

**Investigating the effect of item order on the Personal
Wellbeing Index**

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for the award of Bachelor of Arts (Psychology) Honours

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entitled: Investigating the effect of item order on the Personal Wellbeing Index

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We the undersigned declare that the above-named research project has been completed as described in the Application for Ethics Approval and in accordance with the ethics guidelines of Deakin University.

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CHAPTER 1:
LITERATURE REVIEW

ABSTRACT

The pursuit of happiness is an endeavour as old as man, with ancient Greek philosopher Aristotle (384-322 BC) suggesting that pursuing happiness is not only inevitable, but is the point of human existence. In the field of psychology, the study of Subjective Wellbeing (SWB) is dedicated to understanding this phenomenon. In Australia, the International Wellbeing Group study SWB by way of survey results derived from the Personal Wellbeing Index (PWI). This review explores the historical theories and measurement of SWB and the development and psychometric properties of the PWI. Cognitive and contextual influences on item response are then considered in relation to the effects of item order on survey response. The PWI is considered extremely valid, reliable and robust and for over a decade has obtained consistent results both in Australia and internationally. The PWI has been psychometrically tested and altered many times, increasing in strength and robustness, however it has yet to be tested for item order effects. If item-order effects alter the scores derived from the PWI, over a decade of survey results produced both nationally and internationally may become invalid.

The pursuit of happiness is an endeavour as old as man. Ancient Greek philosopher Aristotle (384-322 BC) suggested that pursuing happiness is not only inevitable, but is the point of human existence (Aristotle; Ross & Brown 2009). Centuries later the phrase “Life, Liberty and the pursuit of Happiness” was immortalised within the American Declaration of Independence (1776) as an example of each individuals “unalienable right” that is to be protected by the government elect. Today individuals and nations continue to be focused on understanding and increasing happiness and so it is no surprise that happiness and quality of life are central topics within many disciplines. In the field of psychology, the study of Subjective Wellbeing (SWB) is dedicated to understanding these phenomena, and in Australia the International Wellbeing Group study this by way of survey results derived from the Personal Wellbeing Index (PWI). The following review will explore theories of SWB and the psychometric properties of the PWI, in relation to the cognitive and contextual effects of item order on survey response.

2. SUBJECTIVE WELLBEING (SWB)

2.1 Defining SWB

SWB refers to how a person experiences the quality of their life (Diener, 1984). It is considered the combination of emotional reactions (the frequency of positive and negative affect) and cognitive judgments of satisfaction (Diener, 1984). During the 1940’s there was a push for research to focus on understanding and explaining happiness and wellbeing (Lowy, 1945) and since then, a variety of theories have been proposed to explain SWB.

2.2 Theories of SWB

2.2.1 Set Point Theory

SWB is thought to be a stable construct, with research showing that levels of self-reported SWB are unlikely to vary regardless of the length of time between measurements (Emmons & Diener, 1985). These findings suggest that SWB has a ‘set-point’ (Cummins, 1995; Lucas, Clark, Georgellis & Diener, 2003) and that this is both stable and consistent across time and steady in the presence of major life events (Diener, 2000). While major

events affect levels of SWB, those levels return to the original 'set-point' within three months, suggesting adaptation (Suh, Diener & Fujita, 1996).

2.2.2 Adaptation Level Theory

Adaptation Level Theory posits that while SWB may be temporarily affected by extremely positive or negative life events, those effects wear off with a slow return to normal levels (Helson, 1964). One famous and commonly cited study, by Brickman, Coates and Janoff-Bulman (1978), demonstrated this phenomena with findings that both lottery winners (extremely positive event) and accident victims left with debilitating conditions (extremely negative event) showed no significant difference in levels of happiness between one and twelve months after the event, when compared to the control group. These results support the idea that individuals adapt to their circumstances and in doing so, SWB returns to its 'set-point'. Although this reveals stability at the individual level, scores are also stable and similar across populations (Cummins, 1998).

2.2.3 Stability of SWB

The stability of SWB was explored in the 1995 paper by Cummins, in which data were assessed from 16 different life satisfaction studies that sampled western populations. Cummins found little deviation in average scores on wellbeing across populations with data revealing a mean score of 75.02 and a standard deviation of 2.74. Cummins (1998) subsequently replicated the findings with additional western and non-western data, with results indicating a normative world range of 60-80 and an international SWB mean of 70 (SD= 5). The results of Cummins work lead him to propose the Homeostasis theory of Subjective Wellbeing (Cummins, 1998; Cummins, Gullone & Lau, 2002).

2.2.4 Homeostasis Theory

Homeostasis theory posits that SWB is a feeling state that is both hard-wired and biologically determined (Cummins, 2010). According to this theory, a chronic and persistent negative challenge can cause homeostasis to fail, resulting in a loss of contact with Homeostatically Protected Mood (HPMood), which allows negative affect to dominate. Long term or severe stressors may cause SWB levels to drop dramatically

below the set-point and lead to homeostatic defeat (Cummins, 1995). In these circumstances, homeostasis may not restore itself without intervention, resulting in the condition we understand as Depression (Cummins, 1995). Homeostasis theory has received criticism for its similarity to Adaptation Level Theory, however the differentiation lies in that homeostasis explains the process behind *how* SWB returns to a normal state, not simply that it does.

