

**THE EFFECT OF RECIPROCITY NUDGES ON TAX COMPLIANCE:
EVIDENCE FROM AN EXPERIMENTAL STUDY**

by

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.....
Nompumelelo Lorraine Monageng

ABSTRACT

THE EFFECT OF RECIPROCITY NUDGES ON TAX COMPLIANCE: EVIDENCE FROM AN EXPERIMENTAL STUDY

by

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Governments and tax authorities have taken a keen interest in understanding the effects of nudging as a tool to influence voluntary tax compliance. However, research in this area has focused on developed countries, resulting in limited empirical evidence available relevant to developing countries. This thesis addresses this knowledge gap. It focuses on the use of reciprocity nudges to influence the tax compliance behaviour of individual taxpayers in South Africa. This thesis also explores the role of structural and content attributes of the message in the effectiveness of tax nudges.

In this study, a core sequential mixed methods approach was applied. Initially, a qualitative content analysis process was carried out in order to identify structural and content attributes, from existing literature, for an effective message aimed at changing behaviour. This was followed by a quantitative content analysis that was carried out on 12 South African Revenue Service (SARS) videos. The experimental phase of the thesis was then designed based on the results of the content analysis and was conducted with 172 student participants.

In addition to its main (confirmatory) finding that nudge messages can make a difference to voluntary tax compliance, four further key findings emerge from this thesis. First, the results indicate that in order for a nudge message to be effective, it must contain certain structural and content attributes. Second, the timing between the exposure to a reciprocity nudge and the making of a tax compliance decision has no statistically significant impact on tax

compliance. Third, reciprocity nudges do not appear to be more effective on some sub-groups of the population than others. Fourth, high levels of perceived corruption and attitudes towards tax had no impact on the tax compliance of individuals exposed to a reciprocity nudge.

This thesis extends the current knowledge of how insights from behavioural economics can be incorporated to assist with influencing voluntary tax compliance. Furthermore by adopting a mixed method approach this thesis demonstrates how one method can be used to inform another in tax compliance research. The thesis also provides further clarity on the role of structural and content attributes that ought to be incorporated into tax nudge messages.

DEDICATION

This thesis is dedicated to:

- my parents, Veli and Lindiwe Shabangu;
- my grandparents, Joseph Shabangu, Catherine Shabangu, Sarah Shabangu, Maria Nhlapo, Titus Maseko and Violet Maseko;
- my husband, Tumelo Monageng; and
- my children, Gaopalelwe, Reoagile, Kegomoditswe and Motheo.

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LIST OF ABBREVIATIONS AND ACRONYMS

Abbreviation/Acronym	Meaning
DQ	Descriptive research question
EMS	Economic and Management Sciences
GDP	Gross domestic product
KMO	Kaiser-Meyer-Olkin
OECD	Organisation for Economic Co-operation and Development
PAYE	Pay As You Earn
PH	Primary hypothesis
PH ₀	Null primary hypothesis
PIT	Personal income tax
PQ	Primary research question
SADC	Southern African Development Community
SARS	South African Revenue Service
SH	Secondary hypothesis
SH ₀	Null secondary hypothesis
SPSS	<i>Statistical Package for the Social Sciences</i>
SQ	Secondary research question
UK	United Kingdom
USA	United States of America
VAT	Value-Added Tax

CHAPTER 1: INTRODUCTION

1.1 BACKGROUND

“Taxes are the price we pay for a civilized society ...” (Oliver Wendell Holmes Jr., 1927)

Taxes are an important component of any economy; they play a vital part in the provision of basic public services and goods for the benefit of all citizens of a country. It is for this reason that tax authorities from both developed and developing nations have been tasked by their governments with increasing the overall levels of tax compliance.¹ This has become an increasingly important task in light of the increasing dependence of many economies on tax revenues and the continuous search by some African countries for solutions to reduced dependence on foreign aid.

In executing their task of increasing the levels of tax compliance, tax authorities have widely implemented enforcement strategies such as tax audits and penalties (McKerchar & Evans, 2009:175). These enforcement strategies are, however, both costly and time consuming (Kirchler, Hoelzl & Wahl, 2008:220). As a result, tax authorities have increasingly turned their attention towards identifying and promoting voluntary compliance, sometimes as an alternative to enforcement strategies but usually as a complement.

Strategies to promote voluntary compliance are wide-ranging and include measures which seek to change the behaviour of taxpayers by making them more inclined to comply with their tax obligations. This thesis seeks to make a contribution in this area of voluntary tax compliance by exploring, in detail, one aspect of voluntary tax compliance: the effect of communicating reciprocity messages as a “nudge” to encourage voluntary tax compliance.

Nudging has become a policy tool used by governments across many areas, including taxation, to encourage or discourage certain behaviours amongst citizens. Given the current interest of scholars and governments in nudging and the move by some African revenue authorities (such as the South African Revenue Service (SARS) and the Kenya Revenue Authority) towards using advertising campaigns as both an education tool and as a tool to

¹ A detailed explanation of what is meant by the concept of tax compliance is provided in Chapter 2. In simple terms and for the purposes of this overview, tax compliance can be taken to mean compliance by a taxpayer with the obligations imposed by the tax system.

communicate reciprocity messages, this thesis aims to shed light on the effectiveness of communicating such messages in multicultural developing countries, such as South Africa.

This study therefore focuses on the effect of reciprocity messages used as nudges to improve voluntary tax compliance. Reciprocity nudges refer to nudges using beliefs about the use of resources by the government (Castro & Scartascini, 2015:66).

The study is carried out in South Africa for three major reasons. Firstly, although the country has had a growing culture of tax compliance, like many other countries South Africa faces significant problems in ensuring that particular sections of its population comply with their tax obligations (SARS 2012d:1). For example, in its tax compliance programme, SARS has identified tax compliance amongst wealthy individuals as a high risk area, with over 20 per cent of these individuals having been identified as having discrepancies between their tax declared income and their asset base (SARS 2012d:10). The taxi industry is also listed as one of SARS' focus areas (SARS, 2016b). The South African taxi industry is usually cash-based and SARS acknowledges that tax compliance levels in cash-based businesses are low (National Assembly, 2013). Despite efforts made by SARS to improve tax compliance, there has been a decline in tax compliance in certain sectors in recent years (SARS, 2018:5). There are therefore many problems with voluntary compliance in South Africa which make it a fertile ground for study.

Secondly, South Africa is a culturally diverse country, which provides an opportunity to examine the effect of reciprocity nudges on different population groups. The study therefore explores whether the effect of communication reciprocity messages as nudges to encourage voluntary tax compliance differs amongst these different population groups.

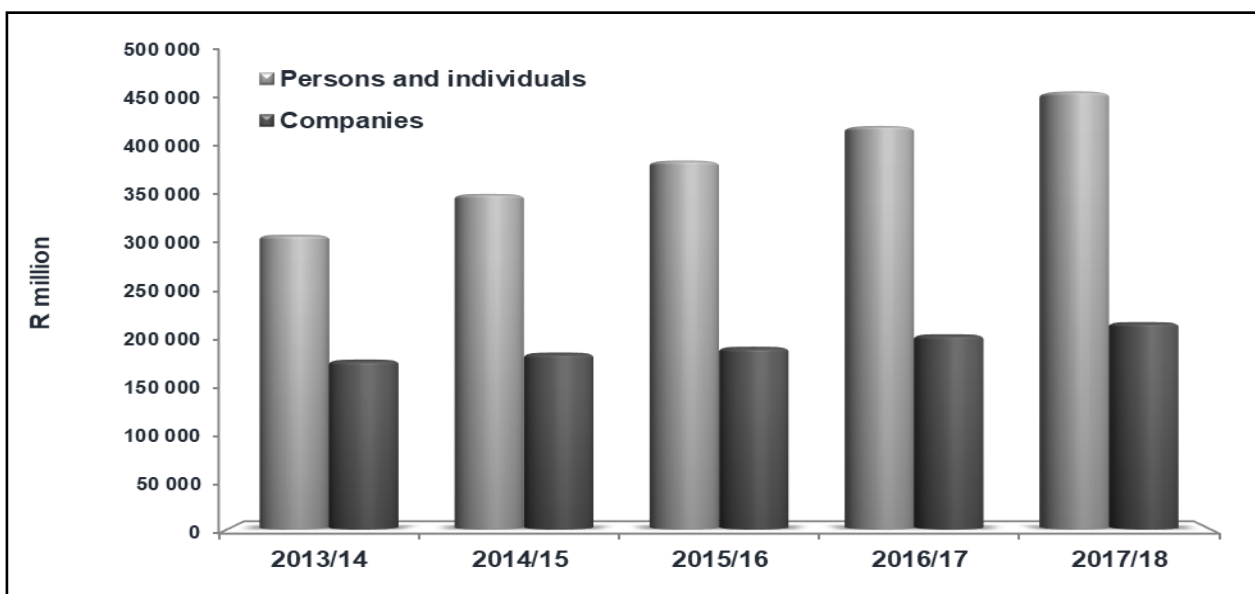
Thirdly, South Africa has had its challenges with regard to perception of poor service delivery and the decrease in public trust in the government. This provides an opportunity to study the relationship between reciprocity nudge messages and tax compliance in such an environment.

1.2 SOUTH AFRICAN OVERVIEW

The previous section has provided a brief background for this thesis and has outlined the reasons for conducting the study in South Africa. It is thus also important to provide a detailed overview of the South African personal income tax (PIT) system in order to better understand the context of this thesis.

South Africa relies heavily on income and profit taxes, more so than on taxes such as Value-Added Tax (VAT). In 2017, 53 per cent of South Africa's total tax revenue was derived from taxes on income and profits (Organisation for Economic Co-operation and Development (OECD, ATAF & AUC, 2019:231). A significant percentage of taxes on income and profits is attributable to individual taxpayers. The contribution to total tax revenue from PIT in South Africa indicates consistent growth as opposed to revenue derived from company income tax as indicated in Figure 1.1.

Figure 1.1: Contribution of PIT and company income tax to total tax revenue: South Africa



Source: National Treasury & SARS (2018:10).

In 2017/2018, PIT accounted for 38.1 per cent of South Africa's total tax revenue (considerably higher than the company income tax contribution of 18.1 per cent). With a population estimated at 58.78 million in mid-2019 and a reported unemployment rate of 29 per cent in the second quarter of 2019, the importance of improving tax compliance levels amongst individual taxpayers is becoming increasingly important for South Africa (Statistics South Africa, 2019a:v, Statistics South Africa, 2019b:1).

1.2.1 Personal income tax in South Africa

Income tax has been levied in South Africa since the 1800s and is levied on individuals' taxable income (Stiglingh & Silke, 2018:12-13). Taxable income is calculated as gross income, less exempt income, less allowable deductions. Taxable capital gains are also an inclusion into taxable income (National Treasury & SARS, 2016:32).

The South African tax system was initially source based, indicating that individuals were taxed on income and profits attributable to a South African source. The system changed to residence-based in 2001 as part of the recommendations made by the Katz Commission, which was appointed in 1994 by the post-apartheid government to study the tax system and make recommendations on improving the system. The change broadened the tax base and aligned the country's tax system with international standards (Hattingh, Roeleveld & West, 2016:324; Nyamongo & Schoeman, 2007:481).

Since the introduction of income tax, other changes with regard to PIT have also been made. One of these changes was the repealing of the Black Taxation Act applicable to Black persons (Republic of South Africa, 1984:3), in 1984. This repeal meant that from the 1985 tax year all population groups in South Africa were subject to PIT in terms of the Income Tax Act (58/1962) (hereafter referred to as the Income Tax Act). Changes made in the 1990s included the harmonisation of the different tax schedules that applied to different tax units² into two tax schedules; one for natural persons and the other for non-natural persons (Hattingh *et al.*, 2016:325). The tax brackets were also reduced from twenty-four to seven. These changes simplified tax on personal income (Davis Tax Committee, 2016:26).

There have also been significant changes to the number of individuals registered for PIT. In the 2003 tax year, there were 3.6 million registered individual taxpayers, and 3.5 million of these individuals were expected to submit a tax return in the specific year (2003)³ (National Treasury & SARS, 2008:31). Since the 2011 tax year, all individuals who are formally employed are required to be registered with SARS for PIT irrespective of whether the

² Prior to 1995, the family was the tax unit. The tax system differentiated between married and unmarried persons. Single persons were taxed at a higher rate than married persons, and married women were taxed at a higher rate than married men (Hattingh *et al.*, 2016:325).

³ The difference in number between registered taxpayers and those expected to submit a tax return is due to the fact that taxpayers may have been registered and may have been liable to submit tax returns previously, for other years but were not liable to submit a return for the 2003 tax year.

individual's taxable income is below or above the tax threshold. The number of registered individuals in the 2011 tax year was 10.3 million, with 4.8 million expected to submit a tax return for the applicable tax year (National Treasury & SARS, 2012:33). By the 2017 tax year, there were 19.9 million individuals registered, representing a percentage growth of 9.9 in the tax register. Of these individuals, 6.3 million were expected to submit tax returns (National Treasury & SARS, 2018:38).

With the exception of individuals who meet the requirements of the employment income exclusion, individuals registered for PIT are required to submit a tax return if the individual receives income from employment which exceeds R500 000,⁴ has a capital gain or loss exceeding the annual capital gains exclusion, receives a taxable allowance or advance, receives South African interest that exceeds the interest exemption, receives income from any trade other than employment or is specifically requested by SARS to submit a tax return. If the individual is a South African resident with foreign assets or income, the individual may be requested to submit a tax return, provided certain requirements are met. Non-residents who receive interest or who have interest accruing from a source in South Africa may also be required to submit a tax return in South Africa provided certain requirements are met.

During the tax season, individuals are expected to submit their tax return for the applicable tax year, which runs from 1 March to the end of February. The tax season opens on 1 July each year and continues until the last day of October for branch filing and the first week of December for eFiling. Once an individual submits a tax return, SARS assesses the return and issues a notice of assessment to the taxpayer. The notice of assessment reflects the taxpayer's taxable income and indicates the amount due to SARS or the refund the taxpayer is entitled to from SARS. In the 2017 tax year, (from those taxpayers expected to submit tax returns) 4.8 million (76.5 per cent) were assessed as at June 2018 (National Treasury & SARS, 2018:37).

In the tax years 2015/2016, 2016/2017 and 2017/2018, the tax return filing compliance levels for PIT was above 90 per cent (SARS, 2018:65). The registration compliance increase could have been attributable to filing campaigns conducted and also to changes in economic conditions (SARS, 2018:65). Payment compliance levels, however, were not so high; for

⁴ This amount is equivalent to \$27 352.30, converted at an exchange rate of USD1 = ZAR18.28 as at 20 May 2020.

example, the compliance level for the 2017/2018 tax year was only 44.2 per cent (SARS, 2018:64).

PIT as a percentage of Gross Domestic Product (GDP) between 2010 and 2015 was the highest when compared with the percentage of GDP of other taxes such as VAT and company income tax. In 2015, the percentage of PIT was 9.7 (higher than the average for OECD countries of 8.9 per cent) (OECD, 2018a; 2018b). Table 1.1 indicates that South Africa's PIT to GDP percentage is relatively high when compared with that of other developing countries in Africa.

Table 1.1: PIT as a percentage of GDP

Year		2010	2011	2012	2013	2014	2015
OECD - average		8.2	8.3	8.6	8.7	8.8	8.9
Non-OECD economies	Cameroon	.9	.9	1.0	1.1	1.1	1.1
	Mauritius	1.5	1.5	1.6	1.7	1.8	1.9
	Morocco	3.4	3.6	4.0	3.9	3.7	3.3
	Rwanda	3.1	3.2	3.6	3.8	3.6	3.7
	Senegal	3.0	3.2	3.3	2.9	3.1	3.2
	South Africa	8.0	8.0	8.2	8.5	8.9	9.7
	Tunisia	4.2	4.5	4.5	4.9	5.1	5.9

Source: OECD (2018a; 2018b).

Table 1.2 indicates that South Africa's non-tax revenue is much lower than that of other developing African countries. South Africa's heavier reliance on revenue from PIT emphasises the importance, in South Africa, of encouraging tax compliant individuals to remain compliant and encouraging non-compliant individuals to be compliant.

Table 1.2: Non-tax revenue as a percentage of GDP

Year		2010	2011	2012	2013	2014	2015
Country							
Non-OECD economies	Cameroon	4.8	6.2	5.0	4.9	4.2	4.3
	Mauritius	3.8	3.5	3.1	3.2	2.7	2.7
	Morocco	3.6	3.9	3.7	4.1	3.8	3.9
	Rwanda	12.3	12.3	8.8	11.2	9.4	8.9
	Senegal	3.2	2.9	3.8	3.8	5.2	4.6
	South Africa	.6	.7	.7	.7	.6	.6
	Tunisia	2.9	4.0	3.5	3.6	2.4	2.1

Source: OECD (2018b).

1.2.2 South African personal income tax base

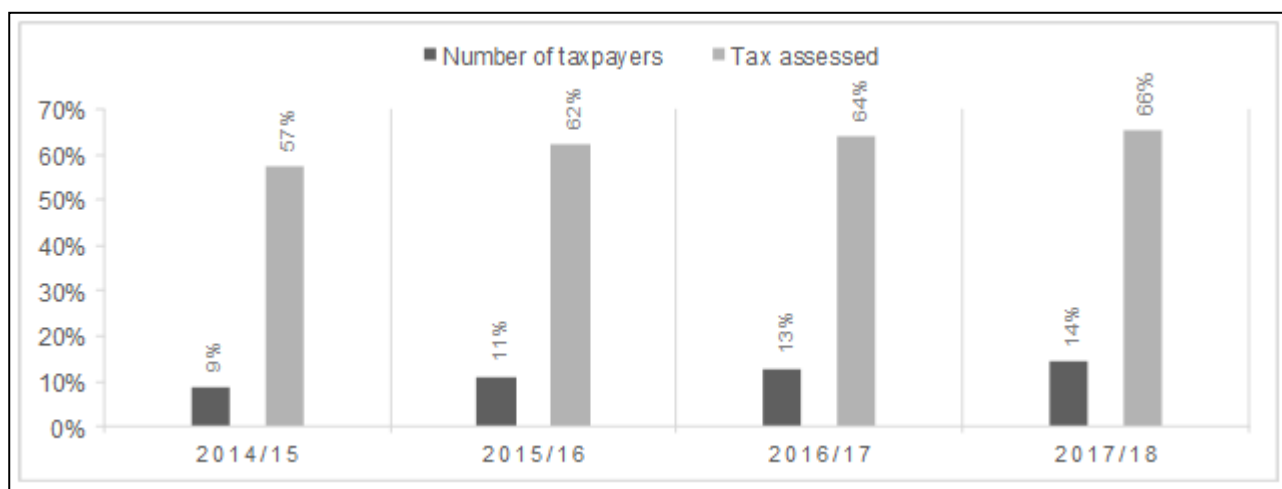
Across the ten years between the 2007/2008 and the 2017/2018 fiscal years, South African government expenditure grew by 160 per cent, from an estimated R600 billion in 2007/2008 to an estimated R1.56 trillion in 2017/2018 (National Treasury, 2007:19; 2017:7). This was as a result of the country's growing financial needs, with most of the expenditure allocated to social services (50.4 per cent in 2007/2008 and 57 per cent in 2017/2018) (National Treasury, 2007:19; 2017:7). A similar increase should be present in the country's revenue to finance the growth in expenditure; however, tax revenue only increased from R599.3 billion in the 2007/2008 tax year to R1.14 trillion in 2017/2018 (National Treasury & SARS, 2008:1; 2017:viii).

One of the measures to increase tax revenue is to broaden the tax base. During 2001, the government enjoyed some success in broadening the PIT base; this included taxing fringe benefits and introducing capital gains tax (Steenekamp, 2012b:43). Nonetheless, although the number of taxpayers expected to submit tax returns increased by 61 per cent between 2005 and 2015, the government budget deficit widened to R134.6 billion (3.5 per cent of GDP) in 2015 (National Treasury, 2017:iv).

South Africa is highly dependent on a few individual taxpayers for most of the collected PIT. Therefore, increasing the number of individual taxpayers liable for tax would greatly assist in increasing the tax base, resulting in a reduced dependence on the few already-taxpaying individuals.

During the 2017 tax year, 65.6 per cent of taxes collected through PIT were paid by 14.4 per cent of the assessed taxpayers (National Treasury & SARS, 2018:41). It is evident from Figure 1.2 that although individuals with a taxable income above R500 000 constitute a small portion of the total individuals assessed, a significant portion of the tax liability can be attributed to these taxpayers.

Figure 1.2: Distribution of assessed individuals with taxable income above R500 000



Source: National Treasury & SARS (2018:41).

The contribution to tax revenues by high-income earners has continued to increase, given the additional revenue generated from these taxpayers by the introduction of a 45 per cent PIT bracket for individuals with taxable income above R1.5 million. The new tax bracket became effective from the 2017/2018 tax year of assessment.

Even though taxing wealthy individuals may address the fundamental principle of vertical equity, there is the risk that changes in tax rates aimed at high-income earners may change their economic behaviour, causing an undesired effect on tax revenue (Steenekamp, 2012a:24). This makes finding alternative mechanisms to increase the tax base even more important.

Bringing potentially tax liable individuals who are currently operating in the informal sector into the tax net would be one such mechanism to increase the tax base. Currently, the profile of the South African individual taxpayer comprises employed individuals.

In summary, there is an increasing need to cast the tax net even wider than its current reach to include individuals in informal sectors and the non-compliant individuals operating in the formal sector. This will perhaps also ease the burden on formally employed taxpayers and high-income earners.

1.2.3 Attitudes towards tax compliance in South Africa

The National Treasury (2017:38) has highlighted the fact that concerns about levels of tax compliance and about tax morality⁵ are key risks that may hamper national tax revenue collection. These concerns about taxpayers' willingness to pay taxes have been confirmed by research undertaken in South Africa in previous years. For example, in Oberholzer's study (2007) on the perceptions of taxation of the various population groups in South Africa, 58 per cent of the respondents who participated in the study were of the view that a large proportion of the taxes collected by government had been used for meaningless purposes. Further, 88 per cent of the respondents believed that waste and corruption in the South African government were at high levels. Only 24 per cent of the respondents believed that the amount of tax they had paid was reasonable when compared with the benefits they had received from the government, whereas 52 per cent of the respondents believed that the government had not provided enough information on the use of tax revenue.

Table 1.3: Survey responses regarding fiscal exchange and government spending

Statements relating to fiscal exchange and government spending	Percentage of respondents who agreed with the statement %	Percentage of respondents who disagreed with the statement %	Percentage of respondents who had no opinion regarding the statement %
A large portion of taxes is used by government for meaningless purposes	58.46	32.69	8.85
Waste and corruption in government is high	87.69	6.93	5.38
The amount of tax I have to pay is reasonable considering the benefits received	24.23	38.46	37.31
The government does not provide enough information about how they use taxpayers' money	51.92	23.85	24.23

Source: Adapted from Oberholzer (2007:102).

As observed in the responses to the question related to government waste and corruption in Table 1.3, a key factor that may impact levels of tax compliance is the concern held by

⁵ Tax morality is the intrinsic motivation to pay taxes (Williams & Martínez, 2014:6).

taxpayers that their taxes are being wasted as a result of corruption. The extent of the perception of corruption in South Africa can be best explained by its ranking on the Transparency International Corruption Perceptions Index. This index ranks 180 countries based on the perceived corruption of a country's public sector. Table 1.4 presents the results shown in the index for Southern African Development Community (SADC) countries for 2018, when 180 countries around the world were ranked (Transparency International, 2018). The ranking column in Table 1.4 indicates a country's ranking relative to other countries included in the index. The score column reflects each country's score on a scale of 0 to 100: zero indicates highly corrupt and 100 indicates very clean. South Africa did not rank as well as some fellow SADC countries, such as Seychelles, Botswana and Namibia. However, South Africa scored better than other SADC countries, such as Zimbabwe, Congo and Angola.

Table 1.4: Transparency International Corruption Perceptions Index (SADC countries only)

Country	Score	Ranking
Seychelles	66	28
Botswana	61	34
Namibia	53	52
Mauritius	51	56
South Africa	43	73
Lesotho	41	78
Swaziland	38	89
Tanzania	36	99
Zambia	35	105
Malawi	32	120
Mozambique	23	158
Zimbabwe	22	160
Congo	19	165
Angola	19	165

Source: Transparency International (2018).

SARS acknowledges that perceptions of corruption and of poor state delivery are considered threats to promoting tax compliance. SARS' annual performance plan for the period 2015-2016 states that this risk influences its ability to promote tax compliance due to the loss of public confidence in government (SARS, 2016c:26).

Despite the negative perceptions of many South African taxpayers and their concerns about corruption, data published by Statistics South Africa indicates an improvement in household

services provided to citizens. The percentage of households with access to electricity improved, from 76.7 per cent in 2002 to 84.7 per cent in 2018; whilst 89 per cent of households in 2018 had access to piped water, compared with the 84.4 per cent that had access to piped water in 2002. And most dramatically, the percentage of students aged five years and older attending schools without paying tuition fees increased from 21.4 per cent in 2007 to 67.2 per cent in 2018 (Statistics South Africa, 2018:15).

However, despite such improvements in service delivery, it appears to be the case that South African taxpayers object less to the actual payment of taxes than they do to the spending of the funds by government. The work of Oberholzer (2007:102) supports this contention, as her study shows that 73.5 per cent of the respondents disagreed with the statement that it is unfair to pay taxes and in a more recent study by Junpath, Khaewa and Stainbank (2016:111) conducted in South Africa, 76.7 per cent of the participants completely agreed that it is every South Africa's duty to pay their fair share of taxes. Moreover, Ali, Fjeldstad and Sjørusen (2014:835) found that South African individuals are more likely to have a tax compliant attitude if they are satisfied with certain services provided by the government.

The results of Ali *et al.*'s study (2014:828-842) are based on an Afrobarometer survey conducted in 2011 and 2012 which also indicated that 83 per cent of the South Africans who participated in the survey believed that the level of corruption in the country had increased when compared with the year prior to the survey;⁶ further, 30 per cent of the participants held a negative attitude towards tax as they were of the view that citizens should not pay taxes or should pay taxes only if they choose to (Plus 94 Research, 2015:16).

South Africa was also one of the participating countries in a World Value Survey⁷ conducted between 2010 and 2014 (World Values Survey Association, 2015). In the survey, 34.7 per cent of the participants agreed that it is unjustifiable to cheat on taxes. This percentage was considerably lower than other African countries, such as Zimbabwe, Nigeria and Egypt, where 52.9 per cent, 49.9 per cent and 60.7 per cent of the participants respectively were

⁶ The survey was conducted between August and September 2015.

⁷ The World Values Survey is a worldwide survey project that looks at socio-cultural and political change, based on representative national samples. The project started in 1981 (Torgler & Schneider, 2005:233).

of the view that it is unjustifiable to cheat on taxes (World Values Survey Association, 2015:471).

In summary, although some matters discussed in this section clearly indicate that the perception of corruption in South Africa is high, progress has been made in improving the provision of public goods and services. Given that taxpayers object less to the actual payment of taxes than they do to the spending of the funds by government, communicating such improvements may be a beneficial strategy to implement in order to influence voluntary tax compliance. Current and past strategies used by SARS to increase tax compliance are discussed in the section that follows.

1.2.4 Strategies to increase tax compliance in South Africa

It has already been acknowledged that most tax systems rely on the voluntary compliance of taxpayers (SARS, 2012d:4). It is therefore appropriate to consider key aspects of the strategies adopted by the revenue authority in South Africa to address the issue of tax compliance. Figure 1.3 shows the SARS compliance programme model.

Figure 1.3: Tax compliance model



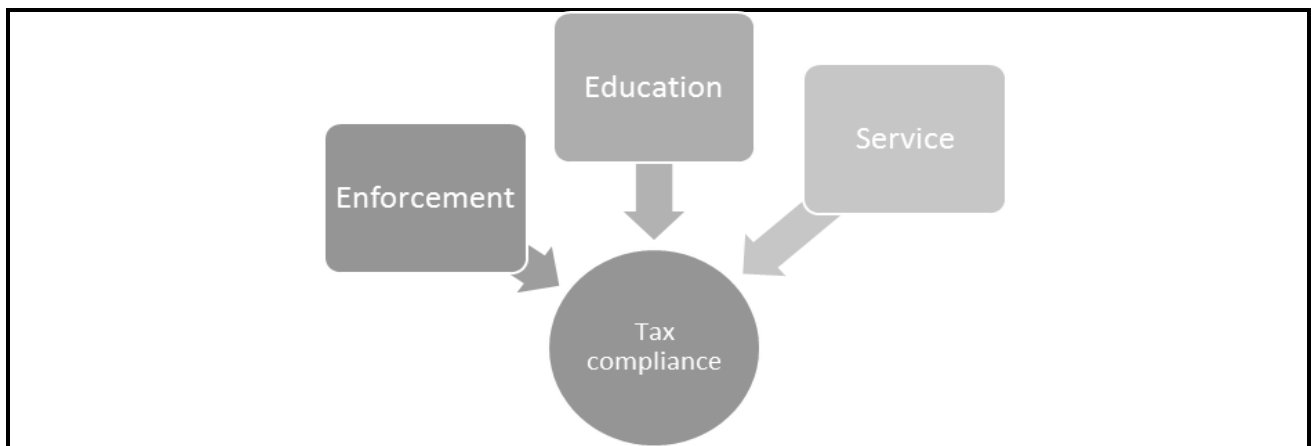
Source: SARS (2012d:4).

This model is adapted from the Australian Taxation Office model (Australian Taxation Office, 2015). The left side of the model illustrates the different attitudes that taxpayers can have towards tax compliance. These attitudes range from “have decided not to comply” at the top of the pyramid, through to “willing to do the right thing” (to comply) at the base. The right side of the model shows the various strategies that can be adopted to deal with various

types of taxpayers. These strategies focus on the following three pillars which are adopted by SARS to encourage tax compliance (see Figure 1.4):

- **enforcement**, which comprises measures such as conducting audits on selected taxpayers and imposing penalties which are linked to the strategies, using the full force of the law and deterring by detection (as indicated in the compliance model in Figure 1.3);
- **education**, which involves initiatives aimed at educating taxpayers about their tax obligations and the fulfilling of these obligations and which is linked to the strategy of helping taxpayers to comply; and
- **service**, which involves initiatives to simplify tax compliance.

Figure 1.4: Strategies to improve tax compliance



Source: SARS (2016c:17).

1.2.4.1 Enforcement

One key component of enforcement consists of the use of penalties by SARS. Penalties are levied under the Tax Administration Act (28/2011) (hereafter referred to as the Tax Administration Act) and are grouped into three categories: (1) administrative non-compliance penalties, (2) understatement penalties and (3) penalties related to criminal offences.

Administrative non-compliance penalties are levied on taxpayers failing to comply with a provision of the Income Tax Act. In the 2017/2018 tax period, tax owed by taxpayers to SARS included R27 billion related to administrative penalties and interest (SARS, 2018:43).

Understatement penalties are levied when a taxpayer prejudices SARS or the fiscus because of a default in rendering a return, an omission from a return, an incorrect statement made in a return, failure to pay the correct amount of tax if no return is required or an impermissible avoidance arrangement (Stiglingh & Silke, 2016:1154).

The provision made for penalties related to criminal offences include criminal offences ranging from failure to submit a tax return, to failure to retain tax-related records as required by the Tax Administration Act. The penalty for such offences is a fine or imprisonment.

SARS also makes extensive use of tax audits as an enforcement strategy. During its 2017/2018 tax period, SARS achieved audit coverage of 14 per cent of registered taxpayers, the majority of these audits being verification audits (SARS, 2018:68). Additionally, SARS has plans to increase targeted audits in order to address the issue of non-compliance (SARS, 2016a:76). Other enforcement strategies used by SARS include site inspections and the naming and shaming of non-compliant taxpayers.

1.2.4.2 Education

SARS has introduced several education initiatives to assist taxpayers with fulfilling their tax compliance obligations. These initiatives include hosting seminars and workshops at SARS branches to educate taxpayers on income tax, Pay As You Earn (PAYE) and VAT (SARS, 2017). The workshops have also been extended to school learners and students at higher learning institutions (SARS, 2016a:56). SARS has also used the media to educate taxpayers on tax compliance.

In 2009, SARS began using mobile tax units, which are converted vehicles used as mobile offices. Mobile tax units were introduced to educate taxpayers in rural areas on their tax obligations and to assist them with tax registration. SARS estimates that there has been a growth in the number of taxpayers who are able to file their tax returns independently as a result of the training received through the mobile tax units (OECD, 2015:172). In the 2017/2018 tax year, 262 000 taxpayers were assisted through mobile tax units (SARS, 2018:49).

1.2.4.3 Service

To improve service to taxpayers, SARS has made some significant strides in recent years. During the 2006/2007 tax period, SARS introduced e-filing, providing taxpayers with the opportunity to file their tax returns electronically. The percentage of individual taxpayers submitting their tax returns electronically increased from 1 per cent during the year e-filing was introduced to 52.5 per cent in 2017/2018 (Lewis & Alton, 2015:8; SARS, 2018:69).

SARS has also reduced the time it takes for tax returns to be assessed from 180 days in 2006, to 93.6 per cent of the returns being assessed in 24 hours for the 2017 tax year (SARS, 2016a:12; 2018:9). SARS has 53 branches servicing taxpayers throughout the country, including a call centre. The centre processed over five million calls during 2017/2018 (SARS, 2018:13, 58).

In conclusion, it can be seen that SARS does make use of a range of compliance strategies; however, there is still an overreliance on enforcement-based mechanisms such as audits. As noted by the OECD, with changes in economic activities, technology and availability of data, it will become more important for tax authorities to rethink the composition of their compliance strategies. The need for proactive tax compliance strategies such as nudging will expand in the future (OECD, 2017:21, 25).

With the background regarding PIT in South Africa (including attitudes towards tax compliance and the strategies that have been implemented by SARS to promote and enforce tax compliance) in place in the above sections, the research problem and motivation for this study are discussed in section 1.3 and 1.4 respectively.

1.3 RESEARCH PROBLEM

The focus of this study is to determine the effect of reciprocity nudges on the tax compliance of individual taxpayers. Nudging is a behavioural economics concept used in fields such as psychology, marketing, public administration and health sciences (Thaler & Sunstein, 2009).

Research into behavioural economics in the field of taxation has expanded considerably and gained traction in recent years (Hashimzade, Myles & Tran-Nam, 2013:942; Holzinger & Biddle, 2016:1). Governments and tax authorities from OECD countries have also taken a keen interest in understanding the effects of behavioural economics on tax compliance (Holzinger & Biddle, 2016:1). Several authors conducted experiments on the effect of

messaging nudges on tax compliance behaviour (Coleman, 1996; Hasseldine, Hite, James & Toumi, 2007:171-194; Wenzel, 2001); however, most of these studies were conducted in developed countries, with limited focus on developing countries, particularly in Africa. This study addresses that problem, given the considerable evidence that compliance behaviour differs across different cultural settings (Cummings, Martinez-Vazquez & McKee, 2001; Torgler, 2003b).

Evidence on the effect of reciprocity nudges on tax compliance is mixed. Blumenthal, Christian and Slemrod (2001:125-138) found that using reciprocity messages as nudges has no significant effect. By way of contrast, Hasseldine *et al.* (2007:171-194) found a significant effect on tax compliance. Furthermore, the literature appears to lack evidence of the effects of the time lag between the communication of a nudge message and the compliance decision. This study addresses that problem.

The focus of the current study will be on reciprocity nudges using audio-visual media as a mode of delivery. Audio-visual messages have been found to be superior in evoking cognitive responses when compared with written messages (Dijkstra, Buijtsels & van Raaij, 2005:383). In a study conducted in South Africa by Oberholzer, de Kock and Walker (2008:34), participants recalled televised SARS advertisements in comparison with other modes of delivery used by SARS, such as radio, billboards, newspapers, telephone and direct mail. Given the imminent impact of the Fourth Industrial Revolution on communication, it is important that modes of delivering nudge messages, other than physical mail, be explored.

1.4 RATIONALE FOR THE STUDY

The OECD (2004:70) has noted that "... in order to manage and improve compliance with tax and other relevant laws, revenue authorities need to adopt an administrative approach that encourages voluntary compliance within a co-operative and participative regulatory environment". This statement highlights the fact that voluntary compliance has become an increased focus area for tax authorities. An enforced compliance strategy utilising economic deterrence measures as the only measures to increase tax compliance may not have a positive effect (Richardson & Sawyer, 2001:196).

In several countries, tax evasion levels have not decreased despite increasing fines and penalties (Kim, 2008:411). Measures to encourage voluntary compliance are therefore being pursued by countries around the world. This thesis explores one such strategy in the context of South Africa: the potential to improve tax compliance outcomes by using specific taxpayer “nudges” delivered in the form of communications to taxpayers, designed to encourage taxpayer compliance.

This thesis is important for several reasons. Firstly, it seeks to shed light on the effectiveness of reciprocity nudges when used as strategies to promote voluntary tax compliance in a developing country such as South Africa. South Africa is a diverse country, and the effects of reciprocity nudge messaging may differ for different subcultures of the population. South Africa is also an important tax role model in Africa, and numerous African countries consult South Africa for advice on tax-related matters. The African Tax Institute, based in South Africa, is an important institution that provides training and technical assistance to African public officials and academics (African Tax Institute, Not dated).

Secondly, this thesis aims to create awareness in developing countries of the importance of employing reciprocity-based strategies to encourage voluntary tax compliance.

Thirdly, this thesis contributes to the body of knowledge by providing a better understanding of how the effectiveness of reciprocity nudges may be affected by variables such as gender, income level, population group of the taxpayer, attitude towards tax and perception of corruption.

Kornhauser (2007:153) analysed previous nudge-related studies and found that normative appeals may fail as a result of the extended time lag between the communication of the nudge message and the compliance decision. Thus, fourthly, this thesis further adds to the body of knowledge by considering the time-related effects. This is achieved by factoring the effects of time into the experimental design.

Finally, this thesis makes a contribution based on the methodology that is used. There is currently no evidence of an experimental study investigating the effect of reciprocity nudge messaging from a South African taxpayer perspective; therefore, this will be the first known study of this topic in South Africa.

1.5 RESEARCH OBJECTIVES AND QUESTIONS

The main aim of this study is to determine the effect of reciprocity nudging on the tax compliance behaviour of individual taxpayers in South Africa.

The secondary objectives are:

- to make recommendations about the structural and content⁸ attributes of a nudge message and the timing of reciprocity nudges; and
- to determine whether the effect of reciprocity nudges differs based on factors such as gender, income level, population group of the taxpayer, attitude towards tax and perception of corruption.

In order to achieve these primary and secondary objectives, this study aims to address four related research questions:

- What is the effect of reciprocity nudges on the tax compliance behaviour of individual taxpayers in South Africa?
- What structural and content message attributes are appropriate when using reciprocity to encourage voluntary tax compliance?
- What timing is appropriate when using reciprocity to encourage voluntary tax compliance?
- Does the effect of reciprocity nudges differ based on variables such as gender, income level, population group of the taxpayer, attitude towards tax and perception of corruption?

⁸ Content attributes of a message are those attributes that may appear in the message regardless of the medium used to communicate that message whilst structural attributes of a message are those attributes that are relevant to the medium used to communicate the message (Neuendorf, 2017:33).

1.6 SCOPE OF THE STUDY

The scope of the study is limited in a number of ways. In the first place, the study is limited to individual personal taxpayers in South Africa and uses students as proxies. And although there is evidence that the experimental responses of students are no different from those of non-student subjects (Alm, 1991:584), the use of students as participants means that the results of this study cannot be generalised to the entire population of taxpayers in South Africa.

“Individual taxpayers”, for the purposes of this study, refers to salaried employees; individuals who receive benefits from retirement funds; self-employed individuals trading as sole proprietors; individuals who are partners in partnerships; and individuals who receive passive income such as rental income, dividend income and interest income (National Treasury & SARS, 2015:30). The study therefore does not apply to other taxable entities (such as corporations), nor does it apply to individual taxpayers who are not South African taxpayers.

In the second place, the focus of the study is on PIT. The study therefore excludes individual taxpayer compliance with other taxes, such as VAT.

Finally, the nudges tested in this study are limited to reciprocity nudges delivered using audio-visual media. Other forms of nudge, such as deterrence and social norm nudges, are beyond the scope of this study. The reason for excluding deterrence nudge messages is that studies generally report a positive influence of deterrence messages on tax compliance (Ariel, 2012; Castro & Scartascini, 2015; Hasseldine, Hite, James & Toumi, 2007; Ortega & Sanguinetti, 2013). Social norm nudges are also excluded from this article as most studies on tax nudging have focused on these types of nudge. However, existing studies provide limited and contradicting evidence regarding the effectiveness of reciprocity nudge messages (Mascagni, 2018:288). Furthermore, a very limited number of studies have focused on the effectiveness of reciprocity nudge messages in developing countries, particularly in Africa.

As noted by Rosid (2017:108), corruption is seen as more prevalent in developing countries compared to developed countries and given the lack of focus on studying reciprocity nudge messages in developing countries, many questions remain as to how, if at all, perceptions

of corruption might influence the effectiveness of reciprocity nudge messages in changing tax compliance behaviour in this context. Furthermore, given the limited resources available to the researcher and to keep the study manageable, it was deemed appropriate to exclude deterrence nudge messages and social norm nudge messages and focus on the effectiveness of reciprocity nudge messages.

1.7 RESEARCH DESIGN

This section explains the research design adopted to meet the primary and secondary research objectives of the study. A pragmatic research philosophy is adopted, as a content analysis process and an experimental method were used to enable reliable and credible data to address the research questions and objectives (Saunders, Lewis & Thornhill, 2012:130).

The study is empirical in nature as primary data were collected and analysed (Mouton, 2001:57). A mixed methods approach, using an experiment (quantitative approach) preceded by a content analysis (qualitative and quantitative approach), was applied. This study therefore applied a core sequential mixed methods qual-quant. The data obtained by applying this method were then embedded in the experimental design. This means that the sequential mixed method was a secondary source of data.

This study comprises two phases: an initial content analysis phase was designed to lead into and support the more significant second phase, which comprised a classical experiment. In the first phase of the research, a mixed content analysis method was adopted in order to determine structural and content attributes of effective reciprocity nudge messages that use audio-visual media as a mode of delivery. The content analysis was undertaken in relation to 12 SARS videos used in a "Touching Lives" campaign in the period 2012-2013. The campaign focused on communicating how taxes have contributed in providing public goods or services to ordinary South Africans (reciprocity messages).

The data collected in the content analysis phase assisted with the design of the experiment conducted in the second phase. The experiment in the second phase involved four treatment groups and a control group. The treatment groups were required to watch a short video containing a reciprocity message, which was intended to communicate how tax revenues are being used by the government and thus act as a nudge to influence tax compliance

behaviour (“reciprocity message group”). The control group did not receive any form of nudge.

In order to examine the effect of the timing of a nudge message on tax compliance behaviour, participants in the treatment groups were exposed to the nudge message at different stages of the experiment. Two of the treatment groups were exposed to the nudge message immediately before making their tax compliance decision. The other two treatment groups had a time lag between viewing the nudge video and making their tax compliance decision.

Participants were also exposed to two different nudge videos: one video was selected in the content analysis phase as most likely to be effective in improving tax compliance behaviour, and the other was selected in the content analysis phase as less likely to have an effect on tax compliance behaviour.

All of the participants recruited for the study were students from the University of Pretoria’s Faculty of Economic and Management Sciences (EMS Faculty). Effort was made to recruit a broad cross-section of students from this Faculty in an attempt to ensure that both male and female students and participants from different population groups were selected. Participants were then randomly allocated to a treatment group or to the control group.

Participants in all of the treatment groups and in the control group were required to watch videos and complete tasks related to those videos, for which they were able to earn taxable income and thereafter declare the income earned from performing the tasks. Participants were also requested to complete a questionnaire at the end of the experiment.

The quantitative data obtained from the experiment were then statistically analysed using IBM’s *Statistical Package for the Social Sciences* (*SPSS Statistics*: a statistical software package) to determine if there was an association between communicating reciprocity messages and tax compliance.

1.8 STRUCTURE OF THE THESIS

The main conclusions of the study are presented in the format of a thesis. The structure of the thesis is explained and summarised below.

Chapter 1 outlines the background and states the rationale for the study. The purpose and research objectives of the study are also discussed, and explanations for the importance and scope of the study are given. Next, the research design adopted to carry out the study is briefly explained, and the chapter concludes with this overview of the structure of the thesis.

Chapter 2 provides a review of the literature on tax compliance and on the factors underpinning voluntary tax compliance in more detail, followed by an exploration of the research surrounding nudge theory. The chapter also provides a consideration of the use of nudging as a means of influencing tax compliance behaviour. This chapter presents the conceptual framework within which the study is undertaken and – as a result of the review of the literature – identifies the gap in knowledge that the study is designed to address. It also presents the research hypotheses.

Chapter 3 details the research framework, methodologies and methods. The manner in which the data is analysed is also discussed as well as any ethical considerations observed in this study.

Chapter 4 presents the process of the content analyses and the outcomes of both the qualitative and quantitative content analyses undertaken in this study. Included in this chapter is a discussion of the quantitative content analysis pilot testing that was conducted, together with the related results. The chapter also presents further hypotheses related to this research and provides a discussion of the results of the qualitative content analysis process as they relate to the descriptive research question posed in Chapter 1.

Chapter 5 outlines the process and outcomes of the conducted experiment. The chapter also provides a summary of the experimental research findings and relates them to the findings of previous research documented in Chapter 2. The experimental design, description of the treatment groups, participant selection process, and experimental procedures are also outlined in Chapter 5, along with the pilot testing of the experiment and its related results.

Finally, Chapter 6 draws the thesis to a close. It summarises the findings and provides a discussion of the contribution of this study to the current body of knowledge. Implications for revenue authorities, limitations of the study and suggestions for future research are also discussed.

CHAPTER 2: LITERATURE REVIEW

2.1 INTRODUCTION

Chapter 1 has provided a background for this study and a detailed overview of the South African PIT system, the research problem, the rationale for the study as well as the research questions, objectives, scope, research design and structure.

The purpose of Chapter 2 is to provide a review of relevant literature. This chapter begins, in Section 2.2, by providing a review of literature on tax compliance, focusing on the definition of tax compliance and on the three existing tax compliance models. This discussion is followed, in Section 2.3, by a discussion on voluntary tax compliance and factors influencing voluntary tax compliance. Section 2.4 then provides a discussion of nudge theory, focusing on the definition of nudging and on the concept of libertarian paternalism. Given the critique regarding the potential for nudges to infringe on people's freedom of choice, it is relevant to discuss the concept of libertarian paternalism when discussing nudging. The link between nudging and tax is then discussed in Section 2.5, followed by a review of the specific literature related to the application of nudging in the context of tax compliance. Section 2.6 sets out the research questions and hypotheses development. A conclusion to the chapter is provided in Section 2.7

2.2 TAX COMPLIANCE

Tax compliance can be thought of as involving a continuum of definitions (James & Alley, 2002:29). Different scholars have provided varied definitions of tax compliance over the years: some have taken an enforcement approach when measuring the degree of non-compliance (Brand, 1996:413-419); others have applied a conceptual approach to the definition of tax compliance (James & Alley, 2002:27-42); whilst yet others have applied an operational approach to the definition (McKerchar & Evans, 2009:171-201).

With the enforcement approach to the definition of tax compliance, the "tax gap" is used as a measurement of tax non-compliance. The tax gap is defined by Mazur and Plumley (2007:569) as the difference between the amount of taxes owed by taxpayers and the amount that is actually paid to the revenue collection authority on time. In terms of this approach, tax compliance is achieved if there is no difference between taxes owed and taxes paid. Andreoni, Erard and Feinstein (1998:819) provide a wider definition of the tax gap.

They refer to the tax gap as the difference between income taxes that are actually owed by households and what the households report and pay voluntarily. Andreoni *et al.*'s definition (1998:819) encompasses the element of voluntary compliance which is discussed later in this chapter. As noted by James and Alley (2002:29), the definition of the tax gap is problematic, as it might give the impression that tax compliance can be measured with certainty, and it does not take into account that both taxpayers and the government might have different interpretations of the amount of tax owed to the government by taxpayers.

In taking a simplistic and conceptual approach to the definition of tax compliance, Kirchler (2007:21) refers to tax compliance as taxpayers' willingness to pay their taxes and to non-compliance as the failure to meet tax obligations, whether intentional or unintentional. SARS (2014:29) takes a similar approach and defines tax compliance as the "... degree to which taxpayers and traders meet their obligations in terms of the legislation administered by SARS". James and Alley (2002:32) suggest that tax compliance can be defined as the willingness of individuals to voluntarily act within both the spirit and the letter of the tax law.

The operational approach to the definition of tax compliance has been applied by authors such as McKerchar and Evans (2009:172), who define tax compliance as "... registering with the revenue authority as required, filing the required returns on time, accurately reporting tax liability (in the required returns) in accordance with the prevailing legislation, rulings, return instructions, and court decisions, paying any outstanding taxes as they fall due and maintaining all records as required". Roth, Scholz and Witte (1989:21) refer to a tax compliant taxpayer as one who timeously files returns that accurately reflect the taxpayer's tax liability in accordance with the applicable tax law and with court decisions that apply at the time when the return is filed. This operational approach is similar to the approach taken by the OECD (2004:7), which defines tax compliance as the extent to which taxpayers meet the following obligations:

- "... registering in the system;
- timely filing or lodgement of requisite taxation information;
- reporting of complete and accurate information (incorporating good record keeping); and
- payment of taxation obligations on time ...".

Some of the definitions mentioned above (James & Alley, 2002:27-42; Kirchler, 2007) take into account a taxpayer's willingness to comply as part of the definition of tax compliance,

whilst others (McKerchar & Evans, 2009:171-201; OECD, 2004; Roth *et al.*, 1989) do not mention whether the taxpayer needs to comply voluntarily in order to be viewed as a compliant taxpayer. It can, however, be argued that if a taxpayer only complies as a result of threats or enforcement, this cannot be viewed as proper compliance, even though the taxpayer would have met his or her tax obligations (James & Alley, 2002:30).

An important aspect that is often taken into account in the definition of tax compliance is the aspect of intentional non-compliance versus unintentional non-compliance. Intentional non-compliance is where a taxpayer who is fully aware of his or her tax obligations decides not to fulfil those obligations (Devos, 2014:5). This would include tax evasion, which is when a taxpayer deliberately decides not to comply with his or her tax obligations. Unintentional non-compliance is where a taxpayer does not fully fulfil his or her tax obligations due to a non-deliberate decision (Devos, 2014:5). The definitions provided by various authors refer to accurately reporting one's tax liability as one of the obligations of a tax compliant taxpayer (McKerchar & Evans, 2009:171-201; OECD, 2004; Roth *et al.*, 1989). Not accurately reporting one's tax liability, even as a result of unintentional errors or misunderstanding of the tax law, may be viewed as being non-compliant. Roth *et al.* (1989:21) differentiate between the different types of non-compliance. They use the term "underreporting" for a taxpayer who reports an amount that is less than his or her actual tax liability, whilst "overreporting" is the term they use for a taxpayer who reports an amount greater than his or her actual tax liability. Both of these taxpayers are viewed as non-compliant. Legal tax avoidance is not included in the definition of tax non-compliance (Devos, 2014:4).

McBarnet (2001:6) distinguishes between different types of tax compliance:

- Committed compliance refers to taxpayers who are willing to comply without any enforcement.
- Capitulative compliance refers to taxpayers who are unwilling to comply without any enforcement.
- Creative compliance refers to taxpayers who arrange their affairs within the ambits of the law in such a way that they pay minimal taxes.

As can be noted through the discussion above, there are differences between the various definitions of tax compliance. There are generally, however, two approaches to tax compliance as shown in Table 2.1. The first approach is one that is in line with standard

deterrence models (which view taxpayers as economic maximisers) and is often termed the “economic” approach. The second, “behavioural”, approach is one that acknowledges that other factors, such as beliefs and norms, also influence tax compliance.

Table 2.1: Approaches to tax compliance

Tax compliance	First approach	Second approach
Concept of:	Tax gap: 100% compliance less actual revenue	Voluntary willingness to act in accordance with the spirit as well as the letter of the law.
Definition:	Narrower	Wider
Tax compliance:	Economic rationality	Behavioural co-operation
Exemplified by:	Trade off: 1. Expected benefits of evading. 2. Risk of detection and application of penalties. 3. Maximise personal wealth	Individuals are not simply independent, selfish utility maximisers. They interact according to differing attitudes, beliefs, norms and roles. Success depends on co-operation.
Issues of:	Efficiency in resource allocation	Equity, fairness and incidence
Taxpayer seen as:	Selfish calculator of pecuniary gains and losses	“Good citizen”
Can be termed the:	Economic approach	Behavioural approach

Source: James & Alley (2002:33).

Both of the approaches mentioned in Table 2.1 are embedded in theories that support their assumptions about taxpayers’ behaviour. McKerchar and Evans (2009:175) refer to three models of tax compliance (1) economic deterrence models, (2) social psychology models and (3) fiscal psychology models. The first broadly equates to the economic approach of James and Alley (2002:33), whilst the second and third encompass the behavioural approach. Each of these is briefly discussed below in order to broaden the understanding of the concept of tax compliance.

2.2.1 Economic deterrence models

The study by Allingham and Sandmo (1972:323-338) is one of the most cited works on deterrence models. The study analysed taxpayers’ decisions on whether to evade taxes by underreporting their income and also to what extent. Allingham and Sandmo (1972:323-338) used expected utility theory and the economics of crime theory to derive a model for tax compliance. In their model, the taxpayer decides the amount that he or she would like to conceal in order to maximise his or her utility. Variables such as tax rate, penalties, income and the probability of being audited are factored into the model.

Allingham and Sandmo's model (1972:323-338) shows that tax evasion will decrease as a result of increased tax rates and that an increase in penalties and audit probability will result in an increase in tax compliance. The model, although thought to be simple by Allingham and Sandmo (1972:323-338), includes the effects of risk aversion on tax evasion. The model predicts that if tax evasion has a positive expected outcome, a risk-neutral person would not report his or her income; alternatively, if tax evasion is expected to have a negative outcome, the same person would declare his or her income. Table 2.2 summarises the predictions of the model as interpreted by Weber, Fookien and Herrmann (2014:11-12).

Table 2.2: Predictions of the Allingham and Sandmo model (1972)

Variable	Prediction
Audit probability	Positive correlation with compliance: a higher audit probability decreases the expected payoff from tax evasion.
Fine rate	Positive correlation with compliance: a higher fine rate decreases the expected payoff from tax evasion.
Tax rate	Positive correlation with compliance for the assumption of decreasing absolute risk aversion: for a taxpayer with decreasing absolute risk aversion, a higher tax rate cuts the safe net income for the case of compliance. Thus, the taxpayer is less willing to take the risk and the tax compliance increases.
Gross income	Negative correlation with compliance for the assumption of decreasing absolute risk aversion.

Source: Weber *et al.* (2014:11-12).

Srinivasan (1973:339-346) also based his tax compliance model on expected utility theory. In his model, he proposed that if the probability of detection is independent of the level of income, then tax evasion would increase as the level of income increases. Yitzhaki (1974:201-202) extended the work of Allingham and Sandmo (1972:323-338) to include the effect of risk on the tax compliance decision. This extension aimed to make the model presented by Allingham and Sandmo more realistic (Weber *et al.*, 2014:11).

Apart from Yitzhaki (1974:201-202), there have also been other extensions of standard deterrence models. Webley, Robben, Elffers and Hensing (1991:10) mention two of these extensions: interactive models and models that use limited rationality. The interactive models incorporate other players, such as tax authorities, when considering the tax compliance behaviour of taxpayers; whilst models that use limited rationality treat the tax compliance decision as a two-stage approach: in the first stage, the individual reformulates

options; and in the second stage, the individual evaluates these options and chooses the one with the highest value.

Deterrence models have, however, been criticised for their assumption that taxpayers behave in a manner similar to each other that is predictable. These models also make the assumptions that risk preferences are the same and that taxpayers are aware of the probability of being audited (Fjeldstad, Schulz-Herzenberg & Sjursen, 2012:8). This criticism arises from the fact that the decision of whether to comply with tax obligations also depends on other factors, such as morals and social dynamics (Andreoni *et al.*, 1998:852). Despite this criticism, the effect of economic factors on tax compliance has continued to be examined by various authors who have investigated the effect of tax rate, level and type of income, tax audits, probability of being audited and fines and penalties. The results of some of these studies are briefly discussed below.

2.2.1.1 Tax rate

Clotfelter (1983:363-373) examined the association between tax evasion and tax rate and found that tax compliance decreases with increasing marginal tax rates and that reducing marginal tax rates will result in an increase in tax compliance (Clotfelter, 1983:368). A study by Pommerehne and Weck-Hannemann (1996:165) also found that an increasing tax rate leads to a decrease in tax compliance. This is not in line with the predictions made in the earlier study by Allingham and Sandmo (1972:323-338). However, a study by Alm, Sanchez and de Juan (1995:13) found results that support Allingham and Sandmo's theory that higher tax rates lead to higher tax compliance.

2.2.1.2 Level and type of income

A study by Muehlbacher, Kirchler, Hoelzl, Ashby, Berti, Job, Kemp, Peterlik, Roland-Lévy and Waldherr (2008:302), conducted in eight different countries, found that hard-earned income is more likely to be reported for tax purposes than income that is earned easily. Ali, Cecil and Knoblett (2001:192) found that high-income earners are more prone to be less compliant than low-income earners. Castro and Scartascini (2015:76) also found in their study that individuals with lower levels of wealth are more likely to have a positive response to nudge messages than those with presumed higher levels of wealth.

2.2.1.3 Tax audits

Witte and Woodbury (1985:1-13) examined the impact of audits on tax compliance, and their results indicate that the impact of tax audits on tax compliance is dependent upon the type of taxpayer being audited. Their results show that tax audits have a large influence on small proprietors' tax compliance and a very small but significant effect on middle-income wage and salary earners (Witte & Woodbury, 1985:9).

2.2.1.4 Probability of being audited

The majority of studies conducted to examine the effect of the probability of being audited on tax compliance have found that increasing audit probability leads to an increase in tax compliance. In their 1985 study, Witte and Woodbury (1985:1-13) developed a tax compliance model. Their model suggests that the likelihood of being audited will have a positive effect on tax compliance. Pommerehne and Weck-Hannemann (1996:161) also observed that the probability of being audited has a positive relationship to tax compliance; however, they note that this relationship is weak. Slemrod, Blumenthal and Christian (2001:455-483) conducted a study in which a group of taxpayers were informed by a letter that their tax returns would be "closely examined". The result of the study was that the level of tax compliance amongst middle- and low-income taxpayers increased as a result of receiving these letters. Furthermore, the effect of the letters was much more significant for those taxpayers who had an opportunity to evade (Slemrod *et al.*, 2001:482).

Alm *et al.* (1995:3-18) conducted an experiment with student subjects from Spain and the United States of America (USA) who received income and had to pay taxes on income reported. Their experiment included a probability of being audited, in which case, if underreporting was discovered, the identified subject had to pay both the undeclared tax and a fine. The experiment investigated the effect of changes in the probability of detection, the fine rate, the tax rate, the provision of public goods, and social norms. Their results with regard to tax audits reveal that tax compliance increases with an increase in audit rate (Alm *et al.*, 1995:12).

2.2.1.5 Fines and penalties

Research evidence that higher tax penalties lead to higher tax compliance is limited (Webley *et al.*, 1991:9). Alm, Jackson and McKee (1992:110) found that taxpayer compliance increases with an increase in penalties; however, they state that this relationship is not

significant. A study by Park and Hyun (2003:678) also supports the finding that higher fines lead to higher tax compliance. However, some studies have found that fines and penalties have no impact on tax compliance. Such studies include the one undertaken by Ali *et al.* (2001:186-202), which found that increasing the penalty rate has no effect on the tax compliance levels of low-income taxpayers but that it does have an effect on the compliance levels of high-income earners (Ali *et al.*, 2001:194).

The results from the aforementioned studies concerning the impact of fines and penalties on tax compliance are therefore mixed (Richardson & Sawyer, 2001:142). Despite this, certain theoretical concepts from deterrence models have been adopted by tax authorities, and there is a body of evidence that supports the broad relevance of such deterrence strategies (McKerchar & Evans, 2009:175).

Having discussed the role of economic deterrence models in tax compliance literature, it is appropriate to discuss models that have applied a behavioural approach to understanding tax compliance. Social psychology models are discussed first, followed by fiscal psychology models.

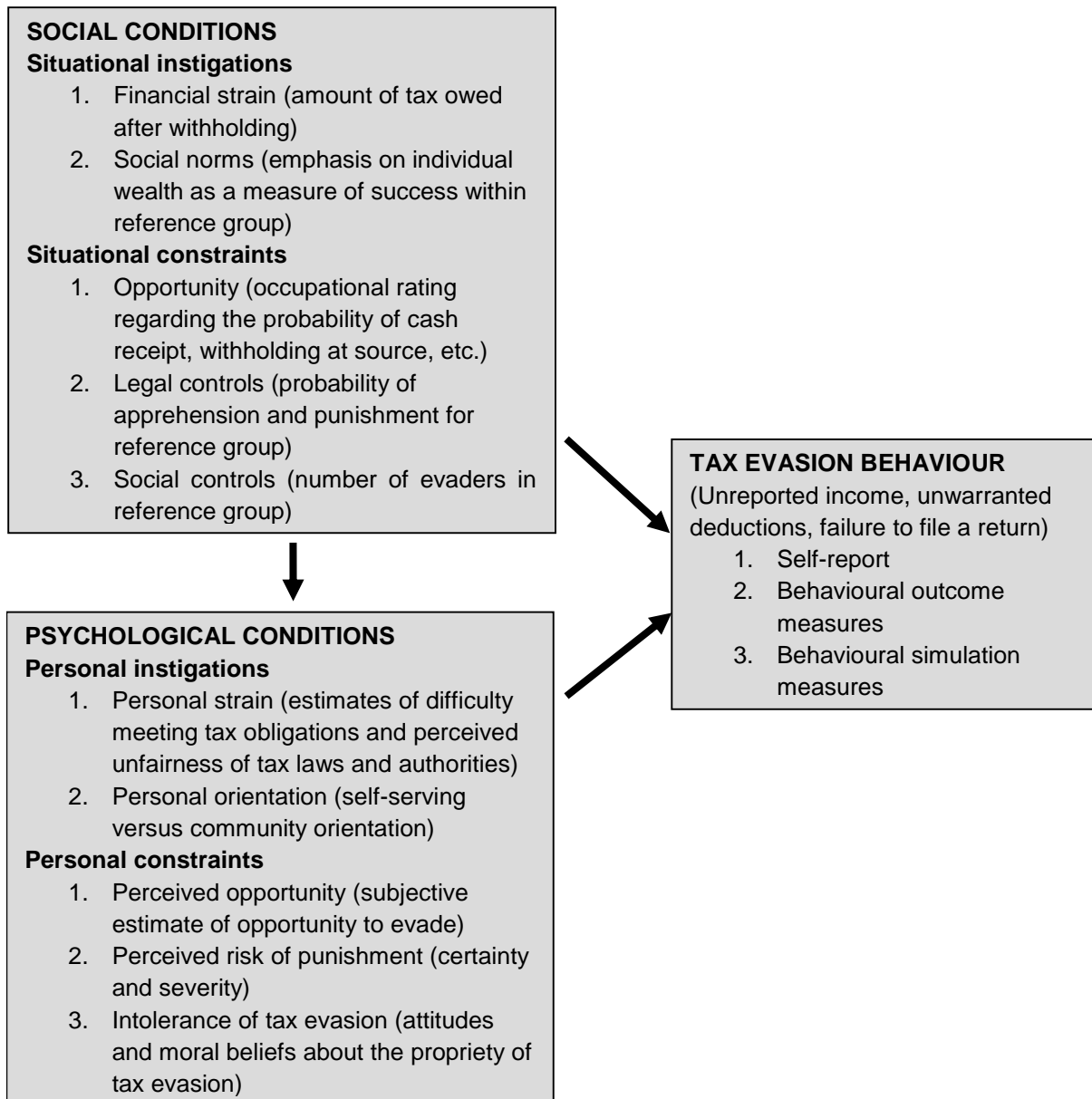
2.2.2 Social psychology models

Expected utility theory, discussed in the previous section, predicts that people will evade taxes if the expected outcome is positive. If this was actually the case, then most countries would be expected to have low tax compliance levels, as audit and penalty rates are low in most countries (Alm *et al.*, 1995:5). As the tax compliance levels observed do not correlate with the predictions of expected utility theory, it can be assumed that tax compliance must be affected by other factors not mentioned by expected utility theory, or that such other factors are not captured by the theory (Alm *et al.*, 1995:5). Tax compliance behaviour can only partly be explained by the rational choice approach portrayed by the expected utility theory (Kirchler, Muehlbacher, Kastlunger & Wahl, 2007:2). It is therefore important to consider other theories that take into account actual human behaviour (Kirchler *et al.*, 2007:17).

Social psychology models examine human behaviour in order to obtain an understanding of how people make decisions and how such decisions affect tax compliance behaviour

(McKerchar & Evans, 2009:176). Webley *et al.* (1991) based their work on one such model as illustrated in Figure 2.1.

Figure 2.1: Webley *et al.*'s social psychology model of individual income tax evasion behaviour (1991)



Source: Webley *et al.* (1991:21).

Webley *et al.* (1991)'s model views tax evasion as a defensive behaviour within a social dilemma.⁹ Their model consists of two variables: "instigations" and "constraints". Instigations are thought to be the first stage in the process of deciding whether to evade taxes or not, and constraints come later. Examples of instigations are financial strain, social norms, personal norms and personal orientation as illustrated in Figure 2.1. After a taxpayer feels instigated to evade taxes, the taxpayer considers constraints. Examples of constraints are the opportunity (or perceived opportunity) to evade taxes, legal controls, social controls, perceived risk of punishment, and intolerance of tax evasion, as illustrated in Figure 2.1.

