$1] (SS1);
[Strat2$2] (U2); [GC4$1] (BB1); [FBI2$1] (MM1); [IS1$2] (SS2);
[Strat2$3] (U3); [GC4$2] (BB2); [FBI2$2] (MM2); [IS1$3] (SS3);
[Strat2$4] (U4); [GC4$3] (BB3); [FBI2$3] (MM3); [IS1$4] (SS4);
[Strat3$1] (V1); [GC4$4] (BB4); [FBI2$4] (MM4); [IS2$1] (TT1);
[Strat3$2] (V2); [GC5$1] (CC1); [FBI3$1] (NN1); [IS2$2] (TT2);
[Strat3$3] (V3); [GC5$2] (CC2); [FBI3$2] (NN2); [IS2$3] (TT3);
APPENDIX P

Structural Invariance Test Code in Mplus (3)

Model Male:

AcaInt by AID1-AID7@1;

AcaInt*;  

GoalCom with Maintain (XX2);  

Maintain by AcaInt*;

GoalCom with StaffCon (XX3);  

AID1-AID7* (A1-A7);  

[GoalCom with StaffCon (XX3)]:  

AID1-AID7* (A1-A7);

AID1-AID7* (A1-A7);  

AcaInt with InfoSeek (XX11);  

[AID3$1] (D1);

[AID3$2] (D2);

[AID3$3] (D3);

[AID3$4] (D4);

[AID4$1] (E1);

[AID4$2] (E2);

[AID4$3] (E3);

[AID4$4] (E4);

[AID5$1] (F1);

[AID5$2] (F2);

[AID5$3] (F3);

[AID5$4] (F4);

[AID6$1] (G1);

[AID6$2] (G2);

[AID6$3] (G3);

[AID6$4] (G4);

AID1-AID7@1;

AcaInt*;

GoalCom with Maintain (XX2);  

Maintain by AcaInt*;

GoalCom with StaffCon (XX3);  

AID1-AID7* (A1-A7);  

[GoalCom with StaffCon (XX3)]:  

AID1-AID7* (A1-A7);

AID1-AID7* (A1-A7);  

AcaInt with InfoSeek (XX11);  

[AID3$1] (D1);

[AID3$2] (D2);

[AID3$3] (D3);

[AID3$4] (D4);

[AID4$1] (E1);

[AID4$2] (E2);

[AID4$3] (E3);

[AID4$4] (E4);

[AID5$1] (F1);

[AID5$2] (F2);

[AID5$3] (F3);

[AID5$4] (F4);

[AID6$1] (G1);

[AID6$2] (G2);

[AID6$3] (G3);

[AID6$4] (G4);

AID1-AID7@1;

AcaInt*;

GoalCom with Maintain (XX2);  

Maintain by AcaInt*;

GoalCom with StaffCon (XX3);  

AID1-AID7* (A1-A7);  

[GoalCom with StaffCon (XX3)]:  

AID1-AID7* (A1-A7);

AID1-AID7* (A1-A7);  

AcaInt with InfoSeek (XX11);  

[AID3$1] (D1);

[AID3$2] (D2);

[AID3$3] (D3);

[AID3$4] (D4);

[AID4$1] (E1);

[AID4$2] (E2);

[AID4$3] (E3);

[AID4$4] (E4);

[AID5$1] (F1);

[AID5$2] (F2);

[AID5$3] (F3);

[AID5$4] (F4);

[AID6$1] (G1);

[AID6$2] (G2);

[AID6$3] (G3);

[AID6$4] (G4);
FACEBOOK AND INTERNATIONAL TERTIARY INTEGRATION

APPENDIX P

Structural Invariance Test Code in Mplus (4)

[CFCon$2] (J2); [SC3$3] (P3); [Strat3$2] (V2); [GC5$2] (CC2);
[CFCon$3] (J3); [SC3$4] (P4); [Strat3$3] (V3); [GC5$3] (CC3);
[CFCon$4] (J4); [SC4$1] (Q1); [Strat3$4] (V4); [GC5$4] (CC4);
[CFAdd$1] (K1); [SC4$2] (Q2); [Strat4$1] (W1); [GC6$1] (DD1);
[CFAdd$2] (K2); [SC4$3] (Q3); [Strat4$2] (W2); [GC6$2] (DD2);
[CFAdd$3] (K3); [SC4$4] (Q4); [Strat4$3] (W3); [GC6$3] (DD3);
[CFAdd$4] (K4); [SC5$1] (R1); [Strat4$4] (W4); [GC6$4] (DD4);
[CFMet$1] (L1); [SC5$2] (R2); SCBro-Strat4@1; GC1-GC6@1;
[CFMet$2] (L2); [SC5$3] (R3); InfoSeek*; [InfoSeek*]; GoalCom*; [GoalCom*];
[CFMet$3] (L3); [SC5$4] (R4);
[CFMet$4] (L4); SC1-SC5@1; StaffCon*; GoalCom by GC1-GC6* FBI by
CFBro-CFMet@1; [StaffCon*]; (X1-X6); FBUpDBC15* (EE)
Maintain*;
[Maintain*];
InfoSeek by [GC1$1] (Y1); FBI1* (FF)
SCBro* (S1) [GC1$2] (Y2); FBI2* (GG)
StaffCon by [GC1$3] (Y3); FBI3* (HH)
Strat2* (S2) [GC2$1] (Z1); FBI4* (II)
SC1-SC5* (M1-M5); Strat3* (S3) [GC2$2] (Z2); FBI5* (JJ)
[SC1$1] (N1); Strat4* (S4); [GC2$3] (Z3); FBI6* (KK);
[SC1$2] (N2); SCBro$1 (T1); [GC3$1] (AA1); [FBI1$1] (LL1);
[SC1$3] (N3); SCBro$2 (T2); [GC3$2] (AA2); [FBI1$2] (LL2);
[SC1$4] (N4); SCBro$3 (T3); [GC3$3] (AA3); [FBI1$3] (LL3);
[SC2$1] (O1); SCBro$4 (T4); [GC3$4] (AA4); [FBI1$4] (LL4);
[SC2$2] (O2); [Strat2$1] (U1); [GC4$1] (BB1); [FBI2$1] (MM1);
[SC2$3] (O3); [Strat2$2] (U2); [GC4$2] (BB2); [FBI2$2] (MM2);
[SC2$4] (O4); [Strat2$3] (U3); [GC4$3] (BB3); [FBI2$3] (MM3);
[SC3$1] (P1); [Strat2$4] (U4); [GC4$4] (BB4); [FBI2$4] (MM4);
[SC3$2] (P2); [Strat3$1] (V1); [GC5$1] (CC1); [FBI3$1] (NN1);
APPENDIX P

Structural Invariance Test Code in Mplus (5)

[FBI3$2] (NN2); [IS2$3] (TT3); AcaInt with InfoSeek (XX11);
[FBI3$3] (NN3); [IS2$4] (TT4); Maintain with StaffCon (XX12);
[FBI3$4] (NN4); [IS3$1] (UU1); Maintain with Interstf (XX13);
[FBI4$1] (OO1); [IS3$2] (UU2); Maintain with FBI (XX14);
[FBI4$2] (OO2); [IS3$3] (UU3); Maintain with InfoSeek (XX15);
[FBI4$3] (OO3); [IS3$4] (UU4);
[FBI4$4] (OO4); [IS4$1] (VV1); StaffCon with Interstf (XX16);
[FBI5$1] (PP1); [IS4$2] (VV2); StaffCon with FBI (XX17);
[FBI5$2] (PP2); [IS4$3] (VV3); StaffCon with InfoSeek (XX18);
[FBI5$3] (PP3); [IS4$4] (VV4);
[FBI5$4] (PP4); [IS5$1] (WW1); Interstf with FBI (XX19);
[FBI6$1] (QQ1); [IS5$2] (WW2); Interstf with InfoSeek (XX20);
[FBI6$2] (QQ2); [IS5$3] (WW3);
[FBI6$3] (QQ3); [IS5$4] (WW4); FBI with InfoSeek (XX21);
[FBI6$4] (QQ4); IS1-IS5@1; InterStf*; [Interstf*];
FBUpDBC15@1 Output: Standardized;
FBI1-FBI6@1; GoalCom with AcaInt (XX1);
FBI*; [FBI*]; GoalCom with Maintain (XX2);
GoalCom with StaffCon (XX3);
GoalCom with Interstf (XX4);
GoalCom with FBI (XX5);
GoalCom with InfoSeek (XX6);
AcaInt with Maintain (XX7);
AcaInt with StaffCon (XX8);
AcaInt with Interstf (XX9);
AcaInt with FBI (XX10);
APPENDIX Q

Latent Factor Means Difference Test Code in Mplus (1)

Title: Gender Factor Means Difference Test

Data: (see Appendix L) Missing are all (-999);

Variable: Names are Case m1f2 AID1 AID2 AID3 AID4 AID5 AID6 AID7 GC1 GC2 GC3 GC4 GC5 GC6 CFBro CFCon CFAdd CFMet SC1 SC2 SC3 SC4 SC5 SCBro Strat2 Strat3 Strat4 FBUpDBC15 FBI1 FBI2 FBI3 FBI4 FBI5 FBI6 IS1 IS2 IS3 IS4 IS5;

Categorical are AID1 AID2 AID3 AID4 AID5 AID6 AID7 GC1 GC2 GC3 GC4 GC5 GC6 CFBro CFCon CFAdd CFMet SC1 SC2 SC3 SC4 SC5 SCBro Strat2 Strat3 Strat4 FBUpDBC15 FBI1 FBI2 FBI3 FBI4 FBI5 FBI6 IS1 IS2 IS3 IS4 IS5;

Grouping is m1f2 (1 = Male, 2 = Female);

Analysis:

Type = general;

Estimator = WLSMV;

Parameterization = theta;

Model:

AcaInt by AID1-AID7* (A1-A7); [AID1$1] (B1); [AID1$2] (B2); [AID1$3] (B3); [AID1$4] (B4); [AID2$1] (C1); [AID2$2] (C2); [AID2$3] (C3); [AID2$4] (C4); [AID3$1] (D1); [AID3$2] (D2); [AID3$3] (D3); [AID3$4] (D4); [AID4$1] (E1); [AID4$2] (E2); [AID4$3] (E3); [AID4$4] (E4); [AID5$1] (F1); [AID5$2] (F2); [AID5$3] (F3); [AID5$4] (F4); [CFBro$1] (I1); [CFBro$2] (I2); [CFBro$3] (I3); [CFBro$4] (I4); [CFCon$1] (J1); [CFCon$2] (J2); [CFCon$3] (J3); [CFCon$4] (J4); [CFAdd$1] (K1); [CFAdd$2] (K2); [CFAdd$3] (K3); [CFAdd$4] (K4); [CFAdd$5] (K5); [CFAdd$6] (K6); [CFAdd$7] (K7); [CFAdd$8] (K8); [CFAdd$9] (K9);

Maintain by AcaInt@1; Maintain@1; AcaInt@1; SC1-SC5* (M1-M5);

Categorical are AID1 AID2 AID3 AID4 AID5 AID6 AID7 GC1 GC2 GC3 GC4 GC5 GC6 CFBro CFCon CFAdd CFMet SC1 SC2 SC3 SC4 SC5 SCBro Strat2 Strat3 Strat4 FBUpDBC15 FBI1 FBI2 FBI3 FBI4 FBI5 FBI6 IS1 IS2 IS3 IS4 IS5;

Missing are all (-999); [AID5$2] (F2); [AID5$3] (F3); CFBro-CFMet@1; [AID5$4] (F4); [AID6$1] (G1); [AID6$2] (G2); StaffCon by [AID6$3] (G3); [SC1$1] (N1); [SC1$2] (N2); [SC1$3] (N3); [SC1$4] (N4);

Grouping is m1f2 (1 = Male, 2 = Female);
Latent Factor Means Difference Test Code in Mplus (2)