The model has two sets of conditions, one being the social conditions and the other the psychological conditions. It is suggested that both have a direct effect on either self-reported tax behaviour or on actual tax compliance behaviour. The variables in the two conditions are similar and do not include demographic variables such as income, age of the taxpayer, gender, and other similar variables. Webley *et al.* (1991) argue that demographic variables are not important in explaining tax compliance behaviour and that their inclusion is simply a matter of measurement convenience.

The model illustrated in Figure 2.1 is based on the theory of deviance. Other theories are also often mentioned in social psychology models, including attribution theory, equity theory, prospect theory, the theory of reasoned action and the theory of planned behaviour (McKerchar & Evans, 2009:176; Webley *et al.*, 1991). Each of these theories is discussed below.

2.2.2.1 Attribution theory

Attribution theory relates to how people interpret the world around them (Webley *et al.*, 1991:18). In the terms of this theory, people make judgments based on internal (personal) or external (situational) attributes; they attribute others' behaviour to their own personal attributes, and when judging their own behaviour, they attribute the cause of that behaviour to external attributes (McKerchar & Evans, 2009:176).

⁹ A social dilemma has two features: the first is that an individual will get a better outcome if the individual's decision is a defensive one rather than a co-operative one; the second is that everyone will be worse off if they all choose a defensive decision (Webley *et al.*, 1991).

Kelley (in Webley *et al.*, 1991:18) states that there are attribution rules which people use when they have information from different observations. From the perspective of tax compliance, distinctiveness and consensus are the relevant attribution rules used (Kaplan, Reckers & Roark, 1988:372). Distinctiveness is when an individual has opportunities to perform an act that is unethical or illegal, such as tax evasion. High distinctive behaviour is when an individual is involved in tax evasion but not in other illegal or unethical behaviour. Low distinctive behaviour is when an individual is engaged in various illegal and unethical behaviours, including tax evasion. Consensus refers to the degree to which an individual's behaviour is similar to or different from the behaviour of other similar individuals under similar conditions (Kaplan *et al.*, 1988:372).

Kaplan *et al.* (1988:371-379) studied the relationship between the causal attributions of individuals for others' evasion behaviour and the individuals' own behavioural intentions to evade. They found that when an evader's financial need is high, observers tend to attribute most of the cause of the evasion behaviour to external factors (Kaplan *et al.*, 1988:377).

Although attribution theory has been applied in studies aimed at understanding tax compliance behaviour, the interpretations and inferences made (based on this theory) tend to be subjective in nature (McKerchar, 2002:55). Attribution theory is also retrospective in nature, focusing on what has caused a certain behaviour, rather than on how a certain behaviour can be motivated. Other social psychology theories, however (such as equity theory, discussed below), do focus on how behaviour can be motivated.

2.2.2.2 Equity theory

Equity theory stems from the theory of cognitive dissonance. The equity theory states that people are more likely to comply with rules if they view the system that imposes the rules as equitable (McKerchar & Evans, 2009:176). When applied to the tax environment, equity theory posits that taxpayers are more likely to voluntarily contribute towards taxes if they perceive the goods and services they receive as equitable.

Various studies have been conducted in the tax field to examine the role of this relationship between the government and the taxpayer (Alm, Jackson & McKee, 1993:285-303; Alm, McClelland & Schulze, 1992:21-38). Alm *et al.* (1993:285-303) studied the effect of the use of tax revenue on compliance and the decision process by which uses for tax revenue are chosen. A laboratory experiment was conducted with student subjects. The study found that

tax compliance is higher when individuals vote on the use of their taxes than when an identical result is imposed upon them and that tax compliance is significantly lowered by the imposition of an unpopular expenditure programme (Alm *et al.*, 1993:295, 298). Alm, McClelland and Schulze (1992:21-38) examined the role of public good provision on tax compliance.¹⁰ In the experiment, participants received income and had to make a decision on how much of that income they would report. The probability of being audited and fined was factored into the experimental design. The participants received a “public good” for their taxes, depending on the level of group taxes received. The study found that an increase in the public good received results in an increase in tax compliance (Alm, McClelland & Schulze, 1992:24).

Equity theory has been instrumental in the understanding of tax compliance behaviour, particularly in how to motivate tax compliance. However, it has been pointed out that the theory tends to be vague with regard to how and with whom a person will choose to compare him- or herself. The theory has also been criticised for not taking individual differences into account. Individuals may have different ways of measuring inequality, based on their different personality traits (Pritchard, 1969:179-180). Prospect theory, which is discussed below, is one of the social psychology theories that takes individual differences into account, particularly in terms of how these differences relate to decision taken under risk.

2.2.2.3 Prospect theory

Prospect theory has been applied successfully in various studies in the tax field (Kirchler *et al.*, 2007:17). The theory was first introduced by Kahneman and Tversky (1979:263-291) in their pioneering study that examined decisions under risk. In their study, Kahneman and Tversky proposed an alternative to expected utility theory. Their model consists of two phases: the first phase is when the individual undertakes a preliminary analysis of the given choices, and the second phase is when the individual evaluates the choices and makes a decision (Kahneman & Tversky, 1979:274). The proposed theory posited that individuals would have a reference point when making gain and loss decisions and that people are risk averse in decisions that guarantee gains and risk seeking in decisions that may result in losses (Kahneman & Tversky, 1979:263).

¹⁰ The study also examined the role of weighting audit probability on tax compliance. Refer to Alm, McClelland and Schulze (1992:21-38) for those results.

Prospect theory proposes that the manner in which choices are framed has an impact on the decision taken. The manner in which taxes are framed could result in the taxpayer being risk averse or risk seeking. If taxes are framed as a gain, the taxpayer will be risk averse, and if taxes are framed as a loss, the taxpayer will be risk seeking.

Tax studies that have applied prospect theory include a study by Elffers and Hessing (1997:289-304) which used prospect theory to propose two ways to increase tax compliance: a deliberate overwithholding of income tax and the introduction of a standard deduction. A study by Yaniv (1999:753-764) applied prospect theory to examine the role that advance tax payments may play in tax compliance, and a study by Holler, Hoelzl, Kirchler, Leder and Mannetti (2008:597-611) showed that the manner in which messages to increase tax compliance are framed could have an effect on tax compliance.

Although prospect theory assists in explaining tax compliance behaviour that cannot be explained by expected utility theory, prospect theory also has some shortcomings. As noted by Smith and Kinsey (1987:649), the theory has been developed and tested using experiments where people have to choose between alternative objective and created outcomes; however, in reality, people may expect gains or losses that are subjective and intangible.

2.2.2.4 Theory of reasoned action

The theory of reasoned action has been viewed as an important theory that could assist in understanding tax evasion (Hessing, Elffers & Weigel, 1988:406). The theory of reasoned action states that behaviour is a result of the intention to perform the behaviour. The theory was pioneered by Fishbein and Ajzen (1975).

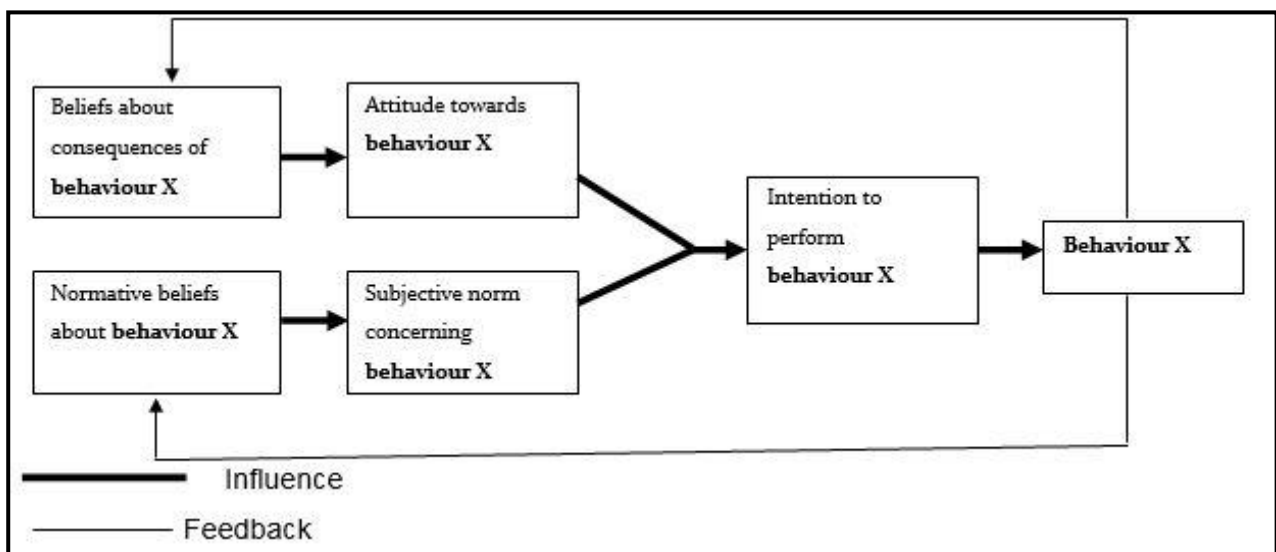
In their 1975 work, Fishbein and Ajzen developed a conceptual framework relating to attitude and its effect on human behaviour. They differentiated between attitude, belief, behavioural intention and behaviour: attitude is the favourable or unfavourable evaluation of an object; belief represents the information a person has about an object; behavioural intention refers to an individual's intention to perform a certain behaviour; and behaviour is a person's observable act (Fishbein & Ajzen, 1975:11-13).

The theory of reasoned action assumes that a person associates an object with certain attributes and thus forms a belief about that object. A person's belief about him- or herself,

other people, institutions, events, etcetera, has an effect on the person's attitude, behavioural intention and ultimately on the person's behaviour towards that object. Attitude is then formed by the person's belief about a particular object. If the belief that a person has about an object are associated with positive attributes, then the person will have a positive attitude towards that object. If the belief about the object is associated with negative attributes, then the attitude towards it will be negative. Attitude then leads to behavioural intention towards an object, and intention affects actual observed behaviour. The approach applied in the framework outlined by Fishbein and Ajzen (1975) is that a human being is a rational being who uses information available to him or her to make judgments, form evaluations and arrive at a decision (Fishbein & Ajzen, 1975:14).

Fishbein and Ajzen (1975) further acknowledged that the relationship between belief, attitude, behavioural intention and behaviour is interlinked. For example, a person's belief and attitude towards an object could be affected by prior performance of a particular behaviour. Figure 2.2 shows this interrelated link.

Figure 2.2: Relationship between belief, attitude, behavioural intention and behaviour



Source: Fishbein & Ajzen (1975:16).

The theory of reasoned action has been applied in tax research; however, the manner in which it has been applied has been criticised. One of the criticisms is that the extent to which the theory is expected to predict actual tax compliance behaviour is hard to determine (Hessing *et al.*, 1988:407).

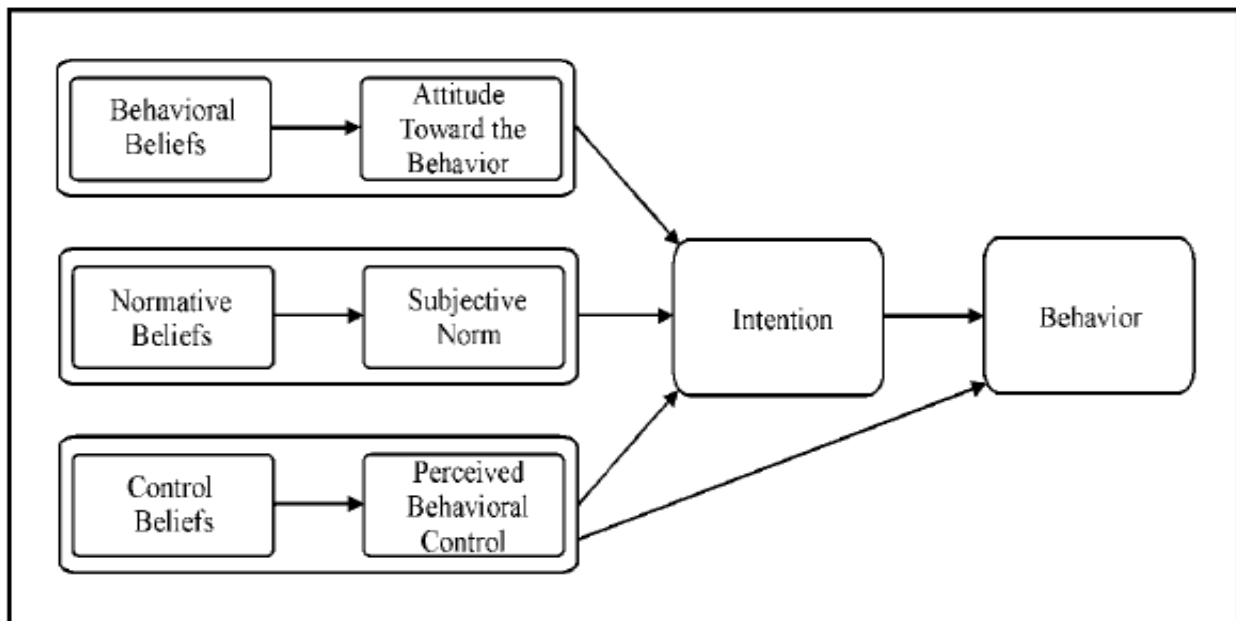
Hessing *et al.* (1988:405-413) investigated the adequacy of self-reports as a measure of tax compliance behaviour and also whether the theory of reasoned action could be used as an explanation for legally prescribed behaviours, such as tax compliance or non-compliance. Their findings show that there is little correlation between self-reported behaviour of tax evasion and actual tax evasion. With regard to the theory of reasoned action, their findings suggest that there is no significant correlation between subjective norm measures and actual tax evasion status. Further, the significant correlation they observed between subjective norms and attitude measures and self-reported behaviour appears to be as a result of the participants' desires to present a consistent self-image.

Orviska and Hudson (2003:83-102) also found a weak correlation between self-reported tax evasion and attitudes. Orviska and Hudson's study was based on the British Social Attitude Survey, which covered a number of questions related to attitudes, including attitudes towards taxes. They observed cases where people who were of the view that tax evasion was morally wrong still evaded taxes and where people who did not believe that tax evasion was wrong did not evade taxes (Orviska & Hudson, 2003:91). Elffers, Weigel and Hessing (1987:331) also found that attitudes are not a significant predictor of actual tax compliance behaviour.

2.2.2.5 Theory of planned behaviour

The theory of planned behaviour represents another attempt to explain behaviour. This theory originates from the theory of reasoned action. It argues that the intention to perform a specific behaviour will influence actual behaviour. The stronger the intention to perform the behaviour, the more likely that it will be carried out (Ajzen, 1991:181). Behavioural intention is dependent on three factors as illustrated in Figure 2.3: (1) attitude towards the behaviour, (2) subjective norm and (3) perceived behavioural control. Each of these three factors arises as a consequence of an individual's salient beliefs (Bobek & Hatfield, 2003:16).

Figure 2.3: Theory of planned behaviour



Source: Smart (2012:68).

The theory of planned behaviour adds a perceived behavioural control factor to models previously proposed by the theory of reasoned action. Perceived behavioural control refers to a person's perceived difficulty or ease of performing the behaviour of interest. Perceived behavioural control is believed to have an influence on an individual's intention and ultimately on the individual's actual behaviour (Ajzen, 1991:183-184). The theory suggests that attitude towards a behaviour is influenced by behavioural beliefs, that subjective norms are influenced by normative beliefs and that perceived behavioural control is influenced by control beliefs.

Numerous studies have applied the theory of planned behaviour to tax compliance (Langham, Paulsen & Härtel, 2012:364-402; Trivedi, Shehata & Mestelman, 2005:29-61). Another study is that of Bobek and Hatfield (2003:13-38), who investigated the interaction between the theory of planned behaviour and moral obligation in tax compliance. One of the predictions in the study was that attitude, social norms and perceived behavioural control were positively related to tax non-compliance. The findings report that the theory of planned behaviour is useful in explaining tax non-compliance.

Smart (2012) examined whether the theory of planned behaviour could provide an explanation of tax compliance behaviour. A survey was conducted with 1000 randomly selected taxpayers and 1266 tax agents and tax lawyers. The survey comprised 119

questions that measured 12 constructs. Smart's study also found that the theory of planned behaviour is useful in explaining tax compliance behaviour.

In summary, social psychology models and theories provide an alternative explanation to that of expected utility theory with regard to observed tax compliance behaviour. These models examine human behaviour in order to understand how people make decisions, and the models have moved away from the rational choice approach used in expected utility theory. However, the criticism of some of these models is that the interpretations and inferences made tend to be subjective.

Now that social psychology models have been discussed, fiscal psychology models, which are a combination of social psychology models and deterrence models, need to be considered.

2.2.3 Fiscal psychology models

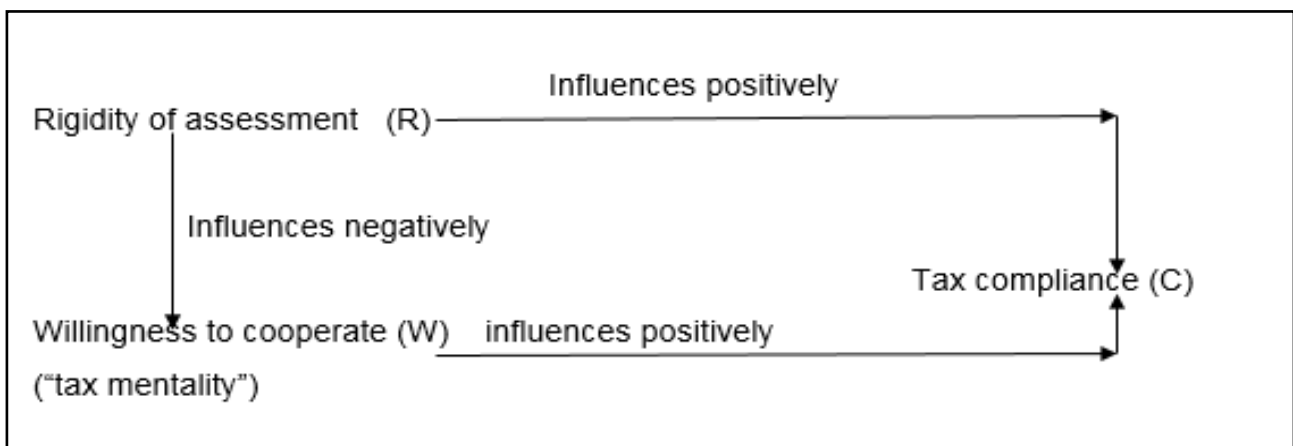
Fiscal psychology models posit that tax compliance is influenced by economic, financial, social and psychological factors and that tax enforcement is a behavioural problem that can be solved by co-operation between tax authorities and taxpayers. The role of the tax authorities is to provide a positive incentive for tax compliance (McKerchar, 2002:58).

Fiscal psychology models place significant focus on taxpayer attitudes (McKerchar & Evans, 2009:177). One of the earliest known studies using a fiscal psychology model is that of Schmolders (1959:340-345). In this study, Schmolders (1959:341) states that the main aim of fiscal psychology is to examine the resistance to taxation according to "tax mentality". Tax mentality is a term also used by Strümpel (1969:30) to describe a taxpayer's willingness to pay tax. Tax mentality, the feeling of tax tension and tax morale are seen as the three psyches that make up a person's attitude towards taxation (McKerchar & Evans, 2009:177). Tax tension is a term used to describe the existence of any of the following: a tax system that contains provisions that do not satisfy people's expectations, as they are a result of a compromise; the repeated proposal of tax changes which are rejected; a public debate being engaged in by different stakeholders, such as labour organisations, over policies; the extensive debate in parliament of tax-related matters; or tax policy being debated by the academic community (Shoup, 1961:1-2). Tax morale refers to individuals' motivation or willingness to comply with tax law (McKerchar, Bloomquist & Pope, 2013:6).

Schmölders (1959:341) indicates that tax mentality differs between people. In his study, a survey was conducted with German citizens. Participants were interviewed to determine their attitudes towards tax and their moral assessments of tax evasion and tax authorities. The findings show that most of the participants viewed tax evaders as clever business men and that most of the participants were also unfamiliar with tax evasion.

Strümpel (1969:13-32) developed a fiscal psychology model of tax compliance. The model presented in Figure 2.4 shows that tax compliance can be influenced by two factors. The first factor is rigidity of assessment, which refers to the amount of tax fines and also to the level of administrative complexity associated with the tax. The second factor is the willingness to co-operate (tax mentality), which refers to the taxpayer's attitude and perception of the tax system (Strümpel, 1969:30).

Figure 2.4: Strümpel's model of tax compliance (1969)



Source: Strümpel (1969:30).

Rigid tax enforcement would result in a negative influence on a taxpayer's willingness to comply with tax law (tax mentality) and would in turn impact tax compliance negatively. Rigid tax enforcement is thus also seen as having a direct effect on tax compliance. Willingness to co-operate also has a direct influence on tax compliance and can be negatively influenced by the rigidity of assessment.

Since the introduction of this model by Strümpel (1969:13-32), other authors have examined the role of attitudes in influencing tax compliance. Lewis (1982:165) studied the link between attitude and tax compliance and argues that tax evasion can be a result of anti-tax attitudes. Torgler and Schneider (2005:231-250) examined attitudes towards paying taxes in Austria. Their study was based on questions extracted from the World Values Survey and European

Values Survey. The study found that factors such as national pride, religion and trust, have an effect on people's attitudes towards tax compliance. Furthermore, they found that if people perceive tax evasion as being widespread, people's motivation to contribute will decrease (Torgler & Schneider, 2005:240).

The concept of tax mentality has evolved over the years and has gradually been replaced by the term "tax morale". Tax morale encompasses attitudinal variables such as: feelings of guilt, moral values and sense of civic duty (Smart, 2012:31).

Despite the knowledge that fiscal psychology models have provided in understanding tax compliance, these models have been criticised. One of the major perceived weaknesses of fiscal psychology models is their reliance on self-reported compliance. Another concern is the inability of the models to identify the mechanisms through which the relationships between demographic variables, attitudinal variables and tax compliance operate (Smart, 2012:30).

Section 2.2 has discussed the different meanings of tax compliance. Scholars have chosen an enforcement approach, a conceptual approach or an operational approach to the definition of tax compliance. An enforcement approach to tax compliance uses the tax gap as a measurement of tax compliance. However, this can be problematic as taxpayers and governments might have different interpretations of the tax gap. A conceptual approach to the definition of tax compliance takes into account the taxpayer's willingness to comply. This is a wider definition which might be difficult to measure. An operational approach to the definition of tax compliance is focused on the administrative steps that a taxpayer would need to adhere to in order to fulfil his or her tax obligations. Therefore, the operational approach to the definition appears to be easier to measure as a taxpayer can be evaluated to determine whether he or she has followed the required steps to fulfil their tax obligations. It is for this reason that in this thesis, an operational approach is applied. The three models of tax compliance (economic deterrence models, social psychology models and fiscal psychology models) have also been discussed in this section, along with the contribution made by the different models and theories towards understanding tax compliance behaviour and their inherent limitations. Based on the above review of these models and theories, none of them can definitively predict or explain tax compliance behaviour. For this reason, an alternative theory, based on the concept of "nudging", is discussed in Section 2.4.

The next section discusses voluntary tax compliance and its potential drivers.

2.3 VOLUNTARY TAX COMPLIANCE

Having explored the various definitions of tax compliance and having considered the three models that underpin the concept, it is important to look at the more specific area of voluntary tax compliance and the factors influencing such compliance. As noted by Muehlbacher, Kirchler and Schwarzenberger (2011:91), it is important to distinguish between voluntary tax compliance and enforced tax compliance, as tax compliance can be influenced either by encouraging voluntary compliance or by enforcing compliance. Deterrence measures, such as audits, lead to enforced compliance, whilst factors such as trust, social norms and services provided by authorities lead to voluntary tax compliance (Olsen, Kasper, Enachescu, Benk, Budak & Kirchler, 2018:43). Modern tax systems are largely dependent on voluntary tax compliance, and tax authorities need to implement measures that encourage this voluntary tax compliance (OECD, 2004:70).

Given the tax compliance behaviour predicted by the standard economic deterrence models, one would expect that most taxpayers would evade taxes as audit probability and penalty rates tend to be low in most countries (Alm *et al.*, 1995:5). However, this is not the behaviour that has been observed, as studies have shown that most taxpayers are actually willing to pay their taxes (Kirchler *et al.*, 2008:211). Therefore, the question should not be why people evade taxes but why people pay taxes (Slemrod, 1998:485).

Voluntary tax compliance is defined by Bornman (2014:312) as:

“... the acceptance of his or her tax obligations by a taxpayer as a duty or moral commitment, in the absence of any enforcement actions directed towards the taxpayer by the collection agency, induced by the intrinsic willingness of the individual to co-operate, based on strong personal ethics and internalised social norms such as co-operation and trust”.

Based on this definition, elements of voluntary compliance are driven by an intrinsic willingness to comply, which is based on ethics and norms. Kirchler and Wahl (2010:343) refer to voluntary compliance as a taxpayer’s willingness to co-operate, originating from the moral obligation to contribute to public welfare.

Voluntary compliance has been described as resulting from trust in revenue authorities. When trust is high, it is predicted that taxpayers will voluntarily pay their taxes; and when

there is a lack of trust between taxpayers and tax authorities, it is predicted that compliance will be low (Kirchler & Wahl, 2010:333). When trust is low, but tax authorities have strong power in dealing with non-compliance, tax compliance is enforced rather than voluntary (Kirchler & Wahl, 2010:333).

Other researchers, such as Hofmann, Hoelzl and Kirchler (2008:209-217), list fairness, social norms, knowledge and evaluation of taxation and motivational tendencies to comply as key variables driving voluntary tax compliance. Each of these potential drivers of voluntary tax compliance is considered below in order to get a better understanding of each factor's effect on voluntary tax compliance.

2.3.1 Trust

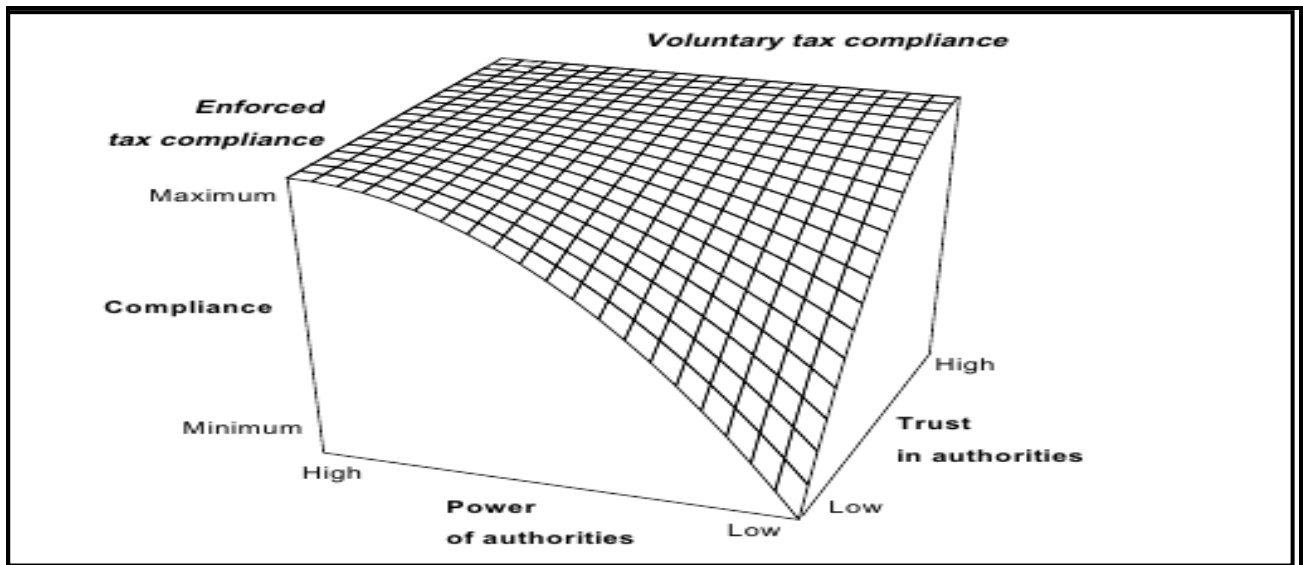
Trust in tax authorities is an important aspect to consider when understanding the factors that influence voluntary tax compliance (Kirchler *et al.*, 2008:210). Trust can be understood more specifically by differentiating between implicit trust (which is trust based on automatic, intuitive or affective processes) and reason-based trust (which is trust based on motivation, benevolence, goal achievement and dependency on the trustees) (Alm, Kirchler, Muehlbacher, Gangl, Hofmann, Kogler & Pollai, 2012:37). Trust in tax authorities is often as a result of motivation, benevolence, goal achievement and dependency, rather than being an implicit trust.

The issue of trust and its influence on voluntary tax compliance was examined by Kirchler *et al.* (2008:210-225), who proposed a framework which, it is argued, can be used conceptually and operationally as a tool to extend research into tax compliance behaviour and also as a tool for responsive regulation in order to encourage tax compliance. The framework is based on the assumption that the tax climate can vary between two climates. In the first climate, taxpayers and tax authorities can be perceived as working against each other. In this climate, there is a "cops and robbers" relationship, where tax authorities view taxpayers as tax evaders, and taxpayers see tax authorities as people who are out to get taxpayers. In the second climate, both parties are seen as working together; tax authorities are seen as being part of the community.

The framework proposed by Kirchler *et al.* (2008:210-225) is also underpinned by the premise that tax compliance is based on two dimensions: trust and power. These jointly

influence tax compliance. An increase in the level of trust in tax authorities is assumed to have a positive influence on voluntary compliance, whilst an increase in the level of the power held by tax authorities is assumed to have a positive influence on enforced compliance. Figure 2.5 illustrates the relationship between power and trust and enforced versus voluntary compliance.

Figure 2.5: Slippery slope framework



Source: Kirchler *et al.* (2008:212).

The “slippery slope” framework in Figure 2.5 suggests that tax compliance will be low when both trust in tax authorities and their power is low. When trust is high, but power is low, voluntary tax compliance will be high. When power is high, but trust is low, enforced tax compliance will be high.

In their study, Kirchler *et al.* (2008:210-225) also discuss previous research into tax compliance and consider the results of those studies, taking into consideration the dimensions of trust and power as included in their framework. Their discussion covers audit probabilities; fines; tax rate; subjective tax knowledge and participation; attitudes towards tax; personal, social and national norms; and perceived fairness. Kirchler *et al.*'s (2008:210-225) observations regarding the results of studies that have examined these variables as well as their observations regarding how trust and power play their roles are summarised briefly below.

Audit probability: The subjective probability of being audited, rather than the objective probability of being audited, is an important factor in tax compliance. The subjectivity of an audit is an indication of the tax authority's power (Kirchler *et al.*, 2008:215).

Fines: How fines are seen is important: in a hostile environment, fines could be viewed negatively; and in a synergistic climate, fines are viewed positively as a means to reprimand those who are acting against the interests of the community (Kirchler *et al.*, 2008:215).

Tax rate: The effect of tax rate on tax compliance is dependent on the level of trust between taxpayers and revenue authorities. In a low trust environment, high tax rates would be viewed negatively; and in a high trust environment, the same level of tax rate would be viewed positively as a contribution that benefits all members of the community (Kirchler *et al.*, 2008:216).

Subjective tax knowledge and participation: Tax knowledge and participation have a positive correlation with trust. High levels of knowledge of tax law lead to higher tax compliance rates. Educating taxpayers by increasing their knowledge of taxes will positively impact taxpayers' trust in tax authorities and thus result in higher levels of voluntary compliance (Kirchler *et al.*, 2008:216-217).

Attitudes towards tax: Favourable attitudes lead to trust in tax authorities and thus increase voluntary compliance. Tax attitudes are also related to the perceived use of tax money (Kirchler *et al.*, 2008:217).

Personal, social and national norms: There is a direct relationship between tax law and national norms: negative social norms can hinder the work of tax authorities; however, positive social norms, such as a society where citizens are perceived to be contributing their fair share of taxes, would help in increasing trust in tax authorities (Kirchler *et al.*, 2008:218).

Perceived fairness: Perceived fairness is linked to trust in tax authorities. When taxpayers perceive that they are being treated fairly, trust can be built and maintained. Retributive justice, however, is linked to power, as it is contingent on finding and fining non-compliant taxpayers (Kirchler *et al.*, 2008:219).

The assumptions of the slippery slope framework have been tested in studies in many countries. In a study by Kogler, Batrancea, Nichita, Pantya, Belianin and Kirchler (2013:169-

180), university students from Austria, Hungary, Romania and Russia were assigned to one of four scenarios characterising a fictitious country. In the experiment, trust in tax authorities and the power of tax authorities were manipulated in order to test their effect on tax compliance. The four scenarios were differentiated as follows: (1) low trust and low power, (2) low trust and high power, (3) high trust and low power and (4) high trust and high power. Kogler *et al.*'s (2013:169-180) findings confirm the assumptions of the slippery slope framework: the highest tax compliance levels were observed when both power and trust were high; in addition, high voluntary tax compliance was observed when trust was high; and high enforced tax compliance was observed when power was high.

Some of the assumptions of the slippery slope framework were also confirmed in a study by Kastlunger, Lozza, Kirchler and Schabmann (2013:36-45) which was conducted amongst 188 self-employed and entrepreneurial Italian participants. In the study, structural equation modelling was used to test the assumptions of the slippery slope framework. The results show that trust is indeed positively related to voluntary tax compliance as proposed by the framework. The study differentiated between coercive power¹¹ and legitimate power,¹² and found that coercive power is negatively correlated to trust, and legitimate power is positively correlated to trust. Additionally, enforced tax compliance was found to be positively correlated to tax evasion (Kastlunger *et al.*, 2013:43).

Overall, therefore, research has indicated that there is a strong and positive relationship between various manifestations of trust and voluntary tax compliance.

2.3.2 Fairness

A number of studies have suggested that there is a strong and positive relationship between fairness and voluntary tax compliance. Fairness indicates both the perceived procedures and consequences of norm-breaking and the perceived balance of taxes paid and public goods received (Hofmann *et al.*, 2008:211). Taxpayers' willingness to comply with tax law is likely to be reduced when taxpayers perceive their contribution towards tax revenue as being unbalanced when compared with the goods received from their government (Hofmann *et al.*, 2008:212). Alm *et al.* (1993:285) also note that how taxes are spent affects voluntary

¹¹ The authors of the study describe coercive power as "... power to set punishment and impose severe fines" (Kastlunger *et al.*, 2013:43).

¹² Legitimate power is described as "... the efficacy of tax authorities' interventions (due to its expertise and ability) in reducing tax crimes" (Kastlunger *et al.*, 2013:43).

tax compliance. The perceived balance of taxes paid and public goods received can also be referred to as reciprocity, which is a taxpayer's belief about how public resources are being utilised by the government (Castro & Scartascini, 2015:66).

The issue of the fairness or enforcement of tax law and taxpayers' evaluation of government spending has received much attention (Kirchler, 2007:74). Schmolders (in Kirchler, 2007:74) examined the issue of fairness. His study indicated that approximately three quarters of German taxpayers viewed the tax burden as high. The study suggested that beliefs about fairness are a relevant component of tax morale.

Andreoni *et al.* (1998:818-860) also considered how issues of fairness may affect a taxpayer's willingness to comply with his or her tax obligations. They point out that should taxpayers view the tax system as unfair, taxpayers may not be willing to comply and may begin to rationalise cheating (Andreoni *et al.*, 1998:851).

Spicer and Lundstedt (in Andreoni *et al.*, 1998:851) found that a taxpayer may feel cheated if the taxpayer perceives that his or her taxes are not well spent by the government. This perception of fairness is thus also linked to the perception of corruption. Gangl, Kirchler, Lorenz and Torgler (2015) also found that the perception of corruption has an adverse impact on taxpayers' willingness to comply. This connection was confirmed again by Rosid, Evans and Tran-Nam (2016:387-425), who found that taxpayers' perceptions of corruption have an influence on intentional non-compliant behaviour. Further, Alon and Hageman (2013:479-494) found that high levels of corruption result in lower levels of tax compliance.

The role of provision of public goods and services was examined by Alm, McClelland and Schulze (1992:21-38) who found that tax compliance is positively influenced by the provision of public goods. Blackwell (2007) performed a synthesised review of 20 experimental studies conducted on the determinants of tax compliance. As part of the review, Blackwell (2007) also examined the effect of public goods return on tax compliance and also found that increasing the return received from a public good will increase tax compliance.

In contrast with the above outcomes, Brooks and Doobs (in Devos, 2014:43) found no significant relationship between fairness and tax compliance. Hasseldine, Kaplan and Fuller (1994:79-93) also found no significant relationship between tax compliance and fairness.

Research thus shows conflicting results with regard to the role of fairness on tax compliance. This inconsistency has been attributed to the lack of differentiation between the different aspects of fairness (Kirchler, 2007:74). In an attempt to provide such differentiation, Wenzel (2003) provides a conceptual framework for fairness and justice, in which he considers three areas of justice: distributive justice, procedural justice and retributive justice. He proposes that these three types of justice must be observed from individual, group and societal perspectives, as they all might have an impact on tax compliance.

The first type of justice is distributive justice, which refers to "... the fairness of the outcomes of a resource allocation or distribution" (Wenzel, 2003:45). From the perspective of tax compliance, distributive justice can be viewed as the "... taxpayers' perceptions of the balance of their share of the commons relative to the benefits they are entitled to receive, and to the contributions others make relative to their share of public goods" (Kirchler, 2007:75). Table 2.3 is a summary of the issues of distributive justice in taxation.

Table 2.3: Distributive justice in taxation: examples for three levels of analysis

	Individual level	Group level	Societal level
Tax burdens	personal tax burden; compared to others; other times; one's relative income	ingroup's tax burden; compared to other groups; other times; its relative income	tax level; distribution; progressivity
Tax-based benefits	personal benefits compared to others; other times; one's relative taxes	ingroup's benefits; compared to other groups; other times; its relative taxes	level of spending; efficiency; distribution over different policies
Avoidance/evasion opportunities	personal options compared to others; other times	ingroup's options relative to other groups	level; distribution of opportunities

Source: Wenzel (2003:49).

As demonstrated in the above table, "tax burdens", "tax-based benefits" and "avoidance/evasion opportunities" are viewed as distributive justice issues which can be evaluated by a taxpayer from the taxpayer's individual level perspective, from a group level perspective or from a societal level perspective.

The second type of justice is procedural justice, which encompasses the quality of interaction between the taxpayer and tax authorities, the extent to which a taxpayer has a say, the extent and quality of information provided to taxpayers by the tax authorities and

compliance and administration costs. This is illustrated in Table 2.4. Procedural justice is viewed as the "... processes of resource distribution" (Kirchler, 2007:75). If the manner in which resources are distributed is perceived by taxpayers as fair, then procedural fairness is high; if the manner of distribution is perceived as unfair, then procedural fairness is low (Kirchler, 2007:75). As with distributive justice, procedural justice can be evaluated from an individual, group or societal level.

Table 2.4: Procedural justice in taxation: examples for three levels of analysis

	Individual level	Group level	Societal level
Interactional treatment	respect for the individual; consistency relative to other individuals	respect for the ingroup; consistency relative to other groups	rights for taxpayers and service standards
Process and decision control	voice; control; consultation of individual	voice; control; consultation and representation of ingroup	consultations of taxpayers in general; democratic structures
Information and explanation	explanations and justification for decisions affecting the individual	explanations and justification for decisions affecting the ingroup	transparency; presentation in media
Compliance costs	efficiency; service vs. costs for the individual	efficiency; service vs. costs for the ingroup	administration and compliance costs; complexity of the tax system

Source: Wenzel (2003:55).

The third type of justice is retributive justice, which refers to perceptions of the fairness of sanction in cases of norm breaking (Kirchler, 2007:76). There are two facets to retributive justice: the first is related to how honest taxpayers perceive the punishment by authorities of others who are "breaking the rules"; the second is related to how those who are "breaking the rules" perceive the fairness of the penalties received as a consequence.

As illustrated in Table 2.5, retributive justice can also be evaluated from an individual, group or societal level.

Table 2.5: Retributive justice in taxation: examples of three levels of analysis

	Individual level	Group level	Societal level
Penalties	appropriateness of penalty for individual (relative to the offence, others)	appropriateness of penalty for ingroup (relative to the offence, others)	severity of penalties; distribution penalties; for different offences; quality of penalties
Audits	rigidity or inconsiderateness of audit for individual case	rigidity or inconsiderateness of audit for ingroup cases	rigidity or inconsiderateness of audit in general

Source: Wenzel (2003:58).

In summary, studies have shown a positive relationship between fairness and voluntary tax compliance. It has also been noted that fairness affects tax morale. However, some studies, such as the one by Hasseldine *et al.* (1994:79-93), have found no significant relationship between tax compliance and fairness. These mixed results have been attributed to a lack of differentiation between the different types of fairness. An attempt has, however, been made to differentiate between the different types of fairness that are discussed in this section.

2.3.3 Social norms

The role of social norms on tax compliance has been widely researched (Coleman, 1996; Onu & Oats, 2014; Wenzel, 2001), and it has been argued that social norms strongly influence people's tax compliance decision and that tax authorities can influence norms and thereby tax compliance (Kornhauser, 2007:138). It has also been reported that people who believe that others are honest have a more negative perception of tax evasion than those who perceive tax evasion as being widespread (Traxler, 2010:89).

Social norms are defined as "... rules and standards that are understood by members of a group and that guide and/or constrain social behaviour" (Onu & Oats, 2014:3). Three types of social norm have been described in the literature: subjective norms, injunctive norms and descriptive norms. Subjective norms are the norms held by an individual's referent others about behaviour; injunctive norms describe what the group approves or disapproves of; and descriptive norms describe what group members actually do (Onu & Oats, 2014:6-7). Onu and Oats (2014:6) point out that although it is useful to differentiate between the effect of social norms and personal norms on tax compliance, such differentiation is often not

needed. This is because social norms and personal norms can be seen as interdependent. Onu and Oats (2014:6) also indicate that personal norms¹³ are internalised social norms.

Table 2.6 summarises the different social norm constructs, which include personal norms.

Table 2.6: Constructs of social norms

	Descriptive norms	Injunctive norms	Subjective norms	Personal norms
Description	What one perceives that other people do in a given situation. Watching others provides information about what is “normal” in a novel or ambiguous situation	The perception of what most people think others should do in a given situation. They specify what should be done and are the moral rules of the group	A person’s perception about what those who are important to him think he should do in a given situation. They are one’s perceptions of the injunctive norms held by the people whose opinions matter most	Self-based standards or expectations for behavior (i.e., what an individual believes he/she should do) in a given situation. These standards arise from internalized values
Social goal being achieved by conforming to norm	Effective action—the desire to be accurate in one’s choices and behaviors	Building and maintaining social relationships	Building and maintaining social relationships	Managing self-concept
When will they matter?	Most likely to use evidence of others’ behavior to decide most effective course of action when the situation is novel, ambiguous, or uncertain, and especially when the source of reference is similar to us	They motivate behavior by promising social rewards or punishments. Need not be expressed in order to direct behavior. These norms are more influential when they are made salient	When people are motivated to comply with the norms of “referent” others	Enforced through the anticipation of self-enhancement or self-deprecation (“self-reinforcing”)

Source: Bobek, Hageman & Kelliher (2013:453).

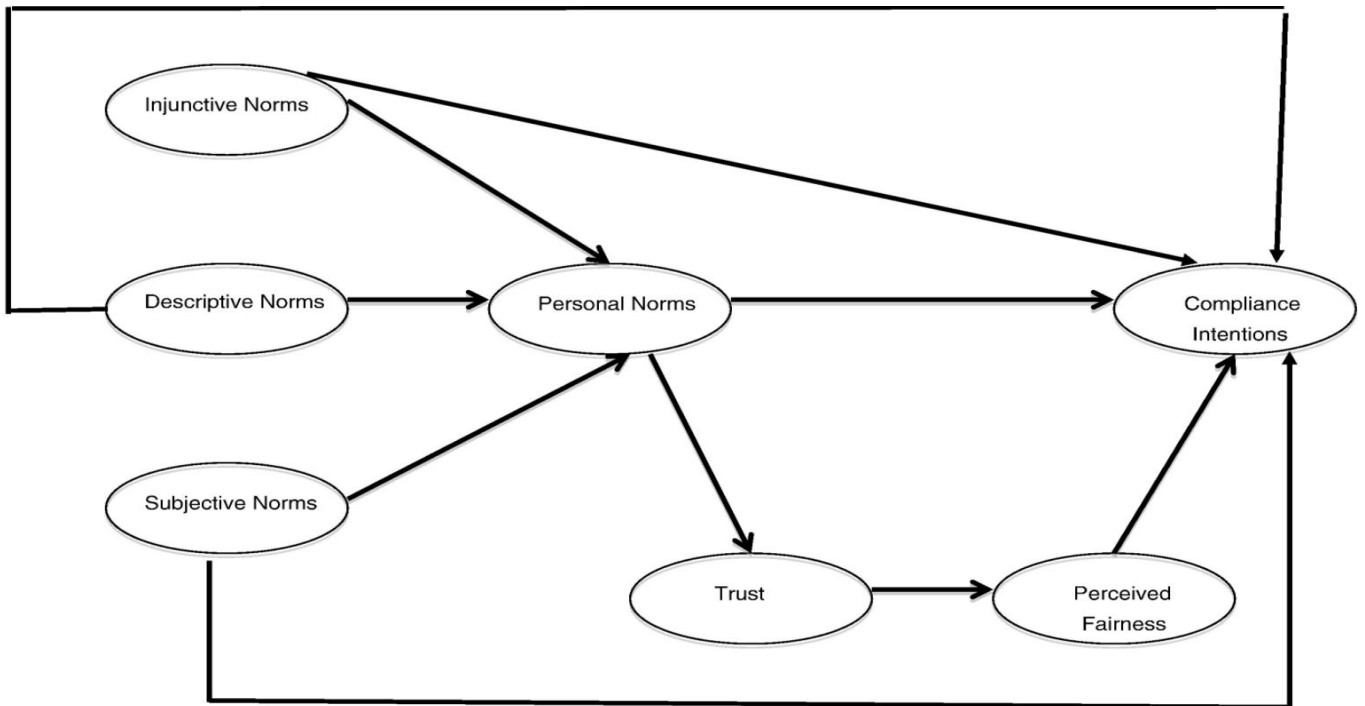
¹³ Personal norms are an individual’s own expectations for behaviour (Bobek *et al.*, 2013:453).

Bobek *et al.* (2013:451-468) investigated the effect of social norms on tax compliance. They focused on descriptive norms, injunctive norms, subjective norms and personal norms. In the study, 174 participants completed a questionnaire based on a hypothetical tax compliance scenario. The questionnaire measured social norms to do with tax compliance. The results presented were that:

- personal and subjective norms have a direct influence on tax compliance;
- injunctive and descriptive norms have an indirect influence on tax compliance; and
- injunctive and descriptive norms are related to personal and subjective norms (they have an influence on personal and subjective norms).

Another study that examined the effect of social norms was that of Jimenez and Iyer (2016:17-26). Information on taxpayers' party identification, trust in government, fairness perceptions and compliance intentions was collected using a survey. Structural equation modelling was then used to test the relationships between the variables. The results of the study are that norms have a significant positive effect on tax compliance intentions. Injunctive, descriptive and subjective norms have an indirect influence on tax compliance intentions through personal norms, and personal norms have a significant influence on trust in government. The above results are shown in Figure 2.6.

Figure 2.6: Proposed model for tax compliance



Source: Jimenez & Iyer (2016:22).

Torgler (2003b) analysed tax morale and tax compliance behaviour in Costa Rica and Switzerland and found that compliance behaviour differs across different cultural settings (Torgler, 2003b:530). Similar results were also observed in an earlier study conducted by Cummings *et al.* (2001) on cross-cultural comparisons of tax compliance behaviour. The results of that study, which was conducted in the USA, South Africa and Botswana, demonstrate that tax compliance behaviour differed across the countries being studied (Cummings *et al.*, 2001:18). Other studies, such as the one by Al-Mamun, Entebang, Mansor, Yasser, Nathan and Rahman (2014:109-124), have also found a difference in tax compliance between different ethnic groups. Al-Mamun *et al.*'s study (2014:109-124) suggests that these differences are due to differences in culture. Their results are similar to those of Alabede (2014:55), who also found differences in tax compliance behaviour across different ethnic groups in Nigeria. However, there have also been studies, such as the one by Kasipillai and Abdul Jabbar (2006:84), which have found no significant differences in tax compliance behaviour, based on ethnicity.

As the majority of studies on social norms and tax compliance have been conducted in developed countries, the role of social norms on tax compliance in a developing country, such as South Africa, is not fully understood (Abrie & Doussy, 2006:4). Fjeldstad's (2006) is

one of the few studies that have investigated social influences on compliance in South Africa. Fjeldstad's study (2006), which focused on non-payment of service charges, found that there is little stigma attached to non-payment of service charges in some communities in South Africa. Only one third of the participants in the major metropolitan areas sampled in the study believed that most of their neighbours paid their required service charges. This view as shared by the participants in the study is a concern, as the perceived high non-compliance could have a negative effect on those who are compliant. However, interventions that provide taxpayers with information about the true norms in their communities could be valuable aids in increasing voluntary compliance (Wenzel, 2001).

2.3.4 Tax knowledge and evaluation of taxation

Tax law is difficult to understand, and the ordinary taxpayer generally shows little interest in tax law (Kirchler, 2007:28). This attitude towards tax leads to a belief that understanding tax law is not worthwhile, as it is too complex to comprehend (Kirchler, 2007:28). Taxpayers' poor knowledge of tax law may also breed in them distrust of tax authorities (Hofmann *et al.*, 2008:210).

In a study conducted by Song and Yarbrough (1978:442-452), where a survey based on 287 households was conducted, it was found that those participants who were knowledgeable in fiscal and tax matters had a high tax ethics score, indicating a positive relationship between fiscal knowledge and tax ethics (Song & Yarbrough, 1978:447).

A study by Eriksen and Fallan (1996:387-402) considered the influence of tax knowledge on attitudes towards tax compliance. The authors conducted a quasi-experiment with student subjects. The experiment consisted of a treatment group (tax law students) and a control group (marketing students). A pretest was conducted at the beginning of the academic year, and a posttest was conducted at the end of the academic year. The pretest consisted of 149 participants, and the posttest consisted of 123. The participants received questionnaires which included questions related to tax knowledge and attitudes towards tax. The results of the study suggest that better tax knowledge will lead to a change in attitude towards tax compliance (Eriksen & Fallan, 1996:397).

Based on the results of the studies discussed above and other similar studies that have examined the impact of tax knowledge on tax compliance (Fallan, 1999:173-184; Grasso &

Kaplan, 1998:85-100; Saad, 2014:1069-1075), there is little doubt that there is a positive relationship between tax knowledge and tax compliance.

2.3.5 Motivational tendencies to comply

Motivational postures are a set of beliefs and attitudes held by a person and openly shared with others. These beliefs emanate from a psychological concept called social distance, which indicates a taxpayer's liking for and ascription of status to his or her tax authority (Braithwaite, 2003:18). Braithwaite (2003:15-39) describes five motivational postures to tax compliance: commitment, capitulation, resistance, disengagement and game play. Table 2.7 elaborates on each of them.

Table 2.7: Motivational postures

Motivational posture	Description	Attitude towards tax authorities
Commitment	Commitment reflects beliefs about the desirability of tax systems and reflects feelings of moral obligation to act in the interest of the collective and pay one's tax with good will.	Positive
Capitulation	Capitulation reflects acceptance of the tax office as the legitimate authority and the feeling that the tax office is a benign power as long as one acts properly and defers to its authority.	Positive
Resistance	Resistance reflects doubts about the intentions of the tax office to behave co-operatively and benignly towards those it dominates and provides the rhetoric for calling on taxpayers to be watchful, to fight for their rights and to curb tax office power.	Negative
Disengagement	Disengagement also communicates resistance, but here the disenchantment is more widespread, and individuals and groups have moved beyond seeing any point in challenging the authorities. The tax office and tax system are beyond redemption for the disengaged citizen, and the disengaged citizen's main objective is to remain both socially distant and blocked from view.	Negative
Game play	Game playing expresses a view that the law is seen as something to be moulded to suit one's purposes, rather than as something to be respected in its defining the limits of acceptable activity.	Negative

Source: Braithwaite (2003:18).

The commitment and capitulation postures reflect positive attitudes towards tax authorities. The resistance, disengagement and game play postures reflect negative attitudes towards tax authorities (Braithwaite, 2003:18). Braithwaite (2003:15-39) argues that it is possible for one taxpayer to hold two motivational postures: some taxpayers may hold one motivational posture in relation to their own personal tax affairs and another motivational posture in relation to their business-related activities (Braithwaite, 2003:21).

Although taxpayers may hold certain motivational postures, this does not necessarily mean that these views will be reflected in the actions they take when fulfilling their tax obligations (Braithwaite, 2003:32). In a study conducted by Kirchler and Wahl (2010:331-346), the correlation between motivational posture and tax compliance behaviour was examined. As expected, enforced tax compliance showed a positive relationship with the resistance motivational posture, whilst tax avoidance showed a positive relationship with the game play motivational posture. Furthermore, voluntary tax compliance correlated positively with the commitment and capitulation motivational postures and correlated negatively with the resistance, disengagement and game playing motivational postures (Kirchler & Wahl, 2010:336).

It can be concluded from the literature reviewed above that voluntary tax compliance is an important aspect to consider when seeking to increase the levels of tax compliance. Each of the factors that has been discussed (trust, fairness, social norms, tax knowledge and evaluation of taxation, and motivational tendencies to comply) has been shown to be an important driver of voluntary tax compliance. These factors are all interrelated; there is no single factor that can fully influence voluntary tax compliance on its own. Thus, in order to influence voluntary tax compliance, it is important to be aware of each of these different but interrelated factors.

The focus of the next part of the chapter is a consideration of “nudge theory”. This provides an essential conceptual framework for the subsequent close analysis of the literature related to the specific research problem addressed by this thesis: whether reciprocity nudges can impact the voluntary tax compliance of individual taxpayers.

2.4 NUDGE THEORY

Nudging is a concept that originates from behavioural economics.¹⁴ Nudges are being embraced increasingly by policymakers, including tax policymakers, as nudges are often cost-effective and can be used to promote both economic and non-economic goals (Sunstein, 2014:583). Nudging has been brought to the forefront in recent years by Thaler and Sunstein (2009).

Behavioural economics research has mainly focused on two components (Mullainathan & Thaler, 2000):

- identifying ways in which observed human behaviour differs from the behaviour that has been modelled by standard economic models; and
- showing how this observed behaviour matters in an economic context.

Behavioural economics recognises that humans have limitations when they are required to make decisions and that they are not *homo economicus*¹⁵ (Bhargava & Loewenstein, 2015:396; Thaler & Sunstein, 2009:7). These cognitive limitations arise because of the complexity of the human mind, which is thought to have two underlying systems that control reasoning. The first system (referred to as System 1 or the Automatic system) is fast, unconscious and automatic; and the second system (referred to as System 2 or the Reflective system) is slow, controlled and self-aware (Frankish, 2010:914).

Dual process theory explains these two systems. It posits that behaviour is a result of either one of the two thinking systems. Behaviour that results from System 1 is typically automatic; an example of this is walking. Behaviour that results from System 2 is reflective; an example is holding your breath when passing a bad smell (Hansen & Jespersen, 2013:14). At times, when making decisions, humans follow their automatic system without pausing to consult their reflective system (Thaler & Sunstein, 2009:24). Table 2.8 summarises the key features of these two systems.

¹⁴ Behavioural economics is a body of research that incorporates research methods from psychology into economic theories (Sugden, 2009:365).

¹⁵ This is the traditional economic description of a human being as a calculating and unemotional maximiser who makes choices on a rational basis (Mullainathan & Thaler, 2000; Thaler & Sunstein, 2009:7).

Table 2.8: Key features of System 1 and System 2

	Automatic (System 1)	Reflective (System 2)
Process	Uncontrolled	Controlled
	Effortless	Effortful
	Associative	Deductive
	Fast	Slow
	Unconscious	Self-aware
	Skilled	Rule-following
Attitudes	Implicit	Explicit
	Cultural stereotypes	Personal beliefs
	Slow acquisition and change	Fast acquisition and change
	Fast access	Slow access

Source: Frankish (2010:922); Hansen & Jespersen (2013:13).

Nudge theory acknowledges that the manner in which choices are framed can affect humans' decision-making capabilities (prospect theory). Thaler and Sunstein (2009:40) provide an example relating to energy conservation, where one nudge was framed as a loss and the other as a gain. The nudge framed as a loss was more successful than the nudge framed as a gain in encouraging energy conservation. Thaler and Sunstein (2009:40) state: "Framing works because people tend to be somewhat mindless, passive decision makers. Their reflective system does not do the work that would be required to check and see whether reframing the questions would produce a different answer."

Nudging is defined as "... any aspect of the choice architecture¹⁶ that alters people's behaviour in a predictable way without forbidding any options or significantly changing their economic incentives" (Thaler & Sunstein, 2009:6). The definition provided by Thaler and Sunstein (2009:6) was revised by Hausman and Welch (2010:126), who defined nudges as:

"... ways of influencing choice without limiting the choice set or making alternatives appreciably more costly in terms of time, trouble, social sanctions, and so forth. They are called for because of flaws in individual decision-making, and they work by making use of those flaws".

Hansen (2016:158) provides a similar definition, referring to a nudge as:

"... a function of ... any attempt at influencing people's judgment, choice or behaviour in a predictable way (1) that is made possible because of cognitive boundaries, biases, routines and habits in individual and social decision-making posing barriers for people to perform rationally in their own declared self-interests and which (2) works by making

¹⁶ Choice architecture refers to the design of different ways in which choices can be presented (Hagman, Andersson, Västfjäll and Tinghög, 2015:441).

use of those boundaries, biases, routines, and habits as integral parts of such attempts”.

The literature refers to different types of nudge. Hansen and Jespersen (2013:3-28) provide two types: the first is a transparent nudge, for which the intention and the way in which behaviour is intended to be changed are reasonably expected to be transparent to the person being nudged; the second is a non-transparent nudge, for which the intention and the way in which behaviour is intended to be changed cannot be reconstructed by the person being nudged (Hansen & Jespersen, 2013:18).

A different typology of nudges is provided by Barton and Grüne-Yanoff (2015:341-359), who refer to three types of nudge: heuristics-triggering nudges, heuristics-blocking nudges and informing nudges. Their classification of nudges is based on psychological mechanisms. Heuristic-triggering nudges trigger fast judgment and decision-making that uses a few cues instead of all information available; heuristics-blocking nudges attempt to counteract the use of heuristics when it is detrimental to use heuristics to make judgments or choices; whilst informing nudges are nudges that provide information (Barton & Grüne-Yanoff, 2015:343; Pietroni & Hughes, 2016:250).

Hagman *et al.* (2015:439-453) adopted a further classification of nudges as either pro-self or pro-social. This classification is based on the identification of the target of the nudging: either a specific type of person or society more generally. Pro-self nudges focus on self-welfare. The basic structure of these nudges is that an individual has to choose between different options with the aim that the individual will choose the option that is most beneficial to his or her well-being in the long run and limit situations where current decisions have a negative impact in future (Hagman *et al.*, 2015:441). Pro-social nudges promote pro-social behaviour. These nudges “... aim to counterbalance rational maximization behaviour in order to avoid overuse or under-provision of public goods” (Hagman *et al.*, 2015:442).

Another classification which is based on cognitive mechanisms of thinking is that provided by Hansen and Jespersen (2013:3-28), who refer to type 1 and type 2 nudges. Type 1 nudges “... are those influencing behaviours that do not involve deliberation, judgment, and choice ...” and type 2 nudges “... are those influencing behaviours best characterized as actions, the results of deliberation, judgment, and choice” (Hansen & Jespersen, 2013:15).

Several authors give a definition of a nudge which recognises that human beings have boundaries, routines and habits that bar them from making rational decisions (Hansen, 2016:155-174; Hausman & Welch, 2010:123-136). Thaler and Sunstein (2009) make a comparison between “humans” and what they term “econs”. The behaviour of econs is based on the notion that is often presented by economists of how people make decisions. Econs are thought to have a great ability to make decisions without error and are assumed to make choices that are in their own best interests. Humans, however, predictably err sometimes when making choices and do not always make choices that are in their best interests (Thaler & Sunstein, 2009:7-8). They argue that nudges can be used to alter humans’ behaviour and thus improve lives by solving societal problems (Thaler & Sunstein, 2009:9).

Nudges have, however, been critiqued for their potential to infringe on people’s freedom of choice. There are concerns that nudges can be paternalistic. Paternalism is defined by Dworkin (1972:65). as “... the interference with a person’s liberty of action justified by reasons referring exclusively to the welfare, good, happiness, needs, interests or values of the person being coerced”. Dworkin (1972:65) further provides comprehensive examples of actions that may be regarded as paternalistic, including laws forbidding people from swimming at a public beach when there are no lifeguards on duty and laws requiring motorcyclists to wear safety helmets when riding their motorcycles.

The use of paternalistic measures, particularly by authorities, has long been criticised for limiting people’s liberty to make their own choices. As noted by Mill (1966:1), “The struggle between Liberty and Authority is the most conspicuous feature in the portions of history with which we are earliest familiar, particularly in that of Greece, Rome, and England.” It has, however, been argued that, depending on the circumstances, some type of paternalism may be appropriate; the type of paternalism that is permitted is termed “libertarian paternalism” (Thaler & Sunstein, 2003:175). However, some scholars have cautioned that the use of actions that force people to make choices (such as providing false information or exploiting the imperfections of human judgment to push people towards a certain choice) cannot be viewed as libertarian paternalism (Hausman & Welch, 2010:130).

As part of their explanation for what libertarian paternalism is, Thaler and Sunstein (2003:175-179) provide an example of a cafeteria in which fruit is placed before the dessert in the food queue. They state that this is a mild intervention that will assist diners to make a healthier choice; however, if the dessert is placed in a different location and diners are thus required to get up and get the dessert, then the decision to eat the dessert rather than the fruit would become an unattractive option as transactional costs would be involved. In the latter scenario, although the dessert's location is hard to find, the fact that the diners' choice between eating the fruit or the dessert is not forbidden means that this approach meets the definition of libertarian paternalism (Thaler & Sunstein, 2003:177).

As per the example provided by Thaler and Sunstein (2003:175-179), for an intervention to be seen as libertarian paternalism, it must not forbid freedom of choice or make it difficult for people to make one choice over another. These kinds of intervention would be regarded as nudges, as, by its definition, a nudge aims to assist with better decision-making whilst not restricting people's freedom of choice (Barton & Grüne-Yanoff, 2015:341).

Another criticism of the use of nudges, particularly where the choice architect¹⁷ operates in a democratic state, is that nudges may go against democratic ideas such as freedom of choice and public consultation or dialogue and that they also contradict the idea that governments are supposed to treat citizens with respect and afford citizens the opportunity to make their own decisions, even where those decisions may be flawed (Hansen & Jespersen, 2013:5; Hausman & Welch, 2010:134). Hausman and Welch (2010:134), however, concede that it is sometimes acceptable for governments to "shape people's choices".

In shaping people's choices, it would be important to think about when a nudge is needed. People may need a nudge when they are faced with difficult or rare decisions and when they have difficulty translating certain aspects of a situation into terms which they can understand (Thaler & Sunstein, 2009:79). Furthermore, "investment goods" and "sinful goods" are good candidates for nudges (Thaler & Sunstein, 2009:74). Examples of investment goods are exercise and flossing of teeth; for these goods, the benefits are delayed, but the costs are borne immediately. Examples of sinful goods are smoking, and consuming alcohol; the

¹⁷ A choice architect is the person or organisation that is responsible for organising the context in which people make choices (Thaler & Sunstein, 2009:3).

pleasure from sinful goods is received immediately, but the consequences are suffered later. Tax compliance can be seen as an investment good, as the cost (payment of taxes) is borne before the benefits (in the form of goods and services) can be received (Thaler & Sunstein, 2009:80).

Table 2.9 indicates the results from studies that have shown a positive influence of nudges on behaviour.

Table 2.9: Examples of success from nudging

Sector	Nature of the nudge	Aim of the nudge	Results	Reference
Organ donation	Default nudge	To increase organ donation rates	Donation rates were about twice as high when opting out of donating than when opting in.	Johnson and Goldstein (2003:1338-1339)
Health	Convenience, attractiveness and norms nudges	To encourage junior-high school students to make healthier choices	Students were 13.4 per cent more likely to take a fruit and 23 per cent more likely to take a vegetable.	Hanks, Just and Wansink (2013:867-869)
Taxation	Social influence nudge	To encourage tax compliance	Social norm message had a positive effect on tax compliance.	Coleman (1996)
Energy conservation	Social influence nudge	To promote household energy conservation	Energy usage was decreased in high-energy-consuming households when descriptive normative information regarding the average home energy usage in their neighbourhood was provided to them.	Schultz, Nolan, Cialdini, Goldstein and Griskevicius (2007:429-434)

Sector	Nature of the nudge	Aim of the nudge	Results	Reference
Transportation	Social influence nudge	To ensure pedestrian safety	Information on peer compliance of pedestrian laws had a strong influence on pedestrian safety behaviour.	Gaker, Zheng and Walker (2010:47-55)

Source: Author's own.

Nudging has been used to influence decisions relating to both sinful goods and investment goods in sectors such as health, taxation, energy conservation and transportation.