[SC5S2] (R2); SCBro-Strat4@1; GC1-GC6@1; [FBI5S2] (PP2);
[SC5S3] (R3); InfoSeek@1; GoalCom@1; [FBI5S3] (PP3);
[SC5S4] (R4); [FBI5$4] (PP4);
SC1-SC5@1; GoalCom by FBI by [FBI6$1] (QQ1);
StaffCon@1; GC1-GC6* (X1-X6) FBUpDBC15* (EE) [FBI6$2] (QQ2);
[SC1$1] (Y1); FBI1* (FF) [FBI6$3] (QQ3);
InfoSeek by [SC1$2] (Y2); FBI2* (GG) [FBI6$4] (QQ4);
SCBro* (S1) [SC1$3] (Y3); FBI3* (HH) FBUpDBC15@1
Strat2* (S2) [SC1$4] (Y4); FBI4* (II) FBI1-FBI6@1;
Strat3* (S3) [SC2S2] (Z2); FBI6* (KK); FBI@1;
Strat4* (S4); [SC2S3] (Z3); [FBI1$1] (LL1);
[SC1$1] (T1); [SC1$2] (AA1); [FBI1$2] (LL2); InterStf by
[SC1$3] (T3); [SC1$4] (AA4); [FBI1$3] (LL3); IS1-IS5* (RR1-RR5);
[SCBro$4] (T4); [SC3S1] (AA4); [FBI1$4] (LL4); [IS1$1] (SS1);
Strat2$1* (U1); [SC3S2] (AA2); [FBI2$1] (MM1); [IS1$2] (SS2);
Strat2$2* (U2); [SC3S3] (AA3); [FBI2$2] (MM2); [IS1$3] (SS3);
Strat2$3* (U3); [SC3S4] (AA3); [FBI2$3] (MM3); [IS1$4] (SS4);
Strat2$4* (U4); [SC4S1] (BB1); [FBI2$4] (MM4); [IS2$1] (TT1);
Strat3$1* (V1); [SC4S2] (BB2); [FBI3$1] (NN1); [IS2$2] (TT2);
Strat3$2* (V2); [SC5S1] (CC1); [FBI3$2] (NN2); [IS2$3] (TT3);
Strat3$3* (V3); [SC5S2] (CC2); [FBI3$3] (NN3); [IS2$4] (TT4);
Strat3$4* (V4); [SC5S3] (CC3); [FBI3$4] (NN4); [IS3$1] (UU1);
Strat4$1* (W1); [SC5S4] (CC4); [FBI4$1] (OO1); [IS3$2] (UU2);
Strat4$2* (W2); [GC6S1] (DD1); [FBI4$2] (OO2); [IS3$3] (UU3);
Strat4$3* (W3); [GC6S2] (DD2); [FBI4$3] (OO3); [IS3$4] (UU4);
Strat4$4* (W4); [GC6S3] (DD3); [FBI4$4] (OO4); [IS4$1] (VV1);
[Strat4$4] (W4); [GC6S4] (DD4); [FBI5$1] (PP1); [IS4$2] (VV2);
APPENDIX Q

Latent Factor Means Difference Test Code in Mplus (3)

[IS4$3] (VV3); StaffCon with Interstf (XX16); [AID4$4] (E4);
[IS4$4] (VV4); StaffCon with FBI (XX17); [AID5$1] (F1);
[IS5$1] (WW1); StaffCon with InfoSeek (XX18); [AID5$2] (F2);
[IS5$2] (WW2); [AID5$3] (F3);
[IS5$3] (WW3); Interstf with FBI (XX19); [AID5$4] (F4);
[IS5$4] (WW4); Interstf with InfoSeek (XX20); [AID6$1] (G1);
IS1-IS5@1; [AID6$2] (G2);
Interstf@1; FBI with Infoseek (XX21); [AID6$3] (G3);

GoalCom with AcaInt (XX1); Model Male:
GoalCom with Maintain (XX2); AcaInt by AcaInt*;
GoalCom with StaffCon (XX3); AID1-AID7* (A1-A7);
GoalCom with Interstf (XX4); [AID1$1] (B1); [AcaInt@0];
GoalCom with FBI (XX5); [AID1$2] (B2);
GoalCom with InfoSeek (XX6); [AID1$3] (B3); Maintain by
[AID1$4] (B4); CFBro-CFMet* (H1-H4);
AcaInt with Maintain (XX7); [AID2$1] (C1); [CFBro$1] (I1);
AcaInt with StaffCon (XX8); [AID2$2] (C2); [CFBro$2] (I2);
AcaInt with Interstf (XX9); [AID2$3] (C3); [CFBro$3] (I3);
AcaInt with FBI (XX10); [AID2$4] (C4); [CFBro$4] (I4);
AcaInt with InfoSeek (XX11); [AID3$1] (D1); [CFCon$1] (J1);
[AID3$2] (D2); [CFCon$2] (J2);
Maintain with StaffCon (XX12); [AID3$3] (D3); [CFCon$3] (J3);
Maintain with Interstf (XX13); [AID3$4] (D4); [CFCon$4] (J4);
Maintain with FBI (XX14); [AID4$1] (E1); [CFAdd$1] (K1);
Maintain with InfoSeek (XX15); [AID4$2] (E2); [CFAdd$2] (K2);
[AID4$3] (E3); [CFAdd$3] (K3);
APPENDIX Q

Latent Factor Means Difference Test Code in Mplus (4)

\( \text{CFAddS4} @ 4; \)
\( \text{SC5S1} @ 1; \)
\( \text{Strat4S4} @ 4; \)
\( \text{GC6S3} @ 3; \)
\( \text{CFMetS1} @ 1; \)
\( \text{SC5S2} @ 2; \)
\( \text{SCBro-Strat4} @ 1; \)
\( \text{GC6S4} @ 4; \)
\( \text{CFMetS2} @ 2; \)
\( \text{SC5S3} @ 3; \)
\( \text{InfoSeek}*; \)
\( \text{GC}1-\text{GC}6 @ 1; \)
\( \text{CFMetS3} @ 3; \)
\( \text{SC5S4} @ 4; \)
\( \text{InfoSeek @ 0}; \)
\( \text{GoalCom*}; \)
\( \text{CFMetS4} @ 4; \)
\( \text{SC1-SC5} @ 1; \)
\( \text{StaffCon*}; \)
\( \text{GoalCom by GC1-GC6*} \)
\( \text{Maintain*}; \)
\( \text{(X1-X6);} \)
\( \text{FBI by} \)
\( \text{[Maintain @ 0];} \)
\( \text{InfoSeek by} \)
\( \text{[GC1S1] (Y1);} \)
\( \text{FBUpDBC15* (EE)} \)
\( \text{SCBro* (S1)} \)
\( \text{[GC1S2] (Y2);} \)
\( \text{FBI1* (FF)} \)
\( \text{StaffCon by} \)
\( \text{Strat2* (S2)} \)
\( \text{[GC1S3] (Y3);} \)
\( \text{FBI2* (GG)} \)
\( \text{SC1-SC5* (M1-M5);} \)
\( \text{Strat3* (S3)} \)
\( \text{[GC2S1] (Z1);} \)
\( \text{FBI3* (HH)} \)
\( \text{[SC1S1] (N1);} \)
\( \text{Strat4* (S4)} \)
\( \text{[GC2S2] (Z2);} \)
\( \text{FBI4* (II)} \)
\( \text{[SC1S2] (N2);} \)
\( \text{SCBroS1} (T1) \)
\( \text{[GC2S3] (Z3);} \)
\( \text{FBI5* (JJ)} \)
\( \text{[SC1S3] (N3);} \)
\( \text{SCBroS2} (T2) \)
\( \text{[GC3S1] (AA1);} \)
\( \text{FBI6* (KK)} \)
\( \text{[SC1S4] (N4);} \)
\( \text{SCBroS3} (T3) \)
\( \text{[GC3S2] (AA2);} \)
\( \text{FBI1S1 (LL1)} \)
\( \text{SC2S1} (O1) \)
\( \text{SCBroS4} (T4) \)
\( \text{[GC3S3] (AA3);} \)
\( \text{FBI1S2 (LL2)} \)
\( \text{SC2S2} (O2) \)
\( \text{Strat2S1} (U1) \)
\( \text{[GC3S4] (AA4);} \)
\( \text{FBI1S3 (LL3)} \)
\( \text{SC2S3} (O3) \)
\( \text{Strat2S2} (U2) \)
\( \text{[GC4S1] (BB1);} \)
\( \text{FBI1S4 (LL4)} \)
\( \text{SC2S4} (O4) \)
\( \text{Strat2S3} (U3) \)
\( \text{[GC4S2] (BB2);} \)
\( \text{FBI2S1 (MM1)} \)
\( \text{SC3S1} (P1) \)
\( \text{Strat2S4} (U4) \)
\( \text{[GC4S3] (BB3);} \)
\( \text{FBI2S2 (MM2)} \)
\( \text{SC3S2} (P2) \)
\( \text{Strat3S1} (V1) \)
\( \text{[GC4S4] (BB4);} \)
\( \text{FBI2S3 (MM3)} \)
\( \text{SC3S3} (P3) \)
\( \text{Strat3S2} (V2) \)
\( \text{[GC5S1] (CC1);} \)
\( \text{FBI2S4 (MM4)} \)
\( \text{SC3S4} (P4) \)
\( \text{Strat3S3} (V3) \)
\( \text{[GC5S2] (CC2);} \)
\( \text{FBI3S1 (NN1)} \)
\( \text{SC4S1} (Q1) \)
\( \text{Strat3S4} (V4) \)
\( \text{[GC5S3] (CC3);} \)
\( \text{FBI3S2 (NN2)} \)
\( \text{SC4S2} (Q2) \)
\( \text{Strat4S1} (W1) \)
\( \text{[GC5S4] (CC4);} \)
\( \text{FBI3S3 (NN3)} \)
\( \text{SC4S3} (Q3) \)
\( \text{Strat4S2} (W2) \)
\( \text{[GC6S1] (DD1);} \)
\( \text{FBI3S4 (NN4)} \)
\( \text{SC4S4} (Q4) \)
\( \text{Strat4S3} (W3) \)
\( \text{[GC6S2] (DD2);} \)
\( \text{FBI4S1 (OO1)} \)
APPENDIX Q

Latent Factor Means Difference Test Code in Mplus (5)

[FBI4S2] (OO2); [IS3S3] (UU3); Maintain with StaffCon (XX12);
[FBI4S3] (OO3); [IS3S4] (UU4);
[FBI4S4] (OO4); [IS4S1] (VV1); Maintain with Interstf (XX13);
[FBI5S1] (PP1); [IS4S2] (VV2); Maintain with FBI (XX14);
[FBI5S2] (PP2); [IS4S3] (VV3); Maintain with InfoSeek (XX15);
[FBI5S3] (PP3); [IS4S4] (VV4);
[FBI5S4] (PP4); [IS5S1] (WW1); StaffCon with Interstf (XX16);
[FBI6S1] (QQ1); [IS5S2] (WW2); StaffCon with FBI (XX17);
[FBI6S2] (QQ2); [IS5S3] (WW3); StaffCon with InfoSeek (XX18);
[FBI6S3] (QQ3); [IS5S4] (WW4);
[FBI6S4] (QQ4); IS1-IS5@1; InterStf*; Interstf with FBI (XX19);
FBUpDBC15@1 [Interstf@0]; Interstf with InfoSeek (XX20);
FBI1-FBI6@1; GoalCom with AcaInt (XX1); FBI with Infoseek (XX21);
[FBI@0]; GoalCom with Maintain (XX2); GoalCom with StaffCon (XX3); Output: Standardized;
InterStf by IS1-IS5* (RR1-RR5); GoalCom with Interstf (XX4);
[IS1S1] (SS1); GoalCom with FBI (XX5);
[IS1S2] (SS2); GoalCom with InfoSeek (XX6);
[IS1S3] (SS3);
[IS1S4] (SS4); AcaInt with Maintain (XX7);
[IS2S1] (TT1); AcaInt with StaffCon (XX8);
[IS2S2] (TT2); AcaInt with Interstf (XX9);
[IS2S3] (TT3);
[IS2S4] (TT4); AcaInt with FBI (XX10);
[IS3S1] (UU1); AcaInt with InfoSeek (XX11);
[IS3S2] (UU2);
APPENDIX R

Two-Way Interaction Effects on Latent Factor Means Mplus Test Code

Title: Interaction of Gender and Location on Academic and Intellectual Development (AID), and Goal & Institutional Commitment (GC).