Whenever there is a nudge, there is also a choice architect that facilitates the effectiveness of the nudge. The choice architecture is an important part of nudging (Hansen & Jespersen, 2013:7). The choice architect is tasked with the responsibility of organising the setting in which individuals make choices (Thaler & Sunstein, 2009:3). Given the definition of a choice architect as the person or organisation that is responsible for organising the context in which people make choices (Thaler & Sunstein, 2009:3), it would appear that many people and institutions are choice architects (for example: governments, people who design ballot papers, and doctors who offer alternative treatments to their patients) (Hansen & Jespersen, 2013:7).

Thaler and Sunstein (2009:109) provide six principles of a good choice architecture as illustrated in Table 2.10.

Table 2.10: Six principles of good choice architecture

Principle	Explanation
Incentives	Good choice architects can assist by directing people's attention to incentives.
Understand mappings	A good system assists people with improving their ability to map choices and to thus choose the best option for them.
Defaults	People will normally take the option that requires the smallest amount of effort.
Give feedback	Giving feedback is the best way to help people improve their decisions.

Principle	Explanation
Expect error	People make mistakes; a well-designed system should expect users to err.
Structure complex choices	The more numerous the choices and the more complex, the more choice architects have to think about and the more likely choice architects are to influence choices.

Source: Thaler & Sunstein (2009:93-108).

The combination of a good choice architecture with a well-structured nudge does not guarantee that a nudge intervention will be successful. The suggestion that “one-nudge-fits-all” is not correct (Jung & Mellers, 2016:62). Studies conducted in the USA, Australia, Brazil, Canada, China and South Africa, amongst other countries, have found that people view nudges differently (Jung & Mellers, 2016:62-74; Sunstein, Reisch & Rauber, 2017:2-31). A study by Jung and Mellers (2016:71-72) conducted to examine American attitudes towards nudges found that most people viewed nudges favourably. People preferred type 2 nudges to type 1 nudges, as type 2 nudges were seen as more effective when making decisions and more appropriate when aiming to change people’s behaviour. Another study, conducted in eight countries (Australia, Brazil, Canada, China, Japan, Russia, South Africa and South Korea) by Sunstein *et al.* (2017), also found that most people viewed nudges favourably. In their study, a survey was sent to approximately one thousand citizens of each country. Participants were required to state whether they approved or disapproved of certain nudges. The nudges selected were related to health, to energy conservation, to organ donation, to road safety, to environmental conservation and to donations to charity.

In their study, Sunstein *et al.* (2017:17) further differentiated between categories of nations, based on the citizens’ views on nudges.

Category 1 nations (termed “principled pro-nudge nations”)¹⁸ are those in which the majority of citizens were inclined to view nudges favourably so long as the nudges were seen as legitimate and were consistent with the values of the majority of citizens in that nation. In relation to this, Brazil, Russia and South Africa showed similar patterns as pro-nudge

¹⁸ Examples of these nations are Australia, Canada, France, Germany, Italy, the United Kingdom (UK) and the USA (Sunstein *et al.*, 2017:17). France, Germany, Italy, the UK and the USA were part of earlier studies. The results of those earlier studies were integrated with those of Sunstein *et al.*’s study (2017:2-31).

western nations. Category 2 nations (termed “cautiously pro-nudge nations”)¹⁹ are those whose citizens displayed a lower enthusiasm for nudges. Category 3 nations (termed “overwhelmingly pro-nudge nations”)²⁰ are those that showed a high rate of approval of nudges.

Hagman *et al.* (2015:439-453) also examined public opinions on the use of nudges, but their study was conducted amongst citizens of Sweden and the USA. The study focused on pro-self nudges and pro-social nudges. It was found that most of the participants in the study had a positive attitude towards the nudges presented in the study. The participants in this study were also asked for their views on whether the nudges that they were presented with were intrusive on freedom of choice. Pro-social nudges were viewed as more intrusive on freedom of choice than pro-self nudges (Hagman *et al.*, 2015:448). In Sweden, the tax nudge in the study was viewed as less intrusive than the other nudges that were presented (Hagman *et al.*, 2015:446).

Jung and Mellers (2016:62-74) suggest that people’s attitudes towards nudges are affected by their disposition as illustrated in Figure 2.7. Individualists tend to have a negative attitude towards nudges in that they view nudges as unnecessary. Conservatives tend to perceive nudges as a threat to autonomy, and they thus also tend to have a negative attitude towards both System 1 and System 2 nudges. Reactants are similar to conservatives in that they also tend to have the view that nudges are a threat to autonomy; however, reactants tend to only oppose System 1 nudges. Additionally, those with a desire for control tend to see nudges as paternalistic, whilst empathetic people are the opposite: they view nudges positively and support both types of nudge (Jung & Mellers, 2016:69-70).

¹⁹ Examples of these nations are Denmark and Hungary. In the study, Japan was also found to fall within this category (Sunstein *et al.*, 2017:17). Denmark and Hungary were part of earlier studies. The results of those earlier studies were integrated with those of Sunstein *et al.*’s study (2017:2-31).

²⁰ Examples of these nations are China and South Korea (Sunstein *et al.*, 2017:18).

Figure 2.7: Summary of individual dispositions towards, perceptions of and support for nudges



Source: Jung & Mellers (2016:70).²¹

As has been indicated previously, behavioural economics recognises that humans have limitations when they are required to make decisions and that there may be a need to assist them with decision-making (Bhargava & Loewenstein, 2015:396; Thaler & Sunstein, 2009:7). Based on the past studies reflected in Table 2.9, it can be argued that nudge theory can be successfully applied to assist in this decision-making process by encouraging or discouraging certain behaviours; and since its application is not limited to specific sectors or disciplines, there is an opportunity to explore the use of nudging as a mechanism to positively influence voluntary tax compliance. The following section discusses how nudges have been used in the field of taxation to influence tax compliance.

²¹ In the study, participants were asked to indicate their preference between two types of nudge (System 1 nudges and System 2 nudges).

2.5 THE USE OF NUDGE THEORY IN TAXATION

Research has consistently shown that tax compliance is affected by norms regarding trust, belief in the legitimacy of the government, procedural justice, reciprocity, altruism and identification with a group (Kornhauser, 2007:138). It has also established that people's beliefs can be affected by providing them with information regarding these norms (Castro & Scartascini, 2015:66). The use of messages to encourage taxpayers to comply with their share of taxes, whether delivered through letters, television or other media, can be seen as nudging taxpayers in what is considered the right direction of complying with their tax obligations.

There has been a steady increase in the number of studies that have involved sending taxpayers messages that may have a positive influence on tax compliance (Ortega & Scartascini, 2015:2). Section 2.5.1 discusses studies that have used messaging as a means of influencing tax compliance behaviour in developed countries, and Section 2.5.2 discusses studies that have used messaging as a means of influencing tax compliance behaviour in developing countries.

2.5.1 Studies on tax nudges in developed countries

Studies that have relied on using nudging as a mode to influence taxpayer tax compliance behaviour have produced mixed and somewhat inconclusive results, with some studies reporting a positive influence, whilst others report no effect.

A study conducted by Schwartz and Orleans (1967:274-300) sought to determine the effect of deterrence threats compared with moral appeals on tax compliance behaviour. The authors conducted an experiment in the USA. The experiment consisted of three treatment groups and a control group. The study was conducted in two parts. In the first phase, participants were interviewed and were asked sanction-based interview questions for those in the sanction treatment group, moral reason interview questions for those in the normative group, questions not related to sanctions or morals for the placebo group, and the control group was untreated. In the second phase, participants' actual tax returns were checked.

The results of the study indicate that normative or conscience appeals are more effective in increasing tax compliance than sanctions or punishments, and the authors even noted that the threat of punishment appeared to have a negative impact on tax compliance. This study

is the first known study in which a randomised experiment was conducted to test two theories of tax compliance behaviour (McGraw & Scholz, 1991:472).

Schwartz and Orleans' (1967:274-300) study was replicated by McGraw and Scholz (1991:471-498), who observed different results. The study examined the effect of appeals to civil duty versus self-interest on tax compliance. This study was also conducted in the USA with 154 participants. There were two experimental groups and a control group, and the study was carried out in phases. In the first phase, participants viewed a 30-minute videotape with one video which emphasised normative duties of citizenship and the social consequences of the change in the 1986 Tax Reform Act and a second video which emphasised the personal consequences of the 1986 Tax Reform Act and strategies to reduce tax liability.

In the other phases of the study, data about beliefs, attitudes and self-reported compliance behaviour were gathered from three interviews: the first immediately following exposure to the video, the second about two weeks later and the third six months later, after the filing of the 1987 tax year return. The study found no evidence that normative and self-interest treatments had any impact on taxpaying behaviour either as reported by the taxpayers or as evident in the officially documented records on the taxpayers. The extensive time lag (three months) between when the participants viewed the treatment videos and when the actual compliance decision was made could perhaps be the reason for the results observed in this study. The study also reports that social variables have an impact on how taxpayers view taxes and on how taxpayers respond to motivational appeals (Schwartz & Orleans, 1967:274-300).

Roberts (1994:67-86) examined the effect on attitudes towards the fairness of income tax and tax compliance of communicating public service information in the USA. He conducted an experiment in which six public service announcements were shown to participants. The first three videos (termed "the cognitive approach videos") communicated (1) vertical equity, (2) the lowering of tax marginal rates and the reduction in tax shelter activities and (3) the use of tax revenue to fund public goods, such as highways and schools, and information that "most Americans do pay their fair share". The third message also addressed tax evasion. The last three videos (termed "effective approach videos") communicated (1) the increase in the tax burden of high-income earners, (2) the widening of the tax base, the

lowering of tax rates and the reduction of taxes for the majority of taxpayers and (3) the use of tax revenue to fund public goods, such as highways and schools, and information that “most taxpayers do pay their fair share”. The third message also addressed tax evasion.

The effectiveness of the treatments in Roberts’s study (1994:67-86) was measured with a questionnaire which the participants completed after being exposed to the treatments. Whilst the results of the study suggest that communicating public service information to taxpayers was effective in improving their attitudes towards fairness and tax compliance, this study did not investigate the impact on actual tax compliance behaviour. However, other studies, such as Coleman’s (1996), do examine the effect of communicating moral appeal and deterrence messages on actual tax compliance.

In the study conducted by Coleman (1996), communicating a social norm message was found to have a modest effect on tax compliance behaviour and sending prior notice to taxpayers before auditing their tax returns (audit threat) increased tax compliance, particularly amongst the low- and medium-income earners. The study by Coleman (1996) is a field experiment which was conducted with a large sample size of 47 000 participants in the USA. In the study, 20 000 taxpayers received a letter from their local tax commissioner which contained a message about the tax compliance behaviour of others. The study measured the payment of taxes, filing errors and whether tax returns were submitted on time. To measure whether the intervention or nudge was successful, the changes in the reported income and taxes paid by the participants for the 1993 tax year were compared with those of the 1994 tax year.

Blumenthal *et al.* (2001:125-138) also investigated the effect of normative appeals on tax compliance. Like the Coleman study (1996), the Blumenthal *et al.* study consisted of a large sample of participants and measured actual tax compliance behaviour. In this field experimental study, 20 000 participants received a social norm message and another 20 000 received a message to support valuable public services. The effect of the experimental treatments on treated groups versus the control group was measured by comparing the year-to-year changes in income reported and taxes paid by the participants. The results of this study indicate that normative appeals have no significant effect on tax compliance. There was no evidence that nudging taxpayers with mail-based letters had an effect on tax compliance. However, the authors note that the nudge messages were

successful for some taxpayers, based on demographics and tax characteristics. They found that upper-middle-income taxpayers were more influenced by the nudge messages than taxpayers in other income brackets and that there was a negative association between the effect of the nudge messages on those who were self-employed or received passive income and tax compliance.

As with the McGraw and Scholz study (1991:471-498), there was a time lapse between when the letters were sent out to the taxpayers and when the taxpayers had to file their returns in the Blumenthal *et al.* study (2001:125-138), and this could have had an influence on the observed results.

As discussed in Section 2.3.3, there are different types of social norm. Wenzel (2001) examined the effects of communicating misconceptions about injunctive and descriptive norms on tax compliance. In his study, a random sample of 1999 Australian taxpayers was sent a survey about their views on and behaviour with regard to tax compliance. The selected taxpayers were also surveyed about their opinions on the behaviour of others. Weeks later, two of the groups were given feedback (by letter) about the discrepancies between their views and the actual tax compliance behaviour of those about whom they had provided opinions. A third group did not receive feedback, and a fourth group did not receive either the survey or any feedback related to it. The first group's participants received feedback on their misconceptions about injunctive norms (the difference between the average normative views and the perceived norms of the average person). The second group of taxpayers received feedback on their misconceptions about descriptive norms (the discrepancy between average taxpayer behaviour and the perceived taxpaying behaviour of the average person). The effectiveness of this nudge was then measured by comparing the tax deduction claimed by the different groups of taxpayers in their actual tax returns.

The results of Wenzel's study (2001) show that the nudge did not have an effect on the deduction of work-related expenses; however, the nudge did have an effect on the deduction of other types of expense. The feedback on the descriptive norm did not significantly reduce the amount of deductions; only the injunctive norm feedback seemed to effectively reduce claims of other deductions. Wenzel (2001) attributes the observed results to the fact that injunctive norms may be more effective than descriptive norms. He also points out that Cialdini, Kallgren and Reno's study (1991:201-234) presents a similar view (Wenzel, 2001).

Furthermore, Wenzel's study (2001) highlights that a long time lag between an intervention and the filing of a tax return is likely to have an effect on whether the nudge is effective. Nudging people at different times has an effect on how they respond to the nudge, and this is often overlooked when designing policies (Behavioural Insights Team, 2014:37). A study by Gillitzer and Sinning (2018) examined the effect of the timing of payment reminders on tax compliance behaviour. Their study focused on the use of reminders as a nudge to increase voluntary tax compliance amongst Australian businesses. The authors particularly focus on how altering the timing of reminder letters (nudges) affects tax compliance behaviour, which they measure as the payment of a tax liability. Their experiment was conducted over a seven-week period. Australian businesses were selected to receive a payment reminder letter one week, two weeks or three weeks after they had missed their payment deadline. The control group was not sent reminder letters. The results of the study show that the businesses that received a reminder letter had a higher probability of paying their debt than the control group. Thus, the nudge had a positive effect on tax compliance behaviour; however, there was no difference in the probability of payment for the businesses exposed to the nudge treatment, irrespective of when the reminder letter was sent, but the reminder letters resulted in faster payment of debt. Therefore, varying the timing of the reminders did not have an effect on tax compliance behaviour.

Other variables that might have an impact on tax compliance have also been tested in tax nudging studies. For example, Torgler (2004:235-253) found that culture has a statistically significant effect on tax compliance: Swiss citizens were found to be less compliant than foreigners. The study was conducted in Switzerland to determine the effects of normative appeals on tax compliance behaviour and involved 580 randomly selected taxpayers. One group was sent a letter before its participants could file their tax returns, and the other group, which served as the control group, was not sent a letter.

In the treatment letter, participants received one of two normative appeal messages. The first, appealing to the taxpayers' moral suasion with reference to their community, stated, "If the taxpayers did not contribute their share, our commune with its 6226 inhabitants would suffer greatly. With your taxes you help keep Trimbach attractive for its inhabitants." (Torgler, 2004:240).

The second normative appeal message, which emphasised reciprocity, stated:

“In Switzerland, contrary to other countries, the citizens have the opportunity to actively participate in the legislative procedure. This advantage is also reflected in the tax legislation, which stipulates self-declaration by the taxpayers. This Swiss system presupposes that citizens have a sense of responsibility and are ready to maintain the functioning of municipalities, cantons, and the state. With your conscientious tax declaration you contribute to preserving this democratic and liberal structure.” (Torgler, 2004:241)

To measure the effect of the above experimental treatments, the tax returns of those individuals who received the treatment letters were compared with those of the control group. Torgler (2004:235-253) looked at the timely payment and filing of tax returns. The results indicate that normative appeals had no significant effect on tax compliance. It should be noted, however, that the treatment letters contained two different appeals, which were communicated in a few sentences. This could perhaps be the reason for the observed results, as taxpayers may not be motivated to read lengthy letters. Torgler (2004:235-253) also points out that his study did not analyse the long-term effects of normative appeals on tax compliance.

Hasseldine *et al.* (2007:171-194) investigated the effect of persuasive communication on tax compliance. A field experiment was conducted with taxpayers. The taxpayers sampled in the study were sole traders with a turnover below a threshold of £15 000. These taxpayers qualified for a simplified tax reporting system. There were five experimental treatments: (1) an offer to assist the taxpayer ("enabling"), (2) a citizenship appeal, (3) a threat of audit, (4) a threat of audit with the possibility of penalties and (5) a guarantee that the return would be audited. Letters were sent to 7307 randomly selected taxpayers by the revenue authority. There was also a separation of taxpayers with self-prepared returns in the experiment and those with paid-preparer returns. The hypotheses posed in the study were (Hasseldine *et al.*, 2007:175, 176):

- “Written communications from a national tax agency will positively affect the sales and net profit reporting behaviour of small business proprietors.”
- “Written communications from a national tax agency will affect the extent of increased levels of reported sales and net profit for both self-prepared and paid-preparer returns.”

The effectiveness of each nudge was measured by observing its effect on sales and net profits. The results of the study suggest that the enabling letter was not effective for increasing turnover in excess of the threshold for self-prepared returns. Sanctions letters, however, were more effective for changes in net profit for self-prepared returns than the normative/citizenship letter but were not effective for paid-preparer returns. Sanctions letters were also more effective for reported turnover than the normative/citizenship letter. Both the sanctions letters and the citizenship letter had a significant impact on reported net profit. In their conclusions to the study, Hasseldine *et al.* (2007:171-194) also recommended further research to consider the longevity of the effect of these nudges on compliance.

Ariel (2012:27-69) examined the effects of a deterrence message and a persuasive message on tax compliance. His study focused on corporate taxpayers rather than on individuals. The research was conducted in Israel, with 4395 companies participating in the field experiment. The experiment consisted of two experimental groups and a control group. One experimental group received a deterrence message letter, whilst the other experimental group received a persuasive message letter. The control group did not receive a letter. The persuasive message in the experiment included a message about how tax revenues were allocated to public goods. The experiment tested two theories: the first hypothesis was that the deterrence message letter should increase tax compliance, and the second hypothesis was that the persuasive message letter should also increase tax compliance. Ariel (2012:39) also hypothesised, based on defiance theory²² and “toothlessness” theory,²³ that the deterrence message could backfire and have a negative effect on tax compliance and that the persuasive message could also backfire and decrease tax compliance rather than increase it.

A difference-in-differences approach²⁴ was used as a measurement of the effectiveness of the nudge. The variables used in the measurement were gross sales declared, actual tax payments made to the tax authorities, and tax deductions.

²² Defiance theory is a theory on sanction effects. According to the theory, defiance occurs under four conditions: (1) the sanction must be perceived as unfair; (2) there must be a poor bond between the offender and the sanctioning agent; (3) the sanction must be perceived as stigmatising; and (4) the offender must deny the shame the sanction has actually caused (Sherman, 1993:460).

²³ Based on this theory, the tax authority might be viewed as toothless and having to persuade taxpayers to be compliant (Ariel, 2012:39).

²⁴ This means: “Positive outcomes were generally defined as either an increase in income tax-dollar payments in the subsequent tax report or timely filing of a tax schedule, compared with a previous tax report, vis-à-vis a nonintervention control group” (Ariel, 2012:33).

The results observed were that neither the deterrence letters nor the persuasion letters had an effect on gross sales and services. For deductions, the persuasion letter backfired: participants' deductions increased instead of decreasing (Ariel, 2012:27-69).

Moral suasions and social norms were also found to have no effect on compliance in a study conducted by Fellner, Sausgruber and Traxler (2013:634-660). The study was conducted in Austria with 50 498 individuals who were required to register and pay for a television or radio licence. The individuals selected for the study were identified as potential evaders by the enforcement authority. The field experiment consisted of six treatment groups: (1) a threat message treatment group, (2) a moral appeal message treatment group, (3) a social norm message treatment group, (4) a threat and social norm message treatment group, (5) a threat and moral appeal message treatment group and (6) a baseline group. There was also a control group. The messages were sent to the individuals by the enforcement authority by mail. The effectiveness of the nudge was measured by determining whether there had been an increase in the number of registered licence payers.

Fellner *et al.*'s study (2013:634-660) found that there were more registrations from the groups that received a treatment than there were from the control group. The moral appeal and the social norm message treatments had no effect on tax compliance. It is also noted in the findings that the social norm message treatment had a different effect when individuals believed that evasion was common and when they believed that tax evasion was rare. When individuals believed that evasion was common, the treatment had a slightly positive effect on compliance, and when they believed that evasion was rare, the treatment had a slightly negative effect on compliance. The threat message treatment had a significant effect on tax compliance.

The Fellner *et al.* (2013:634-660) study is one of a few studies that did consider the longevity of the experimental treatments on compliance. Six months after the experiment was conducted, the authors noted that only 2.36 per cent of the individuals who had registered had deregistered. A large proportion of those who deregistered were those who had received the threat message.

Hallsworth, List, Metcalfe and Vlaev (2017:14-31) conducted two field experiments in the United Kingdom (UK) to examine the effects of social norm and reciprocity messages on tax compliance behaviour. In the first experiment, the focus was on the payment of taxes rather

than on the declaration of taxes. Letters were sent to 101 471 selected taxpayers who had not made their required tax payment by the 31 July 2011 deadline. The selected taxpayers were allocated either to one of five treatment groups or to the control group. In the first treatment group, the treatment letter contained a descriptive norm informing taxpayers that, “Nine out of ten people pay their tax on time.” In the second treatment group, the descriptive norm contained in the letter was more specific to a reference group, informing the taxpayers that, “Nine out of ten people in the UK pay their tax on time.” In the third treatment group, the authors tested the effects of framing by informing the taxpayers that, “Nine out of ten people in the UK pay their tax on time. You are currently in the very small minority of people who have not paid us yet.” The other two treatment groups received a reciprocity message. The first of the two reciprocity messages was framed as a gain: “Paying tax means we all gain from vital public services like the NHS, roads, and schools”; whilst the second message was framed as a loss: “Not paying tax means we all lose out on vital public services like the NHS, roads, and schools.” The experiment also involved a control group that received a standard letter from the tax authorities.

The results of Hallsworth *et al.*'s (2017:14-31) first experiment show that the norm messages had a significant effect on tax compliance, particularly when the taxpayers were told that they were in the minority of taxpayers that did not comply. The results of the study further indicate that the gain- and loss-framed reciprocity messages also had a positive effect on tax compliance and that the loss-framed message did not positively influence compliance any more than the gain-framed message.

A year later, Hallsworth *et al.* (2017:14-31) carried out a second experiment similar to the first one. This experiment focused on examining the reliability of the previously observed results relating to the minority-framed norm and looked at which form of norm-framing worked best to increase tax compliance. The sample in this second experiment included 119 527 taxpayers, who were randomly allocated either to one of thirteen experimental groups or to a control group. The first six treatment groups received different types of social norm message; the next five treatment groups received injunctive social norm messages; and the last two treatment groups received financial information messages, as the experiment also aimed to determine whether providing a taxpayer with basic financial information would increase tax compliance.

The descriptive social norm messages received by the first six treatment groups were characterised by varied psychological distance. The first message (received by the first group) focused on the country's norm; the second message (received by the second group) focused on the norm in the participants' local community; the third message (received by the third group) communicated the tax compliance behaviour of people with a debt similar to the individuals in the treatment group; a combination of the second and third message was received by the fourth group; and the fifth message (received by the fifth group) and last message (received by the sixth group) were replicas of the minority social norm message tested in the first experiment (Hallsworth *et al.*, 2017:21).

Hallsworth *et al.*'s findings (2017:14-31) relating to the descriptive norm indicate that the general country descriptive norm and the local community descriptive norm both increased tax compliance. The debt descriptive norm also had a positive effect on tax compliance and the remaining two messages also had a significant effect on tax compliance.

The five injunctive social norm messages were framed as follows (Hallsworth *et al.*, 2017:22, 23):

- “Everyone in the UK should pay their tax on time.” [Moral duty norm]
- “The great majority of people agree that everyone in the UK should pay their tax on time.” [General injunctive norm]
- “88% of people agree that everyone in the UK should pay their tax on time.” [Percentage injunctive norm]
- “Nine out of ten people agree that everyone in the UK should pay their tax on time.” [Fraction injunctive norm]
- “Nine out of ten people agree that everyone in the UK should pay their tax on time. And nine out of ten people do pay on time.” [Injunctive and descriptive norm]

The findings relating to injunctive social norms show that the moral duty norm message had an effect on tax compliance; the general injunctive norm message had no effect on tax compliance; the percentage injunctive norm message had a significantly larger effect on tax compliance than the fraction injunctive norm message; and the injunctive and descriptive norm message also had an effect on tax compliance. Overall, Hallsworth *et al.* (2017:14-31) found that descriptive norms were more effective at increasing tax compliance than injunctive norms.

The effects of other variables (age, gender and size of the debt) were also tested in the above study (Hallsworth *et al.*, 2017:14-31). The results show no significant difference in how the participants responded to the treatment letters based on these variables, apart from the fact that males responded more positively to the loss-framed message than females.

Alm, Bloomquist and McKee (2017:587-613) examined the effect on tax compliance behaviour of taxpayers' being provided with certain information. A laboratory experiment was conducted in the USA with 212 participants. The experiment consisted of a number of rounds each representing a tax period. Participants were allocated either to one of three treatment groups or to the control group: the control group received no information; in the first treatment group, participants were informed about the percentage of members in their assigned group who had filed tax returns in each experiment round; in the second treatment group, participants were informed about the audit results of other members in their assigned group in each experiment round; and in the last treatment group, participants were provided with the information provided to both the first and second treatment groups. To measure compliance, the authors observed the participants' filing rate and their reporting rate.

The results of the study indicate that, when compared with the control group, the treatment involving informing individuals about their neighbours' or peers' filing behaviour lowered both the filing and the reporting rate. The treatment involving informing individuals about their neighbours' or peers' audit results increased both the filing and the reporting rate. The combination of both types of information also resulted in lower filing and reporting rates than in the control group but resulted in higher rates than those of the first treatment group. Alm *et al.* (2017:587-613) attribute these observed results to the fact that individuals might be more concerned about the behaviour of the enforcement agency than the behaviour of their neighbours or peers. The study also found that the filing and reporting rates of males were lower than those of females and that the filing and reporting rates were also negatively correlated with wealth.

Bott, Cappelen, Sorensen and Tungodden (2017) conducted a randomised field experiment in Norway to test the effect that nudging had on self-reported foreign income. Treatment letters were sent to 15 708 taxpayers who were assigned either to one of the treatment groups or to the control group. The taxpayers in the control group did not receive a letter, whilst those in the other four groups, respectively, received one of the following: a letter that

contained information on how to report foreign income (base letter), a letter that informed the taxpayers about the tax compliance behaviour of others (social norm), a letter that communicated some of the public uses of tax revenues (reciprocity) or a letter that informed the taxpayers that the tax authority had knowledge about their foreign income (deterrence).

The results of Bott *et al.*'s study (2017) show that receiving a letter containing a persuasive message had a significant effect on tax compliance. The letters appeared to have motivated those taxpayers who were already reporting some income to reduce their misreporting. The results also show that, amongst the participants, females and older taxpayers were more likely to be tax compliant than male and younger taxpayers and that those with a higher income also tended to report a higher foreign income.

The study (Bott *et al.*, 2017) also tested the long-term effects of the treatment letters by examining self-reporting behaviour a year after participants had been exposed to the treatment letters. Self-reported foreign income was found to be higher in the deterrence treatment group than in the other treatment groups, but this was not significant. Bott *et al.* (2017) state that the reason for this observed result may be that the moral suasion letters may have made moral arguments salient, but the moral suasion letters did not make a fundamental change in the taxpayers' individual preferences and therefore did not change their behaviour.

As a result of this review of the literature relating to the use of nudges to influence tax compliance behaviour in developed countries, conclusions can be drawn that the outcomes from the research are not entirely conclusive one way or the other in terms of answering the question of whether nudges have a positive or other effect on voluntary tax compliance. This is despite the increased interest in the effect of nudging on tax compliance and particularly in the effect of social norm nudges.

Now that an overview of the literature as it relates to developed countries has been provided, a review of similar research that has been conducted in developing countries is given.

2.5.2 Studies on tax nudges in developing countries

As evidenced by the studies mentioned above, in Section 2.5.1, the main method of delivery of social norm nudges has been the use of letters, and the studies have largely been conducted in developed countries, with little attention paid to developing countries. Ortega and Scartascini's (2015) is one of the few studies conducted in a developing country.

Ortega and Scartascini (2015) conducted a field experiment in Colombia to determine the effects of different message delivery mechanisms on tax compliance. The field experiment consisted of three experimental groups and a control group. Nearly 21 000 taxpayers who had declared but not yet paid their taxes were sent messages from the tax authority, using three different delivery modes. The first group of taxpayers received the message in a physical letter; the second group received the message via an email; and the third group had the message delivered to them by a tax inspector. The message delivered in all three treatment groups was the same: it contained deterrence information and a moral suasion message. The results of the experiment show that the treatments had a positive effect on the tax compliance behaviour of taxpayers. Of the individuals who received a message from the tax authority, 20 per cent paid part of their debt and 11 per cent paid in full. Amongst those individuals who did not receive a message (the control group), only 5 per cent paid part of their debt and 2 per cent paid in full. The conclusion was that the nudge was effective in increasing tax compliance.

With regard to the mode of delivery in Ortega and Scartascini's study (2015), personal visits by the inspectors and emails were found to be more effective than a physical letter. Taxpayers to whom the physical letter was sent were found to be 4 percentage points more likely than the control group to pay their debts. Taxpayers to whom an email was sent were found to be 15 percentage points more likely than the control group to make a payment. Taxpayers who received a personal visit from an inspector were found to be 13 percentage points more likely than the control group to make a payment.

Alm, Cifuentes, Niño and Rocha (2019:43) also conducted a study in Colombia to examine the impact of nudge messages on compliance with "social protection contributions". In their study, deterrence messages, a reciprocity message and a social norm message were communicated to salaried and self-employed individuals. The impact of the messages on compliance was measured based on difference-in-differences calculations.

The results related to individuals who were exposed to a deterrence, reciprocity or social norm message, when compared with those who were exposed to a “neutral” message, are mixed. However, a comparison between those exposed to a nudge message and a control group who were not exposed to a message at all indicated that self-employed individuals were more compliant than salaried individuals.

Another study that focused on a developing country is that of Kettle, Hernandez, Ruda and Sanderson (2016). Their study was conducted in Guatemala, and the sample consisted of both individuals and businesses. This is the first known study that has applied the same nudge treatment to individuals and businesses. The experiment was a field experiment that involved over 43 000 taxpayers. Taxpayers were randomly assigned either to one of five treatment groups or to the control group. Physical letters were sent to the taxpayers, with one treatment group receiving a reminder to declare their taxes and the other four treatment groups receiving deterrence treatment, social norm treatment, deliberate choice treatment²⁵ and national pride treatment letters, respectively.

The results of the above treatments show that when compared with the control group, all letters increased declaration compliance. The social norm and deliberate choice letters increased the rate of payment. These letters increased the average amount paid per taxpayer by 210 per cent and 269 per cent respectively, when compared with the control group. Kettle *et al.* (2016) also tested the long-term effects of these treatment nudges and found that the results remained significant after 12 months.

Torgler (2003a:27-56) also briefly considered the long-term effects of nudges. In his study, an experiment was conducted with a small sample of participants: 37 taxpayers from a small village in Costa Rica. The aim of the study was to determine the impact of fiscal exchange, moral persuasion and positive rewards on tax compliance. The experiment consisted of three experimental groups and a control group. In the experiment, participants were assigned an amount of money and were required to pay back one third of the money received; however, they could choose whether to pay this money back or not. The experimental design included the possibility of being audited and the resultant payment of a

²⁵ In a deliberate choice treatment, the taxpayer is informed that his or her previous failure to declare his or her taxes has been noted and taken as an oversight. The taxpayer is also informed that, should he or she again fail to declare, this will be viewed as an active choice.

fine if participants were found to be non-compliant. In one of the experimental groups, participants received a moral suasion message, whilst the other two experimental groups were characterised respectively by a fiscal exchange treatment and a positive reward treatment. The moral suasion message stated: “Although we will not be able to find out who among you might have been dishonest we want to point out that we greatly appreciate your behaving honestly and paying back the whole amount we have asked you for.” (Torgler, 2003a:55) The compliance rates of the moral suasion group were found to be lower than those of the positive reward treatment group but higher than those of the fiscal exchange treatment group.

To measure the effectiveness of the treatments, the compliance of participants in the experiment groups was compared with that of the control group. The results of the study indicate higher compliance rates for participants who received a treatment message than for those in the control group; however, Torgler (2003a:43) states that the moral suasion treatment in the study did not provide clarity on whether moral appeals could have a positive effect on tax compliance over time.

The effect of other variables was also tested in Torgler’s study (2003a:27-56). It was found that females were more compliant than males, but the difference was not significant. Additionally, low-income earners were found to be more compliant than high-income earners.

Castro and Scartascini (2015:65-82) conducted a field experiment in Argentina which explored whether providing information to taxpayers influenced their tax compliance decision. The field experiment was conducted to examine whether including reciprocity, peer compliance and enforcement messages in the tax bill would affect tax compliance. Their study focused on the effect of social norm, deterrence and reciprocity messages sent together with taxpayers’ tax bills for property taxes. Thus, the study focused on the payment of taxes rather than the reporting (or non-reporting) of tax liabilities. One letter contained a reciprocity message, another contained a peer-effect message, and the last one contained a deterrence message. The experiment also consisted of a control group.

No average effects were found on the taxpayers who received the peer-effect message. Results relating to the deterrence treatment indicate that those who received the deterrence message had a higher probability of complying than those in the control group.

The reciprocity message also had some effect on tax compliance: it seemed to have a positive effect on taxpayers who received a lower quality of public services and a negative effect on those who received a better quality of services (Castro & Scartascini, 2015:65-82).

Although the study by Castro and Scartascini (2015:65-82) makes an important contribution, the results observed could also have been underestimated for the reason that even though all taxpayers in the study received the messages, not all of them would have read the message. Furthermore, the month-long time lag between the communication of the messages and the compliance decision is an issue that might have contributed to the results observed in the study. The study also found that less wealthy taxpayers responded more positively to the nudge messages than more wealthy taxpayers.



Ortega and Sanguinetti (2013) also conducted a field experiment to examine the effects of messaging on tax compliance behaviour. As with Ariel's study (2012:27-69) mentioned in Section 2.5.1, Ortega and Sanguinetti's study (2013) focused on corporate taxpayers rather than on individuals. The study was conducted in Venezuela. Companies were allocated either to a treatment group or to the control group. The experiment consisted of five experimental groups: (1) a group that received a treatment letter that informed taxpayers about the changes in the tax administration office, (2) a group that received a letter that communicated the importance of complying with tax obligations, (3) a group that received a letter that communicated policies aimed at improving service delivery, (4) a group that received a letter that communicated initiatives that focused specifically on social assistance for the poor and elderly and on improvements made to public health and (5) a group that received a placebo letter that communicated the administration office's new address. The results indicate that both deterrence letters and moral suasion letters had a positive effect on tax compliance.

Del Carpio (2013) also found evidence to support previous findings that social norm nudges have an effect on tax compliance and that enforcement treatments have no significant effect. In her study, a field experiment was conducted in two municipalities in Peru with 22 318 individuals. Participants were sent letters. The experiment consisted of seven treatment groups and a control group. The treatment groups included: three social norms treatment groups, a probability of enforcement treatment group, two social norms and enforcement treatment groups and a group that received the standard reminder letter.

The findings show that all letters had an impact on tax compliance and that the social norm treatment letter appeared to have increased tax compliance more than the enforcement letter.

Although research evidence of the effect of nudging on tax compliance in developing countries has begun to emerge, a large part of that research has been conducted in Latin America, with limited research being conducted in Africa. One known study on the impact of nudging on tax compliance behaviour that was conducted in Africa is that of Mascagni, Nell and Monkam (2017). Theirs is an important study as it is the first known study that tested the effects of nudging in an African country. The field experiment was conducted in Rwanda with the help of the Rwanda Revenue Authority. The study investigated the best delivery method to utilise for messages designed to improve tax compliance. The participants were businesses and individuals who received deterrence, reciprocity and reminder messages. The messages were delivered using three different methods: letter, email and SMS. The content of the messages is shown in Figure 2.8.

Figure 2.8: Content of treatment messages used by Mascagni et al. (2017)

Treatment (1)	Subject line (2)	Message (3)	Image (4)
Reminder	Tax filing period open until 31 st March 2016	<i>RRA would like to inform you that you can file your tax return until 31st March 2016. For more information about the filing process and payment methods, contact the call centre (3004) or visit the RRA website (www.rra.gov.rw).</i>	No image
Deterrence	Pay your taxes on time and avoid fines and penalties	Reminder as above, plus: <i>Do you know that if you do not declare and pay your taxes on time, RRA can fine and possibly prosecute you? Pay your taxes on time and avoid fines and penalties.</i>	
Fiscal exchange	Pay taxes. Build Rwanda. Be proud.	Reminder as above, plus: <i>By paying your taxes you make it possible to educate our children, fund our healthcare, and keep us safe. Pay taxes. Build Rwanda. Be proud.</i>	<p>Spending of tax of RWF 100 Uko Leta ikoroha amafaranga 100 y'amashuri</p> 
Control group	No message	No message	No message

Source: Mascagni et al. (2017:14).

Participants in the study (Mascagni et al., 2017) were allocated, based on stratified randomisation, either to one of nine treatment groups or to the control group. The results indicate that all treatments had an effect on tax compliance. Reciprocity messages were

found to more effective than deterrence messages. Additionally, low-cost delivery methods (email and SMS) were found to be more highly effective than letters.

Another study conducted on a developing country outside of Latin America is that of Koumpias and Martinez-Vazquez (2019:33-43), which was conducted in Pakistan. Their study found that tax nudges do improve tax compliance. Whilst the use of both moral appeal television advertisements and neutral information newspaper advertisements as nudges to increase tax compliance did have an effect on tax compliance, the moral appeal television advertisements only had an effect on a particular audience and not on all participants in the study. In light of this, the authors highlight the importance of the content of a nudge message.

In summary, the results of studies conducted in developing countries indicate a positive association between nudging and tax compliance in the context of these developing countries. However, there are a number of conclusions that can be drawn from the literature reviewed in both Section 2.5.1 and in this section. In the first place, despite the increased research being done in this area, most of this research has been conducted in developed countries and has focused on social norms. This has led to very limited empirical evidence being available on the effects of nudging on tax compliance in developing countries. Given the apparent differences between developed and developing countries, the results of the studies conducted in developed countries may not be generalisable to all taxpayers, particularly to those in African developing countries. In the second place, mostly physical letters have been used in such studies as the mode of delivering the nudge. Thus, other forms of messaging have been relatively neglected in the literature.

Research has also focused predominantly on social norm nudges and deterrence nudges, with limited attention given to reciprocity nudges (which are sometimes included in experiments testing moral appeal nudges). As noted by Mascagni (2018:289), the use of reciprocity could be a viable strategy to influence tax compliance behaviour in low-income countries where the quality and quantity of public goods or services provided is often lower than those of more developed countries.

Finally, the effect of the time between exposure to a nudge and when the tax compliance decisions are made has not been adequately addressed in much of the literature. Although Kettle *et al.* (2016) tested the long-term effects of the nudges in their study, it is difficult to

determine whether the effects observed in the field experiment were due to the time that had passed or to other external factors not captured in the experiment.

These conclusions – the overall inconclusive nature of the research, combined with the relative lack of research that has taken place (1) in developing countries, (2) into the effects of alternative communication strategies, (3) into forms of nudge other than social norm nudges and (4) into the impact of time – represent significant gaps in the literature relating to nudges in the tax field. It is these gaps that the current thesis aims to address.

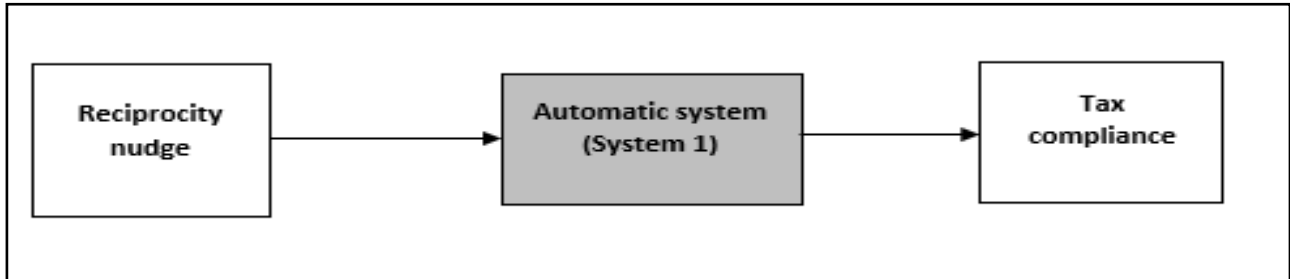
2.6 RESEARCH QUESTIONS AND HYPOTHESES

As discussed in Chapter 1, the purpose of this study is to determine the effect of reciprocity nudges on the tax compliance of individual taxpayers. Thus, the aim of this study is to determine the effect that the independent variable (the nudge) has on the dependent variable (tax compliance behaviour). As the purpose of the study is broad, it can be addressed best by being formulated into a research question or a null hypothesis. However, a single research question or hypothesis does not adequately address the broad research aim of this study. One reason for this is that the effect of the independent variable (the nudge) can also be dependent on factors such as the timing of the nudge, the structural and content attributes of the nudge message, the gender of the taxpayer, the taxpayer's income level, the population group to which the taxpayer belongs, the taxpayer's attitude towards tax and the taxpayer's perception of corruption. Another reason for the inadequacy of a single research question or hypothesis is that the dependent variable (tax compliance) can be measured by various behavioural outcomes which are: registering with revenue authorities as required, filing tax returns on time, accurately reporting tax liability in accordance with prevailing legislation, paying outstanding taxes as they fall due and maintaining all records as required (McKerchar & Evans, 2009:172). This study focuses solely on accurately reporting tax liability as a behavioural outcome for measuring tax compliance.

The predicted relationship between the dependent variable and the independent variable is illustrated in Figure 2.9. The timing of the nudge intervention, the structural and content attributes of the nudge message and factors such as gender, income level, population group, attitude towards tax and perception of corruption may have a moderating and mediating effect on the relationship between nudges and tax compliance as shown in Figure 2.10.

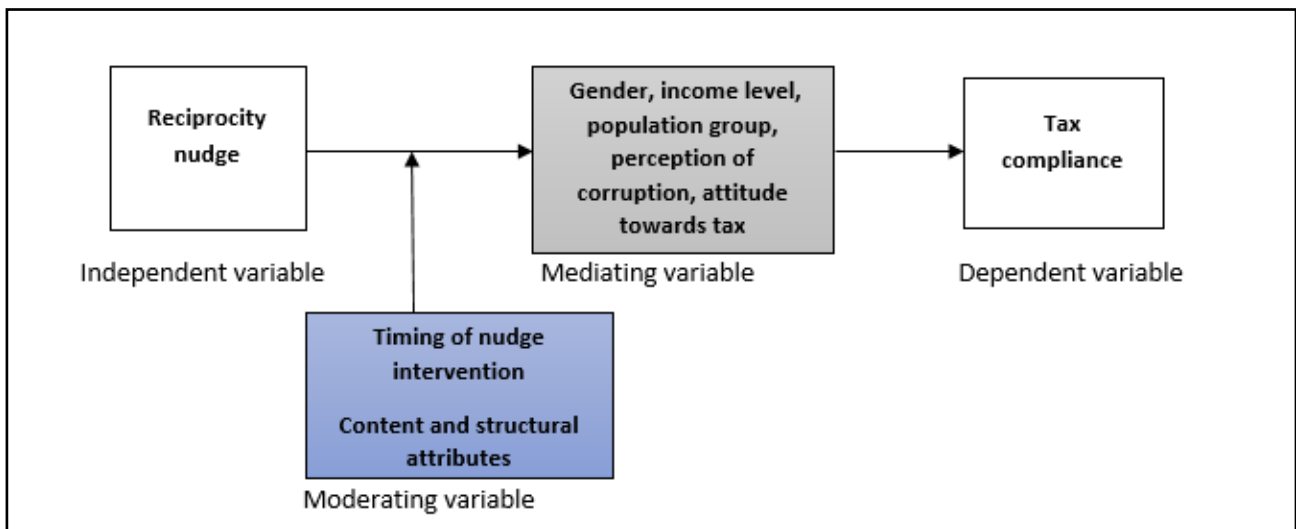
These relationships can be tested through the formulation of further research questions and hypotheses.

Figure 2.9: Predicted relationship between variables



Source: Author's own.

Figure 2.10: Predicted relationship between independent and dependent and mediating and moderating variables



Source: Author's own.

2.6.1 Primary research questions and hypotheses

Broadly, the primary research question (PQ) which has emerged from the literature reviewed in this chapter can be stated as follows:

PQ1: What is the effect of reciprocity nudges on the tax compliance behaviour of individual taxpayers?

Further, the null hypothesis and hypothesis can be stated as follows:

P1H₀: There is no association between reciprocity nudge messages and the tax compliance behaviour of individual taxpayers.

P1H₁: There is an association between reciprocity nudge messages and the tax compliance behaviour of individual taxpayers.

To better address the breadth of the research aim, additional primary research questions, null hypotheses and hypotheses were formulated based on the predicted relationships between the variables of interest. The following additional primary research question is given in Chapter 1:

PQ2: What timing is appropriate when using reciprocity to encourage voluntary tax compliance?

Based on the literature reviewed, the related null hypothesis and hypothesis are:

P2H₀: There is no difference in the tax compliance behaviour of individuals who are exposed to a nudge immediately before making a tax compliance decision and those who have a time lag between viewing the nudge message and making a tax compliance decision.

P2H₁: There is a difference in the tax compliance behaviour of individuals who are exposed to a nudge immediately before making a tax compliance decision and those who have a time lag between viewing the nudge message and making a tax compliance decision.

2.6.2 Secondary research questions and hypotheses

Secondary research questions were formulated in order to understand the relationship between five variables: gender, income level, population group, attitude towards tax and perception of corruption. Given that the study was conducted in South Africa, which is a multicultural country, it was considered important that population group be included as a variable.

The following secondary research questions, as given in Chapter 1, were formulated in order to address the broader research problem:

SQ1: Does gender affect the effectiveness of a nudge intervention?

SQ2: Does income level affect the effectiveness of a nudge intervention?

SQ3: Does population group affect the effectiveness of a nudge intervention?

SQ4: Does attitude towards tax affect the effectiveness of a nudge intervention?

SQ5: Does perception of corruption affect the effectiveness of a nudge intervention?

Based on the literature reviewed, the related hypotheses and null hypotheses are:

S1H₀: There is no association between tax compliance behaviour and gender for individuals who are exposed to a nudge message.

S1H₁: There is an association between tax compliance behaviour and gender for individuals who are exposed to a nudge message.

S2H₀: There is no association between tax compliance behaviour and income level for individuals who are exposed to a nudge message.

S2H₁: There is an association between tax compliance behaviour and income level for individuals who are exposed to a nudge message.

S3H₀: There is no association between tax compliance behaviour and population group for individuals who are exposed to a nudge message.

S3H₁: There is an association between tax compliance behaviour and population group for individuals who are exposed to a nudge message.

S4H₀: There is a difference in the tax compliance behaviour of individuals with a more positive attitude towards tax and the tax compliance behaviour of those with a less positive attitude towards tax.

S4H₁: There is no difference in the tax compliance behaviour of individuals with a more positive attitude towards tax and the tax compliance behaviour of those with a less positive attitude towards tax.

S5H₀: There is no difference in the tax compliance behaviour of individuals with a high perception of corruption and the tax compliance behaviour of those with a lower perception of corruption.

S5H₁: Individuals with a high perception of corruption will be less compliant than those with a lower perception of corruption.

2.6.3 Descriptive research question

To adequately address the primary research questions of this study, it was considered appropriate to obtain an understanding of the structural and content attributes that should be incorporated into tax nudge messages delivered using audio-visual media as the mode of delivery. Structural attributes of a message are those attributes that are relevant to the medium used to communicate the message. The content attributes of a message, also referred to as substance characteristics, are those attributes that may appear in the message regardless of the medium used to communicate that message. (Neuendorf, 2017:33). Thus, in order to obtain this understanding of the structural and content attributes of an effective nudge message, a descriptive research question was also formulated for the study.

As noted in the literature, delivering a message is not a guarantee that the individual to whom the message is delivered will pay attention to the message, irrespective of the mode of delivery (Weiss & Tschirhart, 1994:86). The message needs to draw the attention of the target audience. With this in mind, it is important to note that both the structural and the

content attributes of a message have been linked to greater attention to and memory and liking of a message, all of which are important aspects of an effective message (Morgan, Palmgreen, Stephenson, Hoyle & Lorch, 2003:515). A further brief discussion on the literature related to importance of structural and content attributes of a message is provided in section 4.2.2.1.

The following descriptive research question is given in Chapter 1, and data relating to this question were collected by conducting a content analysis:

*DQ1: What structural and content attributes should be included in tax nudge messages delivered using audio-visual media?*²⁶

2.6.4 Summary of primary, secondary and descriptive research questions

The primary, secondary and descriptive research questions are presented in Table 2.11. The independent and dependent variable associated with each research question is also outlined.

Table 2.11: Summary of research questions

Code	Research question	Independent variable	Dependent variable
Primary research questions			
PQ1	What is the effect of reciprocity nudges on the tax compliance behaviour of individual taxpayers?	Reciprocity nudge	Tax compliance
PQ2	What timing is appropriate when using reciprocity to encourage voluntary tax compliance?	Timing of nudge	Tax compliance
Secondary research questions			
SQ1	Does gender affect the effectiveness of a nudge intervention?	Gender	Tax compliance
SQ2	Does income level affect the effectiveness of a nudge intervention?	Level of income	Tax compliance
SQ3	Does population group affect the effectiveness of a nudge intervention?	Population group	Tax compliance
SQ4	Does attitude towards tax affect the effectiveness of a nudge intervention?	Attitude towards tax	Tax compliance
SQ5	Does perception of corruption affect the effectiveness of a nudge intervention?	Perception of corruption	Tax compliance

²⁶ The hypotheses and null hypotheses related to this descriptive research question are formulated in Chapter 4.

Descriptive research question	
DQ1	What structural and content attributes should be included in tax nudge messages delivered using audio-visual media?

Source: Author's own.

2.7 CONCLUSION

This chapter has provided a review of relevant literature on the tax compliance definition, which is an important concept to consider in addressing the current study problem. It has been found that there is no conclusive agreement on the definition of compliance; for example, some authors have taken an enforcement approach to the definition, whilst others have taken a conceptual approach, and yet others have taken an operational approach. This thesis applies an operational approach to the definition.

This chapter has also reviewed literature relating to the three models of tax compliance (economic deterrence models, social psychology models and fiscal psychology models). Literature on the theories underpinning these models has been discussed, with a particular focus on various social psychology theories, including attribution theory, equity theory, prospect theory, the theory of reasoned action and the theory of planned behaviour. It has been concluded that none of these theories can exclusively predict tax compliance behaviour.

The chapter has also provided a review of literature on voluntary tax compliance and the factors influencing voluntary tax compliance. A discussion on the importance of voluntary tax compliance has been provided and various factors that could have an influence on such compliance have been presented. However, it has been concluded that no single factor can influence voluntary tax compliance on its own.

Following the review of voluntary tax compliance literature, the chapter has provided a review of the literature related to nudge theory. Literature on the different definitions of nudging has been reviewed, together with literature related to the different types of nudge. Literature related to the concept of paternalism has also been considered, and it has been found that, although there are valid concerns regarding the possible infringement on freedom of choice by nudges, there are times when some form of libertarian paternalism may be acceptable. Examples of the successful application of nudges in various sectors have also been provided.

Following on from the above, Section 2.5 has provided a discussion on tax and nudging, with Section 2.5.1 presenting a review of literature related to developed countries and Section 2.5.2 presenting a review of literature related to developing countries. The research has been somewhat inconclusive in that it has pointed to some studies which suggested positive effects of social norm, deterrence and reciprocity nudging in the tax field as well as others which found little to no effect. It has also been established that the majority of the reviewed literature relates to developed countries such as the USA and the UK, with little focus on developing countries, especially those on the African continent. The mode of delivery in these reviewed studies has largely been mailed letters, and the effect of the timing on the effectiveness of nudges has not been fully addressed.

In summary, the reviewed literature indicates that there is a knowledge gap related to the effect of tax nudges on voluntary tax compliance in developing countries, the effect of using different delivery methods and the effect of timing on the effectiveness of nudges. Appropriate primary, secondary and descriptive research questions have been formulated to address this knowledge gap.

CHAPTER 3: RESEARCH DESIGN

3.1 INTRODUCTION

Chapter 2 has reviewed literature related to the definition of tax compliance, voluntary tax compliance, nudge theory and the use of nudge theory in tax. This chapter now addresses the research design followed in this study in order to address the posed research questions (refer to Section 2.6 of Chapter 2 for the stated research questions and hypotheses).

Chapter 3 is presented in seven sections. Following this introductory section, Section 3.2 outlines the research framework. This is followed, in Section 3.3, by a general discussion of research methodology and methods. The research methodology and methods adopted in this study are then discussed in Section 3.4, followed by a discussion on the data analysis technique in Section 3.5. Following this, ethical considerations are discussed in Section 3.6, and, finally, a conclusion to this chapter is presented in Section 3.7.

3.2 RESEARCH FRAMEWORK

The research framework describes the philosophical and theoretical underpinnings and assumptions of the research (Saunders *et al.*, 2012:674). References are traditionally made to two philosophical research paradigms, which are positivism and interpretivism. Positivism is the older of these two paradigms, dating as far back as 450 BC, whilst interpretivism started gaining traction in the 1990s (McKerchar, 2008:6). A researcher who follows a positivist approach generally prefers to collect data about an observable reality and search for causal relationships, whilst a researcher who follows an interpretivist approach believes that he or she cannot be removed from the subjects that are being studied (McKerchar, 2008:7; Saunders *et al.*, 2012:134).

Whilst positivism has been viewed as a dominant paradigm and interpretivism as its polar opposite, it is also recognised that a researcher is not bound to one or the other of these two spectrums. Indeed, a continuum exists between these two paradigms involving, for example, realism and pragmatism (McKerchar, 2008:8).

Realism is regarded as a paradigm that lies between positivism and interpretivism (McKerchar, 2010:77). In the philosophy of realism there is a belief that reality is independent of mind. There are generally two types of realism: direct realism, which asserts that what

individuals experience through their senses accurately portrays the world, and critical realism, which asserts that what individuals see and experience are sensations of the real world that represent what is real. A direct realist recognises the world as unchanging and that the world operates at one level, whilst a critical realist recognises the multiple levels that the world operates in (Saunders *et al.*, 2012:136).

In contrast to realism, pragmatism accepts that there are both singular and various realities in the world. This paradigm generally has three elements which are that (1) actions are dependent on the context and situations in which they occur, (2) actions are linked to consequences and (3) actions are dependent on world views (Morgan, 2017b:2-3; Sefotho, 2015:28). A pragmatist believes that the meaning of actions can be altered over time as a result of changes in the consequences of these actions and thus, that beliefs will continuously evolve as a result of these changes.

This study follows a pragmatic approach, as a content analysis process and an experimental method were adopted to enable reliable and credible data that would address the research questions and objectives (Saunders *et al.*, 2012:130). In this study, the researcher recognises that in order to adequately address the research questions and objectives, it is not only important to determine the causal relationship between nudges and tax compliance but also to understand the context in which this causal relationship operates. Pragmatism is often viewed as the more appropriate paradigm when conducting mixed methods research (Morgan, 2017b:14).

3.3 RESEARCH METHODOLOGY AND METHODS

Research methodology refers to whether the research approach adopted in the study to address the research problem is qualitative, quantitative or involves a mixture of the two (usually referred to as a mixed methods approach). In contrast, the research method indicates the specific tool used by the researcher within one of these three methodologies.

It is generally understood that a qualitative research approach is suited for a researcher who seeks a better understanding of complex situations (Leedy & Ormrod, 2014:98), whilst a quantitative research approach is best suited for a researcher who seeks explanations and predictions that can be generalised. A mixed methods approach combines both qualitative and quantitative approaches in ways which may be simultaneous or sequential and which

may be complementary or confirmatory. Each of these three research methodologies is explained in more detail in the following sections.

3.3.1 Qualitative research approach

A qualitative research approach is a research approach in which the researcher focuses on a phenomenon that occurs in a natural setting and which involves studying the complexity of this phenomenon. In this approach the researcher recognises the many dimensions of the matter being studied and seeks to portray it in its multifaceted form (Leedy & Ormrod, 2014:141). A qualitative research approach is often extensive and interpretive in nature, which means that it relies on subjectivity rather than objectivity. The approach often followed is inductive in nature, which entails theory generation and a focus on building rather than testing theory (McKerchar, 2010:94).

A qualitative research approach consists of the following basic characteristics (Creswell & Creswell, 2018:181):

- **Natural setting:** Data are often collected in the field. Participants are neither brought to a laboratory nor sent data collection instruments to complete.
- **Researcher as key instrument:** Researchers collect and interpret the data themselves.
- **Multiple sources of data:** Researchers rely on multiple sources of data rather than on a single data source.
- **Inductive and deductive data analysis:** Researchers analyse data inductively, building patterns and themes, and then look back deductively from the themes identified to the data, to determine whether there is more evidence to support the themes.
- **Participants' meaning:** Researchers focus on understanding the meaning participants derive from the problem or phenomenon that is being studied by the researcher.
- **Emergent design:** The initial plan for research cannot be tightly prescribed as it may change after the researchers start to collect data.
- **Reflexivity:** Researchers reflect on how their own background, culture and experiences may shape the meaning ascribed to the data and their interpretation thereof.
- **Holistic account:** Researchers try to develop a complex picture of the problem being researched. This may involve reporting multiple perspectives.

A qualitative research approach has some advantages. One is that it can be used to study events in a natural setting, which gives researchers an opportunity to fully understand the

phenomenon that is being studied. Another advantage is that because this approach attempts to understand the meaning of observations, it can be used to collect in-depth information about the topic being studied. Additionally, the methods used to collect data are responsive to local situations and stakeholder needs (Johnson & Onwuegbuzie, 2004:20; Morgan, 2017c:8). However, there are some inherent weaknesses of qualitative research methods, one of which is that the findings may not be generalised to other people or settings, as the research may at times be based on a small sample of individuals or cases. Other weaknesses include the difficulty of testing hypotheses and the fact that theory and data analysis are often time consuming (Johnson & Onwuegbuzie, 2004:20).

Qualitative approaches to research have been applied in academic disciplines such as psychology, education and medicine. In some disciplines, however, it has been frowned upon because of its subjective nature, but it has gained legitimacy in recent years due to research such as that of Noble and Smith (2015:34-35), whose research was conducted to address some of the criticism that had been associated with qualitative research. In relation to research related to tax compliance, some studies have applied a qualitative approach (Dallyn, 2017:336-352; McKerchar, Hodgson & Walpole, 2009:151-178).

There are a number of widely used qualitative research methods, including case study, ethnography, content analysis, phenomenology and grounded theory (Leedy & Ormrod, 2014:141; McKerchar, 2008:14). In a case study design, a unit of analysis is studied in detail over a period of time (Venter & van Zyl, 2017:106). A case study design has the advantage of allowing the researcher to learn more about a situation for which there is little knowledge, and it can be useful in providing preliminary support for hypotheses. However, its weakness is that often the results cannot be generalised to the broader population (Leedy & Ormrod, 2014:143). In tax research, a number of studies have used case studies. Amongst these is a study by Chen Loo, McKerchar and Hansford (2009:181-202) in which a mixed methods approach that involved a survey, experiment and case study was followed in order to understand the impact of self-assessment on the tax compliance behaviour of taxpayers in Malaysia.

The ethnographic approach is the earliest qualitative research method and it focuses on studying a group of people within their cultural setting. It may involve the researcher living amongst the subjects of the study in order to observe and interact with them to obtain an

understanding of shared beliefs, behaviours, languages and events that shape their lives (Saunders *et al.*, 2012:181). This approach has some advantages: it assists the researcher in gaining an understanding of the complexities of the group being studied, and it also allows flexibility in the methods used to gather data (Leedy & Ormrod, 2014:145). But there are also a few challenges associated with this approach: firstly, recording data which comes in forms such as observations, conversations and life stories may be difficult; secondly, it may be a challenge for the researcher to gain the trust and empathy of the group being studied in order to obtain a deeper understanding of their interactions (McKerchar, 2010:95-96). In the field of taxation, there has been very limited adoption of this approach to research. One of the few studies to have adopted this approach is that of Boll (2014:293-303), in which the tax compliance of bookkeepers and business owners was studied.

Content analysis is a term that has been around for many years. The term was first included in *Webster's Dictionary of the English Language* as early as 1961 (Krippendorff, 2004:xvii). It is defined as "... the systematic, objective, quantitative analysis of message characteristics" (Neuendorf, 2017:1). Content analysis is conducted on human communication, which includes television and videotapes, amongst other mediums (Leedy & Ormrod, 2014:150). Content analysis is thought to have emerged through research conducted by political scientists on the effects of propaganda and persuasive messages (Fico, Lacy & Riffe, 2008:117).

Different authors classify content analysis differently, either as a qualitative or a quantitative research method, with some authors classifying it as both qualitative and quantitative. Leedy and Ormrod (2014:151) classify the method as both qualitative and quantitative as it involves the tabulation of the frequency of the characteristics found in the material being analysed. Neuendorf (2017:9) also states that the method can be classified as either quantitative or qualitative. Despite the potential of its being seen as either qualitative or quantitative or both, content analysis tends to be primarily applied as a quantitative research method. In quantitative content analysis, text data is coded and analysed using statistics, whilst qualitative content analysis entails focusing on the characteristics of language as communication, with a focus on the content or contextual meaning of text (Hsieh & Shannon, 2005:1278).

When conducting quantitative content analysis, data about the structural and content attributes of a message are collected. As noted in Section 2.6.3, content attributes of a message, also referred to as substance characteristics, are those attributes that may appear in the message regardless of the medium used to communicate that message. The structural attributes of a message are those attributes that are relevant to the medium used to communicate the message (Neuendorf, 2017:33). Neuendorf (2017:34) notes that "... what's important is that both substance and form characteristics of messages ought to be considered for every content analysis conducted".

Content analysis can be used for the following purposes, amongst others:

- "to disclose international differences in communication content;
- to compare media or levels of communication;
- to audit communication content against objectives;
- to code open-ended questions in surveys;
- to identify the intentions and other characteristics of the communicator;
- to determine the psychological state of persons or groups;
- to detect the existence of propaganda;
- to describe attitudinal and behavioural responses to communications;
- to reflect cultural patterns of groups, institutions, or societies;
- to reveal the focus of individual, group, institutional, or societal attention; and
- to describe trends in communication content" (Weber, 2011b:2).

One advantage of this approach is that it can be used to describe communication messages and can be combined with other methods to test causal relationships. Content analysis can also be utilised as a basis for causal research. Another advantage is that content analysis can be applied to various types of communication. This approach, however, also has some disadvantages: it may be difficult to find a representative sample, coding issues may make it difficult to generalise the results obtained from a content analysis process, and the content analysis process may be complex, time-consuming and labour-intensive (Allen, 2017:2-5).

In tax research, Kananovich (2018:247-267) used a content analysis approach to study the relationship between the nature of a political regime and the construction of the concept of a taxpayer in national press.

A phenomenological study is a study that attempts to understand people's perspectives, perceptions or their understanding of a situation.

Lengthy interviews are often conducted with carefully selected participants in order to address the research question (Leedy & Ormrod, 2014:147). In this type of study, reliance is placed on the honest, personal accounts of individuals being studied (Venter & van Zyl, 2017:104). As noted by McKerchar (2010:101) in relation to tax, this approach to research can be used to study how taxpayers relate to the revenue authority. An advantage of a phenomenological approach is that it can allow for participants' voices to be heard, which can enable the approach to be utilised as a starting point for practical theory and to support or challenge policy (Lester, 1999:1). A disadvantage of using this approach, however, is that it may be difficult to generalise the results obtained, as there is often a concern regarding sample size (Lester, 1999:3).

Lastly, the grounded theory method focuses on developing theory from collected data. This method is particularly useful when the theories surrounding a particular phenomenon are inadequate or non-existent (Leedy & Ormrod, 2014:148). The purpose of this approach is to develop or build theory rather than to test theory. Grounded theory, like any other approach to research, has some limitations. One is that the coding process that is part of this approach can be time consuming, as multiple coding is necessary at times in order to refine the data and their meaning so that grounded theory can be built (Hussein, Hirst, Salyers & Osuji, 2014:5; McKerchar, 2010:98). Another limitation is the threat to external validity (Hussein *et al.*, 2014:8). However, this approach also has a number of advantages. Firstly, the approach encourages researchers to use creating processes in order to extract meaning from the data collected. Secondly, the approach provides the researcher with the potential to conceptualise. Finally, it is an approach that can be used across various disciplines. In the tax discipline, McKerchar *et al.* (2009:151-178) applied this approach in order to understand small businesses in Australia and the drivers of the compliance costs of these businesses.

3.3.2 Quantitative research approach

A quantitative research approach generally takes the view that the world can be understood objectively. In this approach, a researcher is required to be objective and removed from the subjects being studied (McKerchar, 2010:91). This approach is generally followed when the purpose of a study is to relate or compare variables or to identify if a cause and effect relationship exists between variables (McKerchar, 2008:10).

A quantitative research approach consists of the following characteristics (Saunders *et al.*, 2012:162-163):

- examines relationships between variables,
- incorporates control to ensure validity of data,
- uses probability of sampling techniques to ensure generalisability, and
- the researcher is independent from the participants.