Data: File is C:\data\____.csv; Datasets 481g, 481h, 481i, & 481j placed in space above

Variable: Names are Case mNmAfNfA AID1 AID2 AID3 AID4 AID5 AID6 AID7 GC1 GC2 GC3 GC4 GC5 GC6;
Categorical are AID1 AID2 AID3 AID4 AID5 AID6 AID7 GC1 GC2 GC3 GC4 GC5 GC6;
Grouping is mNmAfNfA (1 = MaleNZ;
1 = MaleAUS,
3 = FemaleNZ,
4 = FemaleAUS);

Model:
AID by AID1-AID7*; [AID*];
GC by GC1-GC6*; [GC*];

Model MaleNZ:
[AID] (A11);
[GC] (G11);
AID@1;
GC@1;

Model MaleAUS:
[AID] (A12);
[GC] (G12);
AID*;
GC*;

Model FemaleNZ:
[AID] (A21);
[GC] (G21);
AID*;
GC*;

Model FemaleAUS:
[AID] (A22);
[GC] (G22);
AID*;
GC*;

Model constraint:
new a1 a2;
new b1 b2;
new c;
new r1 r2;
new s1 s2;

Output: Standardized;
APPENDIX S

Figure S1. Notation for Structural Relations in Phase 4 Model
### APPENDIX T

**Structural $\phi, \gamma, \beta$ Difference Test Code in Mplus (1)**

<table>
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<th>Gender Structural $\phi, \gamma, \beta$ Test</th>
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<table>
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<tr>
<th>Code in Mplus</th>
<th>Code in Mplus</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>(1)</td>
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</tbody>
</table>

#### Title:
FBI3 FBI4 FBI5 FBI6 [AID4$1$] (E1); [CFAdd$2$] (K2);

#### Gender Structural $\phi, \gamma, \beta$
IS1 IS2 IS3 IS4 IS5; [AID4$2$] (E2); [CFAdd$3$] (K3);

#### Test
[AID4$3$] (E3); [CFAdd$4$] (K4);

Grouping is m1f2 [AID4$4$] (E4); [CFMet$1$] (L1);

#### Data: (see Appendix L)
(1 = Male, 2 = Female); [AID5$1$] (F1); [CFMet$2$] (L2);

Missing are all (-999); [AID5$2$] (F2); [CFMet$3$] (L3);

#### Variable: Names are
[AID5$3$] (F3); [CFMet$4$] (L4);

Case m1f2 AID1 AID2

Analysis:
[AID5$4$] (F4); CFBro-CFMet@1;

AID3 AID4 AID5 AID6
Type = general; [AID6$1$] (G1); Maintain@1;

AID7 GC1 GC2 GC3
Estimator = WLSMV; [AID6$2$] (G2); [Maintain@0];

GC4 GC5 GC6 CFBro
Parameterization = theta; [AID6$3$] (G3);

CFCon CFAdd CFMet
[CFAdd$2$] (K2);

SC1 SC2 SC3 SC4 SC5
Model: AID1-AID7@1; SC1-SC5* (M1-M5);

SCBro Strat2 Strat3
AcaInt by AcaInt@1; [SC1$1$] (N1);

Strat4 FBUpDBC15
AID1-AID7* (A1-A7); [AcaInt@0]; [SC1$2$] (N2);

FBI1 FBI2 FBI3 FBI4
[AID1$1$] (B1); [SC1$3$] (N3);

FBI5 FBI6 IS1 IS2 IS3
[AID1$2$] (B2); Maintain by [SC1$4$] (N4);

IS4 IS5;
[AID1$3$] (B3); CFBro-CFMet* (H1-H4); [SC2$1$] (O1);

[AID1$4$] (B4); [CFBro$1$] (I1); [SC2$2$] (O2);

Categorical are AID1
[AID2$1$] (C1); [CFBro$2$] (I2); [SC2$3$] (O3);

AID2 AID3 AID4 AID5
[AID2$2$] (C2); [CFBro$3$] (I3); [SC2$4$] (O4);

AID6 AID7 GC1 GC2
[AID2$3$] (C3); [CFBro$4$] (I4); [SC3$1$] (P1);

GC3 GC4 GC5 GC6
[AID2$4$] (C4); [CFCon$1$] (J1); [SC3$2$] (P2);

CFBro CFCon CFAdd
[AID3$1$] (D1); [CFCon$2$] (J2); [SC3$3$] (P3);

CFMet SC1 SC2 SC3
[AID3$2$] (D2); [CFCon$3$] (J3); [SC3$4$] (P4);

SC4 SC5 SCBro Strat2
[AID3$3$] (D3); [CFCon$4$] (J4); [SC4$1$] (Q1);

Strat3 Strat4 FBI1 FBI2
[AID3$4$] (D4); [CFAdd$1$] (K1); [SC4$2$] (Q2);
APPENDIX T

**Structural φ, γ, β Test Code in Mplus (2)**

\[
\begin{align*}
&[SC4S3] (Q3); \quad [Strat4S1] (W1); \quad [GC6S1] (DD1); \quad [FBI4S1] (OO1); \\
&[SC4S4] (Q4); \quad [Strat4S2] (W2); \quad [GC6S2] (DD2); \quad [FBI4S2] (OO2); \\
&[SC5S1] (R1); \quad [Strat4S3] (W3); \quad [GC6S3] (DD3); \quad [FBI4S3] (OO3); \\
&[SC5S2] (R2); \quad [Strat4S4] (W4); \quad [GC6S4] (DD4); \quad [FBI4S4] (OO4); \\
&[SC5S3] (R3); \quad SCBro-Strat4@1; \quad GC1-GC6@1; \quad [FBI5S1] (PP1); \\
&[SC5S4] (R4); \quad InfoSeek@1; \quad GoalCom@1; \quad [FBI5S2] (PP2); \\
&SC1-SC5@1; \quad StaffCon@1; \quad GoalCom by \\
&[StaffCon@0]; \quad GC1-GC6* (X1-X6) \quad FBI by \\
&[GC1S1] (Y1); \quad FBUpDBC15* (EE) \quad [FBI6S1] (QQ1); \\
&InfoSeek by \quad [GC1S2] (Y2); \quad FBI1* (FF) \quad [FBI6S2] (QQ2); \\
&SCBro* (S1) \quad [GC1S3] (Y3); \quad FBI2* (GG) \quad [FBI6S3] (QQ3); \\
&Strat2* (S2) \quad [GC2S1] (Z1); \quad FBI3* (HH) \quad FBUpDBC15@1 \\
&Strat3* (S3) \quad [GC2S2] (Z2); \quad FBI4* (II) \quad FBI1-FBI6@1; \\
&Strat4* (S4); \quad [GC2S3] (Z3); \quad FBI6* (KK); \quad FBI@1; \\
&[SCBro$1] (T1); \quad [GC3S1] (AA1); \quad [FBI1$1] (LL1); \quad [FBI@0]; \\
&[SCBro$2] (T2); \quad [GC3S2] (AA2); \quad [FBI1$2] (LL2); \\
&[SCBro$3] (T3); \quad [GC3S3] (AA3); \quad [FBI1$3] (LL3); \quad InterStf by \\
&[SCBro$4] (T4); \quad [GC3S4] (AA4); \quad [FBI1$4] (LL4); \quad IS1-IS5* (RR1-RR5); \\
&[Strat2S1] (U1); \quad [GC4S1] (BB1); \quad [FBI2$1] (MM1); \quad [IS1S1] (SS1); \\
&[Strat2S2] (U2); \quad [GC4S2] (BB2); \quad [FBI2$2] (MM2); \quad [IS1S2] (SS2); \\
&[Strat2S3] (U3); \quad [GC4S3] (BB3); \quad [FBI2$3] (MM3); \quad [IS1S3] (SS3); \\
&[Strat2S4] (U4); \quad [GC4S4] (BB4); \quad [FBI2$4] (MM4); \quad [IS1S4] (SS4); \\
&[Strat3S1] (V1); \quad [GC5S1] (CC1); \quad [FBI3$1] (NN1); \quad [IS2S1] (TT1); \\
&[Strat3S2] (V2); \quad [GC5S2] (CC2); \quad [FBI3$2] (NN2); \quad [IS2S2] (TT2); \\
&[Strat3S3] (V3); \quad [GC5S3] (CC3); \quad [FBI3$3] (NN3); \quad [IS2S3] (TT3); \\
&[Strat3S4] (V4); \quad [GC5S4] (CC4); \quad [FBI3$4] (NN4); \quad [IS2S4] (TT4); 
\end{align*}
\]
APPENDIX T

Structural $\phi, \gamma, \beta$ Test Code in Mplus (3)

\[
\begin{align*}
\text{[IS3S1 (UU1);} & \quad \text{FBI with InfoSeek(XX9);} & \quad \text{[AID6$\$3] (G3);} \\
\text{[IS3S2 (UU2);} & \quad \text{[AID6$\$4] (G4);} \\
\text{[IS3S3 (UU3);} & \quad \text{Model Male:} & \quad \text{AID1-AID7@1;} \\
\text{[IS3S4 (UU4);} & \quad \text{AcaInt by} & \quad \text{AcaInt*;} \\
\text{[IS4S1 (VV1);} & \quad \text{AID1-AID7* (A1-A7);} \\
\text{[IS4S2 (VV2);} & \quad \text{[AID1$\$1] (B1);} & \quad \text{[AcaInt@*];} \\
\text{[IS4S3 (VV3);} & \quad \text{[AID1$\$2] (B2);} \\
\text{[IS4S4 (VV4);} & \quad \text{[AID1$\$3] (B3);} & \quad \text{Maintain by} \\
\text{[IS5S1 (WW1);} & \quad \text{[AID1$\$4] (B4);} & \quad \text{CFBro-CFMet* (H1-H4);} \\
\text{[IS5S2 (WW2);} & \quad \text{[AID2$\$1] (C1);} & \quad \text{CFBroS1} (I1); \\
\text{[IS5S3 (WW3);} & \quad \text{[AID2$\$2] (C2);} & \quad \text{CFBroS2} (I2); \\
\text{[IS5S4 (WW4);} & \quad \text{[AID2$\$3] (C3);} & \quad \text{CFBroS3} (I3); \\
\text{IS1-IS5}@1; & \quad \text{[AID3$\$1] (D1);} & \quad \text{CFConS1} (J1); \\
& \quad \text{[AID3$\$2] (D2);} & \quad \text{CFConS2} (J2); \\
& \quad \text{[AID3$\$3] (D3);} & \quad \text{CFConS3} (J3); \\
& \quad \text{[AID3$\$4] (D4);} & \quad \text{CFConS4} (J4); \\
\text{InterStf@1;} & \quad \text{GoalCom on AcaInt(XX1);} & \quad \text{[AID4$\$1] (E1);} & \quad \text{CFAddS1} (K1); \\
& \quad \text{GoalCom on Maintain(XX2);} & \quad \text{[AID4$\$2] (E2);} & \quad \text{CFAddS2} (K2); \\
& \quad \text{AcaInt on StaffCon(XX3);} & \quad \text{[AID4$\$3] (E3);} & \quad \text{CFAddS3} (K3); \\
& \quad \text{StaffCon on Interstf(XX4);} & \quad \text{[AID4$\$4] (E4);} & \quad \text{CFAddS4} (K4); \\
& \quad \text{[AID5$\$1] (F1);} & \quad \text{CFMetS1} (L1); \\
& \quad \text{Maintain on FBI(XX5);} & \quad \text{[AID5$\$2] (F2);} & \quad \text{CFMetS2} (L2); \\
& \quad \text{Maintain on InfoSeek(XX6);} & \quad \text{[AID5$\$3] (F3);} & \quad \text{CFMetS3} (L3); \\
& \quad \text{[AID5$\$4] (F4);} & \quad \text{CFMetS4} (L4); \\
& \quad \text{Interstf with FBI(XX7);} & \quad \text{[AID6$\$1] (G1);} & \quad \text{CFBro-CFMet@1;} \\
& \quad \text{Interstf with InfoSeek(XX8);} & \quad \text{[AID6$\$2] (G2);} & \quad \text{Maintain*};
\end{align*}
\]
## APPENDIX T

### Structural $\phi, \gamma, \beta$ Test Code in Mplus (4)

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<th>FBI by</th>
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**InfoSeek by**

- SCBro* (S1)
- Strat2* (S2)
- SCCon by
- Strat3* (S3)
- SC1-SC5* (M1-M5):
  - Strat4* (S4)
  - SC1-SC5* (N1):
  - SC1-SC5* (N2):
  - SC1-SC5* (N3):
  - SC1-SC5* (N4):
  - SC1-SC5* (N5):
  - SC2-SC4* (O1):
  - SC2-SC4* (O2):
  - SC2-SC4* (O3):
  - SC2-SC4* (O4):
  - SC3-SC5* (P1):
  - SC3-SC5* (P2):
  - SC3-SC5* (P3):
  - SC3-SC5* (P4):
  - SC4-SC5* (Q1):
  - SC4-SC5* (Q2):
  - SC4-SC5* (Q3):
  - SC4-SC5* (Q4):
  - SC5-SC5* (R1):
  - SC5-SC5* (R2):
  - SC5-SC5* (R3):
  - SC5-SC5* (R4):

**StaffCon by**

- StaffCon by
- SCCon by
- FBI by
- FBI by
- FBI by
- FBI by
- FBI by
- FBI by
- FBI by
- FBI by
APPENDIX T

Structural $\phi, \gamma, \beta$ Test Code in Mplus (5)

[FBI6$1$] (QQ1); [IS5$2$] (WW2);
[FBI6$2$] (QQ2); [IS5$3$] (WW3);
[FBI6$3$] (QQ3); [IS5$4$] (WW4);
[FBI6$4$] (QQ4); IS1-IS5@1; InterStf*;
FBUpDBC15@1 [Interstf*];
FBI1-FBI6@1;
FBI*; GoalCom on AcaInt(XX1);
[FBI1@*]; GoalCom on Maintain(XX2);
InterStf by IS1-IS5* (RR1-RR5); AcaInt on StaffCon(XX3);
IS1-IS5@1; InterStf*;

[IS1$1$] (SS1);
[IS1$2$] (SS2); Maintain on FBI(XX5);
[IS1$3$] (SS3); Maintain on InfoSeek(XX6);
[IS1$4$] (SS4);
[IS2$1$] (TT1); Interstf with FBI(XX7);
[IS2$2$] (TT2); Interstf with InfoSeek(XX8);
[IS2$3$] (TT3); FBI with InfoSeek(XX9);
[IS2$4$] (TT4);
[IS3$1$] (UU1);
[IS3$2$] (UU2);
[IS3$3$] (UU3);
[IS3$4$] (UU4);
[IS4$1$] (VV1);
[IS4$2$] (VV2);
[IS4$3$] (VV3);
[IS4$4$] (VV4);
[IS5$1$] (WW1);

Output: Standardized;
APPENDIX W

Phase 4 Measurement Model Invariance Tests

Table W1

<table>
<thead>
<tr>
<th>Invariance Test</th>
<th>Parameters Constrained to be Equal</th>
<th>$\chi^2$</th>
<th>df</th>
<th>$\chi^2$/df</th>
<th>$p$</th>
<th>CFI</th>
<th>RMSEA</th>
<th>WRMR</th>
<th>$\Delta \chi^2$</th>
<th>$\Delta$ df</th>
<th>$\Delta$ $\chi^2$/df</th>
<th>$\Delta$ p</th>
<th>$\Delta$ CFI</th>
<th>$\Delta$ RMSEA</th>
<th>Pass</th>
</tr>
</thead>
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<tr>
<td>Full Model</td>
<td>none</td>
<td>1406.895</td>
<td>644</td>
<td>2.185</td>
<td>.139</td>
<td>.965</td>
<td>.050</td>
<td>1.381</td>
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</tr>
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<td>Male Group (n = 163)</td>
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<td>644</td>
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<td>1.078</td>
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<td>.179</td>
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<td>1.271</td>
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<td>—</td>
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<tr>
<td>Scalar DIFFTEST</td>
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<td>—</td>
<td>—</td>
<td>—</td>
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</tr>
<tr>
<td>Structural DIFFTEST</td>
<td>$\lambda$, $\kappa$, $\phi$</td>
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</table>

Note. N = 481a; the configural test refers to the unrestricted baseline model; configural invariance based on RMSEA ≤ .05 (2 decimal places) (Cheung & Rensvold, 2002); change in CFI values pertain to male focal group; results summarised in Table 32 to 2 decimal places; with WLSMV estimation, direct comparison between $\chi^2$ values is only available through the DIFFTEST option (see Muthén & Muthén, 2010, p. 435); metric, scalar, and structural invariance based on $|\Delta\text{CFI}| < .01$ (2 decimal places) (Cheung & Rensvold, 2002); emboldened values pertain to relevant tests of invariance; cells with an em dash (—) indicate that data is not relevant.
Table W2

Phase 4 Measurement Model Invariance Test: 21-and-Under versus 22-and-Over Groups

<table>
<thead>
<tr>
<th>Invariance Test</th>
<th>Parameters Constrained to be Equal</th>
<th>$\chi^2$</th>
<th>$df$</th>
<th>$\chi^2/df$</th>
<th>$p$</th>
<th>CFI</th>
<th>RMSEA</th>
<th>WRMR</th>
<th>$\Delta \chi^2$</th>
<th>$\Delta df$</th>
<th>$\Delta \chi^2/df$</th>
<th>$\Delta p$</th>
<th>$\Delta CFI$</th>
<th>$\Delta RMSEA$</th>
<th>Pass</th>
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<tr>
<td>Full Model</td>
<td>none</td>
<td>1406.895</td>
<td>644</td>
<td>2.185</td>
<td>.139</td>
<td>.965</td>
<td>.050</td>
<td>1.381</td>
<td>—</td>
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<td>—</td>
<td>—</td>
<td>—</td>
<td>✓</td>
</tr>
<tr>
<td>21 and Under Group</td>
<td>none</td>
<td>1031.771</td>
<td>644</td>
<td>1.602</td>
<td>.206</td>
<td>.964</td>
<td>.048</td>
<td>1.072</td>
<td>—</td>
<td>—</td>
<td>—</td>
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<td>—</td>
<td>—</td>
<td>✓</td>
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<tr>
<td>(n = 263)</td>
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<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>22 and Over Group</td>
<td>none</td>
<td>1031.402</td>
<td>644</td>
<td>1.602</td>
<td>.206</td>
<td>.968</td>
<td>.053</td>
<td>1.066</td>
<td>—</td>
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<td>—</td>
<td>—</td>
<td>✓</td>
</tr>
<tr>
<td>(n = 218)</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Configural Test</td>
<td>none</td>
<td>2095.359</td>
<td>1295</td>
<td>1.618</td>
<td>.203</td>
<td>.965</td>
<td>.051</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>✓</td>
</tr>
</tbody>
</table>

Metric DIFFTEST

|                      | $\lambda$                      | —        | —     | —          | —   | .965    | .051  | —    | 80.48           | 31          | 2.596             | .107 | .000     | .000             | ✓    |

Scalar DIFFTEST

|                      | $\lambda, \kappa$               | —        | —     | —          | —   | .965    | .048  | —    | 154.05          | 135         | 1.141             | .285 | .000     | -.003            | ✓    |

Structural DIFFTEST

|                      | $\lambda, \kappa, \phi$         | —        | —     | —          | —   | .976    | .039  | —    | 30.02           | 21          | 1.429             | .232 | .011     | -.009            | ✓    |

Note. $N = 481b$. The Configural Test refers to the unrestricted baseline model; configural invariance based on RMSEA ≤ .05 (2 decimal places) (Cheung & Rensvold, 2002); change in CFI values pertain to 21-and-under focal group; results summarised in Table 32 to 2 decimal places; with WLSMV estimation, direct comparison between $\chi^2$ values is only available through the DIFFTEST option (see Muthén & Muthén, 2010, p. 435); Metric, scalar, and structural invariance based on $|\Delta CFI| < .01$ (2 decimal places) (Cheung & Rensvold, 2002); emboldened values pertain to relevant tests of invariance; cells with an em dash (—) indicate that data is not relevant.
Table W3

Phase 4 Measurement Model Invariance Test: New Zealand versus Australian Groups

<table>
<thead>
<tr>
<th>Invariance Test</th>
<th>Parameters Constrained to be Equal</th>
<th>$\chi^2$</th>
<th>df</th>
<th>$\chi^2$/df</th>
<th>$p$</th>
<th>CFI</th>
<th>RMSEA</th>
<th>WRMR</th>
<th>$\Delta$ $\chi^2$</th>
<th>$\Delta$ df</th>
<th>$\Delta$ $\chi^2$/df</th>
<th>$\Delta$ p</th>
<th>$\Delta$ CFI</th>
<th>$\Delta$ RMSEA</th>
<th>Pass</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full Model</td>
<td>none</td>
<td>1406.895</td>
<td>644</td>
<td>2.185</td>
<td>.139</td>
<td>.965</td>
<td>.050</td>
<td>1.381</td>
<td>.922</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>✓</td>
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<tr>
<td>New Zealand Group</td>
<td>none</td>
<td>986.193</td>
<td>644</td>
<td>1.531</td>
<td>.216</td>
<td>.970</td>
<td>.050</td>
<td>1.104</td>
<td>.922</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Australian Group</td>
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<td>1109.671</td>
<td>644</td>
<td>1.723</td>
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<td>.958</td>
<td>.052</td>
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<td>.916</td>
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<td>.963</td>
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<td>—</td>
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<td>.961</td>
<td>.052</td>
<td>96.69</td>
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<td>.077</td>
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<td>.000</td>
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<td>.960</td>
<td>.051</td>
<td>223.55</td>
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<td>.001</td>
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<tr>
<td>Structural DIFFTEST</td>
<td>$\lambda, \kappa, \phi$</td>
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<td>.964</td>
<td>.048</td>
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<td>.079</td>
<td>.004</td>
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</table>

Note. $N = 481c$. The Configural Test refers to the unrestricted baseline model; configural invariance based on RMSEA ≤ .05 (2 decimal places) (Cheung & Rensvold, 2002); change in CFI values pertain to New Zealand focal group; results summarised in Table 32 to 2 decimal places; with WLSMV estimation, direct comparison between $\chi^2$ values is only available through the DIFFTEST option (see Muthén & Muthén, 2010, p. 435); Metric, scalar, and structural invariance based on $|\Delta\text{CFI}| < .01$ (2 decimal places) (Cheung & Rensvold, 2002); emboldened values pertain to relevant tests of invariance; cells with an em dash (—) indicate that data is not relevant.
Table W4

**Phase 4 Measurement Model Invariance Test: Confucian versus Non-Confucian Groups**

<table>
<thead>
<tr>
<th>Invariance Test</th>
<th>Parameters Constrained to be Equal</th>
<th>$\chi^2$</th>
<th>df</th>
<th>$\chi^2$/df</th>
<th>$p$</th>
<th>CFI</th>
<th>RMSEA</th>
<th>WRMR</th>
<th>$\Delta \chi^2$</th>
<th>$\Delta$ df</th>
<th>$\Delta \chi^2$/df</th>
<th>$\Delta$ p</th>
<th>$\Delta$ CFI</th>
<th>$\Delta$ RMSEA</th>
<th>Pass (✓)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full Model</td>
<td>none</td>
<td>1406.90</td>
<td>644</td>
<td>2.185</td>
<td>.139</td>
<td>.965</td>
<td>.050</td>
<td>1.381</td>
<td>.922</td>
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<td>—</td>
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<td>1.477</td>
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<td>.907</td>
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<td>(n = 157)</td>
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<td>.964</td>
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<td>✓</td>
</tr>
<tr>
<td>Metric DIFFTEST</td>
<td>$\lambda$</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>.963</td>
<td>.051</td>
<td>—</td>
<td>—</td>
<td>—</td>
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<td>—</td>
<td>✓</td>
</tr>
<tr>
<td>Scalar DIFFTEST</td>
<td>$\lambda, \kappa$</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>.963</td>
<td>.049</td>
<td>—</td>
<td>—</td>
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</tr>
<tr>
<td>Structural DIFFTEST</td>
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<td>—</td>
<td>—</td>
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</tbody>
</table>