Quantitative approaches to research are widely used in academic disciplines such as economics, social sciences, health sciences and natural sciences. In tax research, quantitative approaches such as surveys and experiments have been used to study tax compliance. Cummings, Martinez-Vazquez, McKee and Torgler (2009:447-457) used both surveys and an experiment to study tax morale and its effect on tax compliance. Other studies have also used experiments to study tax compliance (Bott *et al.*, 2017; Castro & Scartascini, 2015:65-82).

One benefit of a quantitative research approach is that it can be used to test hypotheses. The results obtained by employing a quantitative research approach can also often be generalised to a wide range of people or settings. Other benefits of this approach include the fact that: the quantitative approach relies on procedures that can be retested by other researchers (replicability), data collection is relatively quick, and data analysis is less time consuming than with a qualitative approach (Johnson & Onwuegbuzie, 2004:19; Morgan, 2017c:8). The quantitative research method does, however, also have some shortcomings: for example, the knowledge obtained may be too abstract and general to be applied to a specific situation, and the focus on theory and hypothesis testing may result in a missed opportunity to better understand a phenomenon (Johnson & Onwuegbuzie, 2004:19).

There tend to be fewer quantitative methods than qualitative methods. The commonly used methods in quantitative research are experiments and surveys. In both of these methods, hypotheses may be developed and tested (McKerchar, 2010:92). The experimental method involves a systematic manipulation of one or more variables in order to establish how the manipulation of the variable(s) affects an outcome (or outcomes) of interest (Creswell & Creswell, 2018:147). Thus, the aim of an experimental study is to explain the relationship between two or more variables.

Internal validity is important when conducting such as study, as, without it, a researcher will find it difficult to draw conclusions about the cause and effect relationship between the variables being studied (Leedy & Ormrod, 2014:235).

According to Gravetter and Forzano (2009:190), an experimental study consists of the following four basic elements²⁷:

- **Manipulation:** One variable is manipulated in order to create two or more treatment conditions.
- **Measurement:** A second variable is measured for each treatment group in order to get a set of scores for each.
- **Comparison:** The scores of one treatment group are compared with the scores of another treatment group in order to identify consistent differences between the different treatments.
- **Control:** All other variables that could potentially influence the two variables being studied are controlled.

There are two designs that can be used to obtain the scores that should be compared in order to determine the cause and effect relationship between two variables. The first design is the within-subjects design, in which the scores are obtained from the same group of participants. The second design is the between-subjects design, in which the scores are obtained from different groups of participants (Gravetter & Forzano, 2009:221).

Whether a researcher uses a within-subjects or a between-subjects experimental design, there are considerations that should be taken into account during the design and implementation process. These considerations include the internal and external validity of the design. Internal validity refers to inferences about whether "... the experimental treatments make a difference in this specific experimental instance" (Shadish, Cook & Campbell, 2002:37). Internal validity threats related to between-subjects designs include assignment bias, which is the risk that participants in one treatment group may have different characteristics to other participants in a different treatment group (for example, participants in one group may be more risk averse than participants in another group) (Gravetter &

²⁷ Section 5.3 and Section 5.6 discuss the manipulation, measurement and control elements as applicable to this current study. In Sections 5.7 and 5.8 the results of the comparisons conducted in this current study are presented and discussed.

Forzano, 2009:165). Another threat to internal validity is that events occurring concurrently with the treatment could have caused the observed effect; these are events that occur between the start of the experiment and the posttest (Shadish *et al.*, 2002:56).

There are also potential threats to external validity that should be considered during the design and implementation process of an experiment. External validity threats arise when conclusions drawn from a sample are incorrectly generalised to other individuals, other settings and other situations (Creswell & Creswell, 2018:171). This means that the effect found in an experiment in a certain type of unit might not have held if other types of unit had been studied or that an effect found in one setting may not hold if other settings were to be used (Shadish *et al.*, 2002:87-89).

An experimental design can be either randomised or quasi-experimental. In a randomised experiment, participants are randomly allocated to a treatment group, and, if applied correctly, the result is that randomisation creates two or more treatment groups that are probably similar to each other on average, and thus, the difference in scores observed between the different treatments is likely to be due to the treatment and not to differences in the groups, which existed at the start of the experiment. In a quasi-experiment, participants are not randomly allocated to the treatment groups; they are allocated by means of self-selection, which means that participants select a treatment group to participate in. In a quasi-experiment, the researcher can also allocate participants to treatment groups (Shadish *et al.*, 2002:14).

The experimental approach is well known for its strengths. One strength is that it allows for results to be generalised rather than being specific to individuals or settings. Another strength is that it can provide a researcher with clear, observable links between experimentally manipulated causes, and outcomes that serve as effects. Objectivity is yet another strength, as the experimental approach relies on procedures that can be reproduced by other researchers (Morgan, 2017c:8, 12). However, as with any approach to research, there are also weaknesses associated with applying this approach. One of the weaknesses lies in the sampling and recruitment of participants: it may not always be possible to allocate participants to a treatment group randomly, and it may be difficult to recruit the large samples of participants that are often needed for an experiment. Another weakness of this approach

is that participants may alter their behaviour simply because of their awareness of being observed, which could affect the results observed (Walker, 2005:575-576).

Experimental approaches have been used in a number of tax compliance studies. Blumenthal *et al.* (2001:125-138) used an experimental approach to study the effect of normative appeals on tax compliance, and Castro and Scartascini (2015:65-82) conducted a field experiment which explored whether providing information to taxpayers influences their tax compliance decision.

Survey methods differ from experimental designs, as they provide a quantitative description of trends, attitudes and views of participants, or they may aim to test associations between variables (Creswell & Creswell, 2018:147). Surveys therefore tend to be used for descriptive research rather than for the testing of a cause and effect relationship between variables that is the focus of experimental studies. Survey methods have been used in a number of tax compliance studies. Muehlbacher *et al.* (2008:298-304) studied the relationship between hard-earned income and tax compliance by using a survey with samples from eight different countries. Jimenez and Iyer (2016:17-26) also used a survey to study the influence of social factors on tax compliance intentions.

The advantages of survey methods include the fact that results from a survey can be used to make statistical generalisations about a population and can be used to test hypotheses related to a variety of variables (Morgan, 2017c:8). The disadvantages associated with this method are that participants may provide responses that they believe the researcher wants to hear and thus, some participants may intentionally misrepresent facts. Additionally, analysing data collected from a survey may be time-consuming, and due to the limit on the number of questions that can be included in a survey, the data collected may not be wide-ranging (Leedy & Ormrod, 2014:196; Saunders *et al.*, 2012:178). There is also the risk that there may be flaws in the design of the survey questions, which may result in a threat to internal validity (McKerchar, 2008:12).

3.3.3 Mixed methods research approach

As can be observed from the above discussion, both the qualitative and the quantitative research approach have their own strengths and weaknesses. The weaknesses of the one may, however, be addressed by the strengths of the other.

Taking a mixed methods approach to research can often help in one method's addressing the weaknesses of another. A mixed methods approach may also assist in providing a complete answer to the research question (McKerchar, 2010:250).

The mixed methods approach is a relatively new methodology, which originated in the late 1980s and early 1990s. The approach is defined as:

“... the type of research in which a researcher or team of researchers combines elements of qualitative and quantitative research approaches (e.g., use of qualitative and quantitative viewpoints, data collection, analysis, inference techniques) for the broad purposes of breadth and depth of understanding and corroboration” (Johnson, Onwuegbuzie & Turner, 2007:123).

Creswell and Creswell (2018:227) discuss a framework in which a mixed method could be embedded as a supportive method within a primary qualitative or quantitative method. From the definition given above, it can be deduced that a mixed methods approach to research involves the following elements (Creswell & Creswell, 2018:215):

- the collection of both qualitative and quantitative data in order to address research questions and objectives;
- the use of rigorous procedures in collecting data, analysing data and interpreting data as required for both qualitative and quantitative methods;
- the integration of the two forms of data;
- the incorporation of these procedures into a mixed methods design; and
- [often] the procedures' being informed by a theory and a philosophical stance.

There are a number of benefits of using a mixed methods approach to research: firstly, the approach can allow a researcher to collect qualitative data that provides insights to help formulate hypotheses about a cause and effect relationship; secondly, the approach can allow one type of data to be collected in order to inform and guide the collection of another type of data; and thirdly, the approach can assist a researcher in making a more convincing case for a particular conclusion if both the qualitative and quantitative data lead to the same conclusion (Leedy & Ormrod, 2014:269).

A mixed method approach also has various challenges, such as the requirement that the researcher should have a good understanding of both qualitative and quantitative approaches. In spite of its challenges, however, there has been a growing appreciation for the fact that the mixed method approach is a methodology that can offer the needed scope

for researchers who are focused more on the purpose of the research question than on being confined to one paradigm (Creswell & Creswell, 2018:215; McKerchar, 2008:20).

A notation system is often applied when combining qualitative and quantitative research approaches. Morgan (2017a:3) refers to the notation system developed by Morse (1991:120-123; 2003), which classifies mixed methods designs as shown in Table 3.1.

Table 3.1: Notation used in mixed methods research

Notation	What it indicates	Example
Uppercase letters	Greater emphasis given to a method	QUAN, QUAL
Lowercase letters	Lesser emphasis given to a method	quan, qual
+	Convergent methods	QUAN + QUAL
→	Sequential methods	QUAL → quan
()	Embed within a design or framework	QUAN(qual)
↔	Recursive	QUAL ↔ QUAN
[]	Study within a series	QUAL → [QUAN + qual]

Source: Adapted from Creswell & Creswell (2018:236).

In the following section, the methodology and methods adopted for the current research are explained, together with the appropriate notations, based on the above coding system.

3.4 RESEARCH METHODOLOGY AND METHODS ADOPTED

Having considered issues related to the research framework and the research methodology (or approach) and the various methods that relate to each of these approaches, what remains is to consider the methodology and methods specifically used in this study.

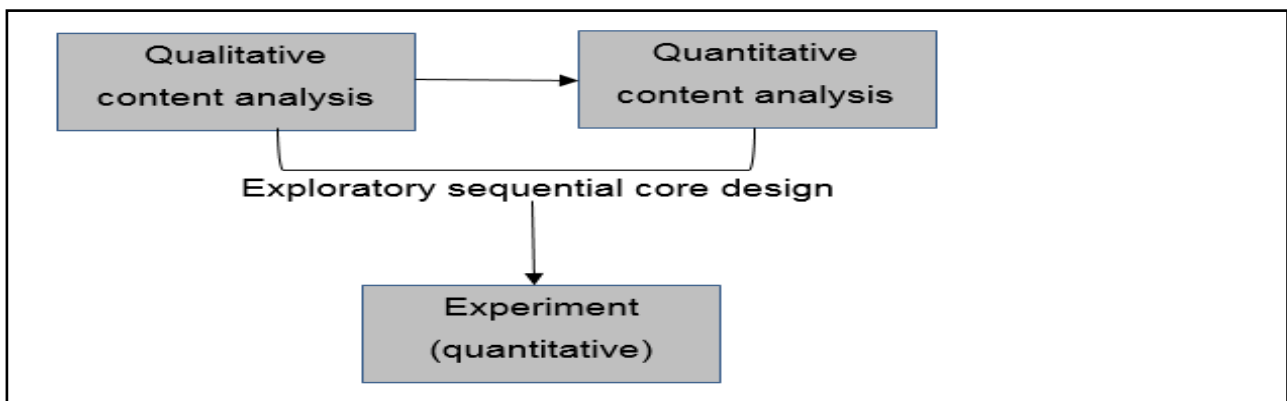
In order to adequately address the research questions and objectives of this study, it was considered that there was a need to use both qualitative and quantitative approaches. In the first place and for the reasons noted above, it was considered that many of the research questions and hypotheses could be addressed using a quantitative approach, particularly employing an experimental design.

However, in order to enhance the quantitative methodology (the experiment), it was also determined that it would be necessary to first conduct a content analysis of the available videos, to determine which of them would be most appropriate to use in the experiment. The content analysis itself was both qualitative and quantitative. A mixed methods approach,

using an experiment (quantitative approach) preceded by a content analysis (qualitative and quantitative approach) was therefore considered appropriate for the current study.

Furthermore, this study applied a sequential core mixed methods content analysis qual → quan. The data obtained by applying this method were then embedded in the experimental design. This means that the sequential mixed method content analysis was a secondary source of data. This method is referred to as the mixed methods experimental design and is shown in Figure 3.1 (Creswell & Creswell, 2018:228).

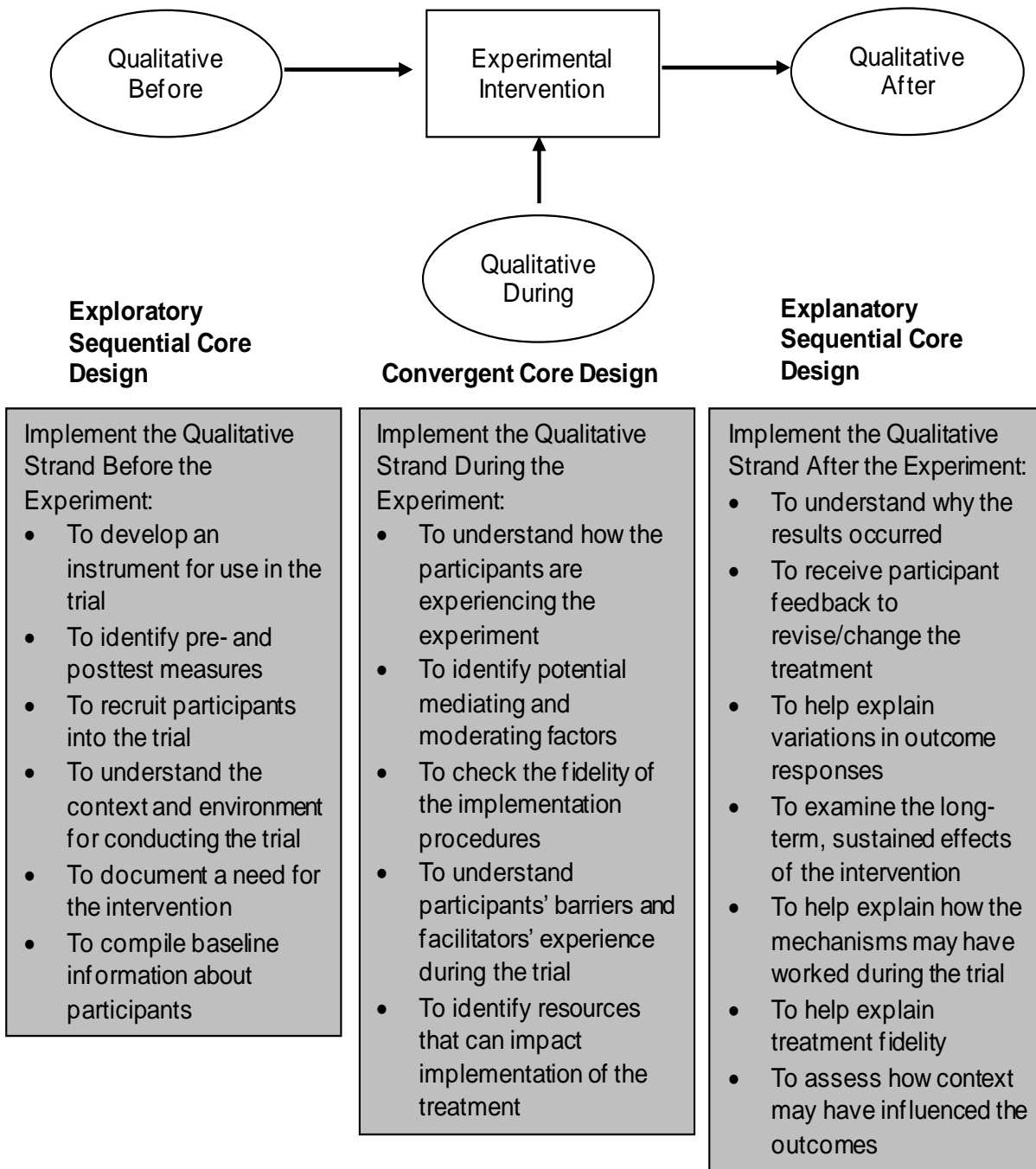
Figure 3.1: Mixed methods design used in this study



Source: Author's own.

The nature of this mixed methods design entails the researcher collecting and analysing both qualitative and quantitative data (Creswell & Creswell, 2018:228). The qualitative data can be incorporated before conducting the experiment, during the experiment or after the experiment as shown in Figure 3.2. The current study embedded the qualitative data before the experiment was conducted.

Figure 3.2: Mixed methods experimental design



Source: Creswell & Creswell (2018:229).

The mixed content analysis method that was applied before conducting the experiment is presented in Chapter 4, which provides a more detailed discussion on the process followed to conduct the content analysis and presents the results of that content analysis. This is followed by a more detailed exposition of the experimental design in Chapter 5, which also includes a description of the conducting of the experiment and an analysis of its outcomes.

3.5 VALIDITY

3.5.1 Qualitative content analysis

There are two types of validity, internal validity and external validity. Internal validity relates to whether the research process applied can demonstrate a causal relationship and external validity relates to whether the results observed can be generalised to a broader population outside the research setting (Fico *et al.*, 2008:124). Generally, a qualitative content analysis is known to suffer from issues of internal validity. In order to address this concern, the following measures were applied in this study:

- research articles and documents used were searched for in reliable databases: *Google Scholar, EbscoHost, ProQuest, Sage, ScienceDirect, SpringerLink* and *Scopus*;
- a detailed description of the structural and content attributes of an effective message was provided, in order to give other researchers an understanding of the attributes identified in the content analysis process;
- the processes that apply when conducting a content analysis as a research method were outlined and a detailed discussion on how these processes were followed in this current study was provided; and
- research articles and documents were coded using using ATLAS.ti, a computer-assisted qualitative data analysis software. The coding was then rechecked to ensure that the data were correctly analysed.

3.5.2 Quantitative content analysis

Generalisability in content analysis is established by the selection of a large sample size as well as the thoroughness of methodology (Macnamara, 2005:13). In this current study, all relevant material was analysed thus reducing the threat to external validity. In order to address issues of internal validity the following measures were applied:

- the processes that apply when conducting a content analysis as a research method were outlined and a detailed discussion on how these processes were followed in this current study was provided; and
- according to Saunders *et al* (2012:451), conducting a pilot test assists the researcher in assessing validity of the research instrument. In this current study, as part of the quantitative content analysis, pilot testing was conducted in order to identify issues and

problems that required to be corrected before conducting an analysis on the entire material selected for analysis.

3.5.3 Laboratory experiment

When conducting an experimental research study, internal and external validity is important. Without internal validity, a researcher will find it difficult to draw conclusions about the cause and effect relationship between the variables being studied (Leedy & Ormrod, 2014:235) and without external validity the researcher may find it difficult to generalise the findings of a study to settings outside the experimental settings. Laboratory experiments allow a researcher to have greater control over aspects of the experiment, such as selection of participants thus improving the internal validity of the research. However, in laboratory experiments external validity is more challenging to establish (Saunders *et al.*, 2012:176). In order to address internal validity concerns, the following measures were applied in this study:

- the four basic elements on an experimental study as outlined by Gravetter and Forzano (2009:190), have been applied in this current study;
- in order to minimise the internal threat related to assignment bias, participants in this current study were randomly allocated to the treatment groups and control group;
- events occurring concurrently with the experiment may pose a threat to internal validity. These are events that occur between the start of the experiment and the posttest and can change the participants' perceptions thus affecting the results observed (Shadish *et al.*, 2002:56). In this current study, the experiment was conducted in one sitting thus reducing the internal validity threat that could arise from events occurring concurrently with the experiment; and
- in order to improve internal validity of the experiment, in this current study, participants were not informed that the experiment related to tax compliance in order to avoid participants changing their behaviour. This raised the issue of deception. This issue was addressed by debriefing participants on the true nature of the experiment at the completion of the experiment and providing them with an explanation as to why this information was initially withheld.

Factors that affect external validity and how they are have been addressed in this current study are stated below:

- adopting a mixed method design in research may help with generalisability of a study (Saunders *et al.*, 2012:169). In this current study, the experiment is preceded by a qualitative and a quantitative content analysis, which provides a more complete understanding of the influence of reciprocity nudge messages on tax compliance;
- subject pool effects are an important consideration in relation to external validity of laboratory experiments. Typically, in laboratory experiments the subject pool is drawn from student populations. Student responses in experiments have been criticised as not being representative of non-student responses. Subject pool effects can be examined in compliance experiments by comparing the behaviour of student participants and non-student (Alm, Bloomquist, & McKee, 2015:1172). In the current study, a pilot test will be conducted to allow the researcher to determine whether there is a difference in the tax compliance behaviour of students and the tax compliance behaviour of non-student taxpayers; and
- poor context setting may pose a threat to the external validity of an experiment. Context setting refers to whether the context in the experiment resembles the context that occurs in the natural setting (Alm *et al.*, 2015:1173). In this current study, the experiment simulated the general environment of a voluntary reporting system. Participants in the experiment earned income by performing tasks. They then decided on how much (if any) of the income earned to declare; as a result, taxes were only paid on income which the participants reported to the tax authority.

3.6 DATA ANALYSIS

3.6.1 Content analysis

Data collected in the qualitative phase of the content analysis were analysed using *ATLAS.ti*, a computer-assisted qualitative data analysis software. The use of computer-assisted qualitative data analysis software is advantageous in that processes are transparent and replicable, which increases the rigour of the research. The software is also time-saving, as documents can be imported easily and coded using open and in vivo coding. The software can also accommodate other digital media formats, such as videos (Hwang, 2008:521, 524).

Data collected from the quantitative phase of the content analysis were analysed by the researcher and an independent coder, using coding forms. Twelve SARS reciprocity nudge videos were analysed to determine the frequencies of common structural and content attributes related to an effective message that had been determined by the qualitative content analysis process. The intercoder reliability was also determined and the results thereof are presented in Chapter 4.

3.6.2 Experiment

The effectiveness of the different experimental treatments was measured by conducting a comparative analysis of the income reported by the participants in the different experimental groups. The nudge was deemed to have a positive effect on tax compliance if the group exposed to a reciprocity message reported higher income than the control group. This comparative analysis was conducted using statistical tools in *SPSS Statistics*.

In deciding on the statistical methods that are most appropriate for the data collected, a researcher should consider whether the data (Leedy & Ormrod, 2014:290):

- have been collected from a single group of participants or from two or more groups;
- involve continuous or discrete variables;
- use a scale of measurement that is nominal, ordinal, interval or ratio;²⁸ and
- reflect a normal or non-normal distribution.

²⁸ Nominal scale is used for labelling data into categories; ordinal scale is used for labelling the values of data in a ranked or ordered manner; interval scale is a numerical scale which states the difference between data values as well as the order of the values; and ratio scale is a numerical scale which states the relative difference between data values as well as the order of the values (Saunders *et al.*, 2012:475).

For this study, descriptive statistics and inferential statistics were calculated to obtain a better understanding of the data collected. Descriptive statistics are statistics used to describe variables, whilst inferential statistics allow a researcher to draw inferences about a population, based on a relatively small sample (Leedy & Ormrod, 2014:289; Saunders *et al.*, 2012:669). Gravetter and Forzano (2009:417) make mention of the two primary purposes of statistics: first, statistics assist the researcher with organising and summarising the data so that the data can be communicated to others; and second, statistics assist the researcher to answer the research questions, by determining what conclusions can be based on the results observed.

Nonparametric statistics were also calculated in this study in order to address the research questions and objectives. Nonparametric statistics are statistics calculated when data are not normally distributed (Saunders *et al.*, 2012:676). The statistics were calculated using *SPSS Statistics*. Statistical software packages have several advantages in that (a) they are user-friendly, as they are logical and easy to follow, and they allow results to be extracted in tabular format, which makes the results easy to read; (b) they contain a wide range of statistical procedures, and they can handle large data sets; (c) they allow assumption testing to be done by testing for characteristics such as skewness and kurtosis, to ensure that the assumptions on which a parametric statistical procedure is based are not violated; (d) they allow tasks to be completed in a relatively short amount of time, compared with statistical procedures completed by hand; and (e) they allow researchers to present data in tabular, chart and graphical formats (Leedy & Ormrod, 2014:314).

3.7 ETHICAL CONSIDERATIONS

Research ethics refers to researchers' responsibility to be honest with and respectful of participants involved in their research. Researchers are governed by a set of ethical guidelines that helps them to take proper actions and decisions (Gravetter & Forzano, 2009:98). Leedy and Ormrod (2014:106) note that most ethical issues fall within four categories: protection from harm, voluntary and informed participation, right to privacy, and honesty with professional colleagues. In the present study, these ethical issues were addressed as follows.

3.7.1 Protection from harm

As the topic of this research is a sensitive issue and in order to observe natural tax compliance behaviour, the participants in the experiments were not initially informed about the true purpose of the experiment. This raised the issue of deception, which was addressed by debriefing participants on the true nature of the experiment at the completion of the experiment. Participants were also then given an explanation for why information about the purpose of the experiment had been withheld. It was made clear to the participants that their responses would be kept confidential and would be used for research purposes only.

3.7.2 Voluntary and informed participation

Participation in the experiment was voluntary. Participants were provided with a letter of introduction and informed consent, which contained details about the nature of the research and the contact details of the researcher and supervisors, and participants were also given the choice to discontinue their participation at any time during the experiment.

3.7.3 Right to privacy

The participants' performance in the experiment was kept confidential. Participants were not required to provide their names or any other information that would allow other people to link the participants' responses to the relevant participants.

3.7.4 Honesty with professional colleagues

The findings of this study were presented in an honest and complete manner, without misrepresentation. No data were fabricated in order to support a particular conclusion. The use of secondary data was referenced to acknowledge other people's material; a list of references is provided at the end of this thesis.

Before data collection commenced, approval was obtained from the Research Ethics Committee of the EMS Faculty at the University of Pretoria.

3.8 CONCLUSION

This chapter has presented the research design applicable to this study. This has been done by commencing with a discussion on research framework, which includes the rationale for this study's adoption of a pragmatic approach, and then by discussing the research methodology and methods (in Section 3.3). This study adopts a sequential core mixed methods approach qual → quan, which means that both qualitative and quantitative data were collected and integrated into a quantitative experimental method. Following this information, a discussion of how the collected data was analysed has been presented. The data collected from the qualitative content analysis were analysed using *ATLAS.ti*; data collected from the quantitative content analysis were analysed using code forms; and the data collected from the quantitative experimental approach were statistically analysed using *SPSS Statistics*. Section 3.6 has provided detailed considerations of the ethical concerns related to this study. The four categories of ethical issues (protection from harm, voluntary and informed participation, right to privacy, and honesty with professional colleagues) have been explained, and a discussion of how they were addressed in this study has also been provided.

In the next chapter, the processes and outcomes related to the content analysis methods are explained. Chapter 5 then outlines the process and outcomes related to the experimental method adopted.

CHAPTER 4: CONTENT ANALYSIS: PROCESS, OUTCOMES AND DISCUSSION

4.1 INTRODUCTION

Chapter 3 has discussed the research design of this study, focusing on research methodology and methods, data analysis techniques and ethical considerations. Chapter 4 discusses the processes and outcomes related to the content analysis methods adopted in this study. Following this introductory section, the content analysis processes are discussed in Section 4.2. Section 4.3 then provides an explanation of how two videos used in the quantitative experimental phase were selected. This explanation is then followed by a discussion of the findings of the content analysis processes in Section 4.4. A conclusion to the chapter is provided in Section 4.5

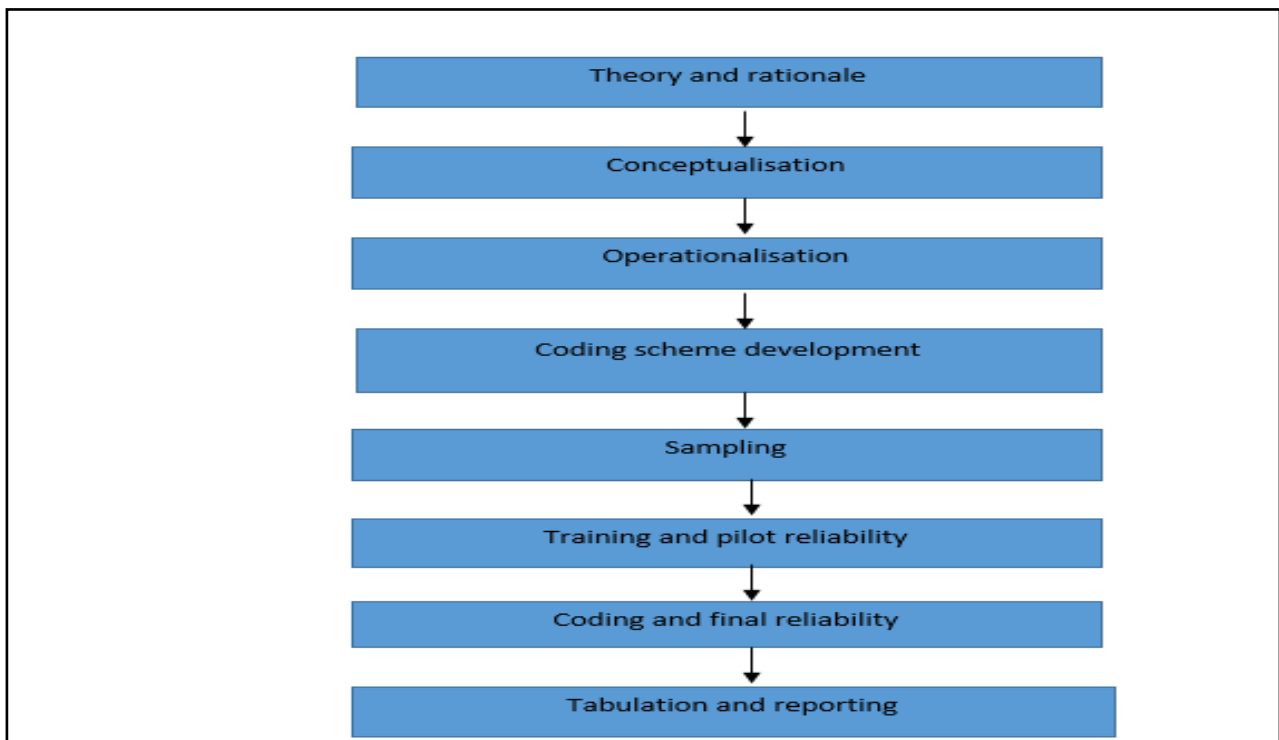
4.2 CONTENT ANALYSIS

As previously discussed, the study's research questions were addressed by employing a mixed methods approach. A mixed content analysis was conducted in order to address one of the secondary research objectives and to support the more significant second phase in which an experimental approach was applied. The content analysis process and results are discussed below in this chapter. The experimental approach and its results are discussed in Chapter 5.

A mixed content analysis method was adopted in order to determine the structural and content attributes of effective nudge messages when using audio-visual media as a mode of delivery. The data obtained from this phase of the research were used to design the experimental phase. A qualitative content analysis was first performed on academic literature in order to identify structural and content attributes of an effective message. This was followed by a quantitative content analysis in relation to 12 SARS videos used in a "Touching Lives" campaign in the period 2012-2013. The campaign focused on communicating how taxes had contributed to the provision of public goods or services to ordinary South Africans (reciprocity messages). Full details of the videos that were analysed are given later in the chapter.

When conducting content analysis as a research method, there is a process that should be followed; Figure 4.1 outlines this process's key steps.

Figure 4.1: Process of content analysis



Source: Adapted from Neuendorf (2017:40-41).

The content analysis process commences with the determination of the theory and rationale for the analysis. Thereafter, conceptualisation, operationalisation of concepts and, if appropriate, formulation of hypotheses take place in order to address the research question. The next important step is the development of the coding scheme, which relates to assigning coding units to each particular category or concept. The next stage of the process is sampling, which involves identification and selection of material to be analysed. In this stage, a sample of the material or all eligible material is selected. In conjunction with the sampling process, the unit of analysis needs to be decided upon. Once the coding scheme has been determined, it is important that it is pilot tested in order to identify any problems that may be present. The training of coders to code the selected material is also essential as is testing to ensure coder reliability; these are undertaken in order to identify any coding problems that should be corrected before finalising the coding scheme. The next step is collecting the data to be analysed and then coding the data according to the coding scheme. The final step is the presentation of the findings and conclusions. Each of these steps as applicable to the current study is discussed in the sections that follow for both the qualitative content analysis and the quantitative content analysis processes.

4.2.1 Qualitative content analysis

4.2.1.1 *Theory, rationale and conceptualisation*

The research question that was addressed by conducting a qualitative content analysis is the descriptive research question discussed in Section 2.6.3 of Chapter 2: What structural and content attributes should be included in tax nudge messages delivered using audio-visual media? Whilst various studies in fields such as health and product advertisements have addressed this topic of structural and content attributes of messages, there is very limited research outside South Africa that focuses on tax-related messages, and there is currently no known research in this area that has been undertaken in South Africa. This therefore provides a rationale for conducting this analysis.

As stated in Section 4.2 once the rationale has been determined, the next step is conceptualisation. Conceptualisation refers to what will be analysed and the reason for the analysis (Holtzhausen, 2010:166). Since one of the objectives of this study is to make recommendations about the structural and content attributes of reciprocity tax nudges delivered using audio-visual media, academic literature was analysed in order to identify appropriate structural and content message attributes, particularly when using audio-visual media. The aim of this part of the research was not to provide a comprehensive analysis of this literature but was rather to identify structural and content message attributes that have been found to be likely to draw a person's attention to the message being communicated. Furthermore, the literature analysed was not confined to attributes related to tax-related messages as there is limited literature in this area. Rather, the literature analysed included literature from other fields such as health and transportation, where media campaigns are often used as nudges to change behaviour.

4.2.1.2 *Operationalisation and coding scheme development*

Messages are thought to be received through one of two routes of persuasion, one being the central route and the other being the peripheral route. Persons who have a strong motivation to process a message will take the central route of processing. In this processing route, argument quality is important, and a strong argument is more likely to be persuasive than a weak argument (Kang, Capella & Fishbein, 2006:352-353). A strong argument is one that is both well-constructed and convincing (Kang *et al.*, 2006:352-353).

Strong arguments are seen as most effective when the receiver is motivated to process the content of the message; however, strong arguments need to focus on the format of the message in order to be more effective than weak arguments (Kang *et al.*, 2006:353).

The peripheral route of persuasion is appropriate to use in situations where motivation and the ability to think about an issue are low. The recipient tends to focus on source attractiveness rather than on the message content (Bator & Cialdini, 2000:530).

Considering the two routes of persuasion, it is essential, when communicating tax nudge messages, that the messages attract the attention of both those individuals likely to use the central route of processing and also those likely to use the peripheral route. This can be done by focusing on a strong argument quality, such as using reciprocity messages, and also on peripheral cues, such as a message's structural and content attributes.

There was no initial code book used to code the data: an inductive content analysis approach was followed by reading through each document to identify concepts from the data. The concepts were then used to create a code book for the quantitative content analysis phase of this study. The data were analysed as collected in order to identify concepts as they emerged.

4.2.1.3 Sampling, data collection and coding

Academic literature was initially identified by searching the following databases: *Google Scholar*, *EbscoHost*, *ProQuest*, *Sage*, *ScienceDirect*, *SpringerLink* and *Scopus*. The snowballing technique²⁹ was also used to identify other relevant literature. The main terms used in the search were “campaigns”, “advertisements” and “communication”, supplemented by the terms “effective”, “mass media”, “media”, “television”, “audio-visual”, “marketing” and “message features”. A substantial number of studies were found when searching the databases using the main terms. Therefore, only those studies where one or more of the main and supplementary terms appeared on the title were selected for further analysis. The reason for this selection criteria was to identify studies that focused on structural and content attributes of effective communication. Subsequent to this selection criteria, the abstracts of studies gathered were read through to determine whether they were relevant or not in answering the research question. Through the process of reviewing the

²⁹ This is a technique in which subsequent relevant literature is identified from the initial literature.

abstracts, it was identified that although the identified studies focused on communication of messages with the aim of changing behaviour, a very limited number of the studies focused on the structural and content attributes of the messages. After following this process, the studies listed in Table 4.1 were identified as being most relevant.

Table 4.1 lists the literature analysed in order to identify elements of effective structural and content message attributes.

Table 4.1: Previous studies reviewed

Author	Title	Year published: page range	Discipline
Albertson and Busby	Hearts or minds? Identifying persuasive messages on climate change	2015:1-9	Climate change
Bator and Cialdini	The application of persuasion theory to the development of effective proenvironmental public service announcements	2000:527-541	Environmental Conservation
Hoekstra and Wegman	Improving the effectiveness of road safety campaigns: current and new practices	2011:80-86	Transportation
Holler <i>et al.</i>	Framing of information on the use of public finances, regulatory fit of recipients and tax compliance	2008:597-611	Taxation
Holtzhausen	Content analysis of roles portrayed by women in advertisements in selected South African media	2010	Marketing
Phillips, Ulleberg and Vaa	Meta-analysis of the effect of road safety campaigns on accidents	2011:1204-1218	Transportation
Skubisz, Miller, Hinsberg, Kaur and Miller	Tips for former smokers: a content analysis of persuasive message features	2016:13-20	Health
Syme, Nancarrow and Seligman	The evaluation of information campaigns to promote voluntary household water conservation	2000:539-578	Water Conservation
Weiss and Tschirhart	Public information campaigns as policy instruments	1994:82-119	Public policy

Source: Author's own.

The data collected from the sources tabulated above were imported into *ATLAS.ti* and analysed by the researcher in order to identify concepts that emerged. After all of the studies (as listed in Table 4.1) were analysed, a report was generated from *ATLAS.ti*. The report

summarised the concepts identified. The coding was then rechecked to ensure that the data were correctly analysed. Pilot testing was not necessary as an inductive approach was followed which was conducted by the researcher.

4.2.1.4 Findings

For the present study, the aim of the qualitative content analysis was to determine the structural and content attributes that are appropriate when communicating nudge messages delivered using audio-visual media. Although the literature review yielded a comprehensive list of concepts, the list is not exhaustive. The final list consists of structural and content attributes that were identified through the literature review and coded using *ATLAS.ti*. Table 4.2 presents the attributes identified and a brief description of each attribute, as it is important that the concepts be clearly defined.

Table 4.2: Structural and content attributes of an effective message

Attribute	Description per literature	Nature of attribute
Captures attention	The message should capture attention; the use of colour, movement, visuals, information quantity and music can assist with this.	Structural attribute
New information	The message should emphasise information that is new to the target audience and that is essential for behavioural change.	Content attribute
Evokes emotion	The message should evoke emotion.	Content attribute
Credible source	The message should be communicated by credible spokespersons and organisations.	Content attribute
Goal framing	The message should contain goal framing.	Content attribute
Credible message	The message should be truthful.	Content attribute
Message clarity	The message should be simple and clear so that it is easy to understand.	Content attribute
Message sidedness	The message should be two-sided.	Content attribute
Message efficacy	The message should deal with “when to” and “how to” knowledge.	Content attribute
Fits with prior knowledge	The message should expand or elaborate on what the target audience already know.	Content attribute
Directs attention	The message should only raise awareness on some issues and not others, to shift the salience of different aspects of problems, which may lead people to think differently.	Content attribute

Attribute	Description per literature	Nature of attribute
Duration of exposure	The message should be broadcast for an extended period: the longer the campaign is broadcast, the greater the probability that it will retain attention.	Structural attribute

Source: Author's own.

The meaning of each feature identified above is discussed below.

Captures attention

The message needs to capture attention so that it can be easily remembered. Some tools that can be used to assist with this include: visual cues, such as intense colour and movement; isolated visuals; objects that contrast with the environment; music; visually unusual introductions; and entertaining messages (Holtzhausen, 2010:105, 115-116)

New information

Providing people with new information in a campaign message can facilitate a change in behaviour (Snyder, 2007:S37). Campaigns may also restate old information, but studies have shown that new information interacts with existing beliefs and attitudes, which may in turn change the standard of evaluation applied to political, social or personal circumstances. New information may also reinforce and build commitment to existing beliefs. It may also trigger emotions, such as fear, pride and hope (Weiss & Tschirhart, 1994:88)

Evokes emotion

Research has found that the effect of a message can be greater if it evokes emotion (Phillips *et al.*, 2011:1205). Messages that evoke positive emotions may have a greater impact than those that evoke negative emotions (Snyder, 2007:S37). Examples of positive emotions are humour, hope and pride; examples of negative emotions are shock, fear, guilt and anger.

Credible source

Source credibility is the degree to which the person or organisation that is providing the message is seen as trustworthy and as possessing the relevant expertise (Holtzhausen, 2010:46). If the source is perceived as credible, the target audience is more likely to accept the message (Holtzhausen, 2010, 46). The source refers to the spokesperson or organisation that provides the message. Characteristics of the spokesperson, such as age, gender and familiarity, can be used by the receiver of the message to judge the message's content. A highly credible source can also be used in a message-dense environment to

better attract the attention of the target audience (Bator & Cialdini, 2000:533). Examples of credible spokespersons are those who are experts or those who are similar to the target audience.

Goal framing

Campaigns aimed at positively influencing tax compliance behaviour can be framed in such a way that either the potential gains resulting from high tax compliance or the potential losses resulting from low tax compliance are highlighted (Holler *et al.*, 2008:588). The effectiveness of either positively or negatively framed messages relies on the recipient's regulatory focus, which can be prompted by the advertisement itself or by the context in which the advertisement is transmitted (Holler *et al.*, 2008:608). In a television advertisement, images and scenes can be used to induce regulatory focus. If the receiver's regulatory focus is matched with the goal framing of the message, then it is probable that the message will be effective (Holler *et al.*, 2008:600).

Under regulatory focus theory, there are two independent self-regulatory systems: the promotion and prevention focus systems. They are explained as follows:

“Promotion goals entail striving to achieve an ideal self, and so produce a sensitivity to the presence or absence of positive outcomes; strategies for achieving promotion goals involve eager pursuit of gains or successes. In contrast, prevention goals entail striving to avoid disasters, and so produce a sensitivity to the presence or absence of negative outcomes; strategies for achieving prevention goals involve the vigilant avoidance of losses or failures.” (Lockwood, Jordan & Kunda, 2002:854)

Regulatory focus can be activated when using audio-visual media by means of images or scenes that activate either the promotion or prevention focus system (Holler *et al.*, 2008:608).

Credible message and message clarity

The message should be truthful (Holler *et al.*, 2008:608). It should also be kept as simple as possible to ensure that it is not misunderstood by the recipient. Campaigns with simpler messages tend to be better understood than those with more complex messages (Weiss & Tschirhart, 1994:87).

Message sidedness

Message sidedness relates to how the message is presented. A one-sided message only presents the argument that favours the position advocated by the source of the message. A two-sided message presents both the opposing and supporting sides of the argument. Research indicates that two-sided messages are more effective than one-sided messages, as one-sided messages have been found to be effective only when the audience is already on the side of the advocated position (Skubisz *et al.*, 2016:15).

Message efficacy

In order to accept a message and be motivated to act on it, an individual must have self-efficacy. According to Skubisz *et al.* (2016:15), "Self-efficacy is an individual's judgement about his or her ability to carry out the behaviour in question." For a message to evoke self-efficacy, the message must provide the receiver with a solution for how to carry out the behaviour in question (Skubisz *et al.*, 2016:15).

Fits with prior knowledge

It is essential to consider how the message content fits with prior knowledge, as message content is more understandable when it expands or elaborates on what people already know (Weiss & Tschirhart, 1994:87).

Directs attention

By raising awareness only for some issues and not for others, a campaign may shift the salience of different aspects of problems, which may lead people to think differently (Weiss & Tschirhart, 1994:89). The concept of directing attention refers to the entire campaign and not just to a single message that is part of the campaign.

Duration of exposure

The longer the message is broadcast, the greater the probability that it will retain attention (Holtzhausen, 2010:105).

4.2.2 Quantitative content analysis

4.2.2.1 *Theory, rationale and conceptualisation*

Both the structural and the content attributes of a message have been linked to greater attention to and memory and liking of a message, which are all important aspects of an effective message (Morgan *et al.*, 2003:515).

Presenting a nudge message, irrespective of the mode of delivery, is not a guarantee that the individuals to whom it is directed will pay attention to the message (Weiss & Tschirhart, 1994:86). The message needs to draw the attention of the target audience, and both the structural and the content attributes of a message have been linked to greater attention to and memory and liking of a message, all of which are important aspects of an effective message (Morgan *et al.*, 2003:515). When designers of information campaigns fail to take into account design principles from mass media communication research, their intentions to change behaviour are not likely to succeed (Bator & Cialdini, 2000:528). Therefore, it is important that designers of tax nudge messages also take into account the design principles mentioned above to ensure that the messages result in changes in behaviour as intended.

4.2.2.2 *Operationalisation and coding scheme development*

In assessing whether the 12 SARS videos chosen for analysis contained effective structural and content attributes, a coding scheme was developed. Developing a coding scheme involves assigning coding units to specific categories or concepts using classification rules. The resulting rules are detailed in the codebook, which is a key component of coding (Macnamara, 2005:9). The codebook provides a list of variables to be researched as well as a framework for conducting the research. The coding scheme for the quantitative content analysis was developed using the structural and content attributes for an effective message as identified in the qualitative content analysis outlined in Section 4.2.1. Each of the 12 attributes – which are: captures attention, new information, evokes emotion, credible source, goal framing, credible message, message clarity, message sidedness, message efficacy, and fits with prior knowledge – was assigned codes for coding purposes. Two attributes (directs attention and duration of exposure) were not included in the development of the coding scheme as they were difficult to measure in this study

4.2.2.3 Sampling and data collection

There are generally two ways in which a sample for content analysis can be gathered. The first is a census of all relevant material. The second is probability sampling, which permits a researcher to collect data that can be used to generalise the results of a content analysis to the rest of the population from which the data was drawn (Fico *et al.*, 2008:121). In this study, all relevant material was analysed.

As noted earlier, 12 videos from the SARS “Touching Lives” campaign were analysed for the purposes of this study. The “Touching Lives” videos were available on the SARS *YouTube* channel. It is important to note that these “Touching Lives” videos were the only campaign videos that were available on the SARS *YouTube* channel at the time when the research was undertaken.

The 12 videos were downloaded from *YouTube* and the length and other basic descriptive attributes of each video were recorded. At the end of the content analysis process, two videos were to be selected for the purpose of designing the experimental phase of this research. One video was to be selected as the most likely to be effective in positively influencing tax compliance behaviour, whilst the other was to be selected as the least likely to be effective in positively influencing tax compliance behaviour.

Table 4.3 contains basic information related to the videos selected for analysis.

Table 4.3: “Touching Lives” videos

Number	Title	Date published	Length of recording	Type of good/service communicated
1	“Walking tall”	October 2012	3:59	Small business development
2	“Dreaming big”	November 2012	3:03	Education
3	“Bridging gaps”	November 2012	3:00	Infrastructure
4	“Celebrating life”	November 2012	3:00	Emergency services
5	“A second chance”	November 2012	3:00	Skills development
6	“Positively alive”	November 2012	3:00	Health services
7	“Home sweet home”	July 2013	3:00	Housing
8	“Finding Thandeka”	July 2013	3:00	Public order and safety
9	“To see again”	July 2013	3:00	Healthy services
10	“To catch a fish”	October 2013	3:00	Small business development
11	“A mother’s love”	October 2013	3:00	Social grants
12	“Rhino wars”	October 2013	3:00	Conservation

Source: Author’s own

For the purposes of pilot testing, two of the videos listed above were selected for content analysis. The process followed in the pilot testing stage is discussed in the section that follows.

4.2.2.4 Pilot testing

Pilot testing is an essential step in the content analysis process that should be conducted before the final coding takes place. Two of the SARS videos were randomly selected for pilot testing. The videos were analysed using the coding scheme developed by the researcher as detailed in Section 4.2.2.2. Refer to Appendix 1 for the pilot test codebook. The content of the videos was analysed by the researcher and an independent coder, using coding forms. Refer to Appendix 2 for the pilot test coding form. The intercoder reliability was determined in order to identify coding issues that needed to be rectified before commencing with the final coding process.

The independent coder was trained prior to the commencement of the pilot test content analysis. This training involved an explanation of the concepts and the variables to be analysed in the different videos. The coder and the researcher then coded the two videos mentioned above as part of the pilot testing, to ensure that the independent coder understood the coding process. Thereafter, coding issues identified were discussed and an agreement was reached on how variables should be interpreted.

The coding scheme was finalised after the pilot testing was conducted. Issues and problems identified during the pilot testing were corrected in the coding scheme. The final coding was then conducted by the researcher and the independent coder. The results of the pilot testing are discussed in Section 4.2.2.6.

4.2.2.5 Reliability testing

A content analysis process must be reliable for it to be considered effective. Reliability refers to whether the measurement undertaken in the content analysis process produces consistent results if conducted at different times, places and with different observers (Fico *et al.*, 2008:123). Reliability is achieved when different coders apply the same coding rules when analysing the same manifest content and are consistent in their classification of the content (Fico *et al.*, 2008:123). Neuendorf (2017:19) notes that reliability in content analysis is vital.

The three types of reliability are stability, reproducibility and accuracy (Weber, 2011a:3). Stability refers to the extent to which the findings of the content analysis will remain the same if recoded at a different time by the same researcher.

Reproducibility refers to intercoder reliability, which is the reliability between different coders. Accuracy refers to the extent to which the classification of text adheres to a standard or norm (Weber, 2011a:3).

The degree of reliability between different coders can be calculated using interpretable coefficients³⁰ (Fico *et al.*, 2008:124). However, it may occur by chance that different coders code content in a similar way without following measurement rules. In order to factor in such a possibility, it is recommended that reliability coefficients such as Scott's pi, Krippendorff's alpha and Cohen's kappa be used to compute the degree of reliability between different coders. Reliability coefficients that produce a score of 80 per cent or greater are acceptable; 60 per cent or greater would be acceptable to most; and below 60 per cent would be an indicator of disagreement. The results of the reliability test calculated in this study are discussed in the section that follows.

4.2.2.6 Findings

Pilot testing findings

A pilot test was conducted before the final coding of the material analysed. This was done in order to identify any issues with the coding scheme that had been developed initially and to finalise concepts and variables. The pilot testing was conducted by the researcher and an independent coder. After the pilot testing, a final coding scheme was documented and used to conduct the final coding. Detailed results of the pilot test and final coding are discussed below.

For the purposes of the pilot testing, two SARS videos were selected at random. As only 12 videos are analysed as part of this study, it was considered that two would be more than sufficient for pilot testing. The videos titled "Finding Thandeka" and "A mother's love" were downloaded, and the length of each video was recorded. Table 4.4 presents the results of the pilot test analysis.

³⁰ Coefficients measure data to determine the existence or non-existence of a certain characteristic.

Table 4.4: Pilot testing results

Title of the video	“Finding Thandeka”	“A mother’s love”
Length (minutes)	3:00	3:00
Captures attention	Yes	Yes
New information	Yes	No
Evokes emotion	Yes	Yes
Credible source (spokesperson)	Yes	Yes
Credible source (organisation)	Difficult to tell	Yes
Goal framing	Positive goal framing	Positive goal framing
Credible message	Yes	Yes
Message clarity	Yes	Yes
Message sidedness	One-sided	One-sided
Message efficacy (when to comply)	No	No
Message efficacy (how to comply)	No	No
Fits with prior knowledge	Yes	Yes

Source: Author’s own.

The results of the pilot test show that both videos contain most of the features of an effective message delivered using audio-visual media.

Strong emotional appeals are used in both videos, and one of the messages provides new information that might not previously have been available to the target audience. The videos capture attention through the use of background music and through the isolation of objects, thus they contained structural attributes of an effective message communicated using audio-visual media. Both video messages contain positive goal framing. Furthermore, both messages are clear as neither focuses on multiple issues; instead, each focuses on one single matter. The written messages at the end of the videos are short and direct. Additionally, both messages are one-sided, presenting the argument that favours SARS. However, neither video provides the target audience with information on when to comply, and only one addresses the “how to comply” element.

During the pilot test, it was identified that the codebook needed to provide a clearer description of the message sidedness variable and that two other variables (credible message and message clarity) needed to be classified separately. Subsequently, both the codebook and the coding form were adapted to factor in these changes.

A reliability test was also conducted using percentage agreement and Krippendorff’s alpha.

Pilot testing reliability test

Percentage agreement is a common coefficient used to assess coder reliability in content analysis (Neuendorf, 2017:175). Krippendorff's alpha is also often used to assess reliability. Krippendorff's alpha is a coefficient used to report the level of agreement between coders' assessments of data. Krippendorff's alpha is suitable for nominal data (Neuendorf, 2017:173), which refers to data that cannot be measured numerically but can be distinguished by being classified into sets (Saunders *et al.*, 2012:669). Although the level of measurement of the data in this current study is nominal, the sample size for the pilot test was not large enough to calculate a reliable Krippendorff's alpha for each variable.

A reliability subsample of 100 per cent was used for the pilot testing reliability assessment. Reliability samples can range from 10 per cent to 100 per cent of the sample (Neuendorf, 2017:187). The results of the reliability tests are presented in Table 4.5.

Table 4.5: Agreement percentages per variable

Agreements	Number of videos	Percentage
Variable: Captures attention		
No agreement	0	0%
Perfect agreement	2	100%
Total number of videos	2	100%
Variable: New information		
No agreement	2	100%
Perfect agreement	0	0%
Total number of videos	2	100%
Variable: Evokes emotion		
No agreement	0	0%
Perfect agreement	2	100%
Total number of videos	2	100%
Variable: Credible source (spokesperson)		
No agreement	0	0%
Perfect agreement	2	100%
Total number of videos	2	100%
Variable: Credible source (organisation)		
No agreement	2	100%
Perfect agreement	0	0%
Total number of videos	2	100%
Variable: Goal framing		
No agreement	0	0%
Perfect agreement	2	100%
Total number of videos	2	100%
Variable: Credible message		

Agreements	Number of videos	Percentage
No agreement	0	0%
Perfect agreement	2	100%
Total number of videos	2	100%
Variable: Message clarity		
No agreement	0	0%
Perfect agreement	2	100%
Total number of videos	2	100%
Variable: Message sidedness		
No agreement	0	0%
Perfect agreement	2	100%
Total number of videos	2	100%
Variable: Message efficacy (when to comply)		
No agreement	0	0%
Perfect agreement	2	100%
Total number of videos	2	100%
Variable: Message efficacy (how to comply)		
No agreement	0	0%
Perfect agreement	2	100%
Total number of videos	2	100%
Variable: Fits with prior knowledge		
No agreement	0	0%
Perfect agreement	2	100%
Total number of videos	2	100%

Source: Author's own.

The level of agreement for the captures attention, evokes emotion, credible source (spokesperson), goal framing, credible message, message clarity, message sidedness, message efficacy (when to comply), message efficacy (how to comply) and fits with prior knowledge variables was 100 per cent. This score is considered acceptable.

In two of the variables (new information and credible source (organisation)), unacceptably low coder agreement percentages were calculated. The percentages were zero for both variables. The discussion between the coders revealed that, for the new information variable, one of the coders assessed the videos for any new information in the message, whilst the other coder assessed the videos for tax-specific new information. This matter was resolved between the coders and the final codebook was amended to give clearer instructions relating to this variable. For the credible source (organisation) variable, discussions revealed that one coder found it difficult to determine whether the source of the message was SARS, the government or another organisation and thus coded the variable

as “difficult to tell whether the source is credible or not”. This matter was also resolved between the coders.

Final coding results and related objective

One of the secondary objectives of this study was to make recommendations about the structural and content attributes of the reciprocity nudge messages. To reach this objective, both a qualitative and a quantitative content analysis were conducted. The qualitative content analysis involved an analysis of academic literature in order to identify the appropriate structural and content attributes that a message should have when using audio-visual media as the mode of delivery. Specific attributes were identified, namely that the message must capture attention, provide new information, evoke emotion, be from a credible source, contain goal framing, be credible in itself, be clear, be two-sided, provide message efficacy, and provide information that fits with prior knowledge. The quantitative content analysis involved analysing SARS videos that were part of the organisation’s “Touching Lives” campaign in order to establish whether they contained the attributes of a message that is likely to be effective (as identified in the qualitative content analysis phase). Another purpose for conducting the quantitative video analysis was to identify two videos to be used in the experimental design of this study. The video selection process for the purposes of the research experiment is discussed in detail in Section 4.3.

The final coding of the videos was performed after making the changes to the codebook and coding form that were identified as necessary during the pilot testing phase. The final codebook and coding form are contained in Appendix 3 and 4 respectively. As has been mentioned previously, 12 videos were analysed as part of this study: 2 were analysed during the pilot testing phase and the remaining 10 were analysed and coded according to the final codebook and coding form.

The purpose of the codebook and the coding form is to provide a clear description of all coding variables. This assisted with the coding of the videos in ensuring that both the independent coder and the researcher had a clear understanding of the variables being coded. The coding form was used in conjunction with the codebook. Independently, both coders watched each of the videos and used the coding form to code each video. The results of the quantitative analysis and the final coding are presented below.

Variable 1: The video captures attention

All of the videos analysed capture the viewer's attention through the use of background music or the isolation of objects. The use of background music is a common feature in all of the videos. Previous research on the role of music in television advertisements suggests that music is a tool that can be used to replace words, represent emotions and evoke emotion in the viewer (Blakeman, 2018:207). Background music is usually used to create memorable advertisements that will attract the audience's attention (Guido, Peluso, Mileti, Capestro, Cambò & Pisanello, 2016:504). Both fast-paced and slow-paced background music is used in the videos, depending on the scenario being portrayed.

Variable 2: The video provides new information

Providing people with new information in a campaign message can facilitate changes in behaviour (Snyder, 2007:S37). Nine of the ten videos analysed provided new information to the audience. The new information provided in the ten videos includes written messages at the end of the videos about the amount of tax contributions, in rand, that is spent on the public service focused on in the video. The video focusing on education ("Dreaming big") provides the information that "... for every R10 in tax contributions, more than R2 goes to education".

Variable 3: The video evokes emotion

All ten of the videos evoke positive emotions through music and through the messages communicated by the spokespersons in the videos. The videos feature stories about ordinary people and how taxes have contributed in improving their lives in various ways. The video titled "Dreaming big" features a young lady who, through a bursary from the Department of Higher Education, became the first person in her family to go to university. As found in prior research, messages that evoke positive emotions may have a greater impact than those that evoke negative emotions (Snyder, 2007:S37).

Variable 4: The video is presented by a credible source (spokesperson)

To be able to touch the target audience, the spokesperson must resonate with the target audience (Blakeman, 2018:127). All ten of the videos have ordinary South Africans as

spokespersons, not actors. If the source is perceived as credible, the target audience is more likely to accept the message (Holtzhausen, 2010, 46).

Variable 5: The video is from a credible source (organisation)

Source credibility is the degree to which the organisation that is providing the message is seen as trustworthy and as possessing the relevant expertise (Holtzhausen, 2010:46). All of the videos analysed are part of the “Touching Lives” campaign that was undertaken by SARS, which is the revenue collecting agency of the South African government and which thus does possess the relevant expertise of tax collection and expenditure.

Variable 6: The video contains goal framing

“What may appear to be arbitrary choices of wording, even alternative wording that has the same meaning, can have a great impact on the decisions and behaviours of the target audience.” (Maibach & Parrott, 1995:32)

All ten videos analysed contain positive goal framing. The videos highlight the positive impact that taxes have had on the ordinary lives of South Africans.

Variable 7: The video provides a credible message

The message communicated should be truthful (Holler *et al.*, 2008:608). In all of the videos, ordinary people relate their personal stories about how their lives have been impacted by a public good or service received as a result of tax contributions made by taxpayers. The use of ordinary people, instead of actors, makes the messages credible to the audience.

Variable 8: The video contains a clear message

Campaigns with simpler messages tend to be better understood (Weiss & Tschirhart, 1994:87). Each of the ten videos analysed focuses on one specific public good or service. The written messages at the end of each video are clear and written in a language that can be understood by the audience.

Variable 9: Video message sidedness

Research indicates that two-sided messages are more effective than one-sided messages (Skubisz *et al.*, 2016:15). All ten videos are one-sided as they only present one side of the argument, which is how taxes are spent. This is a limitation that could perhaps have an impact on how the message is received by the target audience, which could in turn have a negative impact on the effectiveness of the message in changing tax compliance behaviour.

Variables 10 and 11: The video provides message efficacy (when and how to comply)

For a message to evoke self-efficacy, the message must provide the receiver with a solution on how to carry out the behaviour in question (Skubisz *et al.*, 2016:15). None of the videos provide the audience with specific information about when and how to comply with their tax obligation. The omission of such information in the message could result in the target audience's not carrying out the desired behaviour.

Variable 12: The video provides information that fits with prior knowledge

Nine of the videos provide information that fits with prior knowledge. Message content is more understandable when it expands or elaborates on what people already know (Weiss & Tschirhart, 1994:87). Taxpayers are aware that the monies contributed are expected to fund public goods and services. The information provided in the videos expands on this prior knowledge by providing additional information about specific projects that are funded by tax contributions and by providing information about the amounts that are spent on the different public goods or services.

After the content analysis, intercoder reliability was determined for the final coding process as was done with the pilot test. This is discussed below.

Final coding reliability test

The percentage agreement and the Krippendorff's alpha were calculated to determine the intercoder reliability of the final coding process. The results of these reliability tests are presented in Tables 4.6 and 4.7, starting with the percentage agreement coefficient, followed by the results of the Krippendorff's alpha.

Table 4.6: Agreement percentages per variable

Agreements	Number of videos	Percentage
Variable: Captures attention		
No agreement	0	0%
Perfect agreement	10	100%
Total number of videos	10	100%
Variable: New information		
No agreement	1	10%
Perfect agreement	9	90%
Total number of videos	10	100%
Variable: Evokes emotion		
No agreement	0	0%
Perfect agreement	10	100%
Total number of videos	10	100%
Variable: Credible source (spokesperson)		
No agreement	0	0%
Perfect agreement	10	100%
Total number of videos	10	100%
Variable: Credible source (organisation)		
No agreement	0	0%
Perfect agreement	10	100%
Total number of videos	10	100%
Variable: Goal framing		
No agreement	0	0%
Perfect agreement	10	100%
Total number of videos	10	100%
Variable: Credible message		
No agreement	0	0%
Perfect agreement	10	100%
Total number of videos	10	100%
Variable: Message clarity		
No agreement	0	0%
Perfect agreement	10	100%
Total number of videos	10	100%
Variable: Message sidedness		
No agreement	1	10%
Perfect agreement	9	90%
Total number of videos	10	100%
Variable: Message efficacy (when to comply)		
No agreement	0	0%
Perfect agreement	10	100%
Total number of videos	10	100%
Variable: Message efficacy (how to comply)		
No agreement	0	0%
Perfect agreement	10	100%

Agreements	Number of videos	Percentage
Total number of videos	10	100%
Variable: Fits with prior knowledge		
No agreement	1	10%
Perfect agreement	9	90%
Total number of videos	10	100%

Source: Author's own.

The level of agreement on 9 of the 12 variables was 100 per cent. In three of the variables, a reliability percentage of 90 per cent agreement was achieved. As with the pilot testing, the differences in coding for these three variables were discussed between the two coders, any issues were resolved, and an agreement on the coding was reached. As the reliability percentages of all of the variables were above 80 per cent, this was deemed acceptable.

Table 4.7 presents the Krippendorff's alpha coder reliability scores.

Table 4.7: Intercoder reliability: Krippendorff's alpha

Variable	Krippendorff's α
Captures attention	No variation
New information	.4865
Evokes emotion	No variation
Credible source (spokesperson)	No variation
Credible source (organisation)	No variation
Goal framing	No variation
Credible message	No variation
Message clarity	No variation
Message sidedness	.0000
Message efficacy (when to comply)	No variation
Message efficacy (how to comply)	No variation
Fits with prior knowledge	.4865

Source: Author's own.

Krippendorff's alpha compares the "observed" disagreement with the "expected" disagreement. As there were no disagreements in nine of the variables, the alpha could not be computed. In three of the variables, however, the alpha indicated a low reliability; this is due to a low observed disagreement in the data.

4.3 SELECTED VIDEOS

The previous section has discussed the process followed in conducting a content analysis in relation to 12 SARS videos that were used in a “Touching Lives” campaign. In the initial phase of the content analysis, it was identified that in order to be effective, messages that aim to change behaviour should contain the following structural and content attributes: the message should capture attention, provide new information, evoke emotion, be from a credible source, contain goal framing, be credible in itself, be clear, be two-sided, contain message efficacy and provide information that fits with prior knowledge. Table 4.8 shows the results of the analysis performed on the videos. Of the 12 SARS videos analysed for the attributes identified in the first phase of the content analysis, all videos contained structural attributes of a message aimed at changing behaviour, that is communicated using audio-visual media. Of the 12 videos, 8 were ranked as containing the most content attributes of an effective message, and 4 were ranked as containing the fewest content attributes.

Table 4.8: Video analysis results

#	Title	Captures attention	New information	Evokes emotion	Credible source (organisation)	Credible source (spokesperson)	Goal framing	Credible message	Message clarity	Message sidedness (two-sided)	Message efficacy (when to comply)	Message efficacy (how to comply)	Fits with prior knowledge
1	“Walking tall”	✓	✓	✓	✓	✓	✓	✓	✓	X	X	X	✓
2	“Dreaming big”	✓	✓	✓	✓	✓	✓	✓	✓	X	X	X	✓
3	“Bridging gaps”	✓	✓	✓	✓	✓	✓	✓	✓	X	X	X	✓
4	“Celebrating life”	✓	✓	✓	✓	✓	✓	✓	✓	X	X	X	✓
5	“A second chance”	✓	✓	✓	✓	✓	✓	✓	✓	X	X	X	✓
6	“Positively alive”	✓	✓	✓	✓	✓	✓	✓	✓	X	X	X	✓
7	“Home sweet home”	✓	X	✓	✓	✓	✓	✓	✓	X	X	X	✓
8	“Finding Thandeka”	✓	✓	✓	✓	✓	✓	✓	✓	X	X	X	✓
9	“To see again”	✓	✓	✓	✓	✓	✓	✓	✓	X	X	X	✓
10	“To catch a fish”	✓	✓	✓	✓	✓	✓	✓	✓	X	X	X	X
11	“A mother’s love”	✓	X	✓	✓	✓	✓	✓	✓	X	X	X	✓
12	“Rhino wars”	✓	✓	✓	✓	✓	✓	✓	✓	X	X	X	✓

✓ : Indicates presence of the attribute.

X: Indicates absence of the attribute.

_ : Indicates that the presence of the attribute was uncertain.

Source: Author’s own.

As part of the content analysis process, two videos had to be selected for the purpose of designing the experimental phase of this research: the one which contained the most attributes of an effective message and the one which contained the fewest attributes of an effective message. As there are eight videos ranked as possessing most of the content attributes as well as the structural attribute of an effective message, the results of a study by Oberholzer *et al.* (2008:23-48) were used to select the most appropriate video in this category. Oberholzer *et al.* (2008:23-48) examined the routes of persuasion used in SARS' advertising appeals. They found that SARS advertisements that were focused on correctional service (safety), education and tourism had a greater impact on respondents (Oberholzer *et al.*, 2008:36). These findings suggest that public goods or services that individuals resonate with are likely to have a stronger influence than others. This is supported by Ali *et al.* (2014:828-842), who found that people who are more satisfied with certain types of public goods or services are more likely to have a positive attitude towards tax and that different types of public good or service matter in different countries. Of the eight videos identified as possessing the most attributes of an effective message, none focuses on either correctional service or tourism, but one of the videos, titled "Dreaming big", focuses on education. Therefore, the "Dreaming big" video was selected for the purpose of designing the experimental phase of this study.

The video titled "A mother's love" was also selected for the purpose of designing the experimental phase of this study. This video is one of the four videos identified as containing the fewest content attributes of an effective message. In determining which of the four videos to select, four staff members from the EMS Faculty at the University of Pretoria were purposefully selected to rank the videos according to the type of public service or good that would be most likely to have a positive impact on their decision to be tax compliant. Three of the staff members were academics from: the Department of Taxation, the Department of Marketing and the School of Public Management and Administration; one was an administration staff member from the Department of Taxation. The purpose of selecting these four staff members was to obtain a variety of views from a tax expert, a marketing and communications expert, a public administration expert and someone representing an ordinary taxpayer. These four staff members were requested to rank the videos from most likely to have a positive impact on their tax compliance decision to least likely to have a positive impact on their tax compliance decision. The video titled "A mother's love" was ranked overall as the least likely to have an impact on tax compliance.

In conclusion, two videos were selected for the purpose of designing the experimental phase of the study. The video titled “Dreaming big” was selected as the most likely to have an effect on tax compliance, as it contains the most attributes of an effective message, and it focuses on a public service or good that most South African taxpayers would resonate with. The video titled “A mother’s love” was selected as the least likely to have an effect on tax compliance as it contains the fewest attributes of an effective message and focuses on a public service or good that has been identified as least likely to have an impact on tax compliance.

Based on the above, the following hypotheses and null hypotheses can be posed:

P3H₀: There is no association between the reciprocity message selected as most likely to be effective and tax compliance.

P3H₁: There is an association between the reciprocity message selected as most likely to be effective and tax compliance.

P4H₀: There is an association between the reciprocity message selected as least likely to be effective and tax compliance.

P4H₁: There is no association between the reciprocity message selected as least likely to be effective and tax compliance.

4.4 DISCUSSION

This section provides a discussion of the results of the content analysis process as they relate to the descriptive research question posed in Chapter 2:

DQ1: What structural and content attributes should be included in tax nudge messages delivered using audio-visual media?

Research into existing literature has found that both the structural and the content attributes of a message have been linked to greater attention to and memory and liking of a message, all of which are important aspects of an effective message (Morgan *et al.*, 2003:515). Further, research has indicated that people are more likely to do something if it draws their attention. Some ways in which this can be done in an audio-visual message are through the use of images, colour and framing. Elements such as personalisation and presenting campaigns that have an emotional impact on the audience are also important in attracting attention and in increasing the response rate to messages that are aimed to change behaviour (Behavioural Insights Team, 2014:5, 21). Making messages easy to understand has also been found to increase response rate (Behavioural Insights Team, 2014:16).

Findings of this study suggest that, to be effective, a message that aims to change behaviour should have the following structural and content attributes:

- The message should **capture attention** so that the message can be easily remembered. Visual cues, music and unusual introductions are some tools that can be used to aid with this.
- The message should **provide new information**, as new information can facilitate changes in behaviour. New information can also assist with evoking the emotions that are needed to facilitate changes in behaviour.
- The message should **evoke emotion**; and messages that evoke positive emotions may have a greater impact than those that evoke negative emotions.
- The message should **be from a credible source** because, if the source is perceived to be credible, the target audience is more likely to accept the message (Holtzhausen, 2010:46). Credible source refers both to a credible spokesperson and a credible organisation providing the message.
- The message should **contain goal framing**. Campaigns aimed at positively influencing tax compliance behaviour can be framed in such a way that either the potential gains resulting from high tax compliance are highlighted or the potential losses that arise from low compliance levels are highlighted (Holler *et al.*, 2008:588).
- The message should **be credible** or truthful (Holler *et al.*, 2008:608).
- The message should **be clear** by being kept as simple as possible, to ensure that it is not misunderstood by the audience. This is because campaigns with simpler messages tend to be better understood.
- The message should **be two-sided** because the manner in which a message is presented matters in that two-sided messages are more effective in changing behaviour than one-sided messages.
- The message should **contain message efficacy** because in order to accept a message and be motivated to act on it, an individual must have self-efficacy. For a message to evoke self-efficacy, the message must provide the receiver with a solution for how to carry out the behaviour in question (Skubisz *et al.*, 2016:15).
- The message should **provide information that fits with prior knowledge** because messages are more understandable and more likely to affect behaviour when they expand what an individual is already aware of.

- The message should **direct attention** because by raising awareness only on some issues and not on others, a campaign may shift the salience of different aspects of problems, which may lead people to think differently (Weiss & Tschirhart, 1994:89).
- The message must **have an appropriate duration of exposure** because the longer the message is broadcast, the greater the probability that it will retain attention (Holtzhausen, 2010:105).

4.5 CONCLUSION

This chapter has provided a description and analysis of the content analysis processes that was conducted for the current study. The content analysis was conducted in order to determine the necessary structural and content attributes of effective reciprocity nudge messages delivered using audio-visual media as a mode of delivery. A discussion on the various stages involved in the process of conducting the content analyses has been presented, including the development of theory, rationale and conceptualisation, the development of operationalisation and the coding scheme, sampling and data collection, and pilot testing and reliability testing. The findings of the pilot test have also been presented, together with the reliability test results; and a discussion of the subsequent process followed to conduct the final coding (as well as the findings thereof) has also been provided.

Furthermore, the discussion on the final coding findings has focused on each of the 12 variables of interest, which are that the videos being analysed capture attention, provide new information, present a message that evokes emotion, are from a credible source, contain goal framing, are themselves credible, are clear, are two-sided, contain message efficacy and provide information that fits with prior knowledge. The results and findings of the reliability test conducted for the purpose of the final coding have also been discussed.

As a result of the quantitative content analysis process, it has been established that all the selected videos contained structural attributes of an effective message communicated using audio-visual media. Eight of the videos from the SARS “Touching Lives” campaign contain the most content attributes of an effective message, and four contain the fewest content attributes of an effective message. Of the eight videos, and based upon further discussion and analysis, one titled “Dreaming big” was selected for the purpose of designing the experimental phase of this study, and of the four videos, one titled “A mother’s love” was

also selected for the purpose of designing the experimental phase of this study. The experimental process and outcomes are discussed in the chapter that follows.

CHAPTER 5: EXPERIMENT: PROCESS, OUTCOMES AND DISCUSSION

5.1 INTRODUCTION

The previous chapter has discussed the process and outcomes of the content analysis conducted in this study and has provided a discussion and explanation of how the two videos used in the quantitative experimental phase of this study were selected. This chapter discusses the process and outcomes related to the quantitative experimental approach that was adopted in order to test the association between reciprocity nudge messages and tax compliance and discusses the implications of these results. The experimental approach was followed as it allows a researcher to convincingly identify a cause and effect relationship (Leedy & Ormrod, 2014:234).

In this chapter, Sections 5.2 to 5.6 provide detailed information regarding the experimental design, the description of treatment groups, pilot testing (including the results thereof), participant selection and the procedures followed in the experimental process. Section 5.7 then details the results of the experiment by commencing with an explanation of how the final data were cleaned and edited in preparation for analysis. Sub-section 5.7.2 presents the descriptive analysis of the final data, which is followed by the inferential analysis and hypothesis testing of that data. Section 5.8 then provides a detailed discussion of the findings as they relate to each research question. A conclusion to the chapter is provided in Section 5.9.

5.2 EXPERIMENTAL DESIGN

A posttest laboratory experimental design was used. In this design, participants are randomly assigned to groups and the experimental groups are then subjected to a treatment. Both the experimental groups and the control group are then measured using a posttest as illustrated in Table 5.1 (Leedy & Ormrod, 2014:243-244).

Table 5.1: Posttest only control group experimental design

Random assignment	Groups 1-4	Treatment	Observe
	Group 5	Control	Observe

Source: Adapted from Leedy & Ormrod (2014:244).

The experiment simulated the general environment of a voluntary reporting system. The participants in the experiment earned income by performing tasks. They then decided on how much (if any) of the income earned to declare; as a result, taxes were only paid on income which the participants had reported to the tax authority. This is similar to the voluntary reporting system which is applicable to individuals who are self-employed or who earn income from which tax is not withheld at the source. The experiment also incorporated a probability of being audited and a penalty should a participant have been audited and found to have under-declared his or her earnings.

A description of the treatment groups is discussed in the section that follows.

5.3 DESCRIPTION OF TREATMENT GROUPS

The experiment consisted of a control group and four treatment groups. No treatment was applied to the control group. The treatments for the four treatment groups consisted of reciprocity video messages. The reciprocity videos used in the experiment had been selected using the content analysis process outlined in Chapter 4. There were two nudge video messages, each containing a reciprocity message: one video, titled “Dreaming big”, had been selected as the video containing the most attributes of an effective message delivered using audio-visual media; and the other video, titled “A mother’s love”, had been identified as containing the fewest attributes of an effective message delivered using audio-visual media.

Two of the treatment groups were exposed to the “Dreaming big” reciprocity video, with the difference being the timing of when they were exposed to this nudge message during the experimental process. The other two treatment groups were exposed to the “A mother’s love” video, with the difference being the timing of when they were exposed to this nudge message during the experimental process.

The participants who were exposed to a reciprocity nudge message (the “Dreaming big” or “A mother’s love” videos) immediately before making a tax compliance decision were allocated to treatment group A as illustrated in Figure 5.1; whereas participants who were exposed to the timing treatment were allocated to treatment group B as illustrated in Figure 5.2. Therefore, there were two sub-groups in treatment group A: those who watched the “Dreaming big” video and those who watched the “A mother’s love” video.

Similarly, there were two sub-groups in treatment group B: those who watched the “Dreaming big” video and those who watched the “A mother’s love” video. This is illustrated in Table 5.2.

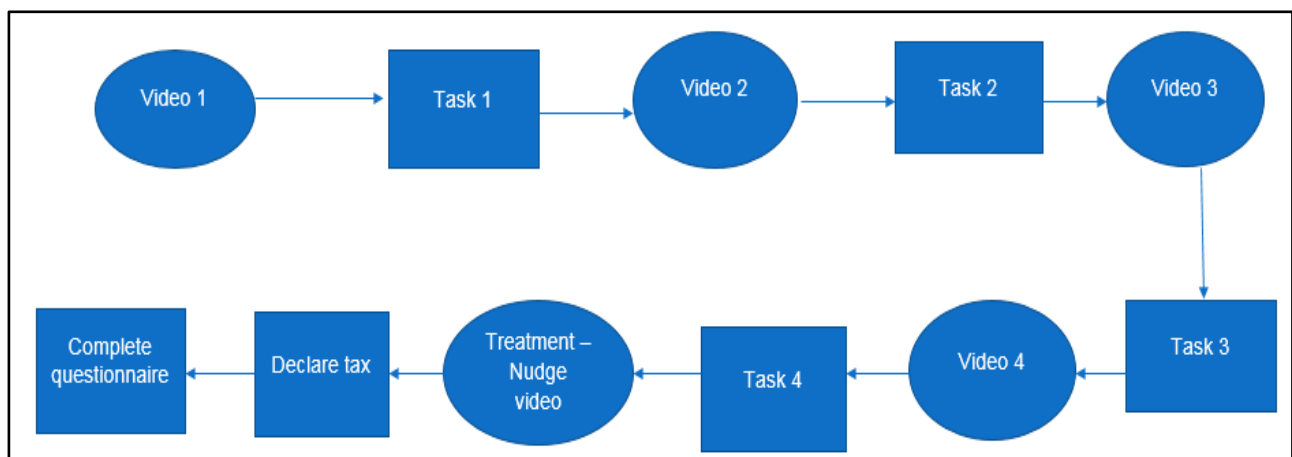
Table 5.2: Treatment groups

Treatment group A (with no time lag)	Treatment group B (with time lag)
“Dreaming big” (A1)	“Dreaming big” (B1)
“A mother’s love” (A2)	“A mother’s love” (B2)

Source: Author’s own.

Figure 5.1 shows the steps followed by participants in treatment groups A1 and A2.

Figure 5.1: Treatment group A (No time lag: groups A1 and A2)



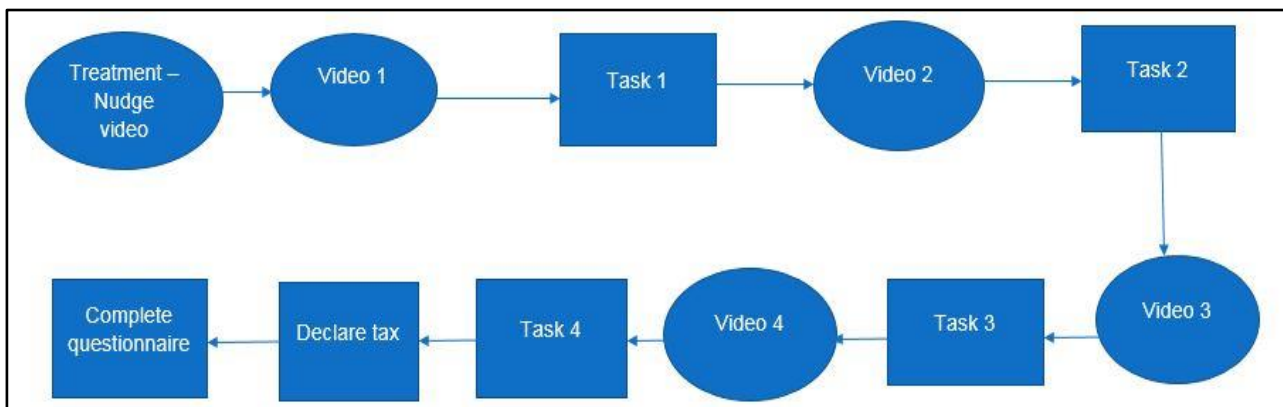
Source: Author’s own.

Participants were required to watch four advertisement videos. After watching each video, they were required to complete a task which entailed answering questions related to the videos watched and which would potentially earn the participants income (a performance-based payout or reward, based on their answers). A typical question might be, for example “What emotion did you feel when watching this video”. The four videos were randomly-selected advertisements that had been downloaded from *YouTube*. None of the messages in these videos was tax-related. After watching the videos and completing the tasks, participants were required to watch the treatment video and then declare the income earned from performing the four previous tasks. Participants were requested to complete a questionnaire at the end of the experiment.

Participants in treatment groups B1 and B2 followed the same steps as participants in treatment groups A1 and A2, with the difference being the timing of the nudge treatment.

Figure 5.2 shows the steps followed by participants in treatment group B.

Figure 5.2: Treatment group B (Time lag: groups B1 and B2)



Source: Author's own.

Treatment group B was included in order to determine whether there is a difference in the tax compliance behaviour of participants who were exposed to the nudge message immediately before making a tax compliance decision and the tax compliance behaviour of those who had a time lag between exposure to the nudge message and the tax compliance decision. As discussed in Chapter 2, there are limited studies that have examined this relationship. Effectively, in treatment group B, the four videos and their associated tasks were interposed between the treatment nudge video and the declaration of income for tax purposes in order to act as a kind of proxy for elapsed time.

The experimental design described above was pilot tested in order to identify any issues that needed to be corrected before commencing with the final experiment. The details related to the pilot testing are discussed in the section that follows.

5.4 PILOT TESTING

A pilot test is conducted to test the data collection instrument in order to minimise the likelihood of participants' encountering problems during the data collection process (Saunders *et al.*, 2012:677). Preliminary analysis can then be conducted using data gathered from the pilot test (Saunders *et al.*, 2012:451).

Due to its importance, a pilot test was conducted for the current study with ten participants, consisting of a mixture of students and non-student taxpayers. The pilot test was considered important for two reasons: first, it allowed the researcher to identify any issues with the

experimental design that might affect the data collection process when conducting the final experiment; second, it allowed the researcher to determine whether there is a difference in the tax compliance behaviour of students and the tax compliance behaviour of non-student taxpayers.

A number of studies have used students as participants in tax experiments (Alm, *et al.* 2017:587-613; Choo, Fonseca & Myles, 2016:102-114; Eriksen & Fallan, 1996:387-402; Gërkhani & Schram, 2006:402-422; McKee, Siladke, & Vossler, 2018:722-756). Some of these studies compared the tax compliance behaviour of student participants to those of non-student participants and found that student participants are less compliant compared to non-student participants (Choo *et al.* 2016:113; Gërkhani & Schram, 2006:412). Alm, *et al.* 2017:607 found no significant difference in tax compliance behaviour of student participants and non-student participants. Furthermore, Alm and McKee (1998:266) point out that evidence suggests that there is no difference in the responses of students in experiments when compared to non-student participants and also that “there is no reason to believe that the cognitive processes of students are different from those of ‘real’ people.”

The procedures followed in selecting participants for the pilot test, the procedures followed during the pilot test itself and the adjustments made to the experiment are discussed below.

An email was sent to some staff members of the University of Pretoria’s EMS Faculty to invite them to voluntarily participate in the pilot study. Only staff members who were income taxpayers were eligible to take part in the pilot test. Five members of staff were subsequently recruited. A separate email was sent to invite students from the EMS Faculty to take part in the pilot test, and five students were subsequently recruited: four were full-time students, and one was a part-time student. All of the student participants had academic backgrounds in accounting and taxation. One of the students was registered for income tax and the other four were not.

As a result there were ten participants in the pilot test: five non-student income taxpayers and five students (one registered for income tax and four not registered for income tax). In order to test all elements of the experimental design, the participants in the pilot test received a performance-based payout similar to the payout that would be received by participants in the final experiment.

During the recruitment phase and at the beginning of the pilot test, participants were informed that they were taking part in an experiment pilot test and that the purpose of the pilot test was to give feedback to the researcher on the experimental design. Participants were requested to keep track of the amount of time it took them to complete the experiment and of any technological issues encountered. They were also requested to give feedback on whether the instructions were easy to understand and on the processes followed during the experiment, including the reporting decision and the completion of the questionnaire at the end of the experiment (to identify any unclear or ambiguous questions).

The participants were requested to provide their feedback in written format. Once all of the feedback and comments were received, the experimental design was adjusted to take these into account. The points that follow outline the experimental design and procedures followed in the pilot study. The issues that were identified in the pilot study, relating to the experimental design and procedures, are also discussed, together with how the experimental design and procedures were modified for the purposes of the main experiment.

(i) In the pilot study, the procedures related to the viewing of the videos, the declaration of income and the completion of the questionnaire were followed separately. The videos were viewed on *Qualtrics*, a platform for collecting data, and the questionnaire was also completed electronically on *Qualtrics*. Participants declared their income in an Excel sheet provided to them. The declaration of income in an Excel sheet resulted in the experiment's taking longer to complete as participants had to switch between *Qualtrics* and Excel to complete the experiment.

The researcher also identified the risk that, due to typing errors, the participant number captured by a participant in the Excel Sheet used for income declaration might differ from the participant number captured in *Qualtrics*, thus making it difficult to match the income declaration decision and the answers provided on the questionnaire on *Qualtrics*. Therefore, to limit the time spent on completing the experiment and to avoid errors related to the capturing of participant numbers, the viewing of videos, declaration of income and completing of the questionnaire were combined in *Qualtrics* for the purposes of the main experiment. This meant that participants would only have to capture their participant number once, on *Qualtrics*.

(ii) In the pilot testing phase, a participant was randomly selected for audit by an assistant, and the calculations related to the audit were done by the assistant on an Excel sheet.

This meant that the participants had to wait for all participants to complete the income declaration phase of the experiment in order to start the audit selection process. This waiting period resulted in the experiment taking longer to complete for some of the participants. In order to avoid human calculation errors, this process was modified by incorporating the audit process into *Qualtrics*, thereby allowing for random selection of participants for an audit and an automatic calculation of the penalty and tax on any undeclared income.

As previously discussed in this section, the pilot test was conducted for two reasons: first, to identify issues with the experiment design that might affect the data collection process when conducting the final experiment; and second, to determine whether there is a difference in the tax compliance behaviour of students and the tax compliance behaviour of non-student taxpayers. Now that the identified issues related to the experimental design have been discussed, the results of the pilot test related to the difference in tax compliance behaviour between students and non-student taxpayers are considered.

5.4.1 Pilot test results

Table 5.3 presents the demographic characteristics of the ten participants in the pilot test.

Table 5.3: Participant demographics for pilot test

Age group	Students	Non-student taxpayers
18 to 25	5	-
26 to 35	-	2
36 to 50	-	1
51 to 65	-	2
Total	5	5
Gender		
Male	1	2
Female	4	3
Total	5	5
Population group		
Black African	2	3
White	2	2
Indian/Asian	1	-
Total	5	5

Education level		
Degree or diploma	2	1
Grade 12 (matric)	1	-
Postgraduate degree	2	4
Total	5	5

Source: Experiment data

All five of the students fell into the 18 to 25 age range, whilst the five non-student taxpayers fell in the 26 to 35, 36 to 50 and 51 to 65 age ranges. A majority (7) of the participants were female, and Black African participants comprise half of the participants, whereas four of the other participants are White and one is Indian/Asian. Furthermore, the majority of the participants have a qualification. Six of the participants have a postgraduate degree, whilst three of the participants have a higher education degree or diploma. Only one of the participants was an undergraduate student.

The participants were allocated to one of the four treatment groups (group A1, group A2, group B1 or group B2) or to the control group. The student participant and the non-student taxpayer in the control group reported the full income that they had earned from the experiment (income earned was equal to income declared). Similarly, in three of the treatment groups, referred to as the “Dreaming big” (with no time lag: group A1) treatment group, the “Dreaming big” (with time lag: group B1) treatment group and “A mother’s love” (with time lag: group B2) treatment group, both the student participants and the non-student taxpayers also reported the full income that they had earned from the experiment. Meanwhile, in the last treatment group, referred to as “A mother’s love” (with no time lag: group A2), the student participant reported an amount of income lower than what the student participant had earned, whilst the non-student taxpayer reported the full income.

Table 5.4 presents the results of the observed tax compliance behaviour of the participants in the pilot test.

Table 5.4: Percentage of participants fully compliant within each group

Cross tabulation					
			Tax compliance (1 = YES, 0 = NO)		Total
			1	0	
Type of participant	Student	Count	4	1	5
		Expected count ³¹	4.5	.5	5
		% within Type of participant	80.0%	20.0%	100.0%
	Non-student Taxpayer	Count	5	0	5
		Expected count	4.5	.5	5
		% within Type of participant	100.0%	.0%	100.0%
Total		Count	9	1	10
		Expected count	9	1	10
		% within Type of participant	90.0%	10.0%	100.0%

Source: SPSS output calculated from experiment data.³²

Therefore, as shown in Table 5.4, four out of five of the students were compliant, whilst all of the non-student taxpayers were compliant. The non-compliant student was not the student who was registered for income tax.

Fisher's exact test was also conducted to determine the association between tax compliance behaviour and exposure to a reciprocity nudge message. This test is used to test the association between two variables (Laerd Statistics, 2016b:1). The results show no statistically significant association between the two variables being considered here: *p-value* = 1.000. Refer to Tables 1 and Table 2 in Appendix 5 which show these results.

Based on the findings presented in Table 5.4, there is no significant difference in the tax compliance behaviour of students and non-student taxpayers. Therefore, these observed results³³ and findings from previous studies (Alm, 1991; Alm & McKee, 1998; Druckman & Kam, 2011) provide evidence to support the use of students as participants in the final

³¹ Expected value count is the value expected for each cell if the variables are independent.

³² The researcher acknowledges that a very small sample has very little power to reject the null hypothesis; however, as the number of rows multiplied by the number of columns does not exceed the sample size, the cross tabulation and associated test result confirm that the student group and the non-student taxpayer group can be considered as having a similar outcome.

³³ As the observed results from the pilot test are based on a small number of participants, the researcher acknowledges that any generalisation should be done cautiously.

experiment. The next section discusses the procedure followed in selecting participants for the final experiment.

5.5 PARTICIPANT SELECTION

Students from the EMS Faculty of the University of Pretoria were recruited for the main experiment through an email which contained an invitation to participate. Posters that displayed information about how to participate in the experiment were also placed in areas that are frequented by students. As a result of the recruiting campaign, a total number of 172 students were the realised sample for the experiment. This resulted in 30 or more participants in each of the experimental groups. This sample size was considered appropriate as the minimum suggested sample size for statistical analysis is 30 (Saunders *et al.*, 2012:266). Effort was made to recruit a broad cross-section of students from the EMS Faculty in an attempt to ensure that both male and female students and participants from different population groups were selected. As noted in Section 5.7.2 below, the attempt to ensure gender diversity was unsuccessful as over 70 per cent of the participants were female. The attempt to ensure ethnic diversity, however, was successful.

Initially, 287 students were selected. Of the 287 students selected, only 137 students arrived, consented to take part in the experiment and completed the experiment. A possible reason for the low turnout rate could be due to the time and the day of when the experiment was conducted. The experiment took place on a Friday at 8:30am. The experiment was then conducted again a week later with 25 students who were registered for the honours degree in Taxation at the University of Pretoria, and 24 of these students completed the experiment. As the number of participants for some of the experimental groups had not reached the desired level of 30 or more, the experiment was conducted again three days later with a separate group of 11 students who were also registered for a degree in the EMS Faculty at the University of Pretoria.³⁴ As a result of all of the above, the experiment was conducted with a cumulative total of 172 participants who consented to take part in the experiment.

As discussed in Chapter 3, a between-subjects design was used for the experiment. Given the internal validity threat of assignment bias that is particularly related to between-subjects

³⁴ As participants were randomly assigned to the experimental groups, any group differences between the participants who participated in the experiment earlier and those who participated a week later would be due to chance; there is little likelihood that a third variable would have an impact on the findings.

designs, participants in this study were randomly allocated to a treatment group in order to minimise this threat.

5.6 PROCEDURES

The experiment was conducted in computer laboratories at the University of Pretoria. Participants were seated in the laboratories in a manner that did not allow them to share information or see the computer screen of the person seated next to them. Each participant's computer contained an information folder consisting of a link to the experiment, which was completed on *Qualtrics*. Participants also received a printed copy of the instructions. Refer to Appendix 6 for the instructions. To ensure that participants understood the experimental procedures, participants were given the opportunity to ask any questions after reading the instructions and were also referred to the informed consent on *Qualtrics*. Refer to Appendix 7 for the informed consent.

Before the commencement of the experimental tasks, participants were informed about the procedures of the experiment. Participants were given assurance of the confidentiality of their responses and were also assured that their responses during the experiment would not be observed by the researcher or the assistants.

This was communicated in order to limit any researcher factors that may have had an effect on the behavioural responses of the participants. Participants were not informed that the experiment related to tax compliance.

Participants were informed that they would be required to perform two steps as part of the experiment.

Step 1: Participants were informed that step one involved performing computerised tasks from which they would earn a performance-based income in laboratory currency (LC). The income earned in LC was converted into South African rand at the end of the experiment. Participants were informed that their earnings in LC would be subject to income tax at a rate of 31 per cent. As noted by Alm (1991:582), the aim of experiments is to create a real microeconomic system. In order to create such a system, elements such as control over the environment, control over the institutions, and participant preferences are important, and there are a number of conditions that have to be satisfied in order to achieve control over preferences. These conditions include: rewarding participants based on the decisions made

in the experiment, having rewards that are sufficient to offset any subjective costs or benefits that participants may place on taking part in the experiment, and making sure that payouts to participants are kept confidential (Alm, 1991:582).

The participants were briefed about how their payout would be calculated, which was as follows:

$$\text{Payout} = \text{LC earnings} - \text{TaxRep} - \text{TaxUD} - \text{Pen}$$

Where:

LC earnings = income earned in laboratory currency before tax

TaxRep = income tax reported

TaxUD = income tax under-declared (if subject to audit and found to have under-declared)

Pen = penalty (if subject to audit and found to have under-declared income tax)

The calculated payout amount in LC was converted into rand at a rate of R1 = 1LC.

Participants were further informed that the computerised tasks required them to watch videos and complete a task related to each of the videos. There were five videos in the experiment, including the treatment video. The purpose of the four videos (excluding the treatment video) and related tasks was to serve as distractor tasks. The purpose of the distractor tasks was to serve as a proxy for time for the participants in treatment group B. The distractor tasks were incorporated into the experimental design to distract and thus diminish the memorisation of the reciprocity nudge message that participants in treatment group B were exposed to at beginning of the experiment. This was done in order to test the hypothesis that there is a difference in the tax compliance behaviour of individuals who are exposed to a nudge immediately before making a tax compliance decision and those who have a time lag between viewing the nudge message and making a tax compliance decision. The four videos (excluding the treatment video) and related tasks also served as attention manipulation checks to determine whether the participants were engaged in the experiment.

Additionally, as an attempt to simulate elements of the income tax system, participants earned income from completing the tasks. The fifth video, for the participants assigned to a treatment group, contained a reciprocity message. There was no treatment video for the participants assigned to the control group.

Step 2: Participants were briefed on the fact that they would be required to declare the income earned from participating in the experiment. They were told to assume that the tax

authority would not know their reported income unless they were audited. Participants were also informed about the audit probability and procedures. The tax rate was set at 31 per cent.³⁵ They were also informed about the audit rate, which was set at 10 per cent³⁶ and that participants who were audited and found to have under-declared their earnings would be required to pay the undeclared amount plus a penalty of 75 per cent of the undeclared amount. A penalty of 75 per cent was considered appropriate as it is in line with the penalty rate imposed by SARS for intentional tax evasion.

A setting in *Qualtrics* was selected that allowed for a random selection of participants from each experiment group for an audit. The audit process involved checking the income declared against the income earned from tasks performed. The check was done automatically in *Qualtrics* by the system.³⁷

At the end of the experiment, participants were requested to complete a questionnaire so that demographic data such as gender, age and population group could be collected. The questionnaire also contained questions designed to assess the attitudes of participants towards tax and their perception of corruption in order to determine whether there is an association between these variables and the tax compliance decisions taken during the experiment. Refer to Appendix 8 for the questionnaire.

Once the experiment was completed, participants received their payout in cash and were debriefed about the purposes of the experiment. Refer to Appendix 9 for the debrief letter given to participants.

5.7 RESULTS

The previous sections have discussed the processes followed to conduct the experiment. This section focuses on presenting the results of the data collected in the experiment. The section provides a discussion on the final data cleaning and editing. Descriptive statistics

³⁵ For the 2017 tax year, 72.8 per cent of South African taxpayers had a taxable income of below R350 000 (National Treasury & SARS, 2018:41). The highest tax rate that these individuals would have been subjected to was therefore 31 per cent. It is for this reason that a rate of 31 per cent was considered appropriate for this experiment.

³⁶ The South African audit probability is 14.47 per cent for registered income tax, VAT, CIT and trust taxpayers (SARS, 2018:68); therefore, an audit probability rate of 10 per cent was considered appropriate for the purposes of this study.

³⁷ A maths operation was performed in *Qualtrics* in order for the penalty and tax on actual income to be automatically calculated for each participant selected for an audit.

which outline the demographics characteristics of the participants of the final experiment are also provided. This is followed by the presentation of inferential statistics and hypotheses testing, which aim to address the research questions of this study.

5.7.1 Final data cleaning and editing

As discussed in Section 5.5, the final experiment was conducted with 172 students as participants. In total, 186 responses were recorded in *Qualtrics* even though there were only 172 participants. In preparing the data for analysis, incomplete, duplicate and multiple responses from the same participant were deleted. Table 5.5 presents the initial number of responses recorded in *Qualtrics*, the number of deleted responses and the final number of responses included in the analysis of the results.

Table 5.5: Number of responses

Experimental group	Group code	Initial number of responses	Number of deleted responses	Final number of responses
Control		35	0	35
“Dreaming big” (with no time lag)	A1	39	6	33
“Dreaming big” (with time lag)	B1	39	5	34
“A mother’s love” (with no time lag)	A2	37	2	35
“A mother’s love” (with time lag)	B2	36	1	35
Total		186	14	172

Source: Author’s own.

Due to internet connection problems encountered by some of the participants during the experiment, a small number of participants ended up with more than one recorded entry in *Qualtrics*. One of these recorded entries for each relevant participant was incomplete and was therefore removed from the data set, whilst the complete entries were preserved. Other participants had two entries recorded on *Qualtrics* with no difference in response between the two. One participant’s response was recorded in *Qualtrics* but was eventually omitted as the participant had not consented to take part in the experiment. After the removal of duplicate, multiple and incomplete responses, the final responses used for analysis totalled 172, representing one response for each participant.

For these remaining 172 responses, there were no missing data. As a result, consideration on how to treat missing data was not given as there was no need for such an assessment.

5.7.2 Descriptive analysis

The results of the pilot study have already been discussed (in Section 5.4.1). This section provides a descriptive analysis of the data collected in the final experiment conducted with 172 student participants. The demographic characteristics of the participants are presented, together with an analysis of their attitudes towards tax and their perceptions of corruption.

Age group: A very large majority of the participants (97.7 per cent) were in the 18 to 25 age group. The remaining 2.3 per cent of the participants fell into the 26 to 35 age group. This was expected as all of the participants were university students. Table 5.6 shows the details related to age group.

Table 5.6: Participants' age groups

Age group	Number of participants	Percentage
18 to 25	168	97.7
26 to 35	4	2.3
Total	172	100

Source: Experiment data.

Gender: Although the gender split of the University of Pretoria's EMS Faculty was 54.6 per cent female and 45.4 per cent male at the time when the experiment was conducted, a larger majority of the participants in the experiment (70.9 per cent) were female. As shown in Table 5.7, there is a low representation of males. This representation is similar to that of the pilot test, where a significant number of participants were also female.

Table 5.7: Participants' gender

Gender	Number of participants	Percentage
Female	122	70.9
Male	50	29.1
Total	172	100

Source: Experiment data.

Population group: A large majority of the participants (75.6 per cent) are Black African. This is followed by the number of White participants at 19.2 per cent. Coloured and

Indian/Asian participants make up 2.9 per cent and 2.3 per cent of participants, respectively, as shown in Table 5.8. This corresponds to the dynamics of the South African population group, where the majority of residents are Black African (80.7 per cent), with White, Coloured and Indian/Asian individuals as the minorities (Statistics South Africa, 2019a:vi).

Table 5.8: Participants' population groups

Population group	Number of participants	Percentage
Black African	130	75.6
White	33	19.2
Coloured	5	2.9
Indian/Asian	4	2.3
Total	172	100

Source: Experiment data.

Education level: A large majority of the participants (73.8 per cent) only had grade 12 (matric) qualifications, which was expected as the majority of the participants were undergraduate students. Meanwhile, those with an undergraduate degree or diploma made up 22.1 per cent of the participants, and those with a postgraduate degree or diploma made up the remainder as shown in Table 5.9.

Table 5.9: Participants' education levels

Highest qualification	Number of participants	Percentage
Grade 12 (matric)	127	73.8
Degree or diploma	38	22.1
Postgraduate degree	3	1.8
Postgraduate certificate	4	2.3
Total	172	100

Source: Experiment data.

Income tax knowledge: In the questionnaire that participants were asked to complete at the end of the experiment, they were asked to rate their knowledge of income tax and were given the options: very good, good, fair, poor, or very poor. The vast majority of participants (roughly 94 per cent) considered their tax knowledge to be fair or better, whilst fewer than 6 per cent rated their tax knowledge as poor or very poor. This is shown in Table 5.10, below. These results were expected given the fact that participants were drawn from a cohort of students in a business faculty.

Table 5.10: Participants' income tax knowledge

Income tax knowledge	Number of participants	Percentage
Very good	19	11
Good	75	43.6
Fair	68	39.5
Poor	8	4.7
Very poor	2	1.2
Total	172	100

Source: Experiment data.

Income tax registration: As expected, most of the participants, at the time of the study, had never been registered for income tax (83.1 per cent). This stands in contrast with the over 16 per cent who had previously been registered for income tax, as shown in Table 5.11.

Table 5.11: Participants' income tax registration status

Registered for income tax	Number of participants	Percentage
No	143	83.1
Yes	29	16.9
Total	172	100

Source: Experiment data.

Attitude towards tax: Participants were asked to state, using a 7 point Likert scale, whether they strongly agreed, agreed, somewhat agreed, neither agreed nor disagreed, somewhat disagreed, disagreed, or strongly disagreed with four statements related to their attitudes towards tax. (Note that a 7 point Likert scale was also used for responses to all subsequent attitudinal questions.) The lowest score (that is 1) indicates that participants strongly agreed with the statement and the highest score (that is 7) indicates that participants strongly disagreed with the statement.

Table 5.12 presents the minimum, maximum, mean and standard deviation scores related to participants' attitudes towards tax. The mean score for the first statement indicates that participants generally agreed that taxes are needed for the development of the country. This indicates a positive attitude towards tax. The mean scores for the second, third and fourth statements indicate that participants somewhat disagreed or disagreed with the statements, again indicating that participants generally have positive attitudes towards tax.

Table 5.12: Participants' attitudes towards tax (n = 172)

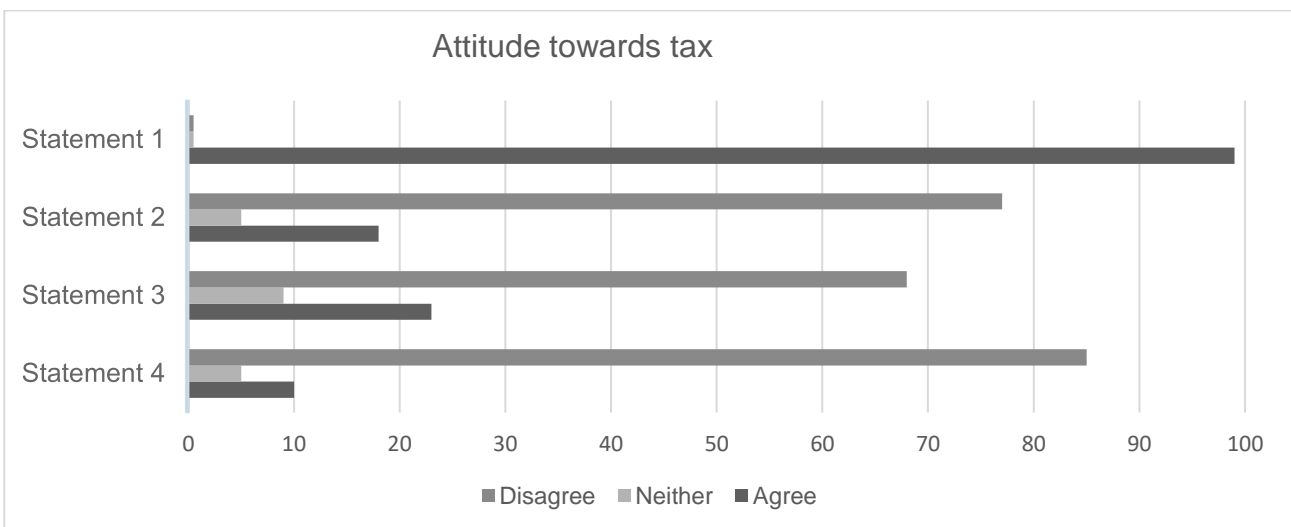
Construct	Statement	Minimum	Maximum	Mean	SD
Attitude towards tax	Citizens must pay their taxes to the government in order for our country to develop.	1	5	1.52	.753
Attitude towards tax	Underreporting my income will not hurt society as a whole.	1	7	5.51	1.782
Attitude towards tax	The government can find enough resources for development from other sources without having to tax the people.	1	7	5.00	1.522
Attitude towards tax	When dissatisfied with the government, it is justifiable to refuse to pay tax to the government.	1	7	5.85	1.474

Source: Experiment data.

These statements related to attitude towards tax were included in the questionnaire completed at the end of the experiment in order to determine whether participants' attitudes towards tax could have affected their tax compliance behaviour in the experiment.

Figure 5.3 shows the percentage of those who agreed with each of the four statements versus those who disagreed or neither agreed nor disagreed.

Figure 5.3: Participants' attitudes towards tax



Source: Experiment data.

Perceptions of corruption: Participants were asked whether they strongly agreed, agreed, somewhat agreed, neither agreed nor disagreed, somewhat disagreed, disagreed, or strongly disagreed with three statements related to participants' perceptions of corruption. The lowest score (that is 1) indicates that participants strongly agreed with the given statement and the highest score (that is 7) indicates that participants strongly disagreed with the statement.

Table 5.13 presents the minimum, maximum, mean and standard deviation scores related to participants' perceptions of corruption. As shown, the mean scores given by participants indicate that participants perceived the level of corruption as very high, as they tended to either strongly agree or agree with the statements provided. This is true of the levels of corruption involving both tax officials and government officials.

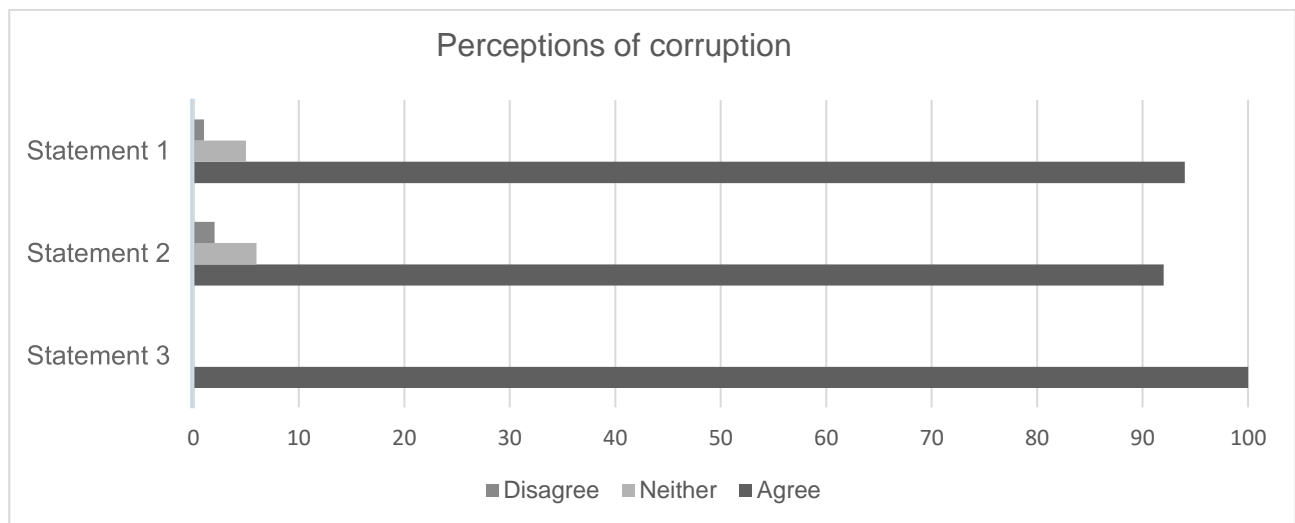
Table 5.13: Participants' perceptions of corruption (n = 172)

Construct	Statement	Minimum	Maximum	Mean	SD
Perception of corruption	The level of corruption involving high-level tax officials is high.	1	5	1.76	.915
Perception of corruption	The level of corruption involving high-level government officials is high.	1	6	1.74	1.001
Perception of corruption	The level of corruption in our country is high.	1	3	1.37	.572

Source: Experiment data.

These statements related to the perception of corruption were included at the end of the experiment questionnaire in order to determine whether participants' perceptions of corruption could have affected their tax compliance behaviour in the experiment. Figure 5.4 shows the percentage of those who agreed with the statements versus those who disagreed and those who neither agreed nor disagreed; and, as can be observed in Figure 5.4, a large percentage of the participants indicated perceptions of high levels of corruption.

Figure 5.4: Participants' perceptions of corruption



Source: Experiment data.

5.7.3 Inferential analysis and hypotheses testing

Due to the nature of the primary and secondary research questions (refer to Chapter 2 for a detailed discussion of the research questions), inferential statistical methods were considered appropriate to allow the researcher to make inferences from the data collected. In order to test the association between exposure to a reciprocity nudge message and tax compliance, as questioned in primary research question one, a Chi-square test for association was conducted. Further, in order to determine possible differences between experimental groups and to address the second primary research question as well as three of the secondary research questions, tests of two proportions (also known as the Chi-square test for homogeneity and Fisher's exact test) were conducted. Following these, a factor analysis was conducted to address the two remaining secondary research questions. This was followed by a Mann-Whitney U test to fully address the two secondary research questions. A logistic regression was also conducted to ascertain the effects of gender, income level, population group, attitude towards tax, perceptions of corruption and exposure to a reciprocity nudge message on tax compliance behaviour. A detailed discussion of each of these statistical methods is provided in this section.

5.7.3.1 Findings of primary research question one

In order to address the first primary research question (What is the effect of reciprocity nudges on the tax compliance behaviour of individual taxpayers?), a Chi-square test for association was conducted. The hypothesis tested and its related null hypothesis are:

P1H₀: There is no association between reciprocity nudge messages and the tax compliance behaviour of individual taxpayers.

P1H₁: There is an association between reciprocity nudge messages and the tax compliance behaviour of individual taxpayers.

The Chi-square test (χ^2) is a nonparametric test that is used to test for association between two nominal variables³⁸ (Laerd Statistics, 2016a:1). This is done by comparing observed frequencies in a cell to the expected frequency to determine if there is an association between the two nominal variables; the greater the association between the variables, the greater the difference between the observed frequencies and the expected frequencies (Laerd Statistics, 2016a:3).

There are several assumptions that have to be met before a Chi-square test can be conducted. The first assumption is that there are two categorical variables³⁹, the second assumption is that there is independence of observations,⁴⁰ and the third assumption is that all cells have expected value counts⁴¹ greater than five, relating to the nature of the data (Laerd Statistics, 2016a:3). As one of the main objectives of this study is to determine the association between reciprocity nudge messages and tax compliance behaviour, the first assumption was met, as these are two nominal variables.⁴² Due to the nature of the experimental design (a between-subjects design), the second assumption was also met. Finally, the third assumption was tested in *SPSS Statistics* and, since the expected value

³⁸ A nominal variable is a variable that has two or more categories which do not have an intrinsic order (Laerd Statistics, Not dated).

³⁹ A categorical variable is a nominal variable or an ordinal variable. A nominal variable is explained in footnote 35 and an ordinal variable is a variable that has two or more categories which can be ranked (Laerd Statistics, Not dated; 2016a:3).

⁴⁰ Independence of observation “means that there is no relationship between the observations in the groups of the categorical variables or between the groups themselves” (Laerd Statistics, 2016a:3).

⁴¹ Expected value count is the value expected for each cell if the variables are independent.

⁴² In this study, participants were grouped into categories. Participants’ compliance status was grouped as compliant or non-compliant. Participants in the treatment groups were grouped as being exposed to a nudge, with those in the control group as not. Thus, the participants were allocated into mutually exclusive and collectively exhaustive groups (Sekaran & Bougie, 2013:212).

counts were greater than five, the third assumption was also met. Table 5.14 shows the results of the hypothesis tested and the expected value counts.

Table 5.14: Expected value counts for all experimental groups

Cross tabulation					
			Tax compliance (1 = YES, 0 = NO)		Total
			0	1	
Treatment vs no treatment (1 = YES, 0 = NO)	0	Count	10	25	35
		Expected count	6.7	28.3	35.0
		% within Treatment vs no treatment (1 = YES, 0 = NO)	28.6%	71.4%	100.0%
		% within Tax compliance (1 = YES, 0 = NO)	30.3%	18.0%	20.3%
	1	Count	23	114	137
		Expected count	26.3	110.7	137.0
		% within Treatment vs no treatment (1 = YES, 0 = NO)	16.8%	83.2%	100.0%
		% within Tax compliance (1 = YES, 0 = NO)	69.7%	82.0%	79.7%
Total	Count	33	139	172	
	Expected count	33.0	139.0	172.0	
	% within Treatment vs no treatment (1 = YES, 0 = NO)	19.2%	80.8%	100.0%	
	% within Tax compliance (1 = YES, 0 = NO)	100.0%	100.0%	100.0%	

Source: SPSS output calculated from experiment data.

Tax compliance was measured by conducting a comparative analysis of the income reported by the participants and the income earned in the experiment. The dependent variable, tax compliance, is 0 if a participant reports less than actual income earned and 1 if income is truthfully reported. There were 12 participants whose declared income exceeded the amount earned. These participants were assumed to be compliant.

The results of the Chi-square test show no statistically significant association between exposure to a reciprocity nudge message and tax compliance: $\chi^2(1) = 2.496$, $p\text{-value} = .114$.

Therefore, the null primary hypothesis, P1H₀, was not rejected. The Cramer's V⁴³ effect size is $\phi_c = .120$, $p\text{-value} = .114$, which shows a weak association between exposure to a reciprocity nudge message and tax compliance. Refer to Tables 1 to 3 in Appendix 10 which show these results.

Participants in the treatment groups were exposed to two different nudge messages. One message (“Dreaming big”) was selected based on a content analysis process as likely to be the most effective message in positively influencing tax compliance behaviour, and the other (“A mother’s love”) was selected as the least likely to be effective. The related hypotheses tested are thus:

P3H₀: There is no association between the reciprocity message selected as most likely to be effective and tax compliance.

P3H₁: There is an association between the reciprocity message selected as most likely to be effective and tax compliance.

P4H₀: There is an association between the reciprocity message selected as least likely to be effective and tax compliance.

P4H₁: There is no association between the reciprocity message selected as least likely to be effective and tax compliance.

On this basis, a Chi-square test for association was conducted between exposure to the nudge message most likely to be effective (“Dreaming big”) and tax compliance. The expected value counts were greater than five. Participants who were exposed to the reciprocity nudge message that was most likely to be effective were more compliant compared to participants in the control group (refer to Tables 4 and 5 in Appendix 10 for the results). There was a statistically significant association between exposure to the reciprocity nudge message that was most likely to be effective and tax compliance: $\chi^2(1) = 4.376$, $p\text{-value} = .036$ (refer to Table 6 in Appendix 10 for the results). However, the strength of this association was also found to be weak: $\phi_c = .207$, $p\text{-value} = .036$ (refer to Table 7 in Appendix 10 for the results). Therefore, it can be stated that those participants who were exposed to this nudge are more likely to be tax compliant compared to the control group; thus, the null primary hypothesis, P3H₀, was rejected.

⁴³ Cramer's V is a measure of the strength of association between two categorical variables. It varies between 0 and 1. Standards for interpreting Cramer's V, as proposed by Cohen (1988), are the following: $df = 1$ (.10 = small effect; .30 = medium effect; .50 = large effect).

A Chi-square test for association was also conducted between exposure to the nudge message least likely to be effective (“A mother’s love”) and tax compliance. The expected value counts were greater than five. Although participants exposed to the nudge message least likely to be effective were more compliant compared to the control group (refer to Tables 8 and 9 in Appendix 10 for the results), there was no statistically significant association between exposure to the reciprocity nudge message least likely to be effective and tax compliance: $\chi^2(1) = .656$, $p\text{-value} = .418$ (refer to Table 10 in Appendix 10 for the results). The strength of the association was also found to be weak: $\phi_c = .079$, $p\text{-value} = .418$ (refer to Table 11 in Appendix 10 for the results). Therefore, the null primary hypothesis $P4H_0$ was rejected.

A comparison was also conducted between the tax compliance percentage rate of participants exposed to the nudge message most likely to be effective (“Dreaming big”) and those exposed to the nudge message least likely to be effective (“A mother’s love”). The tax compliance percentage rate of participants in the “Dreaming big” treatment groups (group A1 and group B1) was higher (88.1 per cent) than those in the “A mother’s love” treatment groups (groups A2 and B2) (78.6 per cent). However, this difference was not significant $p\text{-value} = .137$ (refer to Tables 12 and 13 in Appendix 10 for the results). Therefore, it can be stated that participants who were exposed to a nudge message (whether it was the message hypothesised as most likely to be effective or the one hypothesised as least likely to be effective) were more likely to be tax compliant compared to participants not exposed to a nudge message.

In summary, the results show that exposure to a reciprocity nudge message (whether it contains most attributes of an effective message or contains few of these attributes) has a positive effect on tax compliance behaviour, however a reciprocity nudge message containing most attributes of an effective message is more likely to have a significant effect on tax compliance behaviour compared to one with fewer attributes.

5.7.3.2 Findings of primary research question two

The aim of the second primary research question (What timing is appropriate when using reciprocity to encourage voluntary tax compliance?) is to determine whether there is a difference in the tax compliance behaviour of participants who viewed the reciprocity nudge message immediately before making the tax compliance decision and those who had a time lag between viewing the reciprocity nudge message and making the tax compliance decision. In order to address this question, a Chi-square test for homogeneity and a Fisher's exact test were conducted.

The Chi-square test for homogeneity is a statistical test used to determine if there is a difference in the binomial proportions of two independent groups on a dichotomous dependent variable⁴⁴ (Laerd Statistics, 2016c:1). Before a Chi-square test for homogeneity can be conducted, there are four assumptions that need to be met. The first assumption is that there is a dependent variable and an independent variable which are measured at a categorical level. This assumption was met as there are two variables (compliance behaviour⁴⁵ and time lag (yes/no) between the nudge message and tax compliance decision)⁴⁶ which are measured at a categorical level (Laerd Statistics, 2016c:3).

The second assumption is that there is no relationship between the observations in the groups (independence of observation). This is achieved by assigning different participants to each group. This assumption was met in this study, as a between-subjects experimental design was used, and participants were randomly allocated to the different experimental groups (Laerd Statistics, 2016c:3).

The third assumption that needs to be met before a Chi-square test for homogeneity can be conducted is either that a single sample is used in which participants are randomly allocated to groups, or that purposive sampling is used. In this study, students were selected as participants and were randomly allocated to one of the experimental groups (Laerd Statistics, 2016c:3). Hence, the requirements of the third assumption were met.

⁴⁴ A dichotomous variable is a variable that only has two categories, for example gender (Laerd Statistics, Not dated).

⁴⁵ Participants were categorised as compliant or non-compliant based on their reported income in the experiment.

⁴⁶ Participants were categorised as exposed to a time lag or not exposed to a time lag based on the treatment group to which they were assigned in the experiment.

The fourth assumption is that there is a sufficient sample size. This assumption was tested in *SPSS Statistics* and the expected value counts were greater than five for one of the reciprocity nudge messages; therefore, the assumption was met for that one reciprocity message. Table 5.15 presents the expected value counts for the reciprocity nudge message that satisfied this fourth assumption (“A mother’s love”) (Laerd Statistics, 2016c:3).

Table 5.15: Expected value counts for “A mother’s love” treatments (group A2 and group B2)

Cross tabulation				
		Tax compliance (1 = YES, 0 = NO)		Total
		0	1	
Group A2 “A mother’s love” (with no time lag)	Count	5	30	35
	Expected count	7.5	27.5	35.0
	% within Group	14.3%	85.7%	100.0%
Group B2 “A mother’s love” (with time lag)	Count	10	25	35
	Expected count	7.5	27.5	35.0
	% within Group	28.6%	71.4%	100.0%
Total	Count	15	55	70
	Expected count	15.0	55.0	70.0
	% within Group	21.4%	78.6%	100.0%

Source: *SPSS* output calculated from experiment data.

For the other reciprocity nudge message (“Dreaming big”), the fourth assumption for the Chi-square test for homogeneity was not met, as the expected value counts were not all greater than five as shown in Table 5.16. For this reason, the Fisher’s exact test was conducted.⁴⁷ There are three assumptions that have to be met in order for a Fisher’s exact test to be conducted. The first assumption is that there are two variables that have two categorical independent groups (Laerd Statistics, 2016b:3). This assumption was met for this hypothesis as the two variables, timing of the exposure to the nudge message and tax compliance, have two categorical independent groups.

The second assumption is that there is independence of observations (Laerd Statistics, 2016b:3). This assumption was met, as a participant exposed to the timing treatment could not be included in the groups with participants who were not exposed to the timing treatment

⁴⁷ The Fisher’s exact test is a test commonly used when samples are too small for a Chi-square test for homogeneity (Laerd Statistics, 2016c:11).

and vice versa, and a non-compliant participant could not be included as compliant and vice versa.

The third assumption is that cross-sectional sampling is used. This assumption was also met, as the data in this study were collected at a specific point in time.

Table 5.16: Expected value counts for “Dreaming big” treatments (group A1 and group B1)

Cross tabulation				
		Tax compliance (1 = YES, 0 = NO)		Total
		0	1	
Group A1 “Dreaming big” (with no time lag)	Count	5	28	33
	Expected count	3.9	29.1	33.0
	% within Group	15.2%	84.8%	100.0%
Group B1 “Dreaming big” (with time lag)	Count	3	31	34
	Expected count	4.1	29.9	34.0
	% within Group	8.8%	91.2%	100.0%
Total	Count	8	59	67
	Expected count	8.0	59.0	67.0
	% within Group	11.9%	88.1%	100.0%

Source: SPSS output calculated from experiment data.

The Chi-square test for homogeneity was conducted to determine if there was a difference in the tax compliance behaviour of participants who viewed the reciprocity nudge message (“A mother’s love”) immediately before making the tax compliance decision and those who had a time lag between viewing the video and making the tax compliance decision (in other words, if the distribution of proportions for the tax compliance categories (YES/NO) is the same for those for whom a time lag was present and for those for whom it was not).

The hypothesis tested and the related null hypothesis are:

P2H₁: There is a difference in the tax compliance behaviour of individuals who are exposed to a nudge immediately before making a tax compliance decision and those who have a time lag between viewing the nudge message and making a tax compliance decision for:

H_{1a}: “A mother’s love”

H_{1b}: “Dreaming big”

P2H₀: There is no difference in the tax compliance behaviour of individuals who are exposed to a nudge immediately before making a tax compliance decision and those who have a time lag between viewing the nudge message and making a tax compliance decision for:

H_{0a}: “A mother’s love”

H_{0b}: “Dreaming big”

Of the participants who watched “A mother’s love”, 70 were allocated either to the group that did not have a time lag between viewing the reciprocity video and making the tax compliance decision (group A2) or the group that had a time lag (group B2). There were 35 participants in each group. In terms of tax compliance, 30 participants (85.7 per cent) were compliant in group A2, compared with 25 (71.4 per cent) in group B2. The results indicate that no statistically significant difference exists between the two groups: $\chi^2(1) = 2.121$, *p-value* = .145 (refer to Tables 14 and 15 in Appendix 10 for the results). Therefore, the null primary hypothesis, P2H_{0a}, was not rejected.

For the “Dreaming big” video, as discussed previously, Fisher’s exact test was used to interpret the results. The purpose of this test was to determine whether there was a difference in the tax compliance behaviour of participants who viewed the reciprocity nudge message (“Dreaming big”) immediately before making the tax compliance decision (group A1) and those who had a time lag between viewing the video and making the tax compliance decision (group B1). Of these participants, 67 were allocated between the two groups: 33 participants in group A1 and 34 participants group B1. In terms of tax compliance, 27 participants (81.8 per cent) were compliant in group A1, compared with 31 (91.2 per cent) in group B1. The results therefore indicate that no statistically significant difference exists between the two groups: *p-value* = .305 (refer to Tables 16 and 17 in Appendix 10 for the results). Therefore, the null primary hypothesis, P2H_{0b}, was also not rejected.

In summary, the results for primary research question two indicate that there is no difference in tax compliance between individuals who are exposed to a reciprocity nudge message immediately before making a tax compliance decision and those who have a time lag between the exposure to the reciprocity nudge message and the making of the tax compliance decision.

5.7.3.3 Findings of secondary research question one

Secondary research question one (Does gender affect the effectiveness of a nudge intervention? In other words, is there a relationship between gender and the effectiveness of a nudge intervention?) was addressed by conducting a Fisher's exact test. The hypothesis tested and its related null hypothesis are:

S1H₁: There is an association between tax compliance behaviour and gender for individuals who are exposed to a nudge message.

S1H₀: There is no association between tax compliance behaviour and gender for individuals who are exposed to a nudge message.

As noted earlier, there are three assumptions that have to be met in order for a Fisher's exact test to be conducted. The first assumption is that there are two variables that have two categorical independent groups (Laerd Statistics, 2016b:3). This assumption was met for this hypothesis, as the two variables, gender and tax compliance, have two categorical independent groups: the variable, gender, has two groups (male and female); and the variable, tax compliance, has two groups (compliant and non-compliant).

The second assumption is that there is independence of observations (Laerd Statistics, 2016b:3). This assumption was met, as a male participant could not be included in the female group and vice versa, and a non-compliant participant could not be included as a compliant participant and vice versa.

The third assumption is that cross-sectional sampling is used. This assumption was also met, as the data in this study were collected at a specific point in time.

The results for the Fisher's exact test are presented per treatment group (based on video and time lag) in the tables that follow. The results for the first treatment group (group A1) are presented in Table 5.17. The majority, at 69.7 per cent, of the participants were female, whilst males comprised the other 30.3 per cent. The tax compliance percentage for both genders was above 80 per cent. Males were more compliant compared to females. The difference in the compliance percentage was 7.4 per cent.

Table 5.17: Gender and tax compliance for “Dreaming big” (with no time lag) treatment (group A1)

Cross tabulation					
			Tax compliance (1 = YES, 0 = NO)		Total
			0	1	
Gender	Female	Count	4	19	23
		Expected count	3.5	19.5	23.0
		% within Gender	17.4%	82.6%	100.0%
		% within Tax compliance vs non-compliance	80.0%	67.9%	69.7%
	Male	Count	1	9	10
		Expected count	1.5	8.5	10.0
		% within Gender	10.0%	90.0%	100.0%
		% within Tax compliance vs non-compliance	20.0%	32.1%	30.3%
Total	Count	5	28	33	
	Expected count	5.0	28.0	33.0	
	% within Gender	15.2%	84.8%	100.0%	
	% within Tax compliance vs non-compliance	100.0%	100.0%	100.0%	

Source: SPSS output calculated from experiment data.

The association between gender and tax compliance in group A1 was found to be statistically non-significant: $p\text{-value} > .1$ (refer to Tables 18 and 19 in Appendix 10 for the results).

Table 5.18 presents the results for the second treatment group (group B1). As with the first treatment group, the majority, at 67.6 per cent, of the participants in this treatment group were female, whilst males comprised the other 32.4 per cent. The tax compliance percentage in this group was over

90 per cent for both genders. Females were also slightly more compliant compared to males in this treatment group. The difference in the compliance percentage was 0.4 per cent.

Table 5.18: Gender and tax compliance for “Dreaming big” (with time lag) treatment (group B1)

Cross tabulation					
			Tax compliance (1 = YES, 0 = NO)		Total
			0	1	
Gender	Female	Count	2	21	23
		Expected count	2.0	21.0	23.0
		% within Gender	8.7%	91.3%	100.0%
		% within Tax compliance vs non-compliance	66.7%	67.7%	67.6%
	Male	Count	1	10	11
		Expected count	1.0	10.0	11.0
		% within Gender	9.1%	90.9%	100.0%
		% within Tax compliance vs non-compliance	33.3%	32.3%	32.4%
Total	Count	3	31	34	
	Expected count	3.0	31.0	34.0	
	% within Gender	8.8%	91.2%	100.0%	
	% within Tax compliance vs non-compliance	100.0%	100.0%	100.0%	

Source: SPSS output calculated from experiment data.

As with the previous treatment group, the association between gender and tax compliance in group B1 was found to be statistically non-significant: *p-value* > .1 (refer to Tables 20 and 21 in Appendix 10 for the results).

Table 5.19 presents the results for the third treatment group (group A2). As with the previous two treatment groups, the majority, at 74.3 per cent, of participants in this treatment group were female, whilst males comprised the other 25.7 per cent. The tax compliance percentage in this group was over 80 per cent for both genders. In this group, there was a difference of 4.3 per cent in the compliance rate with males being more compliant compared to females.

Table 5.19: Gender and tax compliance for “A mother’s love” (with no time lag) treatment (group A2)

Cross tabulation					
			Tax compliance (1 = YES, 0 = NO)		Total
			0	1	
Gender	Female	Count	4	22	26
		Expected count	3.7	22.3	26.0
		% within Gender	15.4%	84.6%	100.0%
		% within Tax compliance vs non-compliance	80.0%	73.3%	74.3%
	Male	Count	1	8	9
		Expected count	1.3	7.7	9.0
		% within Gender	11.1%	88.9%	100.0%
		% within Tax compliance vs non-compliance	20.0%	26.7%	25.7%
Total		Count	5	30	35
		Expected count	5.0	30.0	35.0
		% within Gender	14.3%	85.7%	100.0%
		% within Tax compliance vs non-compliance	100.0%	100.0%	100.0%

Source: SPSS output calculated from experiment data.