Note. $N = 481d$. The Configural Test refers to the unrestricted baseline model; configural invariance based on RMSEA $\leq .05$ (2 decimal places) (Cheung & Rensvold, 2002); change in CFI values pertain to Confucian focal group; results summarised in Table 32 to 2 decimal places; with WLSMV estimation, direct comparison between $\chi^2$ values is only available through the DIFFTEST option (see Muthén & Muthén, 2010, p. 435); Metric, scalar, and structural invariance based on $|\Delta \text{CFI}| < .01$ (2 decimal places) (Cheung & Rensvold, 2002); emboldened values pertain to relevant tests of invariance; cells with an em dash (—) indicate that data is not relevant.
Table W5

Phase 4 Measurement Model Invariance Test: Islamic versus Non Islamic Influenced Groups

<table>
<thead>
<tr>
<th>Invariance Test</th>
<th>Parameters Constrained to be Equal</th>
<th>( \chi^2 )</th>
<th>df</th>
<th>( \chi^2/df )</th>
<th>p</th>
<th>CFI</th>
<th>RMSEA</th>
<th>WRMR</th>
<th>( \Delta \chi^2 )</th>
<th>( \Delta df )</th>
<th>( \Delta \chi^2/df )</th>
<th>( \Delta p )</th>
<th>( \Delta ) CFI</th>
<th>( \Delta ) RMSEA</th>
<th>Pass</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full Model</td>
<td>none</td>
<td>1406.895</td>
<td>644</td>
<td>2.185</td>
<td>.139</td>
<td>.965</td>
<td>.050</td>
<td>1.381</td>
<td>.922</td>
<td></td>
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<td></td>
<td></td>
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<td>✓</td>
</tr>
<tr>
<td>Islam Group (n = 219)</td>
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<td>1017.773</td>
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<td>1.580</td>
<td>.209</td>
<td>.970</td>
<td>.051</td>
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<td></td>
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<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Non-Islam Group (n = 262)</td>
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<td>644</td>
<td>1.687</td>
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<td>.961</td>
<td>.051</td>
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<td>.962</td>
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<td>✓</td>
</tr>
<tr>
<td>Metric DIFFTEST</td>
<td>( \lambda )</td>
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<td>—</td>
<td>—</td>
<td>—</td>
<td>.963</td>
<td>.052</td>
<td></td>
<td>60.98</td>
<td>31</td>
<td>1.97</td>
<td>.161</td>
<td>.001</td>
<td>-.001</td>
<td>✓</td>
</tr>
<tr>
<td>Scalar DIFFTEST</td>
<td>( \lambda, \kappa )</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>.963</td>
<td>.049</td>
<td></td>
<td>169.21</td>
<td>132</td>
<td>1.28</td>
<td>.258</td>
<td>.000</td>
<td>-.003</td>
<td>✓</td>
</tr>
<tr>
<td>Structural DIFFTEST</td>
<td>( \lambda, \kappa, \phi )</td>
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<td>—</td>
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<td>—</td>
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<td>.041</td>
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<td>30.40</td>
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<td>1.45</td>
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<td>-.008</td>
<td>✓</td>
</tr>
</tbody>
</table>

Note. \( N = 481 \). The Configural Test refers to the unrestricted baseline model; configural invariance based on RMSEA ≤ .05 (2 decimal places) (Cheung & Rensvold, 2002); change in CFI values pertain to Islamic focal group; results summarised in Table 32 to 2 decimal places; with WLSMV estimation, direct comparison between \( \chi^2 \) values is only available through the DIFFTEST option (see Muthén & Muthén, 2010, p. 435); Metric, scalar, and structural invariance based on |ΔCFI| < .01 (2 decimal places) (Cheung & Rensvold, 2002); emboldened values pertain to relevant tests of invariance; cells with an em dash (—) indicate that data is not relevant.
Table W6

Phase 4 Measurement Model Invariance Test: Living at University versus Not Living at University Groups

<table>
<thead>
<tr>
<th>Invariance Test</th>
<th>Cons.</th>
<th>$\chi^2$</th>
<th>df</th>
<th>$\chi^2$/df</th>
<th>$p$</th>
<th>CFI</th>
<th>RMSEA</th>
<th>WRMR</th>
<th>$\Delta \chi^2$</th>
<th>$\Delta$ df</th>
<th>$\Delta \chi^2$/df</th>
<th>$\Delta p$</th>
<th>$\Delta$ CFI</th>
<th>$\Delta$ RMSEA</th>
<th>Pass</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full Model</td>
<td>none</td>
<td>1417.59</td>
<td>644</td>
<td>2.201</td>
<td>.138</td>
<td>.964</td>
<td>.050</td>
<td>1.389</td>
<td>.923</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>✓</td>
</tr>
<tr>
<td>At University Group (n = 128)</td>
<td>none</td>
<td>926.284</td>
<td>644</td>
<td>1.438</td>
<td>.230</td>
<td>.957</td>
<td>.059</td>
<td>1.164</td>
<td>.894</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>✓</td>
</tr>
<tr>
<td>Outside Univ. Group (n = 351)</td>
<td>none</td>
<td>1190.587</td>
<td>644</td>
<td>1.849</td>
<td>.174</td>
<td>.966</td>
<td>.049</td>
<td>1.263</td>
<td>.925</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>✓</td>
</tr>
<tr>
<td>Configural Test</td>
<td>none</td>
<td>2081.897</td>
<td>1295</td>
<td>1.608</td>
<td>.205</td>
<td>.964</td>
<td>.050</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>✓</td>
</tr>
<tr>
<td>Metric DIFFTEST</td>
<td>$\lambda$</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>.966</td>
<td>.048</td>
<td>—</td>
<td>—</td>
<td>53.93</td>
<td>31</td>
<td>1.74</td>
<td>.187</td>
<td>-.002</td>
<td>-.002</td>
</tr>
<tr>
<td>Scalar DIFFTEST</td>
<td>$\lambda$, $\kappa$</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>.967</td>
<td>.045</td>
<td>—</td>
<td>—</td>
<td>147.41</td>
<td>132</td>
<td>1.12</td>
<td>.291</td>
<td>.001</td>
<td>-.003</td>
</tr>
<tr>
<td>Structural DIFFTEST</td>
<td>$\lambda$, $\kappa$, $\phi$</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>.975</td>
<td>.039</td>
<td>—</td>
<td>—</td>
<td>34.70</td>
<td>21</td>
<td>1.65</td>
<td>.199</td>
<td>.008</td>
<td>-.006</td>
</tr>
</tbody>
</table>

Note. N = 479f. The Configural Test refers to the unrestricted baseline model; configural invariance based on RMSEA ≤ .05 (2 decimal places) (Cheung & Rensvold, 2002); change in CFI values pertain to at university focal group; results summarised in Table 32 to 2 decimal places; with WLSMV estimation, direct comparison between $\chi^2$ values is only available through the DIFFTEST option (see Muthén & Muthén, 2010, p. 435); Metric, scalar, and structural invariance based on $|\Delta$CFI| < .01 (2 decimal places) (Cheung & Rensvold, 2002); emboldened values pertain to relevant tests of invariance; cells with an em dash (—) indicate that data is not relevant.
## Appendix X

### Latent Factor Mean Differences

#### Table X1

**Latent Factor Mean Differences: Male versus Female Groups**

<table>
<thead>
<tr>
<th>Latent Factor</th>
<th>Estimate (d)</th>
<th>S.E.</th>
<th>Est./ S.E.</th>
<th>p (two-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interaction with Staff</td>
<td>0.017</td>
<td>0.099</td>
<td>0.168</td>
<td>0.867</td>
</tr>
<tr>
<td>Staff Concern for Student Development and Teaching</td>
<td>0.097</td>
<td>0.105</td>
<td>0.931</td>
<td>0.352</td>
</tr>
<tr>
<td>Academic and Intellectual Development</td>
<td>0.126</td>
<td>0.110</td>
<td>1.148</td>
<td>0.251</td>
</tr>
<tr>
<td>Goal Commitment</td>
<td>0.178</td>
<td>0.114</td>
<td>1.567</td>
<td>0.117</td>
</tr>
<tr>
<td>Facebook Information-Seeking-i</td>
<td>0.072</td>
<td>0.128</td>
<td>0.560</td>
<td>0.575</td>
</tr>
<tr>
<td>Facebook Intensity-i</td>
<td>0.140</td>
<td>0.097</td>
<td>1.447</td>
<td>0.148</td>
</tr>
<tr>
<td>Facebook Maintaining</td>
<td>0.231</td>
<td>0.147</td>
<td>1.569</td>
<td>0.117</td>
</tr>
</tbody>
</table>

*Note. N = 481a; female group is the reference group, therefore standardized estimates pertain to latent mean differences (d) exhibited in the focal male group; results pertain to STDYX standardization; only emboldened estimates where d ≥ .40 (p < .05) are summarized to 2 decimal places in Table 33.*

#### Table X2

**Latent Factor Mean Differences: 21-and-Under versus 22-and-Over Groups**

<table>
<thead>
<tr>
<th>Latent Factor</th>
<th>Estimate (d)</th>
<th>S.E.</th>
<th>Est./ S.E.</th>
<th>p (two-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interaction with Staff</td>
<td>-0.238</td>
<td>0.103</td>
<td>-2.315</td>
<td>0.021</td>
</tr>
<tr>
<td>Staff Concern for Student Development and Teaching</td>
<td>0.011</td>
<td>0.105</td>
<td>0.102</td>
<td>0.919</td>
</tr>
<tr>
<td>Academic and Intellectual Development</td>
<td>0.085</td>
<td>0.103</td>
<td>0.826</td>
<td>0.409</td>
</tr>
<tr>
<td>Goal Commitment</td>
<td>0.327</td>
<td>0.121</td>
<td>2.700</td>
<td>0.007</td>
</tr>
<tr>
<td>Facebook Information-Seeking-i</td>
<td>0.195</td>
<td>0.105</td>
<td>1.856</td>
<td>0.063</td>
</tr>
<tr>
<td>Facebook Intensity-i</td>
<td>0.333</td>
<td>0.094</td>
<td>3.549</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Facebook Maintaining</td>
<td><strong>0.404</strong></td>
<td>0.143</td>
<td>2.823</td>
<td>0.005</td>
</tr>
</tbody>
</table>

*Note. N = 481b; 22-and-over group is the reference group, therefore standardized estimates pertain to latent mean differences (d) exhibited in the focal 21-and-under focal group; results pertain to STDYX standardization; only emboldened estimates where d ≥ .40 (p < .05) are summarized to 2 decimal places in Table 33.*
Table X3

*Latent Factor Mean Differences: New Zealand versus Australian Groups*

<table>
<thead>
<tr>
<th>Latent Factor</th>
<th>Estimate (d)</th>
<th>S.E.</th>
<th>Est./ S.E.</th>
<th>p (two-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interaction with Staff</td>
<td>0.199</td>
<td>0.095</td>
<td>2.109</td>
<td>0.035</td>
</tr>
<tr>
<td>Staff Concern for Student Development and Teaching</td>
<td>0.249</td>
<td>0.099</td>
<td>2.525</td>
<td>0.012</td>
</tr>
<tr>
<td>Academic and Intellectual Development</td>
<td>0.092</td>
<td>0.098</td>
<td>0.941</td>
<td>0.347</td>
</tr>
<tr>
<td>Goal Commitment</td>
<td>0.046</td>
<td>0.096</td>
<td>0.480</td>
<td>0.632</td>
</tr>
<tr>
<td>Facebook Information-Seeking-i</td>
<td>-0.158</td>
<td>0.100</td>
<td>-1.571</td>
<td>0.116</td>
</tr>
<tr>
<td>Facebook Intensity-i</td>
<td>-0.180</td>
<td>0.088</td>
<td>-2.059</td>
<td>0.040</td>
</tr>
<tr>
<td>Facebook Maintaining</td>
<td>-0.129</td>
<td>0.119</td>
<td>-1.084</td>
<td>0.278</td>
</tr>
</tbody>
</table>

*Note.* N = 481c; Australian group is the reference group, therefore standardized estimates pertain to latent mean differences (d) exhibited in the focal New Zealand group; results pertain to STDYX standardization; only emboldened estimates where d ≥ .40 (p < .05) are summarized to 2 decimal places in Table 33.