As with the previous two treatment groups, the association between gender and tax compliance in group A2 was found to be statistically non-significant: $p\text{-value} > .1$ (refer to Tables 22 and 23 in Appendix 10 for the results).

Table 5.20 presents the results for the fourth treatment group (group B2). As with the other three treatment groups, the majority, at 80 per cent, of participants in this treatment group were female, whilst males comprised the other 20 per cent. The tax compliance percentage in this group was 71.4 per cent for both genders.

Table 5.20: Gender and tax compliance for “A mother’s love” (with time lag) treatment (group B2)

Cross tabulation					
			Tax compliance (1 = YES, 0 = NO)		Total
			0	1	
Gender	Female	Count	8	20	28
		Expected count	8.0	20.0	28.0
		% within Gender	28.6%	71.4%	100.0%
		% within Tax compliance vs non-compliance	80.0%	80.0%	80.0%
	Male	Count	2	5	7
		Expected count	2.0	5.0	7.0
		% within Gender	28.6%	71.4%	100.0%
		% within Tax compliance vs non-compliance	20.0%	20.0%	20.0%
Total	Count	10	25	35	
	Expected count	10.0	25.0	35.0	
	% within Gender	28.6%	71.4%	100.0%	
	% within Tax compliance vs non-compliance	100.0%	100.0%	100.0%	

Source: SPSS output calculated from experiment data.

As with the other treatment groups, the association between gender and tax compliance in group B2 was found to be statistically non-significant: $p\text{-value} > .1$ (refer to Tables 24 and 25 in Appendix 10 for the results).

In order to gain a better understanding of the impact of gender on the effectiveness of a nudge intervention, a comparison was also conducted between the tax compliance percentage rate of females and those of males in the control group. The results show that females were 21 per cent less compliant compared to males. However, the association between gender and tax compliance in the control group was also found to be statistically non-significant: $p\text{-value} = .259$.

In summary, there was no statistically significant association between gender and tax compliance in any of the treatment groups. Therefore, as none of the null hypotheses were rejected, the secondary hypothesis that there is an association between tax compliance behaviour and gender for individuals who are exposed to a nudge message (with or without a time lag) was not supported. However, it is important to note that the difference in tax

compliance behaviour between females and males in the treatment groups was relatively smaller (with the highest difference being 7.4 per cent) whilst the difference in tax compliance behaviour based on gender was 21 per cent in the control group. This perhaps shows that reciprocity nudges are effective in positively influencing the tax compliance behaviour of taxpayers irrespective of their gender.

5.7.3.4 Findings of secondary research question two

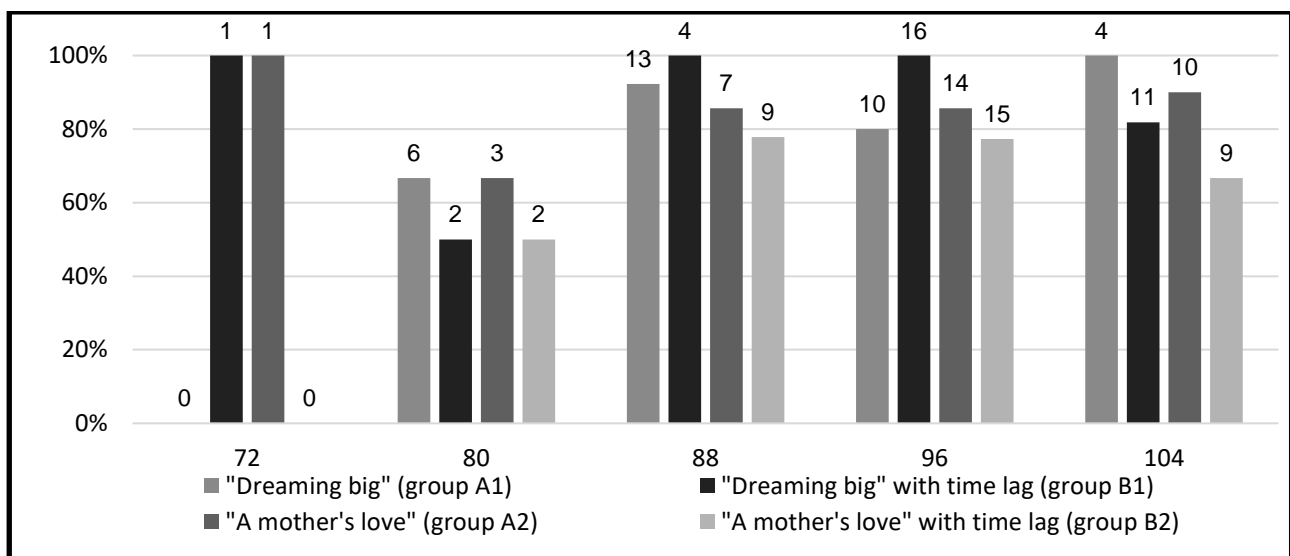
The second secondary research question (Does income level affect the effectiveness of a nudge intervention? In other words, is there a relationship between the level of income and the effectiveness of a nudge intervention for each treatment group?) was also addressed by conducting a Fisher's exact test. The hypothesis tested and its related null hypothesis are:

S2H₁: There is an association between tax compliance behaviour and income level for individuals who are exposed to a nudge message.

S2H₀: There is no association between tax compliance behaviour and income level for individuals who are exposed to a nudge message.

Figure 5.5 presents the findings for each treatment group in terms of tax compliance behaviour based on the level of income that participants earned in the experiment.

Figure 5.5: Income level and tax compliance rate



The minimum income that a participant could earn from the experiment was 0LC, and the maximum was 104LC. The LC was converted into rand at a rate of R1 = 1LC.

The numbers on the bottom of the graph indicate the income levels.

The numbers at the top of the bars indicate the number of participants in that income level per treatment group.

Source: experiment data.

The minimum income that a participant could earn from the experiment was 0LC and the maximum was 104LC. Participants earned 8LC for each correctly answered question in the experiment. None of the participants earned less than 72LC. There were five levels of income (72LC, 80LC, 88LC, 96LC and 104LC).

The tax compliance rate for the first treatment group (“Dreaming big” with no time lag: group A1) was lowest for participants in the R80 level of income, with the highest rate (100 per cent) observed for participants with the highest income earned. The overall tax compliance rate for this treatment group was 84.8 per cent. The association between the level of income and tax compliance in this group was found to be statistically non-significant: $p\text{-value} = .411$ (refer to Tables 26 to 28 in Appendix 10 for the results).

In the second treatment group (“Dreaming big” with time lag: group B1), the lowest tax compliance rate was 50 per cent relating to participants in the R80 level of income. Furthermore, participants in group B1 had the highest overall tax compliance rate of 91.2 per cent, with participants in three of the five income levels showing a tax compliance rate of 100 per cent. The association between the level of income and tax compliance in this treatment group was thus also found to be statistically non-significant: $p\text{-value} = .107$ (refer to Tables 28 to 31 in Appendix 10 for the results).

For the third treatment group (“A mother’s love” with no time lag: group A2), participants who earned R80 had the lowest tax compliance rate of 66.7 per cent. The overall tax compliance rate in group A2 was 85.7 per cent. Participants who earned R72, R88, R96 and R104 had a tax compliance rate equal to or higher than the overall compliance rate.

The association between the level of income and tax compliance in group A2 was thus also found to be statistically non-significant: $p\text{-value} = .833$ (refer to Tables 32 to 34 in Appendix 10 for the results).

In the last treatment group (“A mother’s love” with time lag: group B2), the lowest rate was in the R80 income level (50 per cent). There were no participants who earned R72. The overall tax compliance rate was 71.4 per cent, with participants in the R88 income level showing the highest tax compliance rate at 77.8 per cent. And once again, the association between the level of income and tax compliance in this group was thus found to be

statistically non-significant: $p\text{-value} = .849$ (refer to Tables 35 to 37 in Appendix 10 for the results).

In order to gain a better understanding of the impact of income level on the effectiveness of a nudge intervention, a comparison was conducted between the tax compliance percentages of participants in the different income levels in the control group. The results show that unlike in the treatment groups (where a lower tax compliance rate was observed in the lower income levels), in the control group participants who earned the highest income (104LC) were less compliant. However, the association between income level and tax compliance was also found to be statistically non-significant: $p\text{-value} = .174$.

In summary, there was no statistically significant association between income level and tax compliance in any of the treatment groups. Therefore, as none of the null hypotheses were rejected, the secondary hypothesis that *there is an association between tax behaviour and income level for individuals who are exposed to a nudge message with or without a time lag* was not supported.

5.7.3.5 Findings of secondary research question three

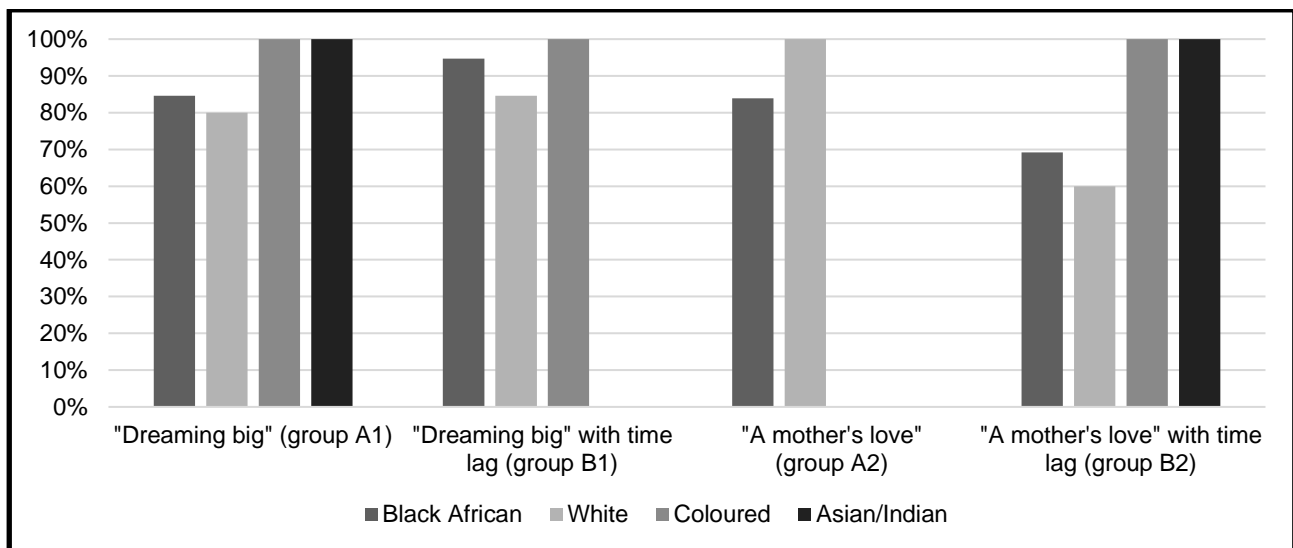
To address the third secondary research question (Does population group affect the effectiveness of a nudge intervention? In other words, is there a relationship between population group and the effectiveness of a nudge intervention for each treatment group?), a Fisher's exact test was conducted as there were cells with expected counts less than 5. The hypothesis tested and its related null hypothesis are:

S3H₁: There is an association between tax compliance behaviour and population group for individuals who are exposed to a nudge message.

S3H₀: There is no association between tax compliance behaviour and population group for individuals who are exposed to a nudge message.

Figure 5.6 presents the findings in terms of the tax compliance behaviour of participants in each treatment group, based on population group.

Figure 5.6: Population group and tax compliance



The percentage axis indicates the percentage of participants who were compliant.

Source: Experiment data.

As shown above, Coloured and Indian/Asian participants showed a compliance rate of 100 per cent. However, these observed results are perhaps due to the small sample of participants from these two population groups.⁴⁸ The compliance rate of White and Black African participants varied between the different treatment groups. In three of the four treatment groups (group A1, group B1 and group B2), Black African participants showed a slightly higher compliance rate than White participants, with the highest compliance rate difference at 10 per cent. However, in spite of the above, the association between tax compliance behaviour and population groups was found to be statistically non-significant in all of the treatment groups: $p\text{-value} = 1.000$ for group A1 (refer to Tables 38 to 40 in Appendix 10 for the results), $p\text{-value} = .629$ for group B1 (refer to Tables 41 to 43 in Appendix 10 for the results), $p\text{-value} = 1.000$ for group A2 (refer to Tables 44 to 46 in Appendix 10 for the results) and $p\text{-value} = .765$ for group B2 (refer to Tables 47 to 49 in Appendix 10 for the results).

A comparison was also conducted on the tax compliance behaviour of participants in the control group based on population group. The results show that White participants were more compliant (100 per cent compliance rate) compared to Black African participants with

⁴⁸ This is representative of the South African population where the majority of the citizens are Black African (80.9 per cent) and White, Coloured and Indian/Asian individuals being the minority White citizens make up 7.8 per cent of the population, Indian/Asian citizens account for 2.5 per cent of the population whilst Coloured citizens account for 8.8 per cent of the population (Statistics South Africa, 2018:2).

a compliance rate of 67.9 per cent. The association between tax compliance behaviour and population groups was also found to be statistically non-significant in the control group $p\text{-value}=.080$.

Therefore, as none of the null hypotheses were rejected, the secondary hypothesis that *there is an association between tax behaviour and population group for individuals who are exposed to a nudge message with or without a time lag* was not supported.

5.7.3.6 Findings of secondary research question four

The fourth secondary research question (Does attitude towards tax affect the effectiveness of a nudge intervention?) considers whether there is a difference in scores given for attitude towards tax between tax compliant participants and non-compliant participants per treatment group. This was measured by comparing the participants' attitudes towards tax with their tax compliance behaviour in each treatment group. The hypothesis tested and its related null hypothesis are:

S4H₁: There is no difference in the tax compliance behaviour of individuals with a more positive attitude towards tax and the tax compliance behaviour of those with a less positive attitude towards tax.

S4H₀: There is a difference in the tax compliance behaviour of individuals with a more positive attitude towards tax and the tax compliance behaviour of those with a less positive attitude towards tax.

In order to measure participants' attitudes towards tax, they were asked to state whether they strongly agreed, agreed, somewhat agree, neither agreed nor disagreed, somewhat disagree, disagreed, or strongly disagreed with the following four statements (Plus 94 Research, 2015; Rosid, Evans & Tran-Nam, 2018:25-26):

- Citizens must pay their taxes to the government in order for our country to develop.
- Underreporting my income will not hurt society as a whole.
- The government can find enough resources for development from other sources without having to tax the people.
- When dissatisfied with the government, it is justifiable to refuse to pay tax to the government.

The lowest score (that is 1) indicates that participants strongly agreed with the statement, and the highest score (that is 7) indicates that participants strongly disagreed with the statement.

Before an analysis could be performed to address the research question, a principal components analysis was conducted to determine whether the participants' responses to these four statements used as a measure of attitude towards tax could be reduced to one factor, described as attitude towards tax. A principal components analysis, similar to an exploratory factor analysis, is a statistical analysis method used to reduce a large set of correlated variables into smaller set of variables or one variable – referred to as the principal component – that explains most of the variance observed in the original variables. The principal component can then be used in further analysis (Laerd Statistics, 2015b:1, 4).

The result of the principal component analysis was that these items could not be reduced to one principal component but might rather be reduced into two principal components as shown in Table 5.21.

Table 5.21: Principal component analysis for attitude towards tax compliance

Component matrix and reliability statistics		
	Component	
	1	2
Attitude_Tax_V1	.747	
Attitude_tax_V2		.718
Attitude_tax_V3		.374
Attitude_tax_V4	.401	
Cronbach's alpha	.413	.452
Number of items	2	2

Source: SPSS output calculated from experiment data.

Cronbach's alpha coefficient was used as a reliability indicator for the items grouped per principal component. The Cronbach's alpha coefficients are $\alpha = .413$ and $\alpha = .452$, respectively. Based on these values, it can be concluded that the internal consistency of the four items used to measure attitude towards tax is not acceptable, as a value below .6 indicates unsatisfactory internal consistency (Sekaran & Bougie, 2013:293). This result is further supported by the low sampling adequacy score of .583 that was assessed using the

Kaiser-Meyer-Olkin (KMO) measure.⁴⁹ The minimum KMO requirement is also a value above .6. A value below .6 indicates that a principal component analysis is not appropriate to use (Laerd Statistics, 2015b:7). Therefore, the four items were not reduced to two principal components for further analysis but were kept as four separate items.

To address the research question, a Mann-Whitney U test was conducted on each of the four statements used to measure participants' attitudes towards tax. This is a nonparametric rank-based test that is used to determine the difference between two groups of a continuous or ordinal dependent variable (Laerd Statistics, 2015a:1). This test was conducted for each treatment group to determine if there was a difference in scores given for attitudes towards tax between tax compliant participants and non-compliant participants.

There are four assumptions that should be considered before conducting a Mann-Whitney U test. The first assumption is that there is a dependent variable that is measured on a continuous level or ordinal level.⁵⁰ Attitude towards tax is the dependent variable which is measured on an ordinal level; therefore, the first assumption was met.

The second assumption is that there is one independent variable that consists of two categories. In this study, the independent variable is tax compliance behaviour, with participants categorised either as compliant or non-compliant based upon their reported income earned from the experiment. If the participant reported all his or her income earned or overreported, the participant was categorised as compliant, and if the participant underreported his or her income, the participant was categorised as non-compliant. Thus, the second assumption was also met.

The third assumption that should be considered is that there is independence of observations. This assumption was also met, as participants were categorised either as compliant or non-compliant, meaning that no participant in the compliant group could also be in the non-compliant group and vice versa, resulting in independence of observations.

Finally, the fourth assumption relates to the distribution of scores for both groups of the independent variable. The Mann-Whitney U test is useful in determining whether there is a

⁴⁹ The KMO is a measure of whether data is suited for a principal component analysis.

⁵⁰ A continuous level of measurement indicates that the categories of the variable are measured on a continuous basis; an ordinal level of measurement indicates that the categories of the variable are measured on an ordered or ranked basis (Saunders *et al.*, 2012:475-476).

difference in distributions of two groups, using mean ranks when they have a different shape. When the distributions of scores have the same shape, the Mann-Whitney U test is then used to determine the difference in the medians of those groups (Laerd Statistics, 2015a:3). Whether the distribution of scores for each treatment group has a different shape or the same shape is discussed further when presenting the results for each treatment group, and the related figures are contained in Appendix 10.

Treatment group A1: “Dreaming big” (with no time lag)

Distributions of the attitude scores for tax compliant participants and non-compliant participants in treatment group one are not similar for any of the four statements (refer to Figures 1 to 4 in Appendix 10 for a visual inspection of the distributions of scores). Therefore, mean ranks were used to determine the difference in scores given for attitudes towards tax between tax compliant participants and non-compliant participants.

The scores in this group relating to statement one for tax compliant participants (mean rank = 16.84) and non-compliant participants (mean rank = 17.90) are not statistically significantly different ($U = 65.5$, $z = -.265$, $p\text{-value} = .827$), using an exact sampling distribution for U (Dineen & Blakesley, 1973:269-273). The scores relating to statement two for tax compliant participants (mean rank = 16.77) and non-compliant participants (mean rank = 18.30) are also not statistically significantly different ($U = 63.5$, $z = -.344$, $p\text{-value} = .752$), using an exact sampling distribution for U . The scores relating to statement three for tax compliant participants (mean rank = 16.95) and non-compliant participants (mean rank = 17.30) are not statistically significantly different either ($U = 68.5$, $z = -.077$, $p\text{-value} = .942$), using an exact sampling distribution for U . Finally, the scores relating to statement four for tax compliant participants (mean rank = 16.84) and non-compliant participants (mean rank = 17.90) are also not statistically significantly different ($U = 65.5$, $z = -.238$, $p\text{-value} = .827$), using an exact sampling distribution for U .

These results indicate that there was no statistically significant difference in the attitudes towards tax of those who were tax compliant versus those who were non-compliant in the treatment group that was exposed to the most effective nudge message with no time lag. Therefore, the tax compliance behaviour observed in this group was not influenced by the participants' attitudes towards tax.

Treatment group B1: “Dreaming big” (with time lag)

Distributions of the attitude scores for tax compliant participants and non-compliant participants in treatment group two are also not similar for any of the four statements (refer to Figures 5 to 8 in Appendix 10 for a visual inspection of the distributions of scores). Therefore, mean ranks were used to determine the difference in scores given for attitudes towards tax between tax compliant participants and non-compliant participants.

The scores in this group relating to statement one for tax compliant participants (mean rank = 16.77) and non-compliant participants (mean rank = 25.00) are not statistically significantly different ($U = 24$, $z = -1.478$, $p\text{-value} = .192$), using an exact sampling distribution for U (Dineen & Blakesley, 1973:269-273). The scores relating to statement two for tax compliant participants (mean rank = 18.37) and non-compliant participants (mean rank = 8.50) are also not statistically significantly different ($U = 73.5$, $z = 1.702$, $p\text{-value} = .105$), using an exact sampling distribution for U . The scores relating to statement three for tax compliant participants (mean rank = 17.94) and non-compliant participants (mean rank = 13.00) are not statistically significantly different either ($U = 60$, $z = .848$, $p\text{-value} = .449$), using an exact sampling distribution for U . Finally, the scores relating to statement four for tax compliant participants (mean rank = 18.16) and non-compliant participants (mean rank = 10.67) are also not statistically significantly different ($U = 67$, $z = 1.313$, $p\text{-value} = .237$), using an exact sampling distribution for U .

The results indicate that there was no statistically significant difference in the attitude towards tax of those who were tax compliant versus those who were non-compliant in the treatment group that was exposed to the most effective nudge message with a time lag. Therefore, the tax compliance behaviour observed in this group was also not influenced by the participants' attitudes towards tax.

Treatment group A2: “A mother’s love” (with no time lag)

As was found for treatment groups A1 and B1, the distributions of the attitude scores for tax compliant participants and non-compliant participants in treatment group A2 are not similar for any of the four statements (refer to Figures 9 to 12 in Appendix 10 for a visual inspection of the distribution of scores). Therefore, mean ranks were used to determine the difference in scores given for attitudes towards tax between tax compliant participants and non-compliant participants.

The scores in this group relating to statement one for tax compliant participants (mean rank = 19.2) and non-compliant participants (mean rank = 11.0) are not statistically significantly different ($U = 110$, $z = 1.913$, $p\text{-value} = .105$), using an exact sampling distribution for U (Dineen & Blakesley, 1973:269-273). However, the scores relating to statement two for tax compliant participants (mean rank = 19.55) are statistically higher than those for non-compliant participants (mean rank = 8.70) ($U = 125.5$, $z = 2.246$, $p\text{-value} = .025$), using an exact sampling distribution for U . Meanwhile, the scores relating to statement three for tax compliant participants (mean rank = 16.45) are statistically lower than those of non-compliant participants (mean rank = 27.30) ($U = 28.50$, $z = -2.231$, $p\text{-value} = .025$), using an exact sampling distribution for U . Finally, the scores relating to statement four for tax compliant participants (mean rank = 18.45) and non-compliant participants (mean rank = 15.30) are once again not statistically significantly different ($U = 88.5$, $z = .672$, $p\text{-value} = .536$), using an exact sampling distribution for U .

The results for treatment group A2 indicate that, like with participants exposed to the most effective nudge message in treatment groups A1 and B1, there is no conclusive indication that attitudes towards tax had an impact on the tax compliance behaviour of participants exposed to the least effective nudge message with no time lag. In two of the statements, there were statistically significant differences in mean ranks; however, in one statement the non-compliant participants had more positive attitudes towards tax than the tax compliant participants, whilst in the other statement, the non-compliant participants had less positive attitudes towards tax than the compliant participants.

A possible explanation for these results is the fact that there is generally evidence of a weak correlation between attitude towards tax and actual tax compliance behaviour in that individuals may have a positive attitude towards tax, but that does not necessarily translate to tax compliant behaviour (Elffers *et al.*, 1987:311-337; Hessing *et al.*, 1988:405-413).

Treatment group B2: “A mother’s love” (with time lag)

Distributions of the attitude scores for tax compliant participants and non-compliant participants in treatment group B2 are similar for statements one, two and three and not similar for statement four (refer to Figures 13 to 16 in Appendix 10 for a visual inspection of the distribution of scores). Therefore, median scores were used to determine the difference in scores for attitudes towards tax between tax compliant participants and non-compliant

participants for statements one, two and three. Meanwhile, the difference in scores for attitudes towards tax between tax compliant participants and non-compliant participants for statement four was determined using mean ranks.

The median scores in this group relating to statement one for tax compliant participants (1.00) and non-compliant participants (1.00) are not statistically significantly different ($U = 111$, $z = -.610$, $p\text{-value} = .627$), using an exact sampling distribution for U (Dineen & Blakesley, 1973:269-273). The median scores relating to statement two for tax compliant participants (7.00) and non-compliant participants (6.00) are also not statistically significantly different ($U = 152$, $z = 1.062$, $p\text{-value} = .339$), using an exact sampling distribution for U . The median scores relating to statement three for tax compliant participants (5.00) and non-compliant participants (6.00) are not statistically significantly different either ($U = 89.5$, $z = -1.343$, $p\text{-value} = .198$), using an exact sampling distribution for U . Finally, the scores relating to statement four for tax compliant participants (mean rank = 18.7) and non-compliant participants (mean rank = 16.1) are also not statistically significantly different ($U = 144$, $z = .760$, $p\text{-value} = .506$), using an exact sampling distribution for U .

The results indicate that, like in the other treatment groups, there is no compelling evidence that the attitudes towards tax of the participants who were tax compliant differed from the attitudes of those who were non-compliant in the treatment group that was exposed to the least effective nudge message with a time lag. Therefore, the tax compliance behaviour observed was not influenced by the participants' attitudes towards tax. Similar results were also observed in the control group where there was no statistically significant difference in the mean ranks of compliant participants and those of non-compliant participants in relation to three of the statements (statements 1, 2 and 4).

However, there was a statistically significant difference in the mean ranks for statement 3 ($U = 180$, $z = 2.068$, $p\text{-value} = .045$, tax compliant participants had a mean rank of 20.20 and non-compliant participants had a mean rank of 12.50).

In summary, the results related to the difference between attitudes towards tax and tax compliance based on the four treatment groups can be presented as shown in Table 5.22.

Table 5.22: Summary of findings of attitude towards tax compliance

Treatment group	Statement 1 Citizens must pay their taxes to the government in order for our country to develop.	Statement 2 Underreporting my income will not hurt society as a whole.	Statement 3 The government can find enough resources for development from other sources without having to tax the people.	Statement 4 When dissatisfied with the government, it is justifiable to refuse to pay tax to the government.
“Dreaming big” (with no time lag: group A1)	<u>No statistically significant difference</u> in attitude scores of tax compliant participants and non-compliant participants	<u>No statistically significant difference</u> in attitude scores of tax compliant participants and non-compliant participants	<u>No statistically significant difference</u> in attitude scores of tax compliant participants and non-compliant participants	<u>No statistically significant difference</u> in attitude scores of tax compliant participants and non-compliant participants
“Dreaming big” (with time lag: group B1)	<u>No statistically significant difference</u> in attitude scores of tax compliant participants and non-compliant participants	<u>No statistically significant difference</u> in attitude scores of tax compliant participants and non-compliant participants	<u>No statistically significant difference</u> in attitude scores of tax compliant participants and non-compliant participants	<u>No statistically significant difference</u> in attitude scores of tax compliant participants and non-compliant participants
“A mother’s love” (with no time lag: group A2)	<u>No statistically significant difference</u> in attitude scores of tax compliant participants and non-compliant participants	<u>Statistically significant difference</u> in attitude scores of tax compliant participants and non-compliant participants	<u>Statistically significant difference</u> in attitude scores of tax compliant participants and non-compliant participants	<u>No statistically significant difference</u> in attitude scores of tax compliant participants and non-compliant participants
“A mother’s love” (with time lag: group B2)	<u>No statistically significant difference</u> in attitude scores of tax compliant participants and non-compliant participants	<u>No statistically significant difference</u> in attitude scores of tax compliant participants and non-compliant participants	<u>No statistically significant difference</u> in attitude scores of tax compliant participants and non-compliant participants	<u>No statistically significant difference</u> in attitude scores of tax compliant participants and non-compliant participants

Source: Author’s own.

Therefore, the null primary hypothesis, S4H₀, was rejected for each treatment group.

5.7.3.7 Findings of secondary research question five

The fifth secondary research question (Does perception of corruption affect the effectiveness of a nudge intervention?) relates to whether there is a difference between participants' perceptions of corruption and tax compliance in each of the treatment groups. This was measured by comparing the participants' tax compliance behaviour with their perceptions of corruption for each treatment group. The hypothesis tested and its related null hypothesis are:

S5H₁: Individuals with a high perception of corruption will be less compliant than those with a lower perception of corruption.

S5H₀: There is no difference in the tax compliance behaviour of individuals with a high perception of corruption and the tax compliance behaviour of those with a lower perception of corruption.

In order to determine their perceptions of corruption, participants were asked to state whether they strongly agreed, agreed, somewhat agreed, neither agreed nor disagreed, somewhat disagreed, disagreed, or strongly disagreed with the following three statements (with strongly agreed represented as a 1 and strongly disagreed as a 7) (Rosid, 2017):

- The level of corruption involving high-level tax officials is high.
- The level of corruption involving high-level government officials is high.
- The level of corruption in our country is high.

Before further analysis could be performed, an initial principal components analysis was conducted in order to determine whether these three items could be reduced to one principal component, broadly described as the perception of corruption. The sampling adequacy value of .644 meets the requirement for a minimum KMO value, as a value above .6 indicates that a principal component analysis is appropriate to use (Laerd Statistics, 2015b:7). Correlations between the items (scores of the 3 statements) are large enough to perform a principal component analysis (Bartlett's test of sphericity⁵¹ χ^2 (89.199), p -value <

⁵¹ Bartlett's test of sphericity is used to determine whether the differences between the variables that are examined in the principal component analysis do not significantly differ from zero. The principal component analysis is only conducted if the test is significant (Cramer & Howitt, 2004).

.001). Accordingly, the result of the principal components analysis is that the three items could be reduced into one principal component as shown in Table 5.23 below.

Table 5.23: Principal components analysis for perception of corruption scores

Component matrix and reliability statistics	
	Component
	1
Perception_corruption_V1	.627
Perception_corruption_V2	.807
Perception_corruption_V3	.537
Cronbach's alpha	.676
Number of Items	3

Source: SPSS output calculated from experiment data.

The Cronbach's alpha coefficient is $\alpha = .676$. Based on this value, it can be concluded that the internal consistency of the three items (scores of the 3 statements) used to measure perception of corruption is acceptable. The average of the three items was calculated in order to construct the latent variable⁵² measuring the perception of corruption. This single variable was then used in the further analysis discussed below.

In order to compare the relationship between the participants' tax compliance behaviour and their perceptions of corruption, a Mann-Whitney U test was conducted to determine whether there was a statistical difference in the mean scores for perceptions of corruption of tax compliant participants and the scores of those who were non-compliant. These results are presented below for each treatment group.

There are four assumptions that should be considered before conducting a Mann-Whitney U test. The first assumption is that there is a dependent variable that is measured on a continuous level or ordinal level. Perception of level of corruption (a lower score indicates a higher perception of corruption) is the dependent variable which is measured on a continuous level; therefore, the first assumption was met.

The second assumption is that there is one independent variable that consists of two categories. In this study, the independent variable is tax compliance behaviour, with participants categorised either as compliant or non-compliant based upon their reported

⁵² A latent variable is a variable that is not directly observed; rather, it is a variable created from other observed variables. In this study, the observed variables are the three perception of corruption statements.

income earned from the experiment. If the participant reported all his or her income earned or overreported, the participant was categorised as compliant, and if the participant underreported his or her income, the participant was categorised as non-compliant. Thus, the second assumption was also met.

The third assumption that should be considered is that there is independence of observations. This assumption was also met, as participants were categorised either as compliant or non-compliant, meaning that no participant in the compliant group could also be in the non-compliant group and vice versa, resulting in independence of observations.

Finally, the fourth assumption that needs to be considered before conducting a Mann-Whitney U test relates to the distribution of scores for both groups of the independent variable. This is an important factor that has to be determined when using the Mann-Whitney U test. Whether the distributions of scores for the groups of the independent variable have the same shape or a different shape determines how the results of the Mann-Whitney U test are interpreted (Laerd Statistics, 2015a:3): if the distributions of scores have a different shape, the Mann-Whitney U test is interpreted using mean ranks; but if the distributions of the scores have the same shape, the Mann-Whitney U test is interpreted using the medians of the two groups of the independent variable.

Whether the distributions of scores for each treatment group have a different shape or the same shape is discussed further when presenting the results for each treatment group, and the related figures are contained in Appendix 10.

Treatment group A1: “Dreaming big” (with no time lag)

The distributions of scores for tax compliant participants and non-compliant participants in treatment group A1 are not similar (refer to Figure 17 in Appendix 10 for a visual inspection of the distribution of scores). The mean ranks for tax compliant participants (16.70) and non-compliant participants (18.70) are not statistically significantly different, ($U = 61.50$, $z = -.447$, $p\text{-value} = 0.679$), using an exact sampling distribution for U (Dineen & Blakesley, 1973:269-273). This suggests that participants had similarly high perceptions of corruption; however, given that 27 of the 33 participants were compliant, it also suggests that their compliant behaviour could have been driven by another factor or factors apart from their perceptions of corruption. One of those factors could be the reciprocity nudge message that the participants were exposed to.

Treatment group B1: “Dreaming big” (with time lag)

The distributions of scores for tax compliant participants and non-compliant participants in treatment group B1 are also not similar (refer to Figure 18 in Appendix 10 for a visual inspection of the distribution of scores). The mean ranks for tax compliant participants (18.32) and non-compliant participants (9.00) are also not statistically significantly different ($U = 72$, $z = 1.590$, $p\text{-value} = .136$), using an exact sampling distribution for U (Dineen & Blakesley, 1973:269-273). This suggests that participants had similarly high perceptions of corruption, as with treatment group A1; however, given that 31 of the 34 participants were compliant, it also suggests that their compliant behaviour could have been driven by another factor or factors apart from their perceptions of corruption. One of those factors could be the reciprocity nudge message that the participants were exposed to.

Treatment group A2: “A mother’s love” (with no time lag)

Much like in treatment groups A1 and B1, the distributions of scores for tax compliant participants and non-compliant participants in treatment group A2 are not similar (refer to Figure 19 in Appendix 10 for a visual inspection of the distribution of scores). The mean ranks for tax compliant participants (16.15) and non-compliant participants (29.10), however, are statistically significantly different ($U = 19.5$, $z = -2.732$, $p\text{-value} = .006$), using an exact sampling distribution for U (Dineen & Blakesley, 1973:269-273). This suggests that compliant participants exposed to the least effective nudge message with no time lag had a higher perception of corruption than non-compliant participants in this treatment group.

Treatment group B2: “A mother’s love” (with time lag)

Like all the other treatment groups, the distributions of scores for tax compliant participants and non-compliant participants in treatment group B2 are not similar (refer to Figure 20 in Appendix 10 for a visual inspection of the distribution of scores). Additionally, as in treatment groups A1 and B1, the mean ranks for tax compliant participants (19.36) and non-compliant participants (14.60) in this group are not statistically significantly different ($U = 159$, $z = 1.284$, $p\text{-value} = .225$), using an exact sampling distribution for U (Dineen & Blakesley, 1973:269-273). This suggests that, in this treatment group, participants had similarly high perceptions of corruption; however, given that 25 of the 35 participants were compliant, it also suggests that their compliant behaviour could have been driven by another factor or factors apart from their perception of corruption. One of those factors could be the reciprocity nudge message that the participants were exposed to.

A comparison was also conducted between perception of corruption and tax compliance behaviour of participants in the control group. The difference in mean ranks between compliant participants and those who were not compliant is not statistically significantly different ($U = 169, z = 1.645, p\text{-value} = .113$).

The results for the treatment groups are summarised in Table 5.24.

Table 5.24: Summary of findings for perceptions of corruption

Treatment group	Result
“Dreaming big” (with no time lag: group A1)	No statistically significant difference in mean perception of corruption scores between tax compliant participants and non-compliant participants
“Dreaming big” (with time lag: group B1)	No statistically significant difference in mean perception of corruption scores between tax compliant participants and non-compliant participants
“A mother’s love” (with no time lag: group A2)	Statistically significant difference in mean perception of corruption scores between tax compliant participants and non-compliant participants
“A mother’s love” (with time lag: group B2)	No statistically significant difference in mean perception of corruption scores between tax compliant participants and non-compliant participants

Source: Author’s own.

Considering the overall results, the null primary hypothesis, $S5H_0$, was supported.

5.7.3.8 Logistic regression

In addition to the various statistical tests outlined above in relation to the relationships and differences between the key variables and their impact upon the primary and secondary research questions, a binomial logistic regression⁵³ was also performed to ascertain the effects of gender, income level, population group, attitude towards tax, perception of corruption and exposure to a reciprocity nudge message on tax compliance behaviour. This regression was performed in order to predict the probability of tax compliance behaviour given an individual’s gender, income level, population group, attitude towards tax, perception of corruption and exposure to a reciprocity nudge message.

⁵³ A binomial logistic regression “attempts to predict the probability that an observation falls into one of two categories of a dichotomous dependent variable based on one or more independent variables that can be either continuous or categorical” (Laerd Statistics, 2017:1).

One of the procedures conducted was the Box-Tidwell procedure (Box & Tidwell, 1962:531-550). This procedure assesses the linearity of the continuous variables with respect to the logit of the dependent variables. The results of this assessment indicate that none of the interaction terms are statistically significant at the 5 per cent level of significance; therefore, the linearity assumption was not violated for any of the continuous variables (refer to Table 5.0 in Appendix 10 for the results). The Hosmer and Lemeshow test⁵⁴ was also conducted and showed non-significance, indicating that the model fit is adequate. Table 5.25 shows the value and level of significance of the Hosmer and Lemeshow test conducted.

Table 5.25: Assessment of model

Test	Value	Significance
Hosmer and Lemeshow test	9.891 (<i>df</i> = 8)	<i>p</i> -value = .273
Nagelkerke R ²	.142	

Source: SPSS output calculated from experiment data.

The percentage of cases correctly classified improved from 80.8 per cent to 81.4 per cent. Sensitivity was 99.3 per cent; specificity was 6.1 per cent; positive predictive value was 81.7 per cent; and negative predictive value was 66.7 per cent. Table 5.26 shows the results of a hierarchical logistic regression in which the dependent variable is tax compliance which takes the value of 1 if a participant was compliant and a value of 0 for non-compliant participants. As one of the primary research questions of this study concerned the effect of reciprocity nudges on the tax compliance behaviour of individual taxpayers, in the logit regression the treatment groups that were exposed to the reciprocity nudge messages are used as dummy variables and the control group is used as the base category.

In line with our hypothesis as observed in Table 5.26, there is a statistically significant association between exposure to the reciprocity nudge message containing most structural and content attributes of an effective message (“Dreaming Big”) (and which also communicates a reciprocal public good or services that resonates with the target audience) and tax compliance. The odds ratio indicates that participants exposed to this reciprocity nudge message were 3.11 more likely to be compliant than participants in the control group who were not exposed to a reciprocity nudge message. We find no statistically significant association between exposure to the reciprocity nudge message that contained the least

⁵⁴ The Hosmer and Lemeshow test is used to assess the goodness of fit of logistic regression models (Laerd Statistics, 2017:11).

structural and content attributes of an effective message (“A Mother’s Love”) and tax compliance. However, the odds ratio indicates that participants exposed to this reciprocity nudge message were still 1.63 more likely to be compliant than participants in the control group.

Table 5.26: Logistic regression

Logistic regression predicting tax compliance behaviour based on gender, population group, attitude towards tax, income level, perception of corruption and exposure to a reciprocity nudge message								
	(B)#	(S.E.)#	Wald#	df#	Sig.#	Exp(B) #	95% confidence intervals for Exp(B)#	
							Lower	Upper
Control group			4.253	2	.119			
“A Mother’s Love” nudge message	.493	.511	.931	1	.334	1.638	.601	4.459
“Dreaming Big” nudge message	1.136	.554	4.214	1	.040**	3.115	1.053	9.220
Gender	-.516	.492	1.100	1	.294	.597	.228	1.565
Income level	-.024	.027	.816	1	.366	.976	.925	1.029
Population_group			.332	3	.954			
Population_group Black African	-.326	.595	.300	1	.584	.722	.225	2.317
Population_group Coloured	-.034	1.387	.001	1	.980	.967	.064	14.652
Population_group Indian/Asian	19.859	19190.900	.000	1	.999	421400877.1	.000	
Attitude towards_tax (Statement 1)	-.136	.296	.210	1	.646	.873	.488	1.560
Attitude towards_tax (Statement 2)	.318	.120	7.041	1	.008***	1.374	1.087	1.737
Attitude towards_tax_(Statement 3)	-.163	.148	1.212	1	.271	.850	.636	1.136
Attitude towards_tax (Statement 4)	-.035	.149	.055	1	.814	.966	.722	1.292
Perception of corruption	.385	.337	1.303	1	.254	1.470	.759	2.847
Constant	2.696	2.946	.837	1	.360	14.815		

Note: The dependent variable, tax compliance, is 0 if a participant reports less than actual income earned and 1 if income is truthfully reported. There were 12 participants whose declared income exceeded the amount earned. These participants were assumed to be compliant.

“A Mother’s Love” nudge video denotes whether the participant was exposed to this specific nudge message, equal to 1 for participants exposed to this nudge message and 0 for participants not exposed to this nudge message.

“Dreaming Big” nudge video denotes whether the participant was exposed to this specific nudge message, equal to 1 for participants exposed to this nudge message and 0 for participants not exposed to this nudge message.

Income level indicates income earned in the experiment: the minimum income that a participant could earn from the experiment was zero and the maximum was 104LC.

The four statements related to attitudes towards tax are summarised in Table 5.22 above.

* Significant at the 10 per cent level

** Significant at the 5 per cent level

***Significant at the 1 per cent level

#(B): Beta coefficient; (S.E): Standard error around coefficient; Wald: Wald statistic; df: Degrees of freedom; Sig.: Significance; Exp (B): Odds ratio.

Source: SPSS output calculated from experiment data.

The odds ratio for female participants to be tax compliant was only .597 as likely as male participants, which suggests that males are more likely to be tax compliant than females. However, the gender difference in tax compliance behaviour is not statistically significant. There is also no statistically significant difference in tax compliance behaviour based on population group. The results further show that as level of income increases the odds ratio of tax compliance decreases (i.e. less likely) but again the difference is not statistically significant.

We find a statistically significant association between Statement 2 of the attitudes towards tax variables and tax compliance whilst there is no significant association between the other three attitudes towards tax variables and tax compliance. In relation to the statistically significant attitude towards tax variables, compliant participants tended to have positive attitudes towards tax compared to non-compliant participants. The results also show that in relation to attitude Statements 1, 3 and 4, for each unit increase in attitude towards tax, participants are less likely to be compliant. However, attitude towards tax Statement 2 indicates that for each unit increase in attitude towards tax, participants are 1.37 more likely to be tax compliant. A possible explanation for these results is the fact that there is generally evidence of a weak correlation between attitude towards tax and actual tax compliance behaviour in that individuals may have a positive attitude towards tax, but that does not necessarily translate to tax compliant behaviour and vice versa (Elffers, Weigel & Hessing, 1987:311-337; Hessing, Elffers & Weigel, 1988:405-413).

As indicated in Table 5.26, there is also no statistically significant association between perception of corruption and tax compliance.

The results in Table 5.26 are confirmatory of the previous results presented in this thesis relating to the one-on-one relationships of the variables included in the regression with tax compliance behaviour. In other words, the logit regression confirms that the nudge message that was selected as likely to be the most effective was indeed effective in influencing the odds of tax compliance behaviour. There is, however, no statistically significant relationship between any of the other variables measured (gender, income level, population group, attitude towards tax, and perception of corruption) and the likelihood of being tax compliant. The only exception is that statement two for attitudes towards tax did influence the likelihood of being tax compliant.

In summary, the overall results of the current study are presented in Table 5.27.

Table 5.27: Summary of hypotheses-testing outcomes

Hypothesis	Outcome
P1H ₁ : There is an association between reciprocity nudge messages and the tax compliance behaviour of individual taxpayers.	There is no statistically significant association between exposure to a reciprocity nudge message and tax compliance. Therefore, the null primary hypothesis, P1H ₀ , was not rejected.
P2H ₁ : There is a difference in the tax compliance behaviour of individuals who are exposed to a nudge immediately before making a tax compliance decision and those who have a time lag between viewing the nudge message and making a tax compliance decision.	There is no statistically significant difference in tax compliance between individuals exposed to a reciprocity nudge message immediately before making a tax compliance decision and those who have a time lag between the exposure to the reciprocity nudge message and the making of the tax compliance decision. Therefore, the null primary hypothesis, P2H ₀ , was not rejected.
P3H ₁ : There is an association between the reciprocity message selected as most likely to be effective and tax compliance.	There is a statistically significant association between exposure to the reciprocity nudge message selected as most likely to be effective and tax compliance. Therefore, the null primary hypothesis, P3H ₀ , was rejected.
P4H ₁ : There is no association between the reciprocity message selected as least likely to be effective and tax compliance.	There is no statistically significant association between exposure to the reciprocity nudge message selected as least likely to be effective and tax compliance. Therefore, the null primary hypothesis, P4H ₀ , was rejected.

Hypothesis	Outcome
S1H ₁ : There is an association between tax compliance behaviour and gender for individuals who are exposed to a nudge message.	There is no statistically significant association between gender and tax compliance. Therefore, the null secondary hypothesis, S1H ₀ , was not rejected.
S2H ₁ : There is an association between tax compliance behaviour and income level for individuals who are exposed to a nudge message.	There is no statistically significant association between income level and tax compliance. Therefore, the null primary hypothesis, S2H ₀ , was not rejected.
S3H ₁ : There is an association between tax compliance behaviour and population group for individuals who are exposed to a nudge message.	There is no association between population group and tax compliance. Therefore, the null primary hypothesis, S3H ₀ , was not rejected.
S4H ₁ : There is no difference in the tax compliance behaviour of individuals with a more positive attitude towards tax and the tax compliance behaviour of those with a less positive attitude towards tax.	There is no statistically significant difference in the attitude scores of tax compliant participants and non-compliant participants. Therefore, the null primary hypothesis, S4H ₀ , was rejected.
S5H ₁ : Individuals with a high perception of corruption will be less compliant than those with a lower perception of corruption.	There is no difference in the tax compliance behaviour of individuals with a high perception of corruption and the tax compliance behaviour of those with a lower perception of corruption. Therefore, the null primary hypothesis, S5H ₀ , was not rejected.

Source: Experiment data.

In this section, the results addressing each primary and secondary research question have been presented. The next section provides an explanation of these results in the context of previous research.

5.8 DISCUSSION

This section provides a discussion on the results observed in this study and on the implications of these results for the use of reciprocity nudge messages as a strategy to improve voluntary tax compliance. The findings as they relate to each research question are discussed below.

5.8.1 Primary research question one: What is the effect of reciprocity nudges on the tax compliance behaviour of individual taxpayers?

P1H₁ proposes that there is an association between reciprocity nudge messages and tax compliance. The use of reciprocity nudge messages has not been as widely researched as the use of social norms and deterrence nudge messages, and although research into the

use of reciprocity nudges has produced mixed results, there is still some evidence that reciprocity nudges are indeed effective in improving voluntary tax compliance and also in improving attitudes towards fairness. Roberts (1994:67-86), for instance, found that communicating public service information to taxpayers has a positive effect on improving their attitudes towards fairness and tax compliance. Meanwhile, Hasseldine *et al.* (2007:171-194) found that reciprocity nudges have a positive effect on tax compliance. This is further supported by Ortega and Sanguinetti (2013), who found similar results. Mascagni *et al.* (2017) further found that reciprocity nudges are more effective than deterrence nudges in influencing tax compliance behaviour. Similar results to these have also been found in other studies that have been discussed in Section 2.5 of this thesis (Bott *et al.*, 2017; Castro & Scartascini, 2015:65-82; Hallsworth *et al.*, 2017:14-31). However, still other studies have found little or no effect of reciprocity nudge messages on tax compliance (Ariel, 2012:27-69; Blumenthal *et al.*, 2001:125-138; Torgler, 2004:235-253).

In addition to the above studies that have specifically considered the use of reciprocity messages as nudges to increase tax compliance, other studies have analysed the role of fiscal exchange (also referred to as reciprocity) in influencing tax compliance. Two such studies found that how taxes are spent influences tax compliance and that taxpayers are more likely to have a tax compliant attitude if they are satisfied with certain public goods or services provided by the government (Ali *et al.*, 2014:828-842; Alm *et al.*, 1993:285-303).

The findings of the current study, based on the statistical analysis performed, suggest that there is indeed an association between reciprocity nudge messages and tax compliance. The results show that, compared with the control group, participants in the treatment groups showed a higher rate of tax compliance, although the difference was not statistically significant. This finding indicates that $P1H_0$ can be partly rejected. The findings of this study are similar to the findings of studies such as the one by Castro and Scartascini (2015:65-82), who found that reciprocity nudges have heterogeneous effects based on other factors such as the level of public goods or services provided.

Based on the findings of this thesis, it is evident that the effectiveness of the nudge was also based on another factor, which is the structural and content attributes of a nudge message. As mentioned in Section 5.7.3, participants in the treatment groups were exposed to two different reciprocity nudge messages: one message was hypothesised as likely to be the

most effective message, and the other was hypothesised as likely to be the least effective (refer to Chapter 4 for a detailed discussion of the content analysis process). The results show that participants exposed to the nudge message hypothesised as most likely to be effective (groups A1 and B1) were indeed more tax compliant than the control group. The association between exposure to this reciprocity nudge message and tax compliance was therefore found to be statistically significant. The results further show that although the tax compliance rate of participants exposed to the reciprocity nudge message hypothesised as least likely to be effective (groups A2 and B2) was higher than the compliance rate of participants in the control group, there was no statistically significant association between exposure to that nudge message and tax compliance. These findings therefore indicate that both P3H₀ and P4H₀ can be rejected.

The findings related to research question one highlight the importance of designing nudge messages that have the appropriate structural attributes to capture the attention of the target audience. The results point to an important aspect of appropriate message content. As emphasised by Mascagni (2018:290), the type of public good or service communicated to taxpayers in these nudge messages matters. Different types of public good or service may generate different responses to the nudge for different taxpayers. This is also linked to the finding by Ali *et al.* (2014:828-842) that taxpayers are more likely to have a tax compliant attitude if they are satisfied with certain public goods or services provided by the government.

5.8.2 Primary research question two: What timing is appropriate when using reciprocity to encourage voluntary tax compliance?

P2H₁ proposes that there is a difference in the tax compliance behaviour of participants who are exposed to a reciprocity nudge message immediately before making a tax compliance decision and those who have a time lag between exposure to the nudge and making a tax compliance decision. Previous research has indicated that the timing of a nudge intervention is an important aspect to consider (Behavioural Insights Team, 2014:37). McGraw and Scholz (1991:471-498) found no evidence that normative appeals have an effect on tax compliance behaviour in their study, where there was a three-month time lag between the participants' exposure to the nudge treatment and participants' making the actual tax compliance decision. Blumenthal *et al.* (2001:125-138) also found that normative appeals have no significant effect on tax compliance behaviour; the long time lag between

participants' exposure to the nudge treatments and participants' making the tax compliance decision could have influenced the results observed in this study. Meanwhile, Wenzel (2001) highlights that a long time lag between participants' exposure to a nudge treatment and making their tax compliance decision is likely to have an impact on the effectiveness of the nudge. However, Gillitzer and Sinning (2018) found that varying the timing of payment reminders (the reminders were used as a nudge to influence tax compliance behaviour) has no effect on tax compliance behaviour.

In the current study, advertisement videos served as a proxy for time for the participants who were exposed to the timing treatment. There were two experimental groups that were exposed to the timing treatment (groups B1 and B2) and two experimental groups that were not (groups A1 and A2) (refer to Section 5.3 for a description of the nudge in each of the different treatment groups). The participants in the timing treatment groups had a time lag between exposure to the nudge treatment and making their tax compliance decision, whilst participants in the other treatment groups were required to make their tax compliance decision immediately after being exposed to the nudge treatment.

The results of the current study provide a lack of conclusive evidence for whether timing of a nudge message has any effect on tax compliance behaviour. Participants in the timing treatment group that viewed the "A mother's love" nudge video (group B2) had a lower tax compliance rate than participants who viewed the same video but were not exposed to the timing treatment (group A2), whilst participants in the timing treatment group that viewed the "Dreaming big" nudge video (group B1) had a higher tax compliance rate than those who viewed the same nudge video but were not exposed to the timing treatment (group A1). The results thus indicate that there is no significant association between the timing of the nudge message and tax compliance. Hence, $P2H_0$ cannot be rejected.

A possible reason for these results may be the different way in which the effect of timing was tested in this study. Unlike in field experiments where this aspect can be practically tested by varying the time by days or weeks, or even months, in the current study, advertisement videos were used as a proxy for time, which, it could be argued, may have influenced the effectiveness of this treatment.

5.8.3 Secondary research question one: Does gender affect the effectiveness of a nudge intervention?

S1H₁ proposes that there is a difference in the tax compliance behaviour of females and males who are exposed to a nudge message. Previous research has indicated that there is a difference in the tax compliance behaviour of females and males. Jackson and Jaouen (1989:131-147) found that females are more tax compliant than males when exposed to a conscience appeal. Torgler (2003a:27-56) also found that females are more compliant than males; however, this was not a strong difference. Similar results were also found by Bott *et al.* (2017), and Hasseldine and Hite (2003:517-533) found that females are more compliant than males when a message is positively framed. Fochmann and Wolf (2019:260-277) found in an experiment that female participants were less likely to evade taxes than male participants. Other studies, such as the one by Kirchler and Maciejovsky (2001:173-194), have also found a significant correlation between tax compliance and gender, but, unlike the previously mentioned studies, these found that males are more compliant than females. Furthermore, Hallsworth *et al.* (2017:14-31) found no significant difference based on gender in how the participants responded to nudge treatment letters, apart from the fact that males responded more positively to a loss-framed message than females.

The findings from the current study indicate that there is a slight difference in the tax compliance rate of males versus females in three of the four treatment groups (group A1, group A2 and group B1); however, this difference is not statistically significant. In two of the treatment groups, females were slightly more compliant than males (group A1 and group B1), and in one of the treatment groups, males were slightly more compliant than females (group A2). A similar comparison conducted on the control group revealed a much higher difference (21 per cent) in the compliance behaviour between females and males. These findings do not provide solid evidence of the association between gender and tax compliance when participants have been exposed to a nudge message.

One possible reason for these conflicting results is the sample size of male participants in this study. Males make up only 29 per cent of the total sample size and are not representative of the population, and thus, the results cannot be generalised to the broader population. Hence, S1H₀ cannot be rejected.

5.8.4 Secondary research question two: Does income level affect the effectiveness of a nudge intervention?

S2H₁ proposes that there is a difference in tax compliance behaviour based on income level. In this study, income level is the participant's accumulated income in the experiment before any taxes and penalties have been deducted. Previous research has indicated that upper-middle-income earners are more influenced by a nudge message than taxpayers in other income levels (Blumenthal *et al.*, 2001:125-138). Alm *et al.* (2017:587-613) found that wealth is negatively correlated to tax compliance. Ali *et al.*'s (2001:186-202) study also suggests that low-income earners are more likely to be compliant than high-income earners. Castro and Scartascini (2015:76) also found that individuals with presumably lower levels of wealth respond more positively to nudge messages than those with presumed higher levels of wealth.

The findings from the current study suggest that low-income earners are less compliant than high-income earners, although the difference in tax compliance is not statistically significant. These results conflict with the prior research discussed above which seems to indicate that low-income earners are more compliant than high-income earners. However, this finding is supported by Blumenthal *et al.* (2001:125-138), who also found that upper-middle-income taxpayers are more compliant.

A possible reason for the results observed in this study is that high-income earners were less willing to risk losing their high income should they be selected for an audit and found to be non-compliant, whilst lower-income earners were more willing to take that risk. The results therefore indicate that S2H₀ cannot be rejected.

5.8.5 Secondary research question three: Does population group affect the effectiveness of a nudge intervention?

S3H₁ proposes that there is a difference in tax compliance behaviour based on the population group of the individuals exposed to a reciprocity nudge message. Previous research into the impact of ethnicity and culture on tax compliance behaviour has generally indicated that there is a difference in tax compliance behaviour based on culture or ethnicity, although there are some studies that have indicated no difference. Kasipillai and Jabbar (2006:73-88) found no significant difference in tax compliance behaviour based on ethnicity. Al-Mamun *et al.* (2014:109-124), however, did find a difference in tax compliance between

different ethnic groups. These results are similar to those of Alabede (2014:39-64), who studied the effect of various demographic variables on the tax compliance behaviour of individuals in Nigeria and found a significant difference in tax compliance behaviour based on the ethnicity of the individual taxpayer. Alabede (2014:46) notes that differences in the cultures of taxpayers may result in differences in the tax compliance behaviour of taxpayers. Similarly, Torgler (2003b) analysed tax morale and tax compliance behaviour in Costa Rica and Switzerland and found that compliance behaviour differs across different cultural settings. Similar results were also found in his 2004 study, which tested the effects of normative appeals on tax compliance behaviour. In the 2004 study, Swiss citizens were found to be less compliant than foreigners. Similar results were also observed in an earlier study conducted by Cummings *et al.* (2001) on cross cultural comparisons of tax compliance behaviour. The results of that study, which was conducted in Botswana, South Africa and the USA, demonstrate that tax compliance behaviour differs across the countries that were studied.

The findings of the current study indicate that the compliance rate of White and Black African participants varied between the different treatment groups. In three of the four treatment groups, Black African participants showed a slightly higher compliance rate than White participants, with the highest compliance rate difference of 10 per cent (group A1, group B1 and group B2). However, the difference in tax compliance behaviour between the population groups was found to be statistically non-significant. Therefore, $S3H_0$ cannot be rejected.

5.8.6 Secondary research question four: Does attitude towards tax affect the effectiveness of a nudge intervention?

$S4H_1$ proposes that there is no difference in the tax compliance behaviour of individuals with a more positive attitude towards tax and the tax compliance behaviour of those with a less positive attitude towards tax. Previous research has indicated a weak link between attitude towards tax and actual tax compliance behaviour. Although there has been a considerable amount of research in this area, there are limited studies that have examined the relationship between attitude towards tax and actual tax compliance behaviour (Kirchler, 2007:55). The focus of studies in this area has been on the correlation between attitude towards tax and self-reported behaviour, with the aim of predicting actual tax compliance behaviour. Orviska and Hudson (2003:83-102) found a weak correlation between attitudes and self-reported tax evasion.

They observed cases where people who viewed tax evasion as morally wrong still evaded taxes and where people who did not believe that tax evasion was wrong did not evade taxes (Orviska & Hudson, 2003:91). Two other studies found that although there is a positive but weak correlation between attitude towards tax and self-reported tax evasion, attitude towards tax is not a significant predictor of actual tax compliance behaviour (Elffers *et al.*, 1987:311-337; Hessing *et al.*, 1988:405-413). Kirchler (2007:55) further notes that there is a complex relationship between attitude and behaviour, and, based on this, it can be concluded that "... attitudes cannot be perceived as a convincing proxy for behaviour".

Although in one of the treatment groups of the current study (group A2) there was a statistically significant difference in the mean ranks of two of the statements used to measure attitude towards tax, in all other treatment groups the findings of the current study suggest that there was no statistically significant difference in the attitudes towards tax of tax compliant participants and those who were non-compliant. Therefore, there is no compelling evidence that the attitude towards tax of people who are tax compliant differs from the attitude of those who are non-compliant. Thus, $S4H_0$ was rejected.

5.8.7 Secondary research question five: Does perception of corruption affect the effectiveness of a nudge intervention?

$S5H_1$ proposes that individuals with a high perception of corruption are less tax compliant than those with a lower perception of corruption. Previous research has indicated that there is a positive correlation between perception of corruption and tax compliance behaviour. Gangl *et al.* (2015) found that perception of corruption has an adverse impact on willingness to comply. Rosid *et al.* (2016:387-425) also found that perceptions of corruption have an influence on individual taxpayers' intentional non-compliant behaviour. Further, Alon and Hageman (2013:479-494) found that high levels of corruption result in lower levels of tax compliance, and Picur and Riahi-Belkaoui (2006:174-180) also found that tax compliance is positively related to the control of corruption.

The findings in the current study related to this research question are mixed. In one of the treatment groups (group A2), there is a statistically significant difference in the scores given for perception of corruption by participants who were compliant and those who were non-compliant; surprisingly, those who were tax compliant had a higher perception of corruption than those who were non-compliant.

In the other treatment groups, however, statistically non-significant differences were observed. In these treatment groups (A1, B1 and B2), the non-compliant participants had a higher perception of corruption than the compliant participants. Therefore, $S5H_0$ was not rejected.

The results of this study may arguably indicate that, regardless of perception of corruption, a reciprocity nudge will have an impact on tax compliance behaviour.

5.9 CONCLUSION

In this chapter, the process and outcomes related to the experiment conducted in this study have been presented. The chapter has provided a description of the experimental design, a description of the treatment groups (in Section 5.3) and an explanation of the pilot testing conducted, together with the results of that pilot testing and the resulting modifications to the experiment (Section 5.4). Further, Sections 5.5 and 5.6 have provided an overview of how participants in the experiment were selected and an explanation of the procedures followed in the experiment. Section 5.7 has presented the results of the main experiment, followed by the discussion of the findings that has been supplied in Section 5.8.

The findings of this study suggest that a reciprocity nudge message delivered through audio-visual media has an effect on tax compliance behaviour provided that the message contains the necessary attributes to make it effective. But the findings are inconclusive as to the possible effect of the timing of the nudge. The chapter has also provided a discussion on other variables tested such as the potential effect of gender, income level, population group, attitude towards tax and perception of corruption on the effectiveness of a reciprocity nudge message.

In the next chapter, a summary of the thesis is provided, together with an outline of the significance of the thesis and the implications of its findings (including its contribution to the literature and to the discipline). The limitations of the research and recommendations for future research are also provided.

CHAPTER 6: CONCLUSION

6.1 INTRODUCTION

This final chapter begins, in Section 6.2, by providing a summary of the thesis and its major findings. Section 6.3 then identifies the contributions made by this thesis to the literature. This is followed by a discussion of the implications of the thesis findings for revenue authorities and policy makers in Section 6.4. Section 6.5 then discusses the limitations of the study, and Section 6.6 provides suggestions for future research. Final comments are provided in Section 6.7.

6.2 SUMMARY OF THE THESIS AND ITS FINDINGS

This study set out to explore the effect of nudges on the tax compliance of individual taxpayers. The study has focused in particular on the effect of reciprocity messages used as a nudge to improve voluntary tax compliance in developing countries such as South Africa. The general literature on this subject is limited, as the focus of previous research studies has been developed countries and the use of social norm nudge messages to influence tax compliance behaviour (Blumenthal *et al*, 2001:125-138; Coleman, 1996; Hallsworth *et al*, 2017:14-31; Hasseldine *et al*, 2007:171-194). This study has also sought to investigate the effect of the timing of nudge messages on tax compliance and whether variables such as gender, income level, population group, attitude towards tax and perception of corruption have any impact on the effectiveness of reciprocity nudge messages in influencing tax compliance behaviour in the context of African developing countries. Another important and often overlooked aspect that this thesis focuses on is the structural and content attributes that are appropriate to ensure the effectiveness of reciprocity nudge messages.

Therefore, the study has sought to answer these questions:

- What is the effect of reciprocity nudges on the tax compliance behaviour of individual taxpayers in South Africa?
- What structural and content message attributes are appropriate when using reciprocity to encourage voluntary tax compliance?
- What timing is appropriate when using reciprocity to encourage voluntary tax compliance?

- Does the effect of reciprocity nudges differ based on variables such as gender, income level, population group of the taxpayer, attitude towards tax and perception of corruption?

In order to adequately answer these research questions, the thesis has first provided an overview of the South African PIT system, together with a discussion on attitudes towards tax compliance in South Africa. This information has been given in order to provide context for the study. Strategies to address issues of tax compliance that are currently adopted or have been adopted in the past by the country's revenue authority have also been discussed. From this overview, it has been gathered that SARS makes use of a range of compliance strategies, from enforcement-based strategies such as audits, to strategies that aim to educate taxpayers about their tax compliance responsibilities; however, there is still an overreliance on enforcement-based strategies. Given the high costs and limited human capital resources associated with conducting audits, this overreliance on reactive enforcement strategies is not sustainable. As noted by the OECD (2017), there is a growing need for tax authorities to make use of proactive tax compliance strategies such as nudging.

The definition of tax compliance has been explored in Chapter 2 of this study. It has been noted that several definitions of tax compliance exist in the literature (Brand, 1996:413-419; James & Alley, 2002:27-42; McKerchar & Evans, 2009:171-201) and that this needs to be understood and discussed in order to identify a definition that represents the context of this thesis. From this review, it has been found that the definition of tax compliance can be broadly categorised into three approaches.

The first approach is the enforcement approach in which the tax gap is used as a measure of tax non-compliance. According to this approach, tax compliance would be achieved if there were no difference between the amount owed by taxpayers and the amount actually paid by taxpayers to tax authorities. The second approach is the conceptual approach, which refers to tax compliance as taxpayers' willingness to pay their taxes. The third approach is the operational approach, which focuses on administrative aspects such as registering for tax, filing returns and other required tax information in a timely manner, reporting complete and accurate information, and paying tax obligations in a timely manner. For the purposes of this thesis, an operational approach to the definition has been applied, as this allows for operationalisation of the research questions.