Table X4

*Latent Factor Mean Differences: Confucian versus Non-Confucian Influenced Groups*

<table>
<thead>
<tr>
<th>Latent Factor</th>
<th>Estimate (d)</th>
<th>S.E.</th>
<th>Est./ S.E.</th>
<th>p (two-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interaction with Staff</td>
<td>-0.100</td>
<td>0.102</td>
<td>-0.978</td>
<td>0.328</td>
</tr>
<tr>
<td>Staff Concern for Student Development and Teaching</td>
<td>-0.234</td>
<td>0.113</td>
<td>-2.149</td>
<td>0.032</td>
</tr>
<tr>
<td>Academic and Intellectual Development</td>
<td>-0.139</td>
<td>0.106</td>
<td>-1.306</td>
<td>0.192</td>
</tr>
<tr>
<td>Goal Commitment</td>
<td>-0.224</td>
<td>0.121</td>
<td>-1.857</td>
<td>0.063</td>
</tr>
<tr>
<td>Facebook Information-Seeking-i</td>
<td>0.260</td>
<td>0.107</td>
<td>2.428</td>
<td>0.015</td>
</tr>
<tr>
<td>Facebook Intensity-i</td>
<td>-0.028</td>
<td>0.112</td>
<td>-0.247</td>
<td>0.805</td>
</tr>
<tr>
<td>Facebook Maintaining</td>
<td>0.142</td>
<td>0.142</td>
<td>0.998</td>
<td>0.318</td>
</tr>
</tbody>
</table>

*Note.* N = 481d; non-Confucian group is the reference group, therefore standardized estimates pertain to latent mean differences (d) exhibited in the focal Confucian group; results pertain to STDYX standardization; only emboldened estimates where d ≥ .40 (p < .05) are summarized to 2 decimal places in Table 33.
Table X5

**Latent Factor Mean Differences: Islamic versus Non-Islamic Influenced Groups**

<table>
<thead>
<tr>
<th>Latent Factor</th>
<th>Estimate (d)</th>
<th>S.E.</th>
<th>Est./ S.E.</th>
<th>p (two-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interaction with Staff</td>
<td>0.180</td>
<td>0.101</td>
<td>1.783</td>
<td>0.075</td>
</tr>
<tr>
<td>Staff Concern for Student Development and Teaching</td>
<td>0.361</td>
<td>0.098</td>
<td>3.670</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Academic and Intellectual Development</td>
<td>0.346</td>
<td>0.105</td>
<td>3.289</td>
<td>0.001</td>
</tr>
<tr>
<td>Goal Commitment</td>
<td><strong>0.505</strong></td>
<td>0.111</td>
<td>4.537</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Facebook Information-Seeking-i</td>
<td>0.322</td>
<td>0.103</td>
<td>3.124</td>
<td>0.002</td>
</tr>
<tr>
<td>Facebook Intensity-i</td>
<td>0.287</td>
<td>0.092</td>
<td>3.133</td>
<td>0.002</td>
</tr>
<tr>
<td>Facebook Maintaining</td>
<td>0.174</td>
<td>0.126</td>
<td>1.384</td>
<td>0.166</td>
</tr>
</tbody>
</table>

Note. N = 481e; non-Islamic group is the reference group, therefore standardized estimates pertain to latent mean differences (d) exhibited in the focal Islamic group; results pertain to STDYX standardization; only emboldened estimates where d ≥ .40 (p < .05) are summarized to 2 decimal places in Table 33.

Table X6

**Latent Factor Mean Differences: Residing at University versus Not Residing at University Groups**

<table>
<thead>
<tr>
<th>Latent Factor</th>
<th>Estimate (d)</th>
<th>S.E.</th>
<th>Est./ S.E.</th>
<th>p (two-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interaction with Staff</td>
<td>0.017</td>
<td>0.099</td>
<td>0.168</td>
<td>0.867</td>
</tr>
<tr>
<td>Staff Concern for Student Development and Teaching</td>
<td>0.097</td>
<td>0.105</td>
<td>0.931</td>
<td>0.352</td>
</tr>
<tr>
<td>Academic and Intellectual Development</td>
<td>0.126</td>
<td>0.110</td>
<td>1.148</td>
<td>0.251</td>
</tr>
<tr>
<td>Goal Commitment</td>
<td>0.178</td>
<td>0.114</td>
<td>1.567</td>
<td>0.117</td>
</tr>
<tr>
<td>Facebook Information-Seeking-i</td>
<td>0.072</td>
<td>0.128</td>
<td>0.560</td>
<td>0.575</td>
</tr>
<tr>
<td>Facebook Intensity-i</td>
<td>0.140</td>
<td>0.097</td>
<td>1.447</td>
<td>0.148</td>
</tr>
<tr>
<td>Facebook Maintaining</td>
<td>0.231</td>
<td>0.147</td>
<td>1.569</td>
<td>0.117</td>
</tr>
</tbody>
</table>

Note. N = 479f; not residing at university group is the reference group, therefore standardized estimates pertain to latent mean differences (d) exhibited in the focal residing at university group; results pertain to STDYX standardization; only emboldened estimates where d ≥ .40 (p < .05) are summarized to 2 decimal places in Table 33.
## Appendix Y

### Location by Gender for Latent Factor Means

Table Y1

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>NZ Male</td>
<td>75</td>
<td>0.17</td>
<td>0.10</td>
<td>1.70</td>
<td>0.089</td>
<td>-0.09</td>
<td>0.10</td>
<td>-0.89</td>
<td>0.372</td>
<td>-0.07</td>
<td>0.10</td>
<td>-0.69</td>
<td>0.491</td>
<td>-0.21</td>
<td>0.12</td>
<td>-1.77</td>
<td>0.077</td>
</tr>
<tr>
<td>NZ Female</td>
<td>139</td>
<td>0.10</td>
<td>0.08</td>
<td>1.20</td>
<td>0.232</td>
<td>0.33</td>
<td>0.082</td>
<td>4.02</td>
<td>&lt;0.001</td>
<td>0.12</td>
<td>0.08</td>
<td>1.50</td>
<td>0.135</td>
<td>0.30</td>
<td>0.09</td>
<td>3.28</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Aus. Male</td>
<td>88</td>
<td>-0.21</td>
<td>0.10</td>
<td>-2.20</td>
<td>0.028</td>
<td>-0.23</td>
<td>0.10</td>
<td>-2.28</td>
<td>0.022</td>
<td>0.03</td>
<td>0.10</td>
<td>0.33</td>
<td>0.746</td>
<td>-0.12</td>
<td>0.12</td>
<td>-1.01</td>
<td>0.313</td>
</tr>
<tr>
<td>Aus. Female</td>
<td>179</td>
<td>-0.06</td>
<td>0.08</td>
<td>-0.82</td>
<td>0.410</td>
<td>-0.03</td>
<td>0.08</td>
<td>-0.41</td>
<td>0.685</td>
<td>-0.09</td>
<td>0.08</td>
<td>-1.14</td>
<td>0.254</td>
<td>0.03</td>
<td>0.09</td>
<td>0.39</td>
<td>0.70</td>
</tr>
</tbody>
</table>

*Note. N = 481g, two-way interaction tests carried out with WLSMV estimator in MPlus 6.0 (Muthén & Muthén, 2010) in accordance with code provided by Hessen (personal communication, February 22, 2013). NZ = New Zealand. Aus. = Australian. S.E. = standard error. Est. = estimates, and pertain to standardized latent factor mean difference from overall mean. Values in bold represent subgroups that exhibit medium effect sizes (.40 ≤ d < .60, Hattie, 2009), whilst values in bold and underlined represent large effect sizes (.60 ≤ d, Hattie, 2009) as presented in Table Y2. Significance values (p) are two-tailed.*
Table Y2

Assessment of Two-Way Interactions: Location by Gender for Staff-Academic System Latent Factor Means

<table>
<thead>
<tr>
<th>Subgroup 1</th>
<th>Subgroup 2</th>
<th>Interaction with Staff (d)</th>
<th>Staff Concern for Student Development (d)</th>
<th>Academic and Intellectual Development (d)</th>
<th>Goal Commitment (d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NZ Male</td>
<td>NZ Female</td>
<td>0.07</td>
<td>-0.42</td>
<td>-0.19</td>
<td>-0.51</td>
</tr>
<tr>
<td>Australian Male</td>
<td>Australian Female</td>
<td>-0.15</td>
<td>-0.20</td>
<td>0.12</td>
<td>-0.15</td>
</tr>
<tr>
<td>NZ Male</td>
<td>Australian Male</td>
<td>0.38</td>
<td>0.14</td>
<td>-0.10</td>
<td>-0.09</td>
</tr>
<tr>
<td>NZ Female</td>
<td>Australian Female</td>
<td>0.16</td>
<td>0.36</td>
<td>0.21</td>
<td>0.27</td>
</tr>
</tbody>
</table>

Note. N = 481g, with respect to Subgroup 2, standardized estimates pertain to latent mean differences (d) exhibited in Subgroup 1. NZ = New Zealand. Values in bold represent subgroups that exhibit medium effect sizes (0.40 ≤ d < 0.60, Hattie, 2009), whilst values in bold and underlined represent large effect sizes (0.60 ≤ d, Hattie, 2009). Because of subgroup sizes (n ≥ 75), both medium and large effect sizes are reported in Table 34.

Table Y3

Two-Way Interactions: Location by Gender for Student-SNS System Latent Factor Means

<table>
<thead>
<tr>
<th>Subgroups</th>
<th>n</th>
<th>Facebook Intensity-international</th>
<th>Facebook Information Seeking-i</th>
<th>Facebook Maintaining</th>
</tr>
</thead>
<tbody>
<tr>
<td>NZ Male</td>
<td>75</td>
<td>-0.08</td>
<td>0.09</td>
<td>-0.88</td>
</tr>
<tr>
<td>NZ Female</td>
<td>139</td>
<td>0.07</td>
<td>0.10</td>
<td>0.72</td>
</tr>
<tr>
<td>Aus. Male</td>
<td>88</td>
<td>-0.05</td>
<td>0.11</td>
<td>-0.47</td>
</tr>
<tr>
<td>Aus. Female</td>
<td>179</td>
<td>0.13</td>
<td>0.08</td>
<td>1.52</td>
</tr>
</tbody>
</table>

Note. N = 481g, two-way interaction tests carried out with WLSMV estimator in MPlus 6.0 (Muthén & Muthén, 2010) in accordance with code provided by Hessen (personal communication, February 22, 2013). NZ = New Zealand. Aus. = Australian. S.E. = standard error. Est. = estimates, and pertain to standardized latent factor mean difference from overall mean. Values in bold represent subgroups that exhibit medium effect sizes (0.40 ≤ d < 0.60, Hattie, 2009), whilst values in bold and underlined represent large effect sizes (0.60 ≤ d, Hattie, 2009) as presented in Table Y4. Significance values (p) are two-tailed.
### Table Y4

*Assessment of Two-Way Interactions: Location by Gender for Student-SNS System Latent Factor Means*

<table>
<thead>
<tr>
<th>Student-SNS System Factor</th>
<th>Subgroup 1</th>
<th>Subgroup 2</th>
<th>Facebook Intensity-International $(d)$</th>
<th>Facebook Information-Seeking-i $(d)$</th>
<th>Facebook Maintaining $(d)$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NZ Male</td>
<td>NZ Female</td>
<td>-0.15</td>
<td>-0.28</td>
<td>-0.30</td>
</tr>
<tr>
<td></td>
<td>Australian Male</td>
<td>Australian Female</td>
<td>-0.18</td>
<td>0.11</td>
<td>-0.02</td>
</tr>
<tr>
<td></td>
<td>NZ Male</td>
<td>Australian Male</td>
<td>-0.03</td>
<td>-0.42</td>
<td>-0.32</td>
</tr>
<tr>
<td></td>
<td>NZ Female</td>
<td>Australian Female</td>
<td>-0.06</td>
<td>-0.03</td>
<td>-0.04</td>
</tr>
</tbody>
</table>

*Note. $N = 481g$, with respect to Subgroup 2, standardized estimates pertain to latent mean differences $(d)$ exhibited in Subgroup 1. NZ = New Zealand. Values in bold represent subgroups that exhibit medium effect sizes (.40 ≤ $d$ < .60, Hattie, 2009), whilst values in bold and underlined represent large effect sizes (.60 ≤ $d$, Hattie, 2009). Because of subgroup sizes ($n ≥ 75$), both medium and large effect sizes are reported in Table 34.*
### Appendix Z

#### Location by Age-Group for Latent Factor Means

Table Z1

**Two-Way Interactions: Location by Age-Group for Staff-Academic System Latent Factor Means**

| Subgroup     | n  | Est. | S.E. | S.E. | p   | Est. | S.E. | S.E. | p   | Est. | S.E. | S.E. | p   | Est. | S.E. | S.E. | p   | Est. | S.E. | S.E. | p   |
|--------------|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| NZ 21 & Under | 100 | -0.06 | 0.09 | -0.68 | 0.49 | 0.10 | 0.09 | 1.14 | 0.26 | 0.03 | 0.09 | 0.38 | 0.71 | 0.23 | 0.10 | 2.30 | 0.02 |
| NZ 22 & Over  | 114 | 0.26 | 0.09 | 2.87 | 0.00 | 0.17 | 0.09 | 2.04 | 0.04 | 0.08 | 0.11 | 0.89 | 0.37 | -0.07 | 0.10 | -0.71 | 0.48 |
| Aus. 21 & Under | 163 | -0.17 | 0.08 | -2.24 | 0.03 | -0.11 | 0.08 | -1.33 | 0.19 | 0.00 | 0.08 | -0.04 | 0.97 | 0.04 | 0.09 | 0.39 | 0.69 |
| Aus. 22 & Over | 104 | -0.02 | 0.09 | -0.24 | 0.81 | -0.19 | 0.09 | -2.12 | 0.03 | -0.10 | 0.09 | -1.18 | 0.24 | -0.20 | 0.11 | -1.84 | 0.07 |

*Note. N = 481h, two-way interaction tests carried out with WLSMV estimator in MPlus 6.0 (Muthén & Muthén, 2010) in accordance with code provided by Hessen (personal communication, February 22, 2013). NZ = New Zealand. Aus. = Australian. S.E. = standard error. Est. = estimates, and pertain to standardized latent factor mean difference from overall mean. Values in bold represent subgroups that exhibit medium effect sizes (.40 ≤ d < .60, Hattie, 2009), whilst values in bold and underlined represent large effect sizes (.60 ≤ d, Hattie, 2009) as presented in Table Z2. Significance values (p) are two-tailed.*

Table Z2

**Assessment of Two-Way Interactions: Location by Age-Group for Staff-Academic System Latent Factor Means**

<table>
<thead>
<tr>
<th>Subgroup 1</th>
<th>Subgroup 2</th>
<th>Interaction with Staff (d)</th>
<th>Staff Concern for Student Development (d)</th>
<th>Academic and Intellectual Development (d)</th>
<th>Goal Commitment (d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NZ 21 &amp; Under</td>
<td>NZ 22 &amp; Over</td>
<td>-0.32</td>
<td>-0.07</td>
<td>-0.05</td>
<td>0.30</td>
</tr>
<tr>
<td>Aus. 21 &amp; Under</td>
<td>Australian 22 &amp; Over</td>
<td>-0.15</td>
<td>0.08</td>
<td>0.10</td>
<td>0.24</td>
</tr>
<tr>
<td>NZ 21 &amp; Under</td>
<td>Australian 21 &amp; Under</td>
<td>0.11</td>
<td>0.21</td>
<td>0.03</td>
<td>0.19</td>
</tr>
<tr>
<td>NZ 22 &amp; Over</td>
<td>Australian 22 &amp; Over</td>
<td>0.28</td>
<td>0.36</td>
<td>0.18</td>
<td>0.13</td>
</tr>
</tbody>
</table>

*Note. N = 481h, with respect to Subgroup 2, standardized estimates pertain to latent mean differences (d) exhibited in Subgroup 1. NZ = New Zealand. Values in bold represent subgroups that exhibit medium effect sizes (.40 ≤ d < .60, Hattie, 2009), whilst values in bold and underlined represent large effect sizes (.60 ≤ d, Hattie, 2009). Because of subgroup sizes (n ≥ 75), both medium and large effect sizes are reported in Table 34.*
### Table Z3

*Two-Way Interactions: Location by Age-Group for Student-SNS System Latent Factor Means*

<table>
<thead>
<tr>
<th>Interaction</th>
<th>Student-SNS Factors</th>
<th>Facebook Intensity-international</th>
<th>Facebook Information Seeking-i</th>
<th>Facebook Maintaining</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>Est.</td>
<td>S.E.</td>
<td>Est./S.E</td>
</tr>
<tr>
<td>NZ 21 &amp; Under</td>
<td>100</td>
<td>0.24</td>
<td>0.08</td>
<td>3.10</td>
</tr>
<tr>
<td>NZ 22 &amp; Over</td>
<td>114</td>
<td>-0.27</td>
<td>0.09</td>
<td>-3.00</td>
</tr>
<tr>
<td>Aus. 21 &amp; Under</td>
<td>163</td>
<td>0.11</td>
<td>0.09</td>
<td>1.30</td>
</tr>
<tr>
<td>Aus. 22 &amp; Over</td>
<td>104</td>
<td>-0.22</td>
<td>0.10</td>
<td>-2.29</td>
</tr>
</tbody>
</table>

*Note. N = 481h, two-way interaction tests carried out with WLSMV estimator in MPlus 6.0 (Muthén & Muthén, 2010) in accordance with code provided by Hessen (personal communication, February 22, 2013). NZ = New Zealand. Aus. = Australian. S.E. = standard error. Est. = estimates, and pertain to standardized latent factor mean difference from overall mean. Values in bold represent subgroups that exhibit medium effect sizes (.40 ≤ d < .60, Hattie, 2009), whilst values in bold and underlined represent large effect sizes (d ≥ .60, Hattie, 2009) as presented in Table Z4. Significance values (p) are two-tailed.*
Table Z4

Assessment of Two-Way Interactions: Location by Age-Group for Student-SNS Latent Factor Means

<table>
<thead>
<tr>
<th>Subgroup 1</th>
<th>Subgroup 2</th>
<th>Facebook Intensity-International (d)</th>
<th>Facebook Information-Seeking-i (d)</th>
<th>Facebook Maintaining (d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NZ 21 &amp; Under</td>
<td>NZ 22 &amp; Over</td>
<td>0.51</td>
<td>0.37</td>
<td>0.28</td>
</tr>
<tr>
<td>Aust. 21 &amp; Under</td>
<td>Aus. 22 &amp; Over</td>
<td>0.33</td>
<td>-0.01</td>
<td>0.12</td>
</tr>
<tr>
<td>NZ 21 &amp; Under</td>
<td>Aus. 21 &amp; Under</td>
<td>0.13</td>
<td>0.03</td>
<td>-0.03</td>
</tr>
<tr>
<td>NZ 22 &amp; Over</td>
<td>Aus. 22 &amp; Over</td>
<td>-0.05</td>
<td>-0.35</td>
<td>-0.19</td>
</tr>
</tbody>
</table>

Note. N = 481h, with respect to Subgroup 2, standardized estimates pertain to latent mean differences (d) exhibited in Subgroup 1. NZ = New Zealand. Values in bold represent subgroups that exhibit medium effect sizes (.40 ≤ d < .60, Hattie, 2009), whilst values in bold and underlined represent large effect sizes (.60 ≤ d, Hattie, 2009). Because of subgroup sizes (n ≥ 75), both medium and large effect sizes are reported in Table 34.
Appendix AA

Location by Islamic Influence for Latent Factor Means

Table AA1

<table>
<thead>
<tr>
<th>Interaction</th>
<th>Interaction with Staff</th>
<th>Staff Concern for Stud. Dev.</th>
<th>Academic &amp; Intellectual Dev.</th>
<th>Goal Commitment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>Est.</td>
<td>S.E.</td>
<td>Est./S.E.</td>
</tr>
<tr>
<td>NZ Islamic</td>
<td>136</td>
<td>.24</td>
<td>.08</td>
<td>2.90</td>
</tr>
<tr>
<td>NZ Not Islamic</td>
<td>78</td>
<td>-.02</td>
<td>.10</td>
<td>-.24</td>
</tr>
<tr>
<td>Aus. Islamic</td>
<td>83</td>
<td>-.14</td>
<td>.10</td>
<td>-1.45</td>
</tr>
<tr>
<td>Aus. Not Islamic</td>
<td>184</td>
<td>-.07</td>
<td>.07</td>
<td>-1.00</td>
</tr>
</tbody>
</table>

Note. N = 481, two-way interaction tests carried out with WLSMV estimator in MPlus 6.0 (Muthén & Muthén, 2010) in accordance with code provided by Hessen (personal communication, February 22, 2013). NZ = New Zealand. Aus. = Australian. S.E. = standard error. Est. = estimates, and pertain to standardized latent factor mean difference from overall mean. Values in bold represent subgroups that exhibit medium effect sizes (.40 ≤ d < .60, Hattie, 2009), whilst values in bold and underlined represent large effect sizes (.60 ≤ d, Hattie, 2009) as presented in Table AA2. Significance values (p) are two-tailed.
Table AA2

Assessment of Two-Way Interactions: Location by Islamic Influence for Staff-Academic System Latent Factor Means

<table>
<thead>
<tr>
<th>Subgroup 1</th>
<th>Subgroup 2</th>
<th>Interaction with Staff (d)</th>
<th>Staff Concern for Student Development (d)</th>
<th>Academic and Intellectual Development (d)</th>
<th>Goal Commitment (d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NZ Islamic</td>
<td>NZ Not Islamic</td>
<td>0.26</td>
<td>0.70</td>
<td>0.63</td>
<td>1.10</td>
</tr>
<tr>
<td>Aus. Islamic</td>
<td>Aus. Not Islamic</td>
<td>-0.07</td>
<td>-0.10</td>
<td>0.13</td>
<td>0.10</td>
</tr>
<tr>
<td>NZ Islamic</td>
<td>Aus. Islamic</td>
<td>0.38</td>
<td>0.59</td>
<td>0.27</td>
<td>0.46</td>
</tr>
<tr>
<td>NZ Not Islamic</td>
<td>Aus. Not Islamic</td>
<td>0.05</td>
<td>-0.21</td>
<td>-0.23</td>
<td>-0.54</td>
</tr>
</tbody>
</table>

Note. N = 481i, with respect to Subgroup 2, standardized estimates pertain to latent mean differences (d) exhibited in Subgroup 1. NZ = New Zealand. Values in bold represent subgroups that exhibit medium effect sizes (0.40 ≤ d < 0.60, Hattie, 2009), whilst values in bold and underlined represent large effect sizes (0.60 ≤ d, Hattie, 2009). Because of subgroup sizes (n ≥ 75), both medium and large effect sizes are reported in Table 34.
Table AA3

Two-Way Interactions: Location by Islamic Influence for Student-SNS System Latent Factor Means