As part of the review of what is meant by tax compliance, the three models generally identified in tax compliance research have also been reviewed. These are economic deterrence models, social psychology models and fiscal psychology models. Based on this review, it has been found that early research into tax compliance tended to apply the economic deterrence models (Allingham & Sandmo, 1972:323-338; Srinivasan, 1973:339-346; Yitzhaki, 1974:201-202), which view the taxpayer as an economic maximiser who decides on how much to conceal from the tax authorities in order to maximise the taxpayer's utility. However, as research has developed through the years, researchers have found that taxpayers' compliance is affected by other factors that are possibly not captured in the economic deterrence models (Alm *et al.*, 1992:21-38; Elffers and Helsing, 1997:289-304; Webley *et al.*, 1991). This has resulted in a move towards social psychology models and fiscal psychology models, which take into account more varied social and fiscal psychological factors that could influence tax compliance behaviour. By understanding the different models adopted in tax compliance research, the context of this thesis can be better understood.

The concept of voluntary tax compliance has also been discussed in Chapter 2. Literature has been reviewed in order to gain an understanding of factors that might have an influence on voluntary tax compliance. This review is appropriate as the aim of this thesis has been to study the effect of using nudge messages as a strategy to influence voluntary tax compliance behaviour, particularly messages incorporating these factors that have been found to have an influence on tax compliance behaviour. Factors such as fairness, which refers to both the perceived fairness of the consequences of norm breaking and the perceived balance of public goods received and taxes paid, have been identified as factors that have an influence on voluntary tax compliance behaviour. Other factors such as trust in tax authorities, social norms and motivational tendencies to comply have also been identified. However, due to the multi-dimensionality of these factors, it was decided that the focus of this thesis would be on one, which is the communication of reciprocity nudge messages. Reciprocity nudges refer to nudges using beliefs about the delivery of goods or services by the government, which ties in with the concept of fairness.

Following the discussion about factors influencing voluntary tax compliance, a discussion of nudge theory has been provided, as this thesis focuses on the use of reciprocity messages as nudges to influence voluntary tax compliance.

From this discussion of nudge theory, it has been gathered that nudging is a concept that originates from behavioural economics and, in recent years, has been explored increasingly by policymakers as a tool to influence behaviours ranging from tax compliance to health-related behaviours. Nudge theory recognises that humans are not just economic maximisers who make decisions or choices on a rational basis but that they have limitations when required to make decisions or choices. These limitations are thought to arise as a result of the two systems that control human reasoning, referred to as System 1 and System 2: behaviour from System 1 is typically automatic, whereas behaviour from system 2 is reflective. Considering the above view, it has been noted that nudges are not viewed as paternalistic in the classical concept of paternalism, as they do not forbid freedom of choice or make it harder for an individual to make a choice. Furthermore, it has been found that investment goods and sinful goods are good candidates for nudges and that the use of nudges is not limited to specific sectors; they can be applied in various sectors as measures to encourage or discourage certain behaviours. In light of this, literature related to the use of nudges in taxation has been reviewed in order to obtain an understanding of the status of literature in this area and to identify gaps in the literature.

In order to address the gaps that have been identified in the literature and thus address the research problem, it was considered appropriate to adopt a mixed methods approach to this study. A mixed methods approach has the advantage of allowing a researcher to collect data that provide insight to help formulate hypotheses about a cause and effect relationship. The method also provides the opportunity for one method to inform another in order to improve the quality of the research findings. In this thesis, a core sequential mixed method was applied. Initially, a qualitative content analysis process was conducted in order to identify, from existing literature (Phillips *et al.*, 2011:1204-1218; Skubisz *et al.*, 2016:13-20; Weiss & Tschirhart, 1994:82-119), the structural and content attributes of an effective message aimed at changing behaviour. One of the important advantages of applying the qualitative content analysis is that it allowed the researcher to start with an open mind in order to fully understand the phenomenon being studied. It also allowed the researcher to broadly explore literature from different fields of study in order to gain an in-depth understanding of key attributes that are required in order for a message aimed at changing behaviour to be effective. Furthermore, through this process, hypotheses about the cause and effect relationship between the existence of appropriate structural and content message attributes and the effectiveness of a nudge message were formulated.

As discussed in Chapter 4, the qualitative content analysis has identified certain key structural and content attributes that a message must possess in order to be effective in changing behaviour. The first is that the message must capture the target audience's attention so that it can be easily remembered. In order to capture attention, visual cues such as the use of intense colour and movement can be incorporated. Music can also be used to capture the attention of the audience. The second key attribute is that the message must provide the audience with new information which can facilitate changes in behaviour. The third attribute is that the message must evoke emotion in the target audience, and messages that evoke a positive emotion such as joy and pride have a greater impact than those that evoke negative emotions.

The fourth key attribute of an effective message that has been identified through the qualitative content analysis is that the message must be communicated by a credible source, which refers to the degree to which the person or organisation that is communicating the message is seen as trustworthy and as possessing the relevant expertise on the subject matter (this applies both to the spokesperson and to the organisation providing the message). The fifth attribute is how the message is framed: a message can be framed in such a way that it highlights the gains when tax compliance is high, or it can be framed to highlight the losses when tax compliance is low (the former represents a positively framed message and the latter represents a negatively framed message). The effectiveness of either of these two ways of framing a message is dependent on the recipient's regulatory focus.

The sixth and seventh key attributes of an effective message are that the message must be credible and clear. For the message to be credible, it must contain truthful information, not untrue information or information aimed at deceiving the audience; and for the message to be clear, it must be kept as simple as possible and deal with one issue instead of many. The eighth attribute is that the message should be two-sided, which means that it presents both sides of an argument, because two-sided messages have been found to be more effective than one-sided messages in effecting changes in behaviour. The ninth key attribute is message efficacy. This comes from the fact that, in order for individuals to be motivated to act based on the message communicated to them, it is important that the message provides individuals with tools to give the individuals the ability to change their behaviour. Such tools include communicating to the audience how they can change their behaviour; in the context

of tax nudges, this would mean, for example, providing the audience with information regarding deadlines for filing returns or making payments, or guiding them to a source from which this information can be obtained.

The tenth attribute identified through the qualitative content analysis is that the message should provide information that fits with prior knowledge, as this has been found to assist in the understandability of the message being communicated. The eleventh attribute can be seen in relation to an entire campaign aimed at changing behaviour in that the campaign must direct attention in order for it to be effective as a whole. This can be done by raising awareness on some issues and not on others. Finally, the twelfth attribute is that the message must have an appropriate duration of exposure, because the longer the message is broadcast, the greater the probability that it will retain attention.

The qualitative content analysis was followed by a quantitative content analysis that was carried out on 12 SARS videos in order to identify the video that contains most of the attributes identified in the qualitative content analysis phase and another that contains the fewest attributes. This provided the opportunity to use the insights gained in the content analysis process in order to improve the quality of the research findings gathered in the experiment phase of the study.

The results from the quantitative content analysis of 12 SARS videos are that all videos contained structural attributes of an effective message communicated using audio-visual media. Eight of the videos contain the most content attributes of an effective message, and 4 contain the fewest content attributes. As only two of the videos had to be selected for the purposes of the experimental phase of this thesis, a video titled “Dreaming big”, which was one of the eight videos containing the most attributes, was selected based on the type of public good or service communicated in the video (education). It has been noted from literature that public goods or services that resonate with the target audience are likely to have a stronger influence on the audience than public goods or services that do not resonate with the target audience (Ali *et al.*, 2014:828-842; Oberholzer *et al.*, 2008:23-48). Additionally, a video titled “A mother’s love”, which was one of the four videos identified as having the fewest attributes, was selected based on the type of good or service (social grants) that was rated by four staff members from the EMS Faculty at the University of Pretoria as least likely to have an impact on their tax compliance decision.

The experimental phase of the thesis was designed based on the above results. The advantage of conducting an experiment was that it allowed the researcher to test the cause and effect relationship between exposure to a reciprocity nudge message and tax compliance behaviour. This allowed for testing of the formulated hypotheses. This design also provided a major advantage in that it allowed the researcher to observe actual tax compliance behaviour instead of relying on self-reported behaviour (literature has found that there is a weak correlation between self-reported behaviour and actual tax compliance behaviour (Elffers *et al.*, 1987:311-337; Hessing *et al.*, 1988:405-413). The two videos selected from the content analysis phase (“Dreaming big” and “A mother’s love”) were utilised in the design of experiment. The experimental design was piloted to ensure that potential issues that might affect the data collection process were identified and corrected. The quantitative experiment was then conducted with 172 participants.

As discussed in Chapter 5, the data from the experiment were analysed using descriptive as well as inferential statistical methods. There were a number of findings.

The findings from the experiment reveal that the structural and content attributes of a message used as a nudge to influence voluntary tax compliance behaviour are important. As hypothesised, the reciprocity nudge video selected as most likely to have a positive influence on tax compliance was found to have a statistically significant association with tax compliance, and the reciprocity nudge video selected as least likely to have a positive influence on tax compliance behaviour was found to have a statistically non-significant association with tax compliance.

It was found that the timing between the exposure to a reciprocity nudge message and the making of a tax compliance decision has no statistically significant impact on tax compliance behaviour: there was no statistically significant difference in the tax compliance behaviour of participants who were exposed to a reciprocity nudge message immediately before making a tax compliance decision and those who had a time lag between the exposure to a reciprocity nudge message and the making of a tax compliance decision.

Another finding is that reciprocity nudges do not appear to have been more effective on some sub-groups of the participant sample than others. The results therefore suggest that there is no statistically significant difference in tax compliance behaviour based on a

taxpayer's gender, income level or population group for individuals exposed to a reciprocity nudge message.

Attitudes towards tax were found to be generally positive. Furthermore, attitudes towards tax were not found to have had any impact on taxpayers' tax compliance behaviour. This supports existing literature that has suggested that attitudes towards tax are not a predictor of tax compliance behaviour and that the relationship between attitudes towards tax and actual tax compliance is complex (Elffers *et al.*, 1987:311-337; Hessing *et al.*, 1988:405-413, Kirchler, 2007).

Finally, there were high levels of perceived corruption as scored by the experiment's participants. The mean scores indicate that these high levels of perceived corruption relate both to high-level tax officials and high-level government officials. Furthermore, perceptions of corruption were found to not have a significant impact on the tax compliance behaviour of individuals exposed to a nudge message. The findings from one of the treatment groups do, however, indicate that those who were compliant had a higher perception of corruption than the non-compliant individuals. It therefore appears that another factor, or factors, such as the nudge itself, had a positive effect on the participants' tax compliance behaviour despite these participants' high perceived levels of corruption.

6.3 CONTRIBUTIONS TO THE LITERATURE

The first contribution made by this thesis is to the field of tax compliance, particularly voluntary compliance. This contribution has been made in a number of ways. This thesis extends how tax compliance has traditionally been researched by including insights from behavioural economics which could assist with influencing voluntary tax compliance. The thesis therefore also contributes to the growing body of research in the field of behavioural economics in exploring how lessons from this field can be applied to encourage voluntary tax compliance. Furthermore, this thesis sheds light on the effectiveness of reciprocity nudge messages when these messages are used as a strategy to positively influence voluntary tax compliance in a developing country.

The second contribution made by this study involves the research methods adopted. By adopting a mixed methods approach, which consisted of a qualitative and quantitative content analysis as well as an experiment, it has been demonstrated how one method can

be used to inform another. Although multiple studies have investigated the effect of reciprocity nudge messages on voluntary tax compliance by making use mainly of field experiments (Ariel, 2012:27-69; Castro & Scartascini, 2015:65-82; Ortega & Sanguinetti, 2013), this thesis makes a contribution by making use of a content analysis method in order to inform and improve the experimental approach. There is currently no known evidence of any other research that has taken this approach. There is also currently no evidence of an experimental study investigating the effect of reciprocity nudge messages from a South African taxpayer perspective.

The third contribution made by this thesis involves its investigation of the structural and content attributes that should be included in tax nudge messages that are delivered using audio-visual media. Prior research has indicated that structural and content attributes are important aspects of an effective message (Morgan *et al.*, 2003:512-526). As a result of the current research, some clarity has been obtained with regard to the structural and content attributes that ought to be incorporated into nudge messages delivered using audio-visual media. Specifically, attention to the development of such messages should be focused on the use of movement, colour and music to assist in capturing the target audience's attention. Evoking positive emotions and goal framing have also been found to be important. Furthermore, in designing audio-visual nudge messages, it would be wise to ensure that the messages are communicated by credible spokespersons and organisations and that the messages themselves are also credible and clear. Attention should further be given to the development of two-sided messages and messages that contain message efficacy, as well as messages that provide new information that fits with the prior knowledge of the target audience. Additionally, message campaigns should direct attention by raising awareness only for some issues and not for many issues at once, and, lastly, the duration of message campaigns should be carefully considered, as the longer a campaign is broadcast, the greater the probability that it will retain the attention of the target audience.

The fourth contribution made by this thesis is the consideration of the timing of nudge messages. There is limited research on the timing of nudge messages and on whether this timing has an impact on the ability of nudge messages to positively influence tax compliance behaviour. This is an important aspect that has not received adequate research attention. This study contributes by providing evidence for the implications of varying the timing between exposure to a nudge message and the making of a tax compliance decision.

This is important as it informs how campaigns aimed at improving tax compliance should be timed to ensure that they result in actual changes in behaviour. The researcher established that neither exposing taxpayers to a nudge message close to the time of making a tax compliance decision nor having a time lag between exposure to the nudge message and the making of a tax compliance decision has an effect on tax compliance behaviour.

The final contribution made by this thesis is that it provides a better understanding of how reciprocity nudges may be affected by variables such as gender, income level, population group, attitude towards tax and perception of corruption. Thus, it provides a better understanding of whether these nudge messages are more effective for some sub-groups of the population than for others. Although there was a slight difference in the tax compliance behaviour of males and females exposed to a reciprocity nudge message, and although low-income earners were less compliant than high-income earners, these differences are not statistically significant. There was also evidence that Black African participants are slightly more compliant than White participants; however, this difference is also not statistically significant. Additionally, there was no evidence of a statistically significant association between either attitude towards tax or perception of corruption and the tax compliance behaviour of individuals exposed to a reciprocity nudge message. This is consistent with Torgler's findings (2003a:27-56) with regard to gender. The evidence outlined above therefore indicates that although there are slight differences based on the aforementioned variables in the tax compliance behaviour of individuals exposed to a nudge message, the effectiveness of reciprocity nudge messages is not strongly influenced by these variables. This is an important finding as it contributes to a better understanding of an often overlooked relationship between these variables and the effectiveness of nudge messages.

This research has also identified some aspects that could be useful to revenue authorities and policy makers. These are discussed in the section that follows.

6.4 PRACTICAL IMPLICATIONS

There are a number of important considerations that were identified in this research that could be useful to revenue authorities or policy makers, particularly those in developing countries. As choice architects, with reference to the context in which individuals make tax compliance decisions, it is important that revenue authorities and policy makers give careful thought to how tax nudge messages are designed and to ensuring that such messages are aimed at the correct audience.

The first consideration for tax authorities is that although they have turned their attention towards using strategies that promote voluntary tax compliance as a complement to enforcement strategies, strategies promoting voluntary tax compliance have become even more important than ever before given the monetary cost and time required to conduct enforcement-based activities such as audits. The use of behavioural economic insights to inform these strategies which promote voluntary compliance is highly important. The findings of this thesis indicate that reciprocity nudge messages that contain the appropriate structural and content attributes are effective in positively influencing tax compliance behaviour.

The second consideration is related to the actual design of tax nudge messages. It is apparent from the research conducted in this thesis that the structural and content attributes of nudge messages are important. Messages that contain most of the attributes of an effective message are more likely to positively influence tax compliance behaviour than those that contain fewer of these attributes. Therefore, careful consideration needs to be given to the content of nudge messages used to influence tax compliance and also to how these messages are packaged, depending on the mode of delivery. It is apparent from the qualitative content analysis of this thesis that, when using audio-visual media as a mode of delivery, message attributes such as background music, isolation of visuals or objects and the use of colour have the ability to capture the attention of the target audience. Correct framing of messages also influences their effectiveness. Revenue authorities therefore need to engage with the potential target audience in advance, through methods such as focus groups, in order to better understand the audience and thereby how best to tailor nudge messages accordingly.

The third consideration for tax authorities is related to the target audience. Although findings from this thesis do not show significant evidence that reciprocity nudge messages are more

successful in some sub-groups in the population than in others, there was still a slight difference in the tax compliance behaviour of some sub-groups. Given these differences, notwithstanding the fact that they have been found to be statistically non-significant, it is important that careful consideration be given to the demographic characteristics of the individuals that a nudge message is aimed at.

Finally, the fourth consideration is that, based on the findings of this research, the time lag between when taxpayers are exposed to a nudge message and when they are required to make a tax compliance decision does not have a significant impact on their decision. In other words, whether a taxpayer is exposed to a reciprocity nudge message just before making a tax compliance decision, or whether there is a slight time lag between the exposure to the nudge message and the making of the tax compliance decision ultimately does not change the taxpayer's decision to be compliant or not. Even so, it is still important for revenue authorities to consider the timing of nudge messages, as it may be likely that those with a better memory of a nudge message are more likely to react positively to the message than those who do not remember the message well.

In conclusion, although reciprocity nudge messages can be effectively utilised as a strategy to influence voluntary tax compliance decisions, careful consideration needs to be given when designing the structure and content of these messages. Effort should be made to ensure that these messages target the correct audience in the correct manner so that the messages are likely to be effective in positively influencing the tax compliance decisions of the target audience.

6.5 LIMITATIONS

As with any research, this study encountered a number of limitations which need to be taken into account. These limitations relate to the nature of the participants involved in the experiment, the timing of the of the conduct of that experiment, particular aspects of the literature review that was conducted to support this thesis, and the medium used to deliver the nudge message.

The first identified limitation relates to the participants sampled in this study. In the experimental phase of the study, students were sampled and used as proxies for individual personal income taxpayers. Thus, the findings from the experimental phase of this research

cannot be generalised to the broader population of individual income taxpayers. This is because non-student taxpayers might have different demographic and behavioural characteristics that might affect the results that were observed in this study. Although the researcher could have sampled non-student taxpayers as part of this study, this was not feasible given cost and time constraints. The researcher was also satisfied that it was appropriate to use students as participants given previous research that has indicated that there is no difference in the tax compliance behaviour of students and that of non-student taxpayers (Alm, 1991:584). In addition, the results of the pilot testing of the experiment provide further evidence that there is no significant difference in the tax compliance behaviour of students and non-student participants, and this supports the use of students as participants in the final experiment.

The second limitation relates to the EMS Faculty staff members who participated in the pilot testing of the experiment. Given that some Faculty staff members (those with academic appointments) would be aware of the ethical implications of research endeavours even though they might have not been initially aware of the true nature of the experiment) the potential risk of being found unethical could have influenced the responses given in the experiment. However, as the staff members involved also comprised general/professional staff who might not be aware of the ethical implications of research endeavours, the researcher is satisfied that it was appropriate to use this mix of staff members as participants in the pilot test.

The third identified limitation is that although effort was made to conduct the experiment on the same day, at the same time with all participants, the initial experiment was only conducted with 137 students, which did not provide the required number of participants. The experiment was thus conducted again a week later with another group of 24 students and also three days later with a separate group of 11 students. However, because participants were randomly allocated either to one of the treatment groups or to the control group, the researcher was satisfied that any group differences between the participants who participated in the experiment earlier and those who participated later would be due to chance, and there is little likelihood that a third variable had an impact on the findings.

The fourth identified limitation relates to the literature reviewed in the qualitative phase of the content analysis in order to identify the structural and content attributes of an effective

message aimed at changing behaviour. The literature reviewed only consists of articles identified through databases available through the University of Pretoria Library website. Therefore, although the search yielded a comprehensive list of studies, the list was not exhaustive. It is therefore possible that other relevant studies may not have been identified through this process. Also, in undertaking the analysis of the structural and content attributes of an effective message, it was not possible to ascertain from the SARS producers and users of the 12 videos in 2012-13 the extent to which they considered the campaign as a whole, and particular videos within the campaign, were more or less successful in achieving the intended outcome of enhancing voluntary compliance by South African individual taxpayers.

The fifth identified limitation is related to the asymmetrical selection process of the two reciprocity nudge videos used in the experiment. The video selected as most likely to be effective was selected based on whether it contained the most structural and content attributes of an effective message as well as the results of a study by Oberholzer *et al.* (2008:23-48). The video selected as least likely to be effective was selected based on whether it contained the least structural and content attributes of an effective message as well as based on a selection process by four faculty staff members.

The sixth identified limitation is that, due to resource constraints, it was not feasible to search and review all prior studies relevant to this thesis. As a result, the literature search and review were limited to studies published in English, meaning that other relevant research published in other languages might have been excluded. The effect of this exclusion on the current thesis is unknown.

The seventh identified limitation is that how the variation of the timing of a nudge message was tested could have resulted in the observed results. Unlike in field experiments, where this aspect can be practically tested by varying the time by days or weeks, or even months, in the current study, advertisement videos were used as a proxy for time, which, it could be argued, may have influenced the effectiveness of the timing treatment. It is important to note that although in this study the variation of the timing of a nudge message was examined, the long-lived effects of a nudge message were not examined.

The final key identified limitation is that, due to time and resource constraints, the study focuses only on the use of reciprocity nudge messages delivered using audio-visual media. Therefore, the effectiveness of such nudge messages communicated using other modes of

delivery was not investigated. However, the vast majority of prior research in this area has focused on the use of physical mail-based messages. As a consequence of this study's focus on audio-visual media, other forms of delivery, such as the use of social media platforms, radio and billboards, need to be explored further.

Since this section has identified and discussed the limitations of this research, the section that follows provides recommendations for future research that could address some of these identified limitations.

6.6 SUGGESTIONS FOR FUTURE RESEARCH

This research study was aimed at providing more information on the effectiveness of employing behavioural insight measures, such as nudging, as tools to improve voluntary tax compliance in a developing country. This information is useful, not only to tax compliance researchers, but also to tax authorities and policymakers who are in charge of developing and implementing a variety of measures to encourage tax compliance. Although this research has provided some useful findings, there are questions that remain unanswered.

This thesis focuses on the use of reciprocity nudge messages as a measure to improve voluntary tax compliance. The effectiveness of other types of nudge message, such as social norm messages and deterrence messages, in the context of a developing country could thus still be studied. As noted from the literature reviewed in this study, previous studies on the effectiveness of both social norms and deterrence nudges have largely focused on developed countries (Hallsworth *et al.*, 2017:14-31; Hasseldine *et al.*, 2007:171-194; Wenzel, 2001). Future research could thus drill down and provide more information on how these types of nudge are impacted by variables such as cultural diversity, general attitudes towards tax and perceptions of corruption, with a focus specifically on developing countries.

The current research examines the effect of reciprocity nudge messages on individual taxpayers. This could, however, be extended to the effect of such nudge messages on the tax compliance behaviour of other types of taxpayer such as corporate income taxpayers. This could be useful in assisting policymakers and tax authorities when developing comprehensive strategies to improve voluntary tax compliance amongst all types of

taxpayer. Furthermore, future research could also expand the subject population by conducting a similar experiment using non-student participants.

Future research could also expand on what has been researched in this thesis by including the effect of enforcement policies, trust-related policies and service-related policies into the experimental design.

Although there has been growing use of behavioural economics in tax compliance research, it is felt that there is still more research that could be done in this area, especially in developing countries, in order to allow for a comprehensive comparison of findings, particularly with regard to the use of nudges as a tool to encourage voluntary tax compliance.

Given that the current study focuses on the use of reciprocity nudge messages delivered using audio-visual media, and considering the imminent impact of the Fourth Industrial Revolution on communication, it is important to also explore the use of social media platforms, such as Twitter and Facebook, as delivery modes for nudge messages. Future research could examine how nudge messages delivered using social media platforms need to be designed and implemented.

Future research may consider testing the variation of the timing of a nudge message in a different manner from how it was tested in this thesis. The findings of this research indicate that the timing between the exposure to a nudge message and the making of a tax compliance decision has no significant impact on tax compliance behaviour. However, studying the effect of time in a different manner would allow for more comparable findings.

The long-lived effects of the reciprocity nudge messages were not examined in this study. As this remains an important and often neglected aspect in studies related to messaging as a nudge to positively influence tax compliance behaviour, future research could provide more insight into this aspect.

6.7 FINAL COMMENTS

Understanding how voluntary tax compliance behaviour can be influenced is a complex and multifaceted issue that has received attention from a wide range of interested parties such as researchers, tax authorities and policymakers. Different studies have examined different factors that could have an influence on voluntary tax compliance behaviour (Hofmann *et al.*, 2008:209-217; Kirchler & Wahl, 2010:331-346; Wenzel, 2001). Based on the findings of these studies, it is apparent that there is no single strategy or factor that can fully provide an explanation for how this complex matter can be understood. Given the limited financial resources available to governments to rely solely on enforced tax compliance, particularly in developing African countries, it is key that research focused on understanding how voluntary tax compliance can be effectively encouraged continues to be conducted by addressing specific aspects of this multifaceted issue.

To address the above issues, this thesis has focused on providing important information regarding the use of nudges, which have been widely used in other disciplines such as in the health sciences, as a measure to positively influence voluntary tax compliance behaviour. This study has not only expanded knowledge about using tax nudges but has also broadened the understanding of how effective these nudges can be in the context of a developing country where there are high perceptions of corruption. This study has also highlighted the practical importance of designing nudge messages that contain the appropriate structural and content attributes to ensure that the messages reach the intended audience.

Finally, the researcher acknowledges that this current research is just one of many building blocks in understanding the use of nudges to influence voluntary tax compliance behaviour. Although a vast scope of possible further research in this area remains, it is nonetheless considered that in this thesis, a worthwhile contribution has been made.

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APPENDIX 1: CONTENT ANALYSIS – PILOT CODEBOOK

1. Introduction

The purpose of this codebook is to assist with the coding of the SARS videos. The coding is done to evaluate whether the videos contain the structural and content attributes of an effective message that is likely to change behaviour. This codebook is used together with the coding forms that reflect the concepts to be analysed in each video.

The codebook should be adhered to as it contains a clear description of each concept and provides instructions on how to code the different variables. Section 2, below, explains the instructions; Section 3 explains the different concepts; and Section 4 provides an explanation for how to code the variables.

2. Instructions

You need to analyse each video selected for the pilot study. This entails paying careful attention to the visuals and the audio in the video. You need to identify the applicable variable in the video and use the code forms to code the presence or absence of each variable.

You need to follow the following steps when analysing the video:

Step 1: Read the descriptions of the concepts and the explanations of the coding variables carefully.

Step 2: Write the title of the video on the coding form.

Step 3: Watch the video, paying attention both to the audio and the visuals, and complete the coding form by identifying the presence or absence of each variable (for example, coding 3 for the presence of the variable, 2 for the absence of the variable and 3 if it is difficult to tell).

3. Concept description

Captures attention: This refers to the use of intense colour or movement: does the message use isolated visuals or objects in contrast with the environment? Does it use music, or an unusual introduction?

New information: Does the message provide information that is perceived as new to the audience?

Evokes emotion: Does the message evoke emotion (for example, fear, pride, happiness, excitement or sadness)?

Credible source: This refers to the degree to which the person or organisation that is providing the message is seen as trustworthy and as possessing the relevant expertise (Holtzhausen, 2010:46). Examples of credible spokespersons are those who are experts or those who are similar to the target audience.

Goal framing: Information campaigns to increase tax compliance can be framed in such a way that they highlight the potential gains when tax compliance is high or highlight the potential losses when tax compliance is low (Holler *et al.*, 2008:588). The effectiveness of positively framed or negatively framed messages depends on the recipient's regulatory focus, which can be induced either by the context in which the advertisement is transmitted or by the advertisement itself (Holler *et al.*, 2008:608). In a television advertisement, images and scenes can be used to induce regulatory focus.

Credible and clear message: Messages should be kept as simple as possible to ensure that they are not misunderstood by the audience. Campaigns with simpler messages tend to be better understood (Weiss & Tschirhart, 1994:87). Messages should also be truthful (Holler *et al.*, 2008:608).

Message sidedness: This relates to how the message is presented to the audience: a one-sided message only presents the argument that favours the position advocated by the source of the message; a two-sided message presents both sides of the argument (the opposing and supporting arguments).

Message efficacy: Messages should deal with "when to" and "how to" knowledge. For a message to evoke self-efficacy, the message must provide the receiver with a solution for how to carry out the behaviour in question (for example, does the message provide contact details for a website or call centre where taxpayers can be assisted to comply?).

Fits with prior knowledge: Does the message expand or elaborate on existing knowledge?

4. Variables

In the coding form, you will find the different variables that are to be used when coding the video that is being analysed. Below are the instructions on how to code the variables on the coding form.

Coder ID: The name and surname of the coder.

Title of the video: The title of the video as provided by SARS on its *YouTube* channel.

Captures attention: This is the presence of attention-grabbing features such as music, isolated visuals, objects that are in contrast with the environment, an unusual introduction, or intense colour or movement. Code as 2 if none of these features are present; code as 3 if some or all of the features are present; code as 1 if it is difficult to tell.

New information: This is the presence of new information that is provided in the message. Code as 2 if it appears that no new information is provided; code as 3 if new information is provided; code as 1 if it is difficult to tell.

Evokes emotion: This refers to whether the message evokes emotional feelings such as sadness, happiness, pride, joy or excitement. Code as 2 if no emotion is evoked; code as 3 if emotion is evoked; code as 1 if indifferent.

Credible source: Credible spokespersons are those who are experts or those who are similar to the target audience (other taxpayers or ordinary citizens of the country). Code as 2 if a credible source is not present; code as 3 if a credible source is present; code as 1 if it is difficult to tell.

Goal framing: This refers to whether the message highlights the gains obtained from the use of tax revenue or the potential losses if taxpayers are non-compliant. Code as 2 if there is negative framing; code as 3 if there is positive framing; code as 1 if it is difficult to tell.

Credible and clear message: Is the message credible and simple? Code as 2 if the message is not credible; code as 3 if the message is credible; code as 1 if it is difficult to tell.

Message sidedness: This relates to how the message is presented to the audience. Code as 2 if the message is one-sided; code as 3 if the message is two-sided; code as 1 if it is difficult to tell.

Message efficacy: This relates to “when to” and “how to” knowledge. Code as 2 if the message does not contain information to assist with compliance; code as 3 if the message does contain information to assist with compliance; code as 1 if it is difficult to tell.

Fits with prior knowledge: This refers to whether the message expands or elaborates on existing knowledge. Code as 2 if the message does not expand or elaborate on information that the audience is expected to know; code as 3 if the message does expand or elaborate on information that the audience is expected to know; code as 1 if the message provides new information rather than expanding on existing information.

APPENDIX 2: CONTENT ANALYSIS – PILOT TEST CODING FORM

<u>Coder ID</u>	Variables										
Title of the video	Captures attention	New information	Evokes emotion	Credible source (spokesperson)	Credible source (organisation)	Goal framing	Credible and clear message	Message sidedness	Message efficacy (when to comply)	Message efficacy (how to comply)	Fits with prior knowledge
	2: No 3: Yes 1: Difficult to tell	2: No 3: Yes 1: Difficult to tell	2: No 3: Yes 1: Indifferent	2: No 3: Yes 1: Difficult to tell	2: No 3: Yes 1: Difficult to tell	2: Negative 3: Positive 1: Difficult to tell	2: No 3: Yes 1: Difficult to tell	2: One-sided 3: Two-sided 1: Difficult to tell	2: No 3: Yes 1: Difficult to tell	2: No 3: Yes 1: Difficult to tell	2: No 3: Yes 1: No, new information

APPENDIX 3: CONTENT ANALYSIS – FINAL CODEBOOK

1. Introduction

The purpose of this codebook is to assist with the coding of the SARS videos. The coding is done to evaluate whether the videos contain the structural and content attributes of an effective message that is likely to change behaviour. This codebook is used together with the coding forms that reflect the concepts to be analysed in each video.

The codebook should be adhered to as it contains a clear description of each concept and provides instructions on how to code the different variables. Section 2, below, explains the instructions; Section 3 explains the different concepts; and Section 4 provides an explanation for how to code the variables.

2. Instructions

You need to analyse each video selected for the pilot study. This entails paying careful attention to the visuals and the audio in the video. You need to identify the applicable variable in the video and use the code forms to code the presence or absence of each variable.

You need to follow the following steps when analysing the video:

Step 1: Read the descriptions of the concepts and the explanations of the coding variables carefully.

Step 2: Write the title of the video on the coding form.

Step 3: Watch the video, paying attention both to the audio and the visuals, and complete the coding form by identifying the presence or absence of each variable (for example, coding 3 for the presence of the variable, 2 for the absence of the variable and 3 if it is difficult to tell).

3. Concept description

Captures attention: This refers to the use of intense colour or movement: does the message use isolated visuals or objects in contrast with the environment? Does it use music, or an unusual introduction?

New information: Does the message provide information that is perceived as new to the audience (for example, a new deadline for filing tax returns)?

Evokes emotion: Does the message evoke emotion (for example, fear, pride, happiness, excitement or sadness)?

Credible source: This refers to the degree to which the person or organisation that is providing the message is seen as trustworthy and as possessing the relevant expertise (Holtzhausen, 2010:46). Examples of credible spokespersons are those who are experts or those who are similar to the target audience.

Goal framing: Information campaigns to increase tax compliance can be framed in such a way that they highlight the potential gains when tax compliance is high or highlight the potential losses when tax compliance is low (Holler *et al.*, 2008:588). The effectiveness of positively framed or negatively framed messages depends on the recipient's regulatory focus, which can be induced either by the context in which the advertisement is transmitted or by the advertisement itself (Holler *et al.*, 2008:608). In a television advertisement, images and scenes can be used to induce regulatory focus.

Credible and clear message: Messages should be kept as simple as possible to ensure that they are not misunderstood by the audience. Campaigns with simpler messages tend to be better understood (Weiss & Tschirhart, 1994:87). Messages should also be truthful (Holler *et al.*, 2008:608).

Message sidedness: This relates to how the message is presented to the audience: a one-sided message only presents the argument that favours the position advocated by the source of the message; a two-sided message presents both sides of the argument (the opposing and supporting arguments).

Message efficacy: Messages should deal with "when to" and "how to" knowledge. For a message to evoke self-efficacy, the message must provide the receiver with a solution for how to carry out the behaviour in question (for example, does the message provide contact details for a website or call centre where taxpayers can be assisted to comply?).

Fits with prior knowledge: Does the message expand or elaborate on existing knowledge?

4. Variables

In the coding form, you will find the different variables that are to be used when coding the video that is being analysed. Below are the instructions on how to code the variables on the coding form.

Coder ID: The name and surname of the coder.

Title of the video: The title of the video as provided by SARS on its *YouTube* channel.

Captures attention: This is the presence of attention-grabbing features such as music, isolated visuals, objects that are in contrast with the environment, an unusual introduction, or intense colour or movement. Code as 2 if none of these features are present; code as 3 if some or all of the features are present; code as 1 if it is difficult to tell.

New information: This is the presence of new information that is provided in the message. Code as 2 if it appears that no new information is provided; code as 3 if new information is provided; code as 1 if it is difficult to tell.

Evokes emotion: This refers to whether the message evokes emotional feelings such as sadness, happiness, pride, joy or excitement. Code as 2 if no emotion is evoked; code as 3 if emotion is evoked; code as 1 if indifferent.

Credible source: Credible spokespersons are those who are experts or those who are similar to the target audience (other taxpayers or ordinary citizens of the country). Code as 2 if a credible source is not present; code as 3 if a credible source is present; code as 1 if it is difficult to tell.

Goal framing: This refers to whether the message highlights the gains obtained from the use of tax revenue or the potential losses if taxpayers are non-compliant. Code as 2 if there is negative framing; code as 3 if there is positive framing; code as 1 if it is difficult to tell.

Credible message: Is the message credible? Code as 2 if the message is not credible; code as 3 if the message is credible; code as 1 if it is difficult to tell.

Message clarity: Is the message clear and simple? Code as 2 if the message is not clear and simple; code as 3 if the message is clear and simple; code as 1 if it is difficult to tell.

Message sidedness: This relates to how the message is presented to the audience. Does the message/argument position in terms of how taxes are spent favour SARS or does it present both the supporting and opposing arguments? Code as 2 if the message is one-sided; code as 3 if the message is two-sided; code as 1 if it is difficult to tell.

Message efficacy: This relates to “when to” and “how to” knowledge. Code as 2 if the message does not contain information to assist with compliance; code as 3 if the message does contain information to assist with compliance; code as 1 if it is difficult to tell.

Fits with prior knowledge: This refers to whether the message expands or elaborates on existing knowledge. Code as 2 if the message does not expand or elaborate on information that the audience is expected to know; code as 3 if the message does expand or elaborate on information that the audience is expected to know; code as 1 if the message provides new information rather than expanding on existing information.

APPENDIX 4: CONTENT ANALYSIS – FINAL CODING FORM

Code r ID	Variables											
Title of the video	Captures attention	New information	Evokes emotion	Credible source (spokesperson)	Credible source (organisation)	Goal framing	Credible message	Message clarity	Message sidedness	Message efficacy (when to comply)	Message efficacy (how to comply)	Fits with prior knowledge
	2: No 3: Yes 1: Difficult to tell	2: No 3: Yes 1: Difficult to tell	2: No 3: Yes 1: Indifferent	2: No 3: Yes 1: Difficult to tell	2: No 3: Yes 1: Difficult to tell	2: Negative 3: Positive 1: Difficult to tell	2: No 3: Yes 1: Difficult to tell	2: No 3: Yes 1: Difficult to tell	2: One-sided 3: Two-sided 1: Difficult to tell	2: No 3: Yes 1: Difficult to tell	2: No 3: Yes 1: Difficult to tell	2: No, 3: Yes 1: No, this is new information

APPENDIX 5: PILOT TEST STATISTICAL ANALYSIS – SUPPORTING TEST TABLES

The supporting tables below relate to the experiment pilot test results presented in Chapter 5. Table 1 shows the number of participants in the pilot study, and Table 2 provides the results of the Fisher’s exact test that was conducted.

Table 1: Number of participants in the pilot study

Cases					
Valid		Missing		Total	
n	Per cent	n	Per cent	n	Per cent
10	100.0%	0	.0%	10	100.0%

Source: SPSS output calculated from experiment data.

Table 2: Fisher’s exact test for association

	Value	Degrees of freedom	Asymptotic significance (2-sided)	Exact significance (2-sided)
Pearson Chi-square	.278 ^a	1	.598	
Continuity correction ^b	.000	1	1.000	
Likelihood ratio	.473	1	.491	
Fisher's exact test				1.000
Number of valid cases	10			

a: Three cells (75.0%) have an expected count less than 5. The minimum expected count is .20.

b: Computed only for a 2x2 table.

Source: SPSS output calculated from experiment data.

APPENDIX 6: EXPERIMENT – INSTRUCTIONS

1. Introduction

Thank you for your participation in this experiment. This experiment process will take approximately 60 minutes to complete. The experiment is about participants' memory of advertisements. The researcher is Nompumelelo Monageng, who is currently a PhD student at the University of Pretoria.

In this experiment you will be expected to view five videos. We want you to pay attention when viewing each of the videos because after viewing each video you will be required to perform a task which entails answering a few questions related to the video. You will earn laboratory credits, which can be converted to rand at the end of the experiment, for each correct answer. After you have viewed all the videos and answered all the related questions you will be told how many laboratory credits (and hence how many rand) you have earned as a result of your participation. You will then be required to declare your earnings as we need to withhold 31% of your earnings for income tax purposes.

Your participation in the experiment will remain anonymous. The responses you give will be treated as strictly confidential, as you cannot be identified in person based on the responses you give. Your participation in this study is very important to us. You may, however, choose not to participate, and you may also stop participating at any time without any negative consequences. At the end of the experiment, a payment will be made to you based on your total income earned as recorded in the reporting decision sheet, after we have deducted the amount of tax based on the declared income.

2. Procedural details

On the desktop computer in front of you, there is a folder “participant folder”, which contains a word document with a web link to the experiment on *Qualtrics*. Open the link.

At the start of the experiment on *Qualtrics*, you will be required to enter your participant number; then you will be required to view videos and answer questions related to the videos. Please press the “next” button on each page on *Qualtrics* in order to continue to the following

page. Note that once you click the “next” button, you cannot go back to the previous page, so please pay attention to what is on the screen before pressing “next”.

We use laboratory currency in this experiment and you will earn 8 laboratory currencies (LC) for each question answered correctly. The LC will be converted into rand at the conclusion of the experiment. You will also receive an attendance fee of R36 which will be included in the pay-out amount.

Once you are done with viewing the videos and answering the related questions you will be required to declare your income (score) earned from participating in the experiment. The amount should be declared in laboratory currency that you earned in the experiment. It is your decision on how much of the income earned you would like to declare. After you have declared your income earned participants will be randomly selected for an audit and if unreported income is found a financial penalty of 75% of the undeclared amount will be imposed. There is a 10% probability that you will be selected for an audit. The computer software will randomly select participants to be audited and check their actual income (score) against the declared income for any unreported income. You will be notified on the computer screen if you have been selected for an audit.

Your decision on the amount of income earned to be declared will affect your total income after tax amount. Accordingly, your total income after tax will depend on your decision on how much of your total earnings to declare, and the probability of audit and penalty rate. Mathematically, your total income after tax can be calculated as follows:

$$\text{Total income earned} - \text{tax on income declared} - \text{undeclared income}^* - \text{penalty}^*$$

**These will only apply if you have been selected for an audit and tax evasion is found.*

The final page of the survey experiment will indicate whether you have been audited or not. The income after tax amount (converted into rand), plus the R36 attendance fee, will be yours to keep and will be paid out to you in cash at the end of the experiment.

When you reach the payout page, please ensure that the following procedure is followed:

- Raise your hand so that the assistant can come and give you the participation fee.
- Show the assistant your student card.

- The assistant will write down how much he or she has given you (which should correspond to the payout amount on the computer screen).
- Sign the list next to your name to confirm the amount and that you have received the money.
- You will then receive a debriefing letter.

Please leave all materials on your desk.

Thank you

APPENDIX 7: EXPERIMENT – INFORMED CONSENT

Letter of introduction and informed consent

Dept. of Taxation

The effect of reciprocity and social norm nudges on tax compliance

Research conducted by:

Mrs. N.L. Monageng (24362442)
email: labexperiment2019@gmail.com

Dear Participant

You are invited to participate in an academic research study conducted by Nompumelelo Monageng, Doctoral student from the Department of Taxation at the University of Pretoria.

The purpose of the study is to research participants' memory of advertisements.

Please note the following:

- Your participation in the experiment will remain anonymous. The responses you give will be treated as strictly confidential, as you cannot be identified in person based on the responses you give.
- Your participation in this study is very important to me. You may, however, choose not to participate and you may also stop participating at any time without any negative consequences.
- The experimental session will not take more than 90 minutes of your time.
- The results of the study will be used for academic purposes only and may be published in an academic journal. We will provide you with a summary of our findings on request.

Please contact my study leaders, Professor Theuns Steyn at theuns.steyn@up.ac.za or Professor Chris Evans at cc.evans@unsw.edu.au, if you have any questions or comments regarding the study.

In research of this nature, the study leader may wish to contact respondents to verify the authenticity of data gathered by the researcher. It is understood that any personal contact

details that you may provide will be used only for this purpose and will not compromise your anonymity or the confidentiality of your participation.

Please indicate below by selecting “I consent to take part in this study” to confirm that:

- You have read and understand the information provided above.
- You give your consent to participate in the study on a voluntary basis and you are 18 years or older.

I consent to take part in this study.

I do not consent to take part in this study and would like to be excluded from this study.

APPENDIX 8: END OF EXPERIMENT QUESTIONNAIRE

Information about you

1. What age group do you fall into?

Younger than 18 years old	
18 to 25 years old	
26 to 35 years old	
36 to 50 years old	
51-65 years old	
Older than 65 years old	

2. Please indicate your gender:

Male	
Female	

3. Please indicate which population group you belong to:

Black African	
White	
Coloured	
Indian/Asian	
Other (please specify)	

4. What is the highest education level you have completed (if currently enrolled, highest qualification received)?

Grade 12 (matric)	
Post-matric certificate	
Degree or diploma	
Postgraduate degree	
Other (please specify)	

5. How would you rate your knowledge of income tax?

Very good	
Good	
Fair	
Poor	
Very poor	

6. Are you currently, or have you in the past, been an income taxpayer in South Africa?

Yes	
No	

7. Have you ever been audited by the South African Revenue Service (SARS)?

Yes	
No	

General questions

8. Please state whether you strongly agree, agree, somewhat agree, neither agree nor disagree, somewhat disagree, disagree or strongly disagree with the following statements:

Citizens must pay their taxes to the government in order for our country to develop.

Strongly agree	
Agree	
Somewhat agree	
Neither agree nor disagree	
Somewhat disagree	
Disagree	
Strongly disagree	

Underreporting my income will not hurt society as a whole.

Strongly agree	
Agree	
Somewhat agree	
Neither agree nor disagree	
Somewhat disagree	
Disagree	
Strongly disagree	

The government can find enough resources for development from other sources without having to tax the people.

Strongly agree	
Agree	
Somewhat agree	
Neither agree nor disagree	
Somewhat disagree	
Disagree	
Strongly disagree	

When dissatisfied with the government, it is justifiable to refuse to pay tax to the government.

Strongly agree	
Agree	
Somewhat agree	
Neither agree nor disagree	
Somewhat disagree	
Disagree	
Strongly disagree	

The level of corruption involving high-level tax officials is high.

Strongly agree	
Agree	
Somewhat agree	
Neither agree nor disagree	
Somewhat disagree	
Disagree	
Strongly disagree	

The level of corruption involving high-level government officials is high.

Strongly agree	
Agree	
Somewhat agree	
Neither agree nor disagree	
Somewhat disagree	
Disagree	
Strongly disagree	

The level of corruption in our country is high.

Strongly agree	
Agree	
Somewhat agree	
Neither agree nor disagree	
Somewhat disagree	
Disagree	
Strongly disagree	

APPENDIX 9: EXPERIMENT – DEBRIEF LETTER

The effect of “reciprocity nudges” on tax compliance

Debriefing

I would like to thank you for taking part in this experiment. You have been told that this study relates to memory and advertisements; however, there is more to this study than what we have told you about so far. Sometimes, in behavioural research, it is necessary to not tell people about the true purpose of the study at the beginning. If we did, it may affect how they respond to the questions asked and to the tasks involved, and this would change the results in way that may make them invalid. In some studies, we want to get an idea of how people respond to certain situations in their day-to-day lives, and sometimes, the best way to do this is to not give them all of the details about the purpose of the study.

We told you that this experiment relates to memory and advertisements and we asked you to watch a few videos and answer questions related to each of the videos after you had watched them. However, we were in fact interested in the effect of the SARS video (which may have been one of the videos you watched) on your tax compliance behaviour. There is some research that suggests that messages (or “nudges”) that communicate how taxes are spent on public goods or services (“reciprocity”) might have a positive effect on the tax compliance behaviour of taxpayers. The time lag between seeing such a video and making the tax compliance decision might also have an impact on the effectiveness of the message.

In this study, some participants watched a SARS video at the beginning of the experiment; others saw the video at the end of the experiment; and some did not see a SARS video at all. After watching the videos, you were required to declare the income earned from experiment, for income tax purposes. This was all done so that we could simulate real-life conditions of tax compliance behaviour. We were interested to see whether watching the SARS video, and the timing of when you watched it, had any impact on the amount of income you declared for tax purposes.

Please note that the details of your participation will be kept entirely private. Any information that you have given as part of the experiment, including the amount of income you declared

for tax purposes, will not be divulged to SARS or to any other person. All personal data derived from the study will be aggregated with other participants' data and will only be reported (in my PhD thesis or in publications based upon the research) in aggregate and not in any way that could identify you or any other person.

We hope that you found your experience of participating in this study to be interesting. We are happy to answer any questions that you may have.

APPENDIX 10: FINAL STATISTICAL ANALYSIS – SUPPORTING TEST TABLES

The supporting tables below relate to the experiment results presented in Chapter 5.

Primary research question one

Table 1 indicates the total number of participants in the experiment. Table 2 and Table 3 then provide the results of the Chi-square test that was conducted to determine the significance of the relationship between exposure to a reciprocity nudge message and tax compliance.

Table 1: Number of participants in the experiment

Cases					
Valid		Missing		Total	
n	Per cent	N	Per cent	n	Per cent
172	100.0%	0	.0%	172	100.0%

Source: SPSS output calculated from experiment data.

Table 2: Chi-square test for association

Chi-square tests						
	Value	Degrees of freedom	Asymptotic significance (2-sided)	Exact significance (2-sided)	Exact significance (1-sided)	Point probability
Pearson Chi-square	2.496 ^a	1	.114	.148	.093	
Continuity correction ^b	1.794	1	.180			
Likelihood ratio	2.317	1	.128	.148	.093	
Fisher's exact test				.148	.093	
Linear-by-linear association	2.482 ^c	1	.115	.148	.093	.055
Number of valid cases	172					

a. 0 cells (.0%) have an expected count less than 5. The minimum expected count is 6.72.

b. Computed only for a 2x2 table.

c. The standardised statistic is 1.575.

Source: SPSS output calculated from experiment data.

Table 3: Strength of the association between variables

Symmetric measures					
		Value	Approximate significance	Exact significance	
Nominal by nominal	Phi	.120	.114	.148	
	Cramer's V	.120	.114	.148	
Number of valid cases		172			

Source: SPSS output calculated from experiment data.

Participants in the treatment groups were exposed to two different nudge messages. One message (“Dreaming big”) was selected based on a content analysis process as likely to be the most effective message, and the other (“A mother’s love”) was selected as likely to be the least effective. Both videos were tested separately to determine whether there is an association between the videos and tax compliance.

Table 4 shows the number of participants exposed to the video that was selected as likely to be the most effective. Table 5 then presents the tax compliance and non-compliance percentages for participants in this treatment group versus the control group.

Table 4: Number of participants for “Dreaming big” treatment (group A1 and group B1)

Cases					
Valid		Missing		Total	
n	Per cent	N	Per cent	n	Per cent
102	100.0%	0	.0%	102	100.0%

Source: SPSS output calculated from experiment data.

Table 5: Tax compliance vs non-compliance percentages for “Dreaming big” treatment (group A1 and group B1)

Cross tabulation					
			Tax compliance (1 = YES, 0 = NO)		Total
			0	1	
Treatment vs no treatment (1 = YES, 0 = NO)	0	Count	10	25	35
		Expected count	6.2	28.8	35
		% within Treatment vs no treatment (1 = YES, 0 = NO)	28.6%	71.4%	100.0%
		% within Tax compliance (1 = YES, 0 = NO)	55.6%	29.8%	34.3%
	1	Count	8	59	67
		Expected count	11.8	55.2	67
		% within Treatment vs no treatment (1 = YES, 0 = NO)	11.9%	88.1%	100.0%
		% within Tax compliance (1 = YES, 0 = NO)	44.4%	70.2%	65.7%
Total	Count	18	84	102	
	Expected count	18	84	102	
	% within Treatment vs no treatment (1 = YES, 0 = NO)	17.6%	82.4%	100.0%	
	% within Tax compliance (1 = YES, 0 = NO)	100.0%	100.0%	100.0%	

Source: SPSS output calculated from experiment data.

Table 6 presents the results of the Chi-square test for significance, and Table 7 indicates the results related to the strength of the association between exposure to the nudge message selected as most likely to be effective and tax compliance behaviour.

Table 6: Chi-square test for association for “Dreaming big” treatment (group A1 and group B1)

Chi-square tests						
	Value	Degrees of freedom	Asymptotic significance (2-sided)	Exact significance (2-sided)	Exact significance (1-sided)	Point probability
Pearson Chi-square	4.376 ^a	1	.036	.054	.037	
Continuity correction ^b	3.306	1	.069			
Likelihood ratio	4.177	1	.041	.054	.037	
Fisher's exact test				.054	.037	
Linear-by-linear association	4.333 ^c	1	.037	.054	.037	.026
Number of valid cases	102					

a. 0 cells (.0%) have an expected count less than 5. The minimum expected count is 6.18.

b. Computed only for a 2x2 table.

c. The standardised statistic is 2.082.

Source: SPSS output calculated from experiment data.

Table 7: Strength of the association between variables for “Dreaming big” treatment (group A1 and group B1)

Symmetric measures				
		Value	Approximate significance	Exact significance
Nominal by nominal	Phi	.207	.036	.054
	Cramer's V	.207	.036	.054
Number of valid cases		102		

Source: SPSS output calculated from experiment data.

Tables 8, 9, 10 and 11 show the number of participants, the tax compliance versus non-compliance percentages, the Chi-square test for significance, and the strength of the association between the two variables, respectively, for the message selected as least likely to be effective.

Table 8: Number of participants for “A mother’s love” treatment (group A2 and group B2)

Cases					
Valid		Missing		Total	
n	Per cent	n	Per cent	n	Per cent
105	100.0%	0	.0%	105	100.0%

Source: SPSS output calculated from experiment data.

Table 9: Tax compliance vs non-compliance percentages for “A mother’s love” treatment (group A2 and group B2)

Cross tabulation					
			Tax compliance (1 = YES, 0 = NO)		Total
			0	1	
Treatment vs no treatment (1 = YES, 0 = NO)	0	Count	10	25	35
		Expected count	8.3	26.7	35
		% within Treatment vs no treatment (1 = YES, 0 = NO)	28.6%	71.4%	100.0%
		% within Tax compliance (1 = YES, 0 = NO)	40.0%	31.3%	33.3%
	1	Count	15	55	70
		Expected count	16.7	53.3	70
		% within Treatment vs no treatment (1 = YES, 0 = NO)	21.4%	78.6%	100.0%
		% within Tax compliance (1 = YES, 0 = NO)	60.0%	68.8%	66.7%
Total	Count	25	80	105	
	Expected count	25	80	105	
	% within Treatment vs no treatment (1 = YES, 0 = NO)	23.8%	76.2%	100.0%	
	% within Tax compliance (1 = YES, 0 = NO)	100.0%	100.0%	100.0%	

Source: SPSS output calculated from experiment data.

Table 10: Chi-square test for association for “A mother’s love” treatment (group A2 and group B2)

Chi-square tests						
	Value	Degrees of freedom	Asymptotic significance (2-sided)	Exact significance (2-sided)	Exact significance (1-sided)	Point probability
Pearson Chi-square	.656 ^a	1	.418	.470	.282	
Continuity correction ^b	.322	1	.571			
Likelihood ratio	.644	1	.422	.470	.282	
Fisher's exact test				.470	.282	
Linear-by-linear association	.650 ^c	1	.420	.470	.282	.136
Number of valid cases	105					

a. 0 cells (.0%) have an expected count less than 5. The minimum expected count is 8.33.

b. Computed only for a 2x2 table.

c. The standardised statistic is .806.

Source: SPSS output calculated from experiment data.

Table 11: Strength of the association between variables for “A mother’s love” treatment (group A2 and group B2)

Symmetric measures				
		Value	Approximate significance	Exact significance
Nominal by nominal	Phi	.079	.418	.470
	Cramer's V	.079	.418	.470
Number of valid cases		105		

Source: SPSS output calculated from experiment data.

Tables 12, and 13 show the number of participants in all treatment groups and the results of the Chi-square test for homogeneity that was conducted to determine whether there was a statistically significant difference in tax compliance behaviour of participants exposed to the reciprocity nudge message hypothesised as most likely to be effective and those exposed to the reciprocity nudge message hypothesised as least likely to be effective.

Table 12: Number of participants in the all treatment groups (group A1, group B1, group A2 and group B2)

Cases					
Valid		Missing		Total	
n	Per cent	N	Per cent	n	Per cent
137	100.0%	0	.0%	137	100.0%

Source: SPSS output calculated from experiment data.

Table 13: Chi-square test for homogeneity for all treatment groups (group A1, group B1, group A2 and group B2)

Chi-square tests					
	Value	Degrees of freedom	Asymptotic significance (2-sided)	Exact significance (2-sided)	Exact significance (1-sided)
Pearson Chi-square	2.206a	1	.137		
Continuity correction ^b	1.579	1	.209		
Likelihood ratio	2.239	1	.135		
Fisher's exact test				.172	.104
Number of valid cases	137				

a. 0 cells (.0 %) have an expected count less than 5. The minimum expected count is 11.25.

b. Computed only for a 2x2 table.

Source: SPSS output calculated from experiment data.

Primary research question two

Table 14 shows the number of participants in the two treatment groups (group A2 and group B2) that were exposed to the video selected as least likely to be effective. Table 15 then shows the results of the Chi-square test for homogeneity that was conducted to determine whether there was a difference in tax compliance behaviour between the two treatment groups.

Table 14: Number of participants for “A mother’s love” treatment (group A2 and group B2)

Cases					
Valid		Missing		Total	
n	Per cent	n	Per cent	n	Per cent
70	100.0%	0	.0%	70	100.0%

Source: SPSS output calculated from experiment data.

Table 15: Chi-square test for homogeneity for “A mother’s love” treatment (group A2 and group B2)

Chi-square tests					
	Value	Degrees of freedom	Asymptotic significance (2-sided)	Exact significance (2-sided)	Exact significance (1-sided)
Pearson Chi-square	2.121 ^a	1	.145		
Continuity correction ^b	1.358	1	.244		
Likelihood ratio	2.154	1	.142		
Fisher's exact test				.244	.122
Number of valid cases	70				

a. 0 cells (.0 %) have an expected count less than 5. The minimum expected count is 7.50.

b. Computed only for a 2x2 table.

Source: SPSS output calculated from experiment data.

Table 16 shows the number of participants in the two treatment groups (group A1 and group B1) that were exposed to the video selected as most likely to be effective. Table 17 then shows the results of the Fisher’s exact test, which was conducted to determine whether there was a difference in tax compliance behaviour between the two treatment groups.

Table 16: Number of participants for “Dreaming big” treatment (group A1 and group B1)

Cases					
Valid		Missing		Total	
n	Per cent	n	Per cent	n	Per cent
67	100.0%	0	.0%	67	100.0%

Source: SPSS output calculated from experiment data.

Table 17: Fisher’s exact test for “Dreaming big” treatment (group A1 and group B1)

	Value	Degrees of freedom	Asymptotic significance (2-sided)	Exact significance (2-sided)
Pearson Chi-square	1.261 ^a	1	.261	
Continuity correction ^b	.585	1	.444	
Likelihood ratio	1.281	1	.258	
Fisher's exact test				.305
Number of valid cases	67			

a. 2 cells (50.0%) have an expected count less than 5. The minimum expected count is 4.43.

b. Computed only for a 2x2 table.

Source: SPSS output calculated from experiment data.

Secondary research question one

A Fisher’s exact test was conducted to determine whether there is an association between gender and the effectiveness of the nudge message. The Fisher’s exact test was conducted for each treatment group. Table 18 and Table 19 show the number of participants and the results for the significance of the association between gender and tax compliance in group A1.

Table 18: Number of participants for “Dreaming big” (with no time lag) treatment (group A1)

Cases					
Valid		Missing		Total	
n	Per cent	n	Per cent	n	Per cent
33	100.0%	0	.0%	33	100.0%

Source: SPSS output calculated from experiment data.

Table 19: Fisher’s exact test for “Dreaming big” (with no time lag) treatment (group A1)

	Value	Degrees of freedom	Asymptotic significance (2-sided)	Exact significance (2-sided)
Pearson Chi-square	.296 ^a	1	.586	.664
Continuity correction ^b	.000	1	.987	
Likelihood ratio	.316	1	.574	.664
Fisher's exact test				1.000
Number of valid cases	33			

a. 2 cells (50.0%) have an expected count less than 5. The minimum expected count is 1.82.

b. Computed only for a 2x2 table.

Source: SPSS output calculated from experiment data.

Table 20 and Table 21 show the number of participants and the results for the significance of the association between gender and tax compliance in group B1.

Table 20: Number of participants for “Dreaming big” (with time lag) treatment (group B1)

Cases					
Valid		Missing		Total	
n	Per cent	n	Per cent	n	Per cent
34	100.0%	0	.0%	34	100.0%

Source: SPSS output calculated from experiment data.

Table 21: Fisher’s exact test “Dreaming big” (with time lag) treatment (group B1)

	Value	Degrees of freedom	Asymptotic significance (2-sided)	Exact significance (2-sided)
Pearson Chi-square	.001 ^a	1	.970	1.000
Continuity correction ^b	.000	1	1.000	
Likelihood ratio	.001	1	.970	1.000
Fisher's exact test				1.000
Number of valid cases	34			

a. 2 cells (50.0%) have an expected count less than 5. The minimum expected count is .97.

b. Computed only for a 2x2 table.

Source: SPSS output calculated from experiment data.

Table 22 and Table 23 show the number of participants and the results for the significance of the association between gender and tax compliance in group A2.

Table 22: Number of participants for “A mother’s love” (with no time lag) treatment (group A2)

Cases					
Valid		Missing		Total	
n	Per cent	n	Per cent	n	Per cent
35	100.0%	0	.0%	35	100.0%

Source: SPSS output calculated from experiment data.

Table 23: Fisher’s exact test for “A mother’s love” (with no time lag) treatment (group A2)

	Value	Degrees of freedom	Asymptotic significance (2-sided)	Exact significance (2-sided)
Pearson Chi-square	.100 ^a	1	.752	1.000
Continuity correction ^b	.000	1	1.000	
Likelihood ratio	.104	1	.747	1.000
Fisher's exact test				1.000
Number of valid cases	35			

a. 2 cells (50.0%) have an expected count less than 5. The minimum expected count is 1.29.

b. Computed only for a 2x2 table.

Source: SPSS output calculated from experiment data.

Table 24 and Table 25 show the number of participants and the results for the significance of the association between gender and tax compliance in group B2.

Table 24: Number of participants for “A mother’s love” (with time lag) treatment (group B2)

Cases					
Valid		Missing		Total	
n	Per cent	n	Per cent	n	Per cent
35	100.0%	0	.0%	35	100.0%

Source: SPSS output calculated from experiment data.

Table 25: Fisher’s exact test for “A mother’s love” (with time lag) treatment (group B2)

	Value	Degrees of freedom	Asymptotic significance (2-sided)	Exact significance (2-sided)
Pearson Chi-square	.000 ^a	1	1.000	1.000
Continuity correction ^b	.000	1	1.000	
Likelihood ratio	.000	1	1.000	1.000
Fisher's exact test				1.000
Number of valid cases	35			

a. 1 cell (25.0%) has an expected count less than 5. The minimum expected count is 2.00.

b. Computed only for a 2x2 table.

Source: SPSS output calculated from experiment data.

Secondary research question two

A Fisher’s exact test was conducted to determine whether there is an association between income level and the effectiveness of the nudge message. The Fisher’s exact test was conducted for each treatment group. Table 26 shows the number of participants in treatment group A1. Table 27 then shows the results related to the association between income level and tax compliance, and Table 28 indicates the significance of the association between the two variables.

Table 26: Number of participants for “Dreaming big” (with no time lag) treatment (group A1)

Cases					
Valid		Missing		Total	
n	Per cent	n	Per cent	n	Per cent
33	100.0%	0	.0%	33	100.0%

Source: SPSS output calculated from experiment data.

Table 27: Compliance per income level for “Dreaming big” (with no time lag) treatment (group A1)

Cross tabulation					
			Tax compliance (1 = YES, 0 = NO)		Total
			0	1	
Income level	LC80	Count	2	4	6
		Expected count	.9	5.1	6
		% within Income level	33.3%	66.7%	100.0%
		% within Tax compliance vs non-compliance	40.0%	14.3%	18.2%
	LC88	Count	1	12	13
		Expected count	2.0	11.0	13
		% within Income level	7.7%	92.3%	100.0%
		% within Tax compliance vs non-compliance	20.0%	42.9%	39.4%
	LC96	Count	2	8	10
		Expected count	1.5	8.5	10
		% within Income level	20.0%	80.0%	100.0%
		% within Tax compliance vs non-compliance	40.0%	28.6%	30.3%
	LC104	Count	0	4	4
		Expected count	.6	3.4	4
		% within Income level	.0%	100.0%	100.0%
		% within Tax compliance vs non-compliance	.0%	14.3%	12.1%
Total	Count	5	28	33	
	Expected count	5	28	33	
	% within Income level	15.2%	84.8%	100.0%	
	% within Tax compliance vs non-compliance	100.0%	100.0%	100.0%	

LC = laboratory currency

Source: SPSS output calculated from experiment data.

Table 28: Fisher’s exact test for “Dreaming big” (with no time lag) treatment (group A1)

	Value	Degrees of freedom	Asymptotic significance (2-sided)	Exact significance (2-sided)
Pearson Chi-square	3.003 ^a	3	.391	.428
Likelihood ratio	3.375	3	.337	.511
Fisher's exact test	2.687			.411
Linear-by-linear association	.902 ^b	1	.342	.443
Number of valid cases	33			

a. 5 cells (62.5%) have an expected count less than 5. The minimum expected count is .61.

b. The standardised statistic is .950.

Source: SPSS output calculated from experiment data.

Table 29 shows the number of participants in treatment group B1. Table 30 then shows the results related to the association between income level and tax compliance, and Table 31 indicates the significance of the association between the two variables.

Table 29: Number of participants for “Dreaming big” (with time lag) treatment (group B1)

Cases					
Valid		Missing		Total	
n	Per cent	n	Per cent	n	Per cent
34	100.0%	0	.0%	34	100.0%

Source: SPSS output calculated from experiment data.