<table>
<thead>
<tr>
<th>Subgroup</th>
<th>n</th>
<th>Student-SNS System Factors</th>
<th>Facebook Intensity-international</th>
<th>Facebook Information Seeking-i</th>
<th>Facebook Maintaining</th>
</tr>
</thead>
<tbody>
<tr>
<td>NZ Islamic</td>
<td>136</td>
<td>Facebook Intensity-international</td>
<td>.26</td>
<td>.07</td>
<td>3.74</td>
</tr>
<tr>
<td>NZ Not Islamic</td>
<td>78</td>
<td>Facebook Intensity-international</td>
<td>-.47</td>
<td>.11</td>
<td>-4.31</td>
</tr>
<tr>
<td>Aus. Islamic</td>
<td>83</td>
<td>Facebook Intensity-international</td>
<td>.16</td>
<td>.11</td>
<td>1.52</td>
</tr>
<tr>
<td>Aus. Not Islamic</td>
<td>184</td>
<td>Facebook Intensity-international</td>
<td>-.08</td>
<td>.08</td>
<td>-1.08</td>
</tr>
</tbody>
</table>

Note. N = 481, two-way interaction tests carried out with WLSMV estimator in MPlus 6.0 (Muthén & Muthén, 2010) in accordance with code provided by Hessen (personal communication, February 22, 2013). NZ = New Zealand. Aus. = Australian. S.E. = standard error. Est. = estimates, and pertain to standardized latent factor mean difference from overall mean. Values in bold represent subgroups that exhibit medium effect sizes (.40 ≤ d < .60, Hattie, 2009), whilst values in bold and underlined represent large effect sizes (.60 ≤ d, Hattie, 2009) as presented in Table AA4. Significance values (p) are two-tailed.
Table AA4

Assessment of Two-Way Interactions: Location by Islamic Influence for Student-SNS System Latent Factor Means

<table>
<thead>
<tr>
<th>Student-SNS Factor</th>
<th>Subgroup 1</th>
<th>Subgroup 2</th>
<th>Facebook Intensity-International (d)</th>
<th>Facebook Information-Seeking-i (d)</th>
<th>Facebook Maintaining (d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NZ Islamic</td>
<td>NZ Not Islamic</td>
<td></td>
<td>0.73</td>
<td>0.57</td>
<td>0.34</td>
</tr>
<tr>
<td>Aus. Islamic</td>
<td>Aus. Not Islamic</td>
<td></td>
<td>0.24</td>
<td>0.28</td>
<td>0.04</td>
</tr>
<tr>
<td>NZ Islamic</td>
<td>Aus. Islamic</td>
<td></td>
<td>0.10</td>
<td>-0.18</td>
<td>-0.05</td>
</tr>
<tr>
<td>NZ Not Islamic</td>
<td>Aus. Not Islamic</td>
<td></td>
<td>-0.39</td>
<td>-0.47</td>
<td>-0.35</td>
</tr>
</tbody>
</table>

Note. N = 481, with respect to Subgroup 2, standardized estimates pertain to latent mean differences (d) exhibited in Subgroup 1. NZ = New Zealand. Values in bold represent subgroups that exhibit medium effect sizes (.40 ≤ d < .60, Hattie, 2009), whilst values in bold and underlined represent large effect sizes (.60 ≤ d, Hattie, 2009). Because of subgroup sizes (n ≥ 75), both medium and large effect sizes are reported in Table 34.
Appendix BB

Age-Group by Islamic Influence for Latent Factor Means

Table BB1

Two-Way Interactions: Age-Group by Islamic Influence for Staff-Academic System Latent Factor Means

<table>
<thead>
<tr>
<th>Subgroup</th>
<th>Interaction with Staff</th>
<th>Staff Concern for Student Dev.</th>
<th>Academic &amp; Intellectual Dev.</th>
<th>Goal Commitment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>Est. / S.E. / p</td>
<td>Est. / S.E. / p</td>
<td>Est. / S.E. / p</td>
</tr>
<tr>
<td>21-&amp;-Under Islamic</td>
<td>143</td>
<td>-.07 / .08 / .372</td>
<td>.05 / .09 / .528</td>
<td>.10 / .09 / .242</td>
</tr>
<tr>
<td>21-&amp;-Under Non-Islamic</td>
<td>120</td>
<td>-.23 / .09 / .008</td>
<td>-.17 / .09 / .049</td>
<td>-.17 / .09 / .055</td>
</tr>
<tr>
<td>22-&amp;-Over Islamic</td>
<td>76</td>
<td>.29 / .10 / .006</td>
<td>.32 / .10 / .002</td>
<td>.23 / .10 / .020</td>
</tr>
<tr>
<td>22-&amp;-Over Non-Islamic</td>
<td>142</td>
<td>.01 / .08 / .884</td>
<td>-.23 / .08 / .007</td>
<td>-.20 / .08 / .17</td>
</tr>
</tbody>
</table>

Note. N = 481j, Two-way interaction tests carried out with WLSMV estimator in MPlus 6.0 (Muthén & Muthén, 2010) in accordance with code provided by Hessen (personal communication, February 22, 2013). S.E. = standard error. Est. = estimates, and pertain to standardized latent factor mean difference from overall mean. Values in bold represent subgroups that exhibit medium effect sizes (.40 ≤ d < .60, Hattie, 2009), whilst values in bold and underlined represent large effect sizes (.60 ≤ d, Hattie, 2009) as presented in Table BB2. Significance values (p) are two-tailed.
Table BB2

*Assessment of Two-Way Interactions: Age-Group by Islamic Influence for Staff-Academic System Latent Factor Means*

<table>
<thead>
<tr>
<th>Subgroup 1</th>
<th>Subgroup 2</th>
<th>Interaction with Staff (d)</th>
<th>Staff Concern for Stud. Dev. (d)</th>
<th>Academic and Intellectual Development (d)</th>
<th>Goal Commitment (d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>21-&amp;-Under Islamic</td>
<td>21-&amp;-Under Non-Islamic</td>
<td>0.16</td>
<td>0.22</td>
<td>0.27</td>
<td>0.36</td>
</tr>
<tr>
<td>22-&amp;-Over Islamic</td>
<td>22-&amp;-Over Non-Islamic</td>
<td>0.28</td>
<td><strong>0.55</strong></td>
<td><strong>0.43</strong></td>
<td><strong>0.69</strong></td>
</tr>
<tr>
<td>21-&amp;-Under Islamic</td>
<td>22-&amp;-Over Islamic</td>
<td>-0.36</td>
<td>-0.27</td>
<td>-0.13</td>
<td>-0.02</td>
</tr>
<tr>
<td>21-&amp;-Under Non-Islamic</td>
<td>22-&amp;-Over Non-Islamic</td>
<td>-0.24</td>
<td>0.06</td>
<td>0.03</td>
<td>-0.31</td>
</tr>
</tbody>
</table>

*Note. N = 481j, with respect to Subgroup 2, standardized estimates pertain to latent mean differences (d) exhibited in Subgroup 1. NZ = New Zealand. Values in bold represent subgroups that exhibit medium effect sizes (0.40 ≤ d < 0.60, Hattie, 2009), whilst values in bold and underlined represent large effect sizes (0.60 ≤ d, Hattie, 2009). Because of subgroup sizes (n ≥ 75), both medium and large effect sizes are reported in Table 34.*
Table BB3

Two-Way Interactions: Age-Group by Islamic Influence for Student-SNS System Latent Factor Means

<table>
<thead>
<tr>
<th>Subgroups</th>
<th>n</th>
<th>Facebook Intensity-international</th>
<th>Facebook Information-Seeking-i</th>
<th>Facebook Maintaining</th>
</tr>
</thead>
<tbody>
<tr>
<td>21-&amp;-Under Islamic</td>
<td>143</td>
<td>.28</td>
<td>.07</td>
<td>4.04</td>
</tr>
<tr>
<td>21-&amp;-Under Non-Islamic</td>
<td>120</td>
<td>.03</td>
<td>.09</td>
<td>0.31</td>
</tr>
<tr>
<td>22-&amp;-Over Islamic</td>
<td>76</td>
<td>.04</td>
<td>.10</td>
<td>0.39</td>
</tr>
<tr>
<td>22-&amp;-Over Non-Islamic</td>
<td>142</td>
<td>-.47</td>
<td>.08</td>
<td>-5.61</td>
</tr>
</tbody>
</table>

Note. N = 481j, two-way interaction tests carried out with WLSMV estimator in MPlus 6.0 (Muthén &Muthén, 2010) in accordance with code provided by Hessen (personal communication, February 22, 2013). S.E. = standard error. Est. = estimates, and pertain to standardized latent factor mean difference from overall mean. Values in bold represent subgroups that exhibit medium effect sizes (.40 ≤ d < .60, Hattie, 2009), whilst values in bold and underlined represent large effect sizes (.60 ≤ d, Hattie, 2009) as presented in Table BB4. Significance values (p) are two-tailed.
Table BB4

*Assessment of Two-Way Interactions: Age-Group by Islamic Influence for Student-SNS System Latent Factor Means*

<table>
<thead>
<tr>
<th>Subgroup 1</th>
<th>Subgroup 2</th>
<th>Facebook Usage Factor</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Facebook Intensity-International (d)</td>
<td>Facebook Information-Seeking-i (d)</td>
<td>Facebook Maintaining (d)</td>
<td></td>
</tr>
<tr>
<td>21-&amp;-Under Islamic</td>
<td>21-&amp;-Under Non-Islamic</td>
<td>0.25</td>
<td>0.25</td>
<td>-0.01</td>
<td></td>
</tr>
<tr>
<td>22-&amp;-Over Islamic</td>
<td>22-&amp;-Over Non-Islamic</td>
<td><strong>0.51</strong></td>
<td>0.32</td>
<td>0.23</td>
<td></td>
</tr>
<tr>
<td>21-&amp;-Under Islamic</td>
<td>22-&amp;-Over Islamic</td>
<td>0.24</td>
<td>0.05</td>
<td>0.06</td>
<td></td>
</tr>
<tr>
<td>21-&amp;-Under Non-Islamic</td>
<td>22-&amp;-Over Non-Islamic</td>
<td><strong>0.50</strong></td>
<td>0.12</td>
<td>0.30</td>
<td></td>
</tr>
</tbody>
</table>

*Note. N = 481j, with respect to Subgroup 2, standardized estimates pertain to latent mean differences (d) exhibited in Subgroup 1. NZ = New Zealand. Values in bold represent subgroups that exhibit medium effect sizes (.40 ≤ d < .60, Hattie, 2009), whilst values in bold and underlined represent large effect sizes (.60 ≤ d, Hattie, 2009). Because of subgroup sizes (n ≥ 75), both medium and large effect sizes are reported in Table 34.*
Appendix CC: Groupwise Structural Differences

### Table CC1

**Groupwise Differences in Structural Relationships in the Phase 4 Model**

<table>
<thead>
<tr>
<th>Level of Group Assessment</th>
<th>Gender</th>
<th>Age-Group</th>
<th>Location</th>
<th>Confucian Influence</th>
<th>Islamic Influence</th>
<th>Residence</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Conf.</td>
<td>Non-Conf.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>NZ</td>
<td>Aus</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not.</td>
<td>Male</td>
<td>Fem</td>
<td>p</td>
<td>21+</td>
<td>22-</td>
<td></td>
</tr>
<tr>
<td></td>
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#### Structural Relations between Exogenous Factors in Phase 4 Model

ϕ₁, ϕ₂, ϕ₃

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Note. N = 481a, 481b, 481c, 481d, & 479f, respectively, see Figure S1 for description of notation (Not.) for structural relations in the Phase 4 Model. NZ = New Zealand. Aus. = Australia. 21+ = 21-and-over. 22- = 22-and-over. @Uni. = at university. Not @Uni = not at university. Islam = Islamic Influenced. Non-Islam = non-Islamic influenced. Conf. = Confucian Influence. Non-Conf. = non-Confucian influenced. Significance values (p) are two-tailed. Only significant values of p < .05 (in bold) are reported, to 2 decimal places, in Table 36.