Table 30: Compliance per income level for “Dreaming big” (with time lag) treatment (group B1)

Cross tabulation					
			Tax compliance (1 = YES, 0 = NO)		Total
			0	1	
Income level	LC72	Count	0	1	1
		Expected count	.1	.9	1
		% within Income level	.0%	100.0%	100.0%
		% within Tax compliance vs non-compliance	.0%	3.2%	2.9%
	LC80	Count	1	1	2
		Expected count	.2	1.8	2
		% within Income level	50.0%	50.0%	100.0%
		% within Tax compliance vs non-compliance	33.3%	3.2%	5.9%
	LC88	Count	0	4	4
		Expected count	.4	3.6	4
		% within Income level	.0%	100.0%	100.0%
		% within Tax compliance vs non-compliance	.0%	12.9%	11.8%
	LC96	Count	0	16	16
		Expected count	1.4	14.6	16
		% within Income level	.0%	100.0%	100.0%
		% within Tax compliance vs non-compliance	.0%	51.6%	47.1%
	LC104	Count	2	9	11
		Expected count	1	10	11
		% within Income level	18.2%	81.8%	100.0%
		% within Tax compliance vs non-compliance	66.7%	29.0%	32.4%
Total	Count	3	31	34	
	Expected count	3	31	34	
	% within Income level	8.8%	91.2%	100.0%	
	% within Tax compliance vs non-compliance	100.0%	100.0%	100.0%	

LC = laboratory currency

Source: SPSS output calculated from experiment data.

Table 31: Fisher’s exact test for “Dreaming big” (with time lag) treatment (group B1)

	Value	Degrees of freedom	Asymptotic significance (2-sided)	Exact significance (2-sided)
Pearson Chi-square	7.445 ^a	4	.114	.142
Likelihood ratio	7.090	4	.131	.140
Fisher's exact test	6.998			.107
Linear-by-linear association	.000 ^b	1	1.000	1.000
Number of valid cases	34			

a. 8 cells (80.0%) have an expected count less than 5. The minimum expected count is .09.

b. The standardised statistic is .000.

Source: SPSS output calculated from experiment data.

Table 32 shows the number of participants in treatment group A2. Table 33 then shows the results related to the association between income level and tax compliance, and Table 34 indicates the significance of the association between the two variables.

Table 32: Number of participants for “A mother’s love” (with no time lag) treatment (group A2)

Cases					
Valid		Missing		Total	
n	Per cent	n	Per cent	n	Per cent
35	100.0%	0	.0%	35	100.0%

Source: SPSS output calculated from experiment data.

Table 33: Compliance per level of income for “A mother’s love” (with no time lag) treatment (group A2)

Cross tabulation					
			Tax compliance (1 = YES, 0 = NO)		Total
			0	1	
Income level	LC72	Count	0	1	1
		Expected count	.1	.9	1
		% within Income level	.0%	100.0%	100.0%
		% within Tax compliance vs non-compliance	.0%	3.3%	2.9%
	LC80	Count	1	2	3
		Expected count	.4	2.6	3
		% within Income level	33.3%	66.7%	100.0%
		% within Tax compliance vs non-compliance	20.0%	6.7%	8.6%
	LC88	Count	1	6	7
		Expected count	1	6	7
		% within Income level	14.3%	85.7%	100.0%
		% within Tax compliance vs non-compliance	20.0%	20.0%	20.0%
	LC96	Count	2	12	14
		Expected count	2	12	14
		% within Income level	14.3%	85.7%	100.0%
		% within Tax compliance vs non-compliance	40.0%	40.0%	40.0%
LC104	Count	1	9	10	
	Expected count	1.4	8.6	10	
	% within Income level	10.0%	90.0%	100.0%	
	% within Tax compliance vs non-compliance	20.0%	30.0%	28.6%	
Total		Count	5	30	35
		Expected count	5	30	35
		% within Income level	14.3%	85.7%	100.0%
		% within Tax compliance vs non-compliance	100.0%	100.0%	100.0%

LC = laboratory currency

Source: SPSS output calculated from experiment data.

Table 34: Fisher's exact test for "A mother's love" (with no time lag) treatment (group A2)

	Value	Degrees of freedom	Asymptotic significance (2-sided)	Exact significance (2-sided)
Pearson Chi-square	1.206 ^a	4	.877	.912
Likelihood ratio	1.163	4	.884	1.000
Fisher's exact test	2.283			.833
Linear-by-linear association	.280 ^b	1	.597	.648
Number of valid cases	35			

a. 7 cells (70.0%) have an expected count less than 5. The minimum expected count is .14.

b. The standardised statistic is .529.

Source: SPSS output calculated from experiment data.

Table 35 shows the number of participants in treatment group B2. Table 36 then shows the results related to the association between income level and tax compliance, and Table 37 indicates the significance of the association between the two variables.

Table 35: Number of participants for "A mother's love" (with time lag) treatment (group B2)

Cases					
Valid		Missing		Total	
n	Per cent	n	Per cent	n	Per cent
35	100.0%	0	.0%	35	100.0%

Source: SPSS output calculated from experiment data.

Table 36: Compliance per income level for “A mother’s love” (with time lag) treatment (group B2)

Cross tabulation					
			Tax compliance (1 = YES, 0 = NO)		Total
			0	1	
Income level	LC80	Count	1	1	2
		Expected count	.6	1.4	2
		% within Income level	50.0%	50.0%	100.0%
		% within Tax compliance vs non-compliance	10.0%	4.0%	5.7%
	LC88	Count	2	7	9
		Expected count	2.6	6.4	9
		% within Income level	22.2%	77.8%	100.0%
		% within Tax compliance vs non-compliance	20.0%	28.0%	25.7%
	LC96	Count	4	11	15
		Expected count	4.3	10.7	15
		% within Income level	26.7%	73.3%	100.0%
		% within Tax compliance vs non-compliance	40.0%	44.0%	42.9%
	LC104	Count	3	6	9
		Expected count	2.6	6.4	9
		% within Income level	33.3%	66.7%	100.0%
		% within Tax compliance vs non-compliance	30.0%	24.0%	25.7%
Total	Count	10	25	35	
	Expected count	10	25	35	
	% within Income level	28.6%	71.4%	100.0%	
	% within Tax compliance vs non-compliance	100.0%	100.0%	100.0%	

LC = laboratory currency

Source: SPSS output calculated from experiment data.

Table 37: Fisher’s exact test for “A mother’s love” (with time lag) treatment (group B2)

	Value	Degrees of freedom	Asymptotic significance (2-sided)	Exact significance (2-sided)
Pearson Chi-square	.754 ^a	3	.860	1.000
Likelihood ratio	.717	3	.869	1.000
Fisher's exact test	1.217			.849
Linear-by-linear association	.004 ^b	1	.951	1.000
Number of valid cases	35			

a. 5 cells (62.5%) have an expected count less than 5. The minimum expected count is .57.

b. The standardised statistic is -.062.

Source: SPSS output calculated from experiment data.

Secondary research question three

A Fisher’s exact test was conducted to determine whether there is an association between population group and the effectiveness of the nudge message. The Fisher’s exact test was conducted for each treatment group. Table 38 shows the number of participants in treatment group A1. Table 39 then shows the results related to the association between population group and tax compliance, and Table 40 indicates the significance of the association between the two variables.

Table 38: Number of participants for “Dreaming big” (with no time lag) treatment (group A1)

Cases					
Valid		Missing		Total	
n	Per cent	n	Per cent	n	Per cent
33	100.0%	0	.0%	33	100.0%

Source: SPSS output calculated from experiment data.

Table 39: Compliance per population group for “Dreaming big” (with no time lag) treatment (group A1)

Cross tabulation					
			Tax compliance (1 = YES, 0 = NO)		Total
			0	1	
Population group	Black African	Count	4	22	26
		Expected count	3.9	22.1	26
		% within Population group	15.4%	84.6%	100.0%
		% within Tax compliance vs non-compliance	80.0%	78.6%	78.8%
	Coloured	Count	0	1	1
		Expected count	.2	.8	1
		% within Population group	.0%	100.0%	100.0%
		% within Tax compliance vs non-compliance	.0%	3.6%	3.0%
	Indian/Asian	Count	0	1	1
		Expected count	.2	.8	1
		% within Population group	.0%	100.0%	100.0%
		% within Tax compliance vs non-compliance	.0%	3.6%	3.0%
	White	Count	1	4	5
		Expected count	.8	4.2	5
		% within Population group	20.0%	80.0%	100.0%
		% within Tax compliance vs non-compliance	20.0%	14.3%	15.2%
Total	Count	5	28	33	
	Expected count	5	28	33	
	% within Population group	15.2%	84.8%	100.0%	
	% within Tax compliance vs non-compliance	100.0%	100.0%	100.0%	

Source: SPSS output calculated from experiment data.

Table 40: Fisher’s exact test for “Dreaming big” (with no time lag) treatment (group A1)

	Value	Degrees of freedom	Asymptotic significance (2-sided)	Exact significance (2-sided)
Pearson Chi-square	.450 ^a	3	.930	1.000
Likelihood ratio	.743	3	.863	1.000
Fisher's exact test	1.580			1.000
Number of valid cases	33			

a. 7 cells (87.5%) have an expected count less than 5. The minimum expected count is .15.

Source: SPSS output calculated from experiment data.

Table 41 shows the number of participants in treatment group B1. Table 42 then shows the results related to the association between population group and tax compliance, and Table 43 indicates the significance of the association between the two variables.

Table 41: Number of participants for “Dreaming big” (with time lag) treatment (group B1)

Cases					
Valid		Missing		Total	
n	Per cent	n	Per cent	n	Per cent
34	100.0%	0	.0%	34	100.0%

Source: SPSS output calculated from experiment data.

Table 42: Compliance per population group for “Dreaming big” (with time lag) treatment (group B1)

Cross tabulation					
			Tax compliance (1 = YES, 0 = NO)		Total
			0	1	
Population group	Black African	Count	1	18	19
		Expected count	1.7	17.3	19
		% within Population group	5.3%	94.7%	100.0%
		% within Tax compliance vs non-compliance	33.3%	58.1%	55.9%
	Coloured	Count	0	2	2
		Expected count	.2	1.8	2
		% within Population group	.0%	100.0%	100.0%
		% within Tax compliance vs non-compliance	.0%	6.5%	5.9%
	White	Count	2	11	13
		Expected count	1.1	11.9	13
		% within Population group	15.4%	84.6%	100.0%
		% within Tax compliance vs non-compliance	66.7%	35.5%	38.2%
Total	Count	3	31	34	
	Expected count	3	31	34	
	% within Population group	8.8%	91.2%	100.0%	
	% within Tax compliance vs non-compliance	100.0%	100.0%	100.0%	

Source: SPSS output calculated from experiment data.

Table 43: Fisher’s exact test for “Dreaming big” (with time lag) treatment (group B1)

	Value	Degrees of freedom	Asymptotic significance (2-sided)	Exact significance (2-sided)
Pearson Chi-square	1.189 ^a	2	.552	.629
Likelihood ratio	1.296	2	.523	.629
Fisher's exact test	1.480			.629
Number of valid cases	34			

a. 4 cells (66.7%) have an expected count less than 5. The minimum expected count is .18.

Source: SPSS output calculated from experiment data.

Table 44 shows the number of participants in treatment group A2. Table 45 then shows the results related to the association between population group and tax compliance, and Table 46 indicates the significance of the association between the two variables.

Table 44: Number of participants for “A mother’s love” (with no time lag) treatment (group A2)

Cases					
Valid		Missing		Total	
n	Per cent	n	Per cent	n	Per cent
35	100.0%	0	.0%	35	100.0%

Source: SPSS output calculated from experiment data.

Table 45: Compliance per treatment group for “A mother’s love” (with no time lag) treatment (group A2)

Cross tabulation					
			Tax compliance (1 = YES, 0 = NO)		Total
			0	1	
Population group	Black African	Count	5	26	31
		Expected count	4.4	26.6	31
		% within Population group	16.1%	83.9%	100.0%
		% within Tax compliance vs non-compliance	100.0%	86.7%	88.6%
	White	Count	0	4	4
		Expected count	.6	3.4	4
		% within Population group	.0%	100.0%	100.0%
		% within Tax compliance vs non-compliance	.0%	13.3%	11.4%
Total		Count	5	30	35
		Expected count	5	30	35
		% within Population group	14.3%	85.7%	100.0%
		% within Tax compliance vs non-compliance	100.0%	100.0%	100.0%

Source: SPSS output calculated from experiment data.

Table 46: Fisher’s exact test for “A mother’s love” (with no time lag) treatment (group A2)

	Value	Degrees of freedom	Asymptotic significance (2-sided)	Exact significance (2-sided)
Pearson Chi-square	.753 ^a	1	.386	.612
Continuity correction ^b	.012	1	.914	
Likelihood ratio	1.316	1	.251	.612
Fisher's exact test				1.000
Number of valid cases	35			

a. 3 cells (75.0%) have an expected count less than 5. The minimum expected count is .57.

b. Computed only for a 2x2 table.

Source: SPSS output calculated from experiment data.

Table 47 shows the number of participants in the final treatment group, group B2. Table 48 then shows the results related to the association between population group and tax compliance, and Table 49 indicates the significance of the association between the two variables.

Table 47: Number of participants for “A mother’s love” (with time lag) treatment (group B2)

Cases					
Valid		Missing		Total	
n	Per cent	n	Per cent	n	Per cent
35	100.0%	0	.0%	35	100.0%

Source: SPSS output calculated from experiment data.

Table 48: Compliance per population group for “A mother’s love” (with time lag) treatment (group B2)

Cross tabulation					
			Tax compliance (1 = YES, 0 = NO)		Total
			0	1	
Populatio n group	Black African	Count	8	18	26
		Expected count	7.4	18.6	26
		% within Population group	30.8%	69.2%	100.0%
		% within Tax compliance vs non-compliance	80.0%	72.0%	74.3%
	Coloured	Count	0	1	1
		Expected count	.3	.7	1
		% within Population group	.0%	100.0%	100.0%
		% within Tax compliance vs non-compliance	.0%	4.0%	2.9%
	Indian/Asian	Count	0	3	3
		Expected count	.9	2.1	3
		% within Population group	.0%	100.0%	100.0%
		% within Tax compliance vs non-compliance	.0%	12.0%	8.6%
	White	Count	2	3	5
		Expected count	1.4	3.6	5
		% within Population group	40.0%	60.0%	100.0%
		% within Tax compliance vs non-compliance	20.0%	12.0%	14.3%
Total	Count	10	25	35	
	Expected count	10	25	35	
	% within Population group	28.6%	71.4%	100.0%	
	% within Tax compliance vs non-compliance	100.0%	100.0%	100.0%	

Source: SPSS output calculated from experiment data.

Table 49: Fisher’s exact test for “A mother’s love” (with time lag) treatment (group B2)

	Value	Degrees of freedom	Asymptotic significance (2-sided)	Exact significance (2-sided)
Pearson Chi-square	1.982 ^a	3	.576	.765
Likelihood ratio	3.052	3	.384	.657
Fisher's exact test	1.771			.765
Number of valid cases	35			

a. 6 cells (75.0%) have an expected count less than 5. The minimum expected count is .29.

Source: SPSS output calculated from experiment data.

Secondary research question four

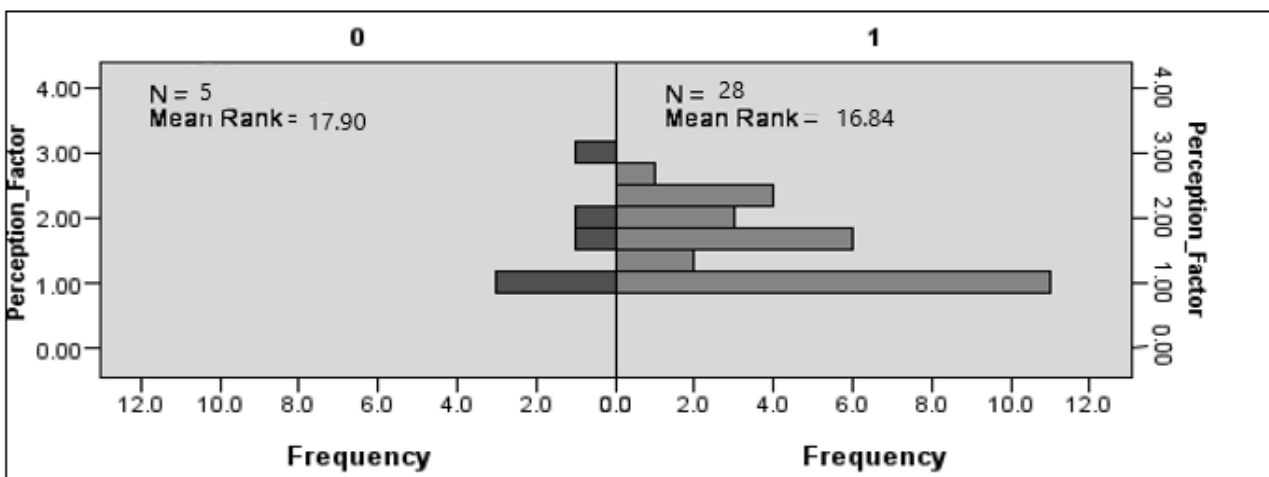
In order to conduct a Mann-Whitney U test, the distribution of attitude scores for tax compliant and tax non-compliant participants had to be assessed to determine whether they were similar or not. Figures 1 to 16 present the distribution of scores for each statement used to measure attitudes towards tax in each of the four treatment groups.

Treatment group A1: “Dreaming big” (with no time lag)

Statement 1: Citizens must pay their taxes to the government in order for our country to develop.

Distributions of the attitude scores for tax compliant participants and non-compliant participants are not similar as assessed by visual inspection of Figure 1.

Figure 1: Distributions of attitude scores (statement 1) for “Dreaming big” (with no time lag) treatment (group A1)



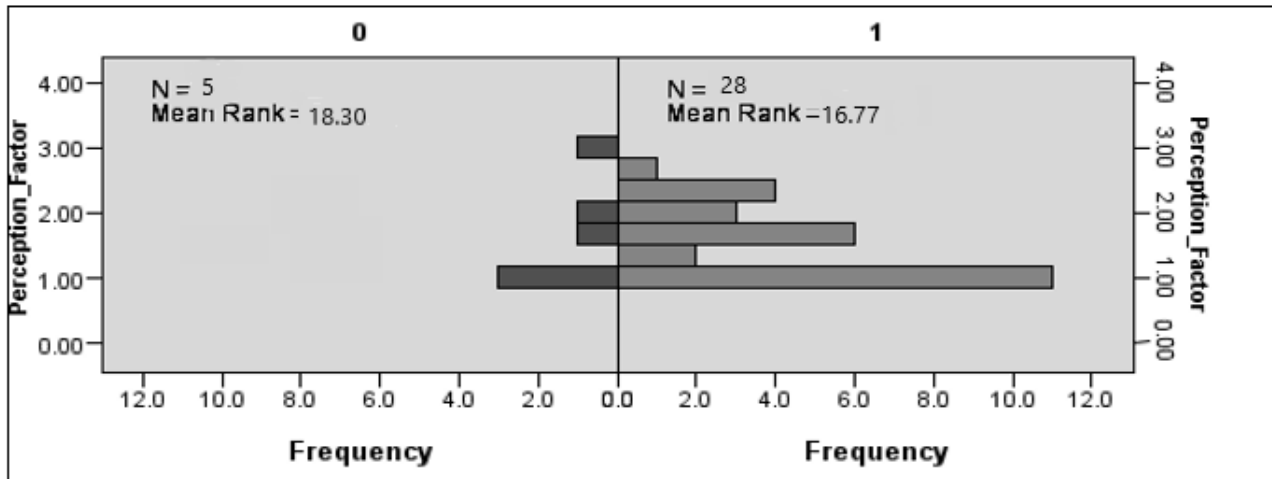
The graph on the left shows the distribution of scores for tax non-compliant participants, and the graph on the right shows the distribution of scores for tax compliant participants. The vertical axis represents the rank of the original attitude scores.

Source: SPSS output calculated from experiment data.

Statement 2: Underreporting my income will not hurt society as a whole.

Distributions of the attitude scores for tax compliant participants and non-compliant participants are not similar as assessed by visual inspection of Figure 2.

Figure 2: Distributions of attitude scores (statement 2) for “Dreaming big” (with no time lag) treatment (group A1)



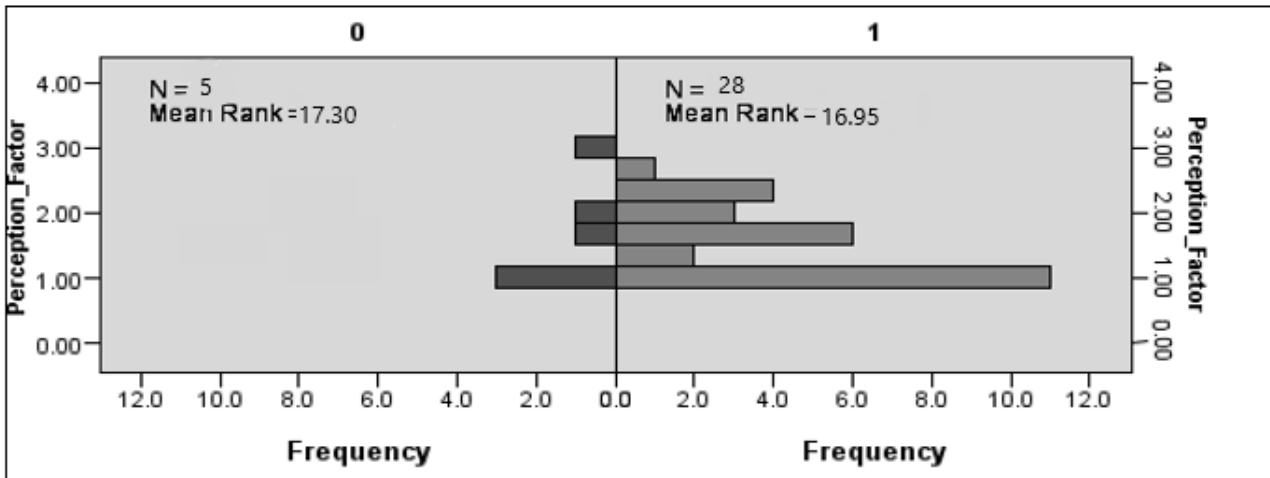
The graph on the left shows the distribution of scores for tax non-compliant participants, and the graph on the right shows the distribution of scores for tax compliant participants. The vertical axis represents the rank of the original attitude scores.

Source: SPSS output calculated from experiment data.

Statement 3: The government can find enough resources for development from other sources without having to tax the people.

Distributions of the attitude scores for tax compliant participants and non-compliant participants are not similar as assessed by visual inspection of Figure 3.

Figure 3: Distributions of attitude scores (statement 3) for “Dreaming big” (with no time lag) treatment (group A1)



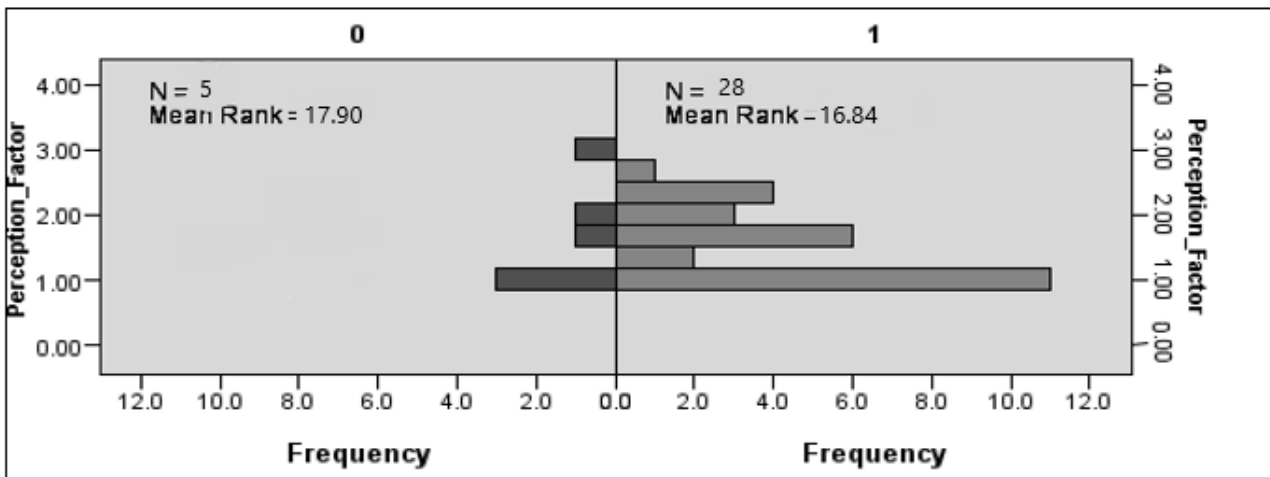
The graph on the left shows the distribution of scores for tax non-compliant participants, and the graph on the right shows the distribution of scores for tax compliant participants. The vertical axis represents the rank of the original attitude scores.

Source: SPSS output calculated from experiment data.

Statement 4: When dissatisfied with the government, it is justifiable to refuse to pay tax to the government.

Distributions of the attitude scores for tax compliant participants and non-compliant participants are not similar as assessed by visual inspection of Figure 4.

Figure 4: Distributions of attitude scores (statement 4) for “Dreaming big” (with no time lag) treatment (group A1)



The graph on the left shows the distribution of scores for tax non-compliant participants, and the graph on the right shows the distribution of scores for tax compliant participants. The vertical axis represents the rank of the original attitude scores.

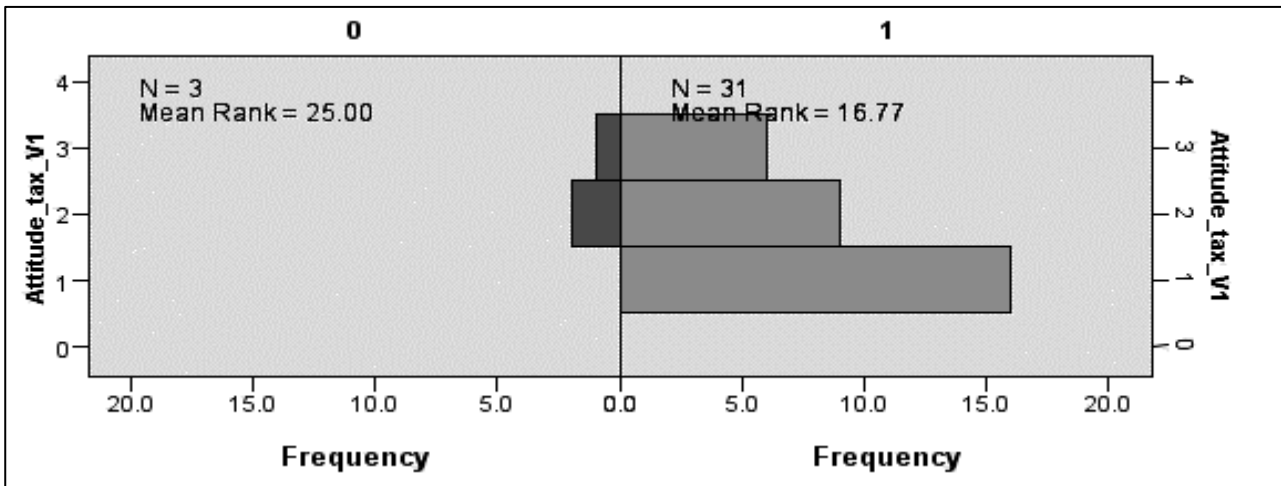
Source: SPSS output calculated from experiment data.

Treatment group B1: “Dreaming big” (with time lag)

Statement 1: Citizens must pay their taxes to the government in order for our country to develop.

Distributions of the attitude scores for tax compliant participants and non-compliant participants are not similar as assessed by visual inspection of Figure 5.

Figure 5: Distributions of attitude scores (statement 1) for “Dreaming big” (with time lag) treatment (group B1)



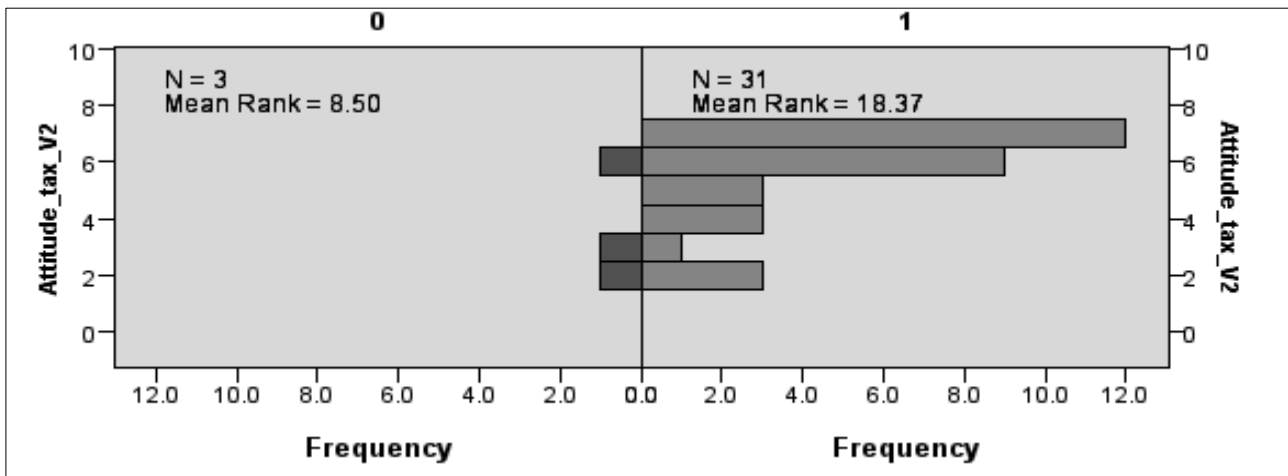
The graph on the left shows the distribution of scores for tax non-compliant participants, and the graph on the right shows the distribution of scores for tax compliant participants. The vertical axis represents the rank of the original attitude scores.

Source: SPSS output calculated from experiment data.

Statement 2: Underreporting my income will not hurt society as a whole.

Distributions of the attitude scores for tax compliant participants and non-compliant participants are not similar as assessed by visual inspection of Figure 6.

Figure 6: Distributions of attitude scores (statement 2) for “Dreaming big” (with time lag) treatment (group B1)



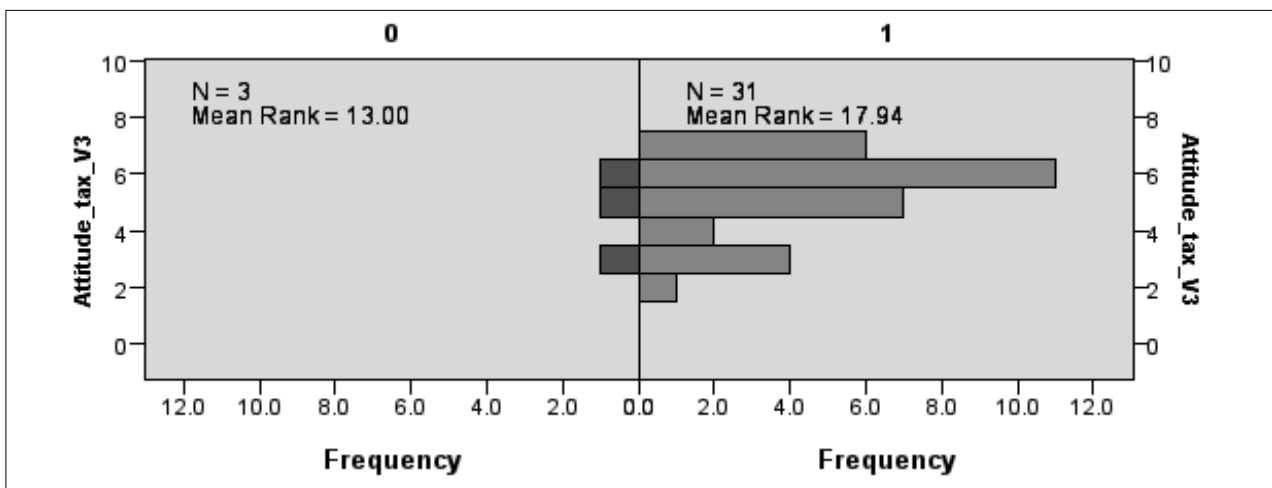
The graph on the left shows the distribution of scores for tax non-compliant participants, and the graph on the right shows the distribution of scores for tax compliant participants. The vertical axis represents the rank of the original attitude scores.

Source: SPSS output calculated from experiment data.

Statement 3: The government can find enough resources for development from other sources without having to tax the people.

Distributions of the attitude scores for tax compliant participants and non-compliant participants are not similar as assessed by visual inspection of Figure 7.

Figure 7: Distributions of attitude scores (statement 3) for “Dreaming big” (with time lag) treatment (group B1)



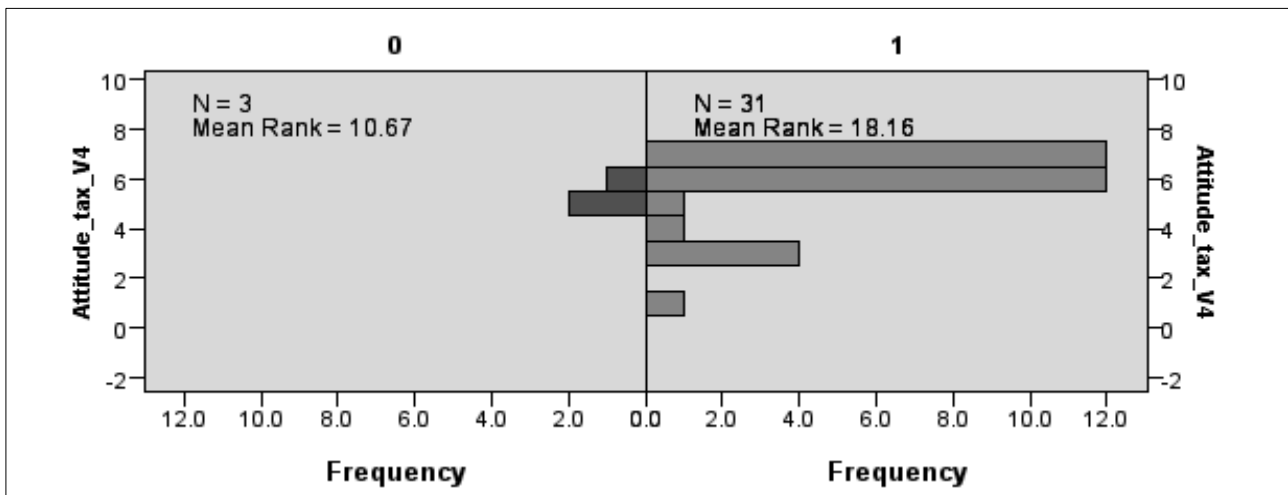
The graph on the left shows the distribution of scores for tax non-compliant participants, and the graph on the right shows the distribution of scores for tax compliant participants. The vertical axis represents the rank of the original attitude scores.

Source: SPSS output calculated from experiment data.

Statement 4: When dissatisfied with the government, it is justifiable to refuse to pay tax to the government.

Distributions of the attitude scores for tax compliant participants and non-compliant participants are not similar as assessed by visual inspection of Figure 8.

Figure 8: Distributions of attitude scores (statement 4) for “Dreaming big” (with time lag) treatment (group B1)



The graph on the left shows the distribution of scores for tax non-compliant participants, and the graph on the right shows the distribution of scores for tax compliant participants. The vertical axis represents the rank of the original attitude scores.

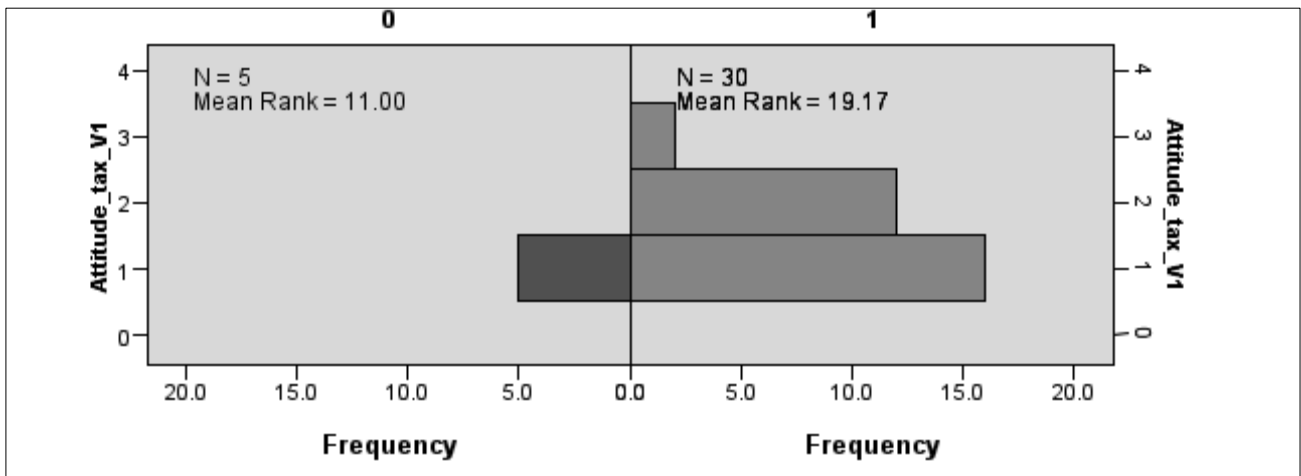
Source: SPSS output calculated from experiment data.

Treatment group A2: “A mother’s love” (with no time lag)

Statement 1: Citizens must pay their taxes to the government in order for our country to develop.

Distributions of the attitude scores for tax compliant participants and non-compliant participants are not similar as assessed by visual inspection of Figure 9.

Figure 9: Distributions of attitude scores (statement 1) for “A mother’s love” (with no time lag) treatment (group A2)



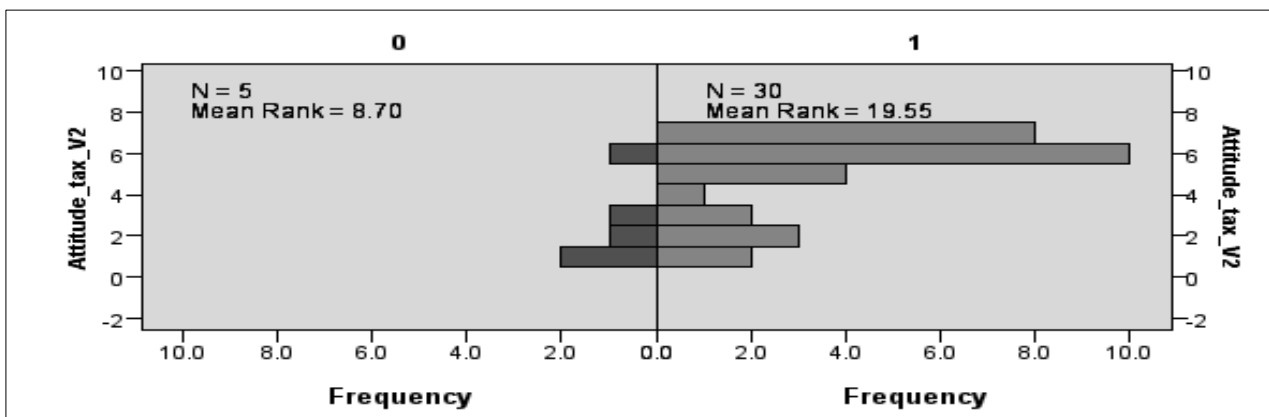
The graph on the left shows the distribution of scores for tax non-compliant participants, and the graph on the right shows the distribution of scores for tax compliant participants. The vertical axis represents the rank of the original attitude scores.

Source: SPSS output calculated from experiment data.

Statement 2: Underreporting my income will not hurt society as a whole.

Distributions of the attitude scores for tax compliant participants and non-compliant participants are not similar as assessed by visual inspection of Figure 10.

Figure 10: Distributions of attitude scores (statement 2) for “A mother’s love” (with no time lag) treatment (group A2)



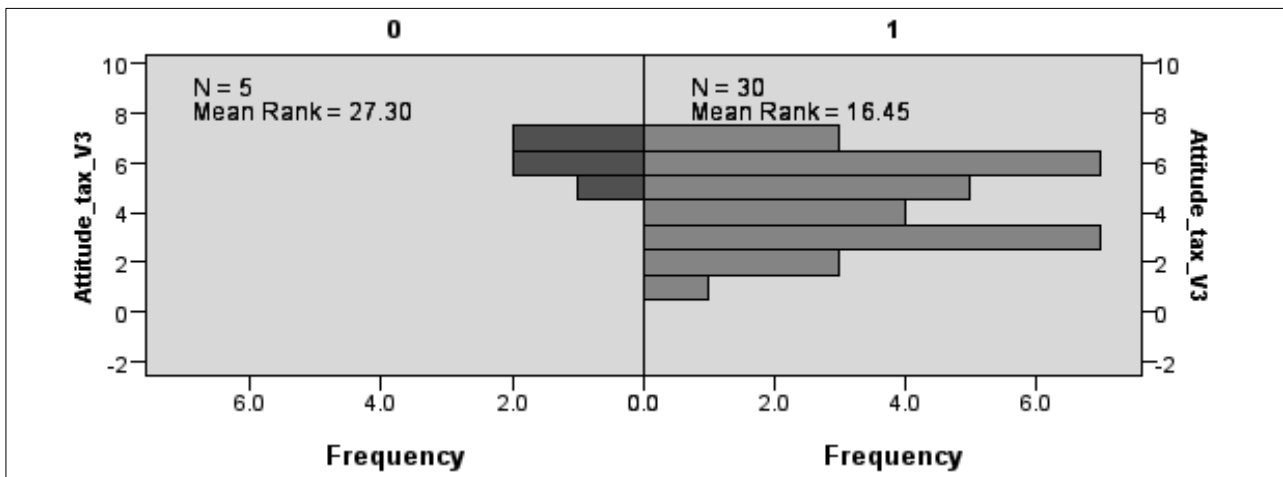
The graph on the left shows the distribution of scores for tax non-compliant participants, and the graph on the right shows the distribution of scores for tax compliant participants. The vertical axis represents the rank of the original attitude scores.

Source: SPSS output calculated from experiment data.

Statement 3: The government can find enough resources for development from other sources without having to tax the people.

Distributions of the attitude scores for tax compliant participants and non-compliant participants are not similar as assessed by visual inspection of Figure 11.

Figure 11: Distributions of attitude scores (statement 3) for “A mother’s love” (with no time lag) treatment (group A2)



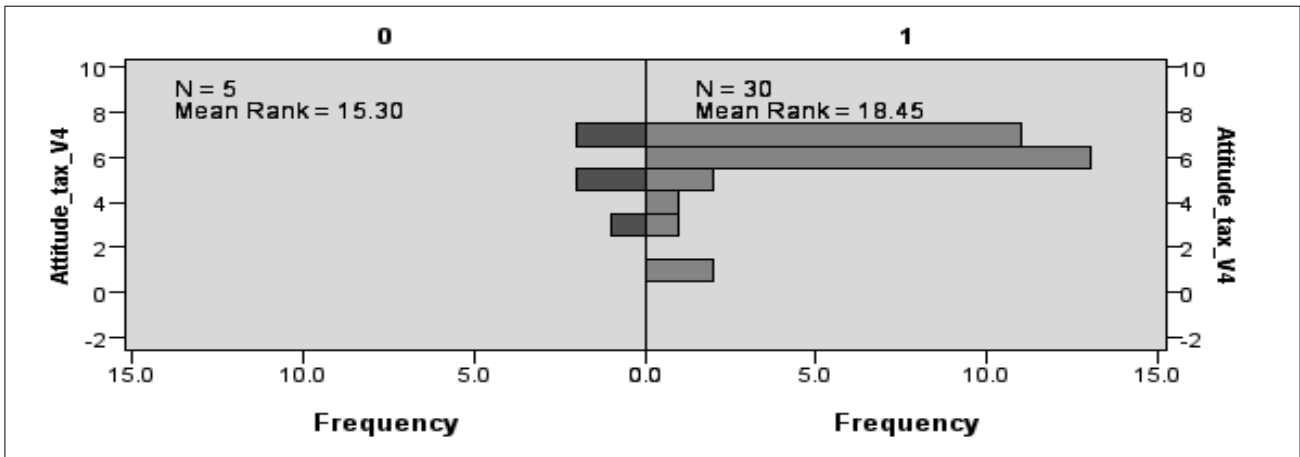
The graph on the left shows the distribution of scores for tax non-compliant participants, and the graph on the right shows the distribution of scores for tax compliant participants. The vertical axis represents the rank of the original attitude scores.

Source: SPSS output calculated from experiment data.

Statement 4: When dissatisfied with the government, it is justifiable to refuse to pay tax to the government.

Distributions of the attitude scores for tax compliant participants and non-compliant participants are not similar as assessed by visual inspection of Figure 12.

Figure 12: Distributions of attitude scores (statement 4) for “A mother’s love” (with no time lag) treatment (group A2)



The graph on the left shows the distribution of scores for tax non-compliant participants, and the graph on the right shows the distribution of scores for tax compliant participants. The vertical axis represents the rank of the original attitude scores.

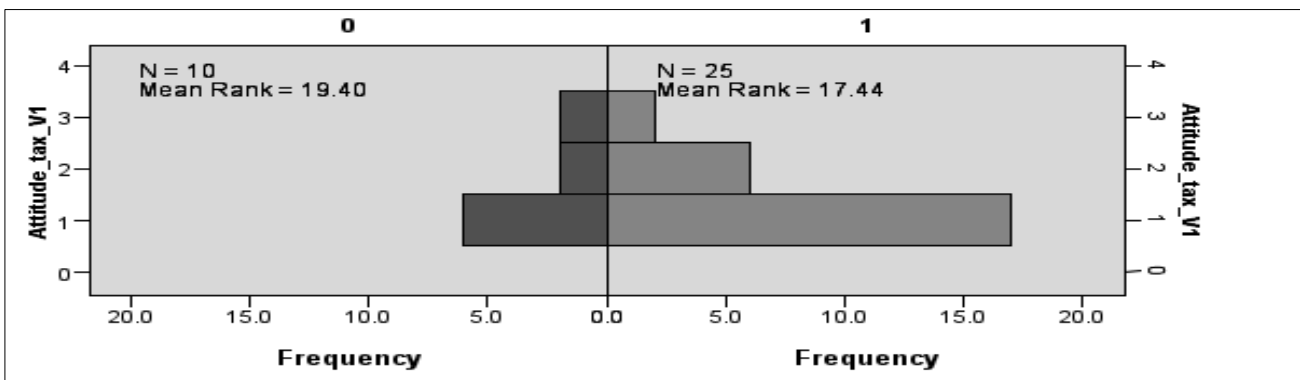
Source: SPSS output calculated from experiment data.

Treatment group B2: “A mother’s love” (with time lag)

Statement 1: Citizens must pay their taxes to the government in order for our country to develop.

Distributions of the attitude scores for tax compliant participants and non-compliant participants are similar as assessed by visual inspection of Figure 13.

Figure 13: Distributions of attitude scores (statement 1) for “A mother’s love” (with time lag) treatment (group B2)



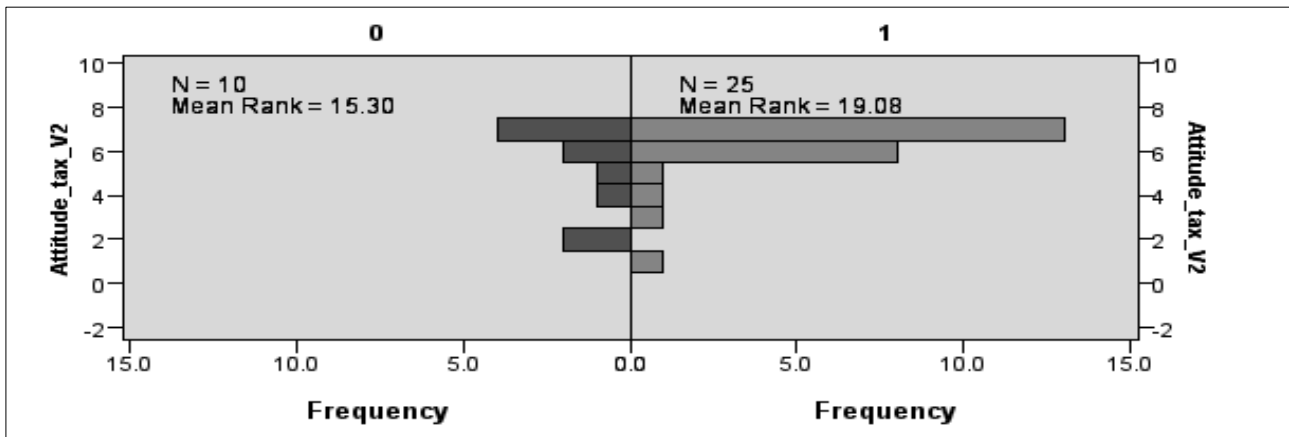
The graph on the left shows the distribution of scores for tax non-compliant participants, and the graph on the right shows the distribution of scores for tax compliant participants. The vertical axis represents the rank of the original attitude scores.

Source: SPSS output calculated from experiment data.

Statement 2: Underreporting my income will not hurt society as a whole.

Distributions of the attitude scores for tax compliant participants and non-compliant participants are similar as assessed by visual inspection of Figure 14.

Figure 14: Distributions of attitude scores (statement 2) for “A mother’s love” (with time lag) treatment (group B2)



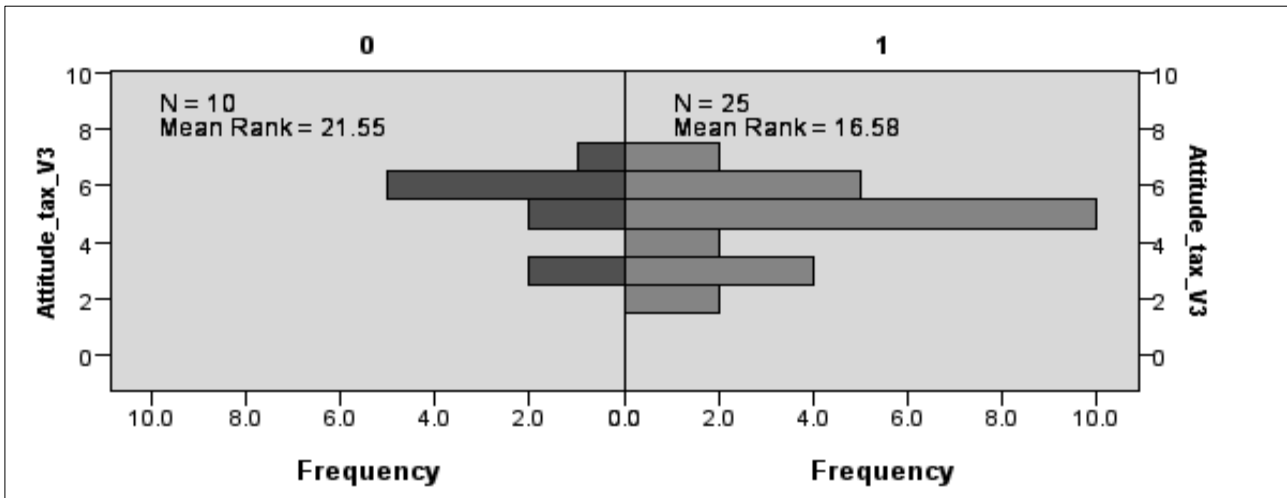
The graph on the left shows the distribution of scores for tax non-compliant participants, and the graph on the right shows the distribution of scores for tax compliant participants. The vertical axis represents the rank of the original attitude scores.

Source: SPSS output calculated from experiment data.

Statement 3: The government can find enough resources for development from other sources without having to tax the people.

Distributions of the attitude scores for tax compliant participants and non-compliant participants are similar as assessed by visual inspection of Figure 15.

Figure 15: Distributions of attitude scores (statement 3) for “A mother’s love” (with time lag) treatment (group B2)



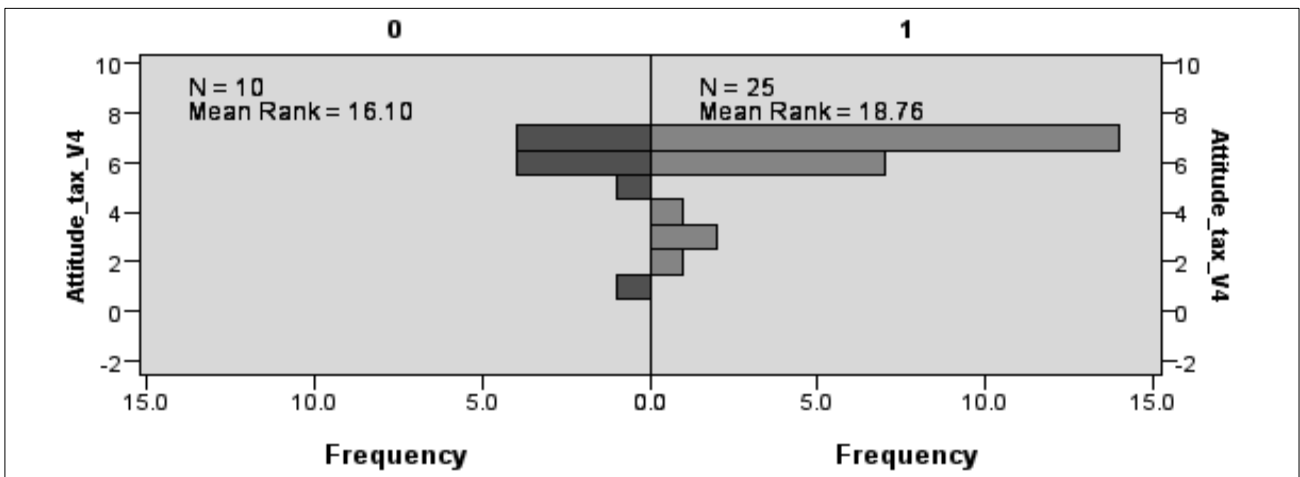
The graph on the left shows the distribution of scores for tax non-compliant participants, and the graph on the right shows the distribution of scores for tax compliant participants. The vertical axis represents the rank of the original attitude scores.

Source: SPSS output calculated from experiment data.

Statement 4: When dissatisfied with the government, it is justifiable to refuse to pay tax to the government.

Distributions of the attitude scores for tax compliant participants and non-compliant participants are not similar as assessed by visual inspection of Figure 16.

Figure 16: Distributions of attitude scores (statement 4) for “A mother’s love” (with time lag) treatment (group B2)



The graph on the left shows the distribution of scores for tax non-compliant participants, and the graph on the right shows the distribution of scores for tax compliant participants. The vertical axis represents the rank of the original attitude scores.

Source: SPSS output calculated from experiment data.

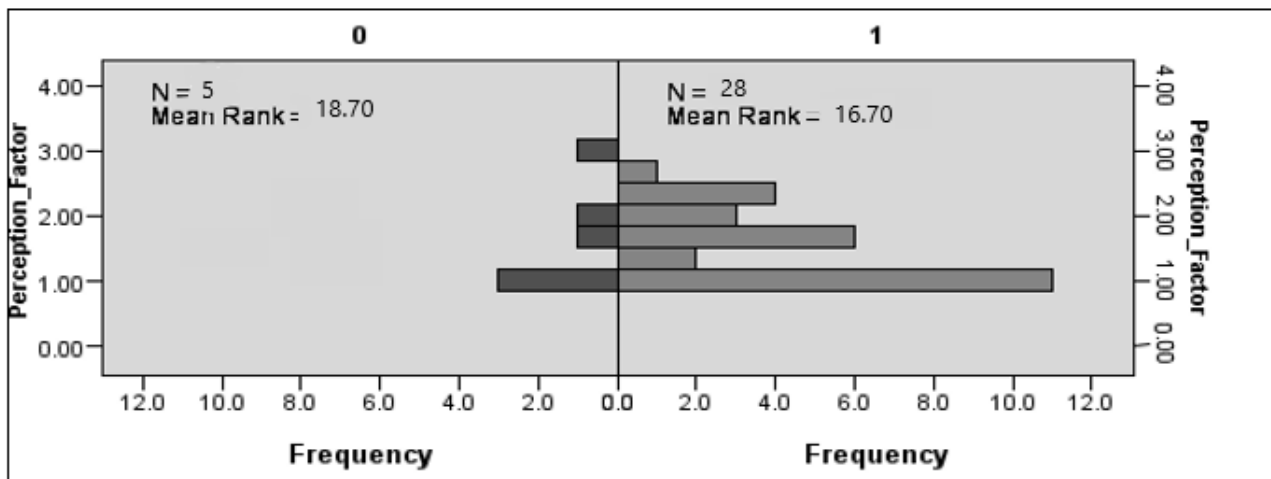
Secondary research question five

In order to conduct a Mann-Whitney U test, the distribution of perception of corruption scores for tax compliant and tax non-compliant participants had to be assessed to determine whether they were similar or not. Figures 17 to 20 present the distributions of scores for each of the four treatment groups.

Treatment group A1: “Dreaming big” (with no time lag)

Distributions of perception of corruption scores for tax compliant participants and non-compliant participants are not similar as assessed by visual inspection of Figure 17.

Figure 17: Distributions of perception of corruption scores for “Dreaming big” (with no time lag) treatment (group A1)



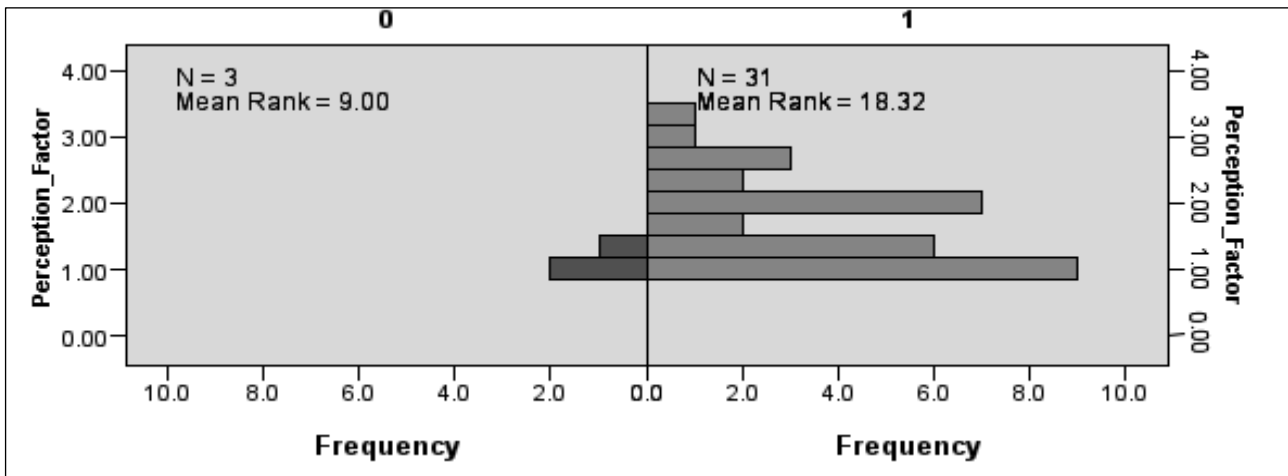
The graph on the left shows the distribution of scores for tax non-compliant participants, and the graph on the right shows the distribution of scores for tax compliant participants. The vertical axis represents the rank of the original perception scores of the participants.

Source: SPSS output calculated from experiment data.

Treatment group B1: “Dreaming big” (with time lag)

Distributions of perception of corruption scores for tax compliant participants and non-compliant participants are not similar as assessed by visual inspection of Figure 18.

Figure 18: Distributions of perception of corruption scores for “Dreaming big” (with time lag) treatment (group B1)



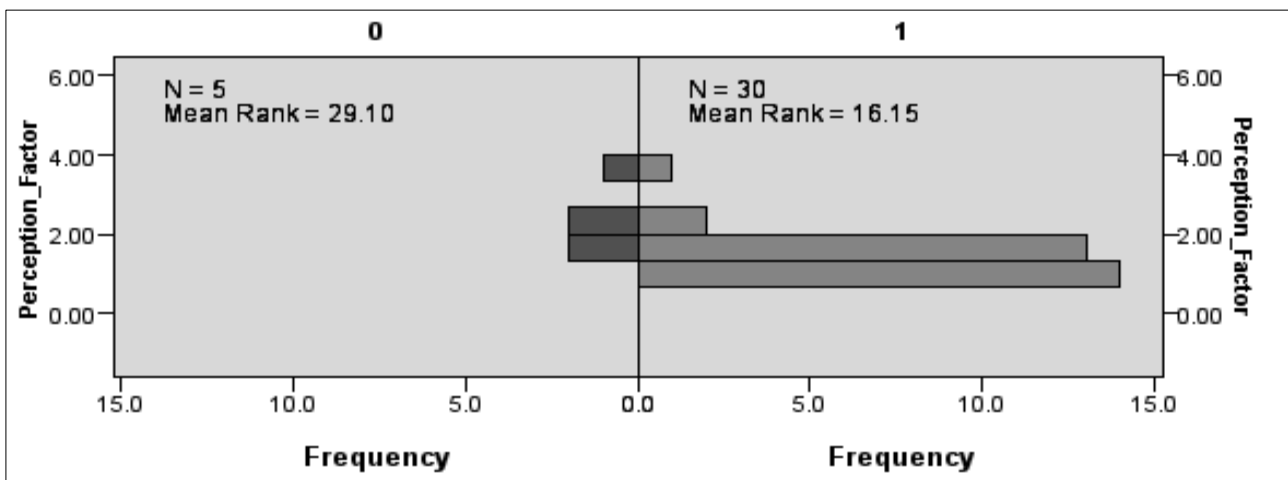
The graph on the left shows the distribution of scores for tax non-compliant participants, and the graph on the right shows the distribution of scores for tax compliant participants. The vertical axis represents the rank of the original perception scores of the participants.

Source: SPSS output calculated from experiment data.

Treatment group A2: “A mother’s love” (with no time lag)

Distributions of perception of corruption scores for tax compliant participants and non-compliant participants are not similar as assessed by visual inspection of Figure 19.

Figure 19: Distributions of perception of corruption scores for “A mother’s love” (with no time lag) treatment (group A2)



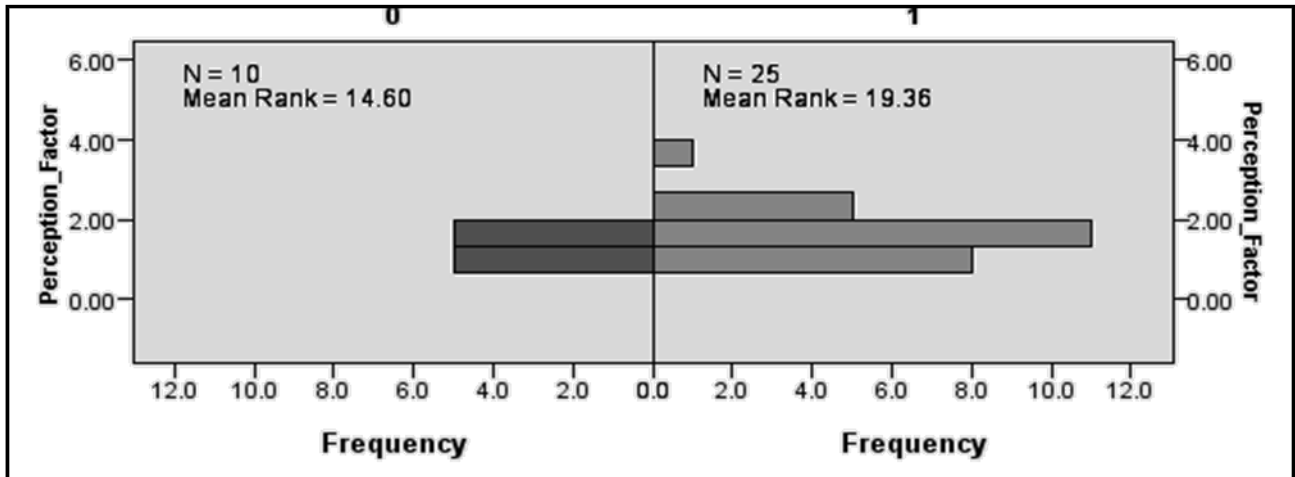
The graph on the left shows the distribution of scores for tax non-compliant participants, and the graph on the right shows the distribution of scores for tax compliant participants. The vertical axis represents the rank of the original perception scores of the participants.

Source: SPSS output calculated from experiment data.

Treatment group B2 “A mother’s love” (with time lag)

Distributions of perception of corruption scores for tax compliant participants and non-compliant participants are not similar as assessed by visual inspection of Figure 20.

Figure 20: Distributions of perception of corruption scores for “A mother’s love” (with time lag) treatment (group B2)



The graph on the left shows the distribution of scores for tax non-compliant participants, and the graph on the right shows the distribution of scores for tax compliant participants. The vertical axis represents the rank of the original perception scores of the participants.

Source: SPSS output calculated from experiment data.

Logistic regression

Table 50 shows the results of the assessment of the linearity of the continuous variables with respect to the logit of the dependent variables. None of the interaction items were found to be significant (*p-values* are greater than .05).

Table 50: Logistic regression

		Variables in the equation					
		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1 ^a	Int_Attitude_1	-.929	1.429	.423	1	.515	.395
	Int_Attitude_2	-1.049	.589	3.174	1	.075	.350
	Int_Attitude_3	1.479	1.040	2.022	1	.155	4.388
	Int_Attitude_4	1.095	.790	1.923	1	.166	2.989
	Int_perception	-.752	1.540	.238	1	.626	.472
	Int_score	-.483	.492	.966	1	.326	.617
	Attitude_tax_V1	1.341	2.380	.318	1	.573	3.824
	Attitude_tax_V2	2.842	1.421	4.000	1	.046	17.157
	Attitude_tax_V3	-3.938	2.645	2.217	1	.137	.019
	Attitude_tax_V4	-2.772	2.013	1.896	1	.169	.063
	Perception_Factor	1.787	2.496	.513	1	.474	5.973
	Income level	2.645	2.713	.951	1	.330	14.084
	Constant	-37.386	45.351	.680	1	.410	.000

a. Variable(s) entered on step 1: Attitude_tax_V1, Attitude_tax_V2, Attitude_tax_V3, Attitude_tax_V4, Income level, Perception_Factor, IntAttV1, IntAttV2, IntAttV3, IntAttV4, IntScore, IntPerception.

Source: SPSS output calculated from experiment data.