2.3 Measuring SWB

2.3.1 Measuring via Affect

A clear understanding of the nature of SWB has implications for how it is measured. Early research into SWB concentrated on the individual's experience of happiness (Bradburn & Caplovitz, 1965) with this conceptualisation placing emphasis on the 'subjective' nature of happiness. The suggestion is that humans are the best tool to judge their own levels of happiness (Kesebir & Diener, 2008). Early measures used direct report from individuals by asking how they feel about the state of their life. This was achieved by asking the question "Taking all things together, how would you say things are these days", with responses defining a level of happiness (Bradburn & Caplovitz, 1965). Bradburn's Affect Balance Scale (ABS) focused on psychological wellbeing as the differentiation between positive and negative feelings, promoting an affective model of wellbeing. This focus on affect continued with the Positive and Negative Affective Scale (PANAS) developed by Watson, Clark and Tellegen (1988), which extended Bradburn's ABS by assessing a range of emotional states via a list of adjectives, over a certain time-frame. For instance "how often have you felt cheerful" yesterday, last week, last month, last year and so on.

2.3.2 Measuring via Cognition

During this time, Diener, Emmons, Larson and Griffin (1985) took a different approach to SWB, focusing on the assessment of global cognitive life evaluations rather than affective reactions, via the now widely used Satisfaction With Life Scale (SWLS). The SWLS is thought to have good psychometric properties (Pavot & Diener, 1993), is comparable to single-item life satisfaction measures and is considered so reliable that it is

often used to validate other scales (Dolan, Peasgood & White, 2006).

2.3.3 Measuring via Affect and Cognition

In contemporary research, affect and cognition are combined in an affective-cognitive model (i.e. Diener, Lucas & Oishi, 2002; Diener, Oishi & Lucas, 2003; Linley, Maltby, Wood, Osborne & Hurling, 2009; Shmotkin, 1998). While the fundamental scale structure remains similar, the questions have evolved as a judgment of ‘satisfaction’. The Personal Wellbeing Index (PWI) created from the Comprehensive Quality of Life Scale (ComQol, Cummins, 1993) focuses on domains responsive to both objective and subjective measurement. This affective-cognitive model measuring satisfaction has been shown to explain 90% of the variance in SWB (Davern, Cummins & Stokes, 2007).

3. THE PERSONAL WELLBEING INDEX (PWI)

3.1 Development of the PWI

3.1.1 History of the PWI

The PWI was originally created out of the Comprehensive Quality of Life Scale (ComQol) (Cummins, McCabe, Romeo & Gullone, 1994) after it was abandoned due its inability to attain psychometric validity (International Wellbeing Group, 2013). The PWI is a fluid scale that evolves with the availability of new data and theory. When originally created, it retained only the overall satisfaction question and six of the seven domains found in the ComQol (International Wellbeing Group, 2013). There has since been many adjustments with the current scale, as seen in the 5th edition of the PWI manual (International Wellbeing Group, 2013), returning to a core of seven domains. The PWI uses the theoretical principle of ‘deconstruction’ to measure SWB with the least number of domains, calculating the first-level of satisfaction with life as a whole (International Wellbeing Group, 2013). These domains each correspond directly to the quality of life domains: standard of living, health, achieving in life, relationships, safety, community-connectedness, and future security, with each domain making an independent contribution

to Life as a Whole.

3.1.2 *Design of the PWI*

The PWI is a self-administered instrument available in written, verbal and electronic format. It replaced the ComQol's 7-point Likert scale with an 11-point end-defined scale, as developed by Jones and Thurstone (1995), anchored by 0 – 'Not at all satisfied' and 10 – 'Completely satisfied' (International Wellbeing Group, 2013). It is argued that naming the scale categories can detract from the interval nature of the derived data and as such, using an end-defined scale both maintains the scale's reliability and increases its sensitivity (Cummins & Gullone, 2000). Wellbeing data are negatively skewed with most people answering within a restricted portion of the positive end of the scale and there is a large trait component found when using SWB to measure outcomes (Cummins & Gullone, 2000). Scale sensitivity therefore becomes crucial, as small deviations in scores can be very meaningful (Cummins & Gullone, 2000). Additionally, results obtained from the 11-point Likert scale are easily converted for simplicity of comparison (International Wellbeing Group, 2013). Data are converted into units of Percentage of Scale Maximum (%SM), by taking each Likert scale and coding it from 0 (lowest) to X (highest response category) and converting it using the formula $(\text{score}/X)100$ (Cummins, Eckersley, Pallant, Van Vugt, & Misajon, 2003). This produces units on a 0 to 100 distribution and from this, the PWI can be scored in two ways; each of the domains can be evaluated separately, or the domain scores can be added and averaged to generate an overall score representative of SWB (International Wellbeing Group, 2013).

3.2 **Properties of the PWI**

3.2.1 *Psychometric Properties of the PWI*

The seven domains of life satisfaction that constitute the PWI are verified using the criterion that a contribution of unique variance should be made from each when entered into a multiple regression to predict general life satisfaction. The combination of each domain's unique contribution, together with the variance they share, predicts roughly 40-60 percent of the overall variance in general life satisfaction (International Wellbeing Group, 2013). In further support of the reliability of the PWI as a tool to measure SWB,

factor analysis of the domains to assess construct validity, consistently reveals a single factor that accounts for roughly 50% of the variance with both Australian and international samples (International Wellbeing Group, 2013). All translations of the PWI have demonstrated evidence of reliability, with internal consistency (Australian data) ranging from 0.70 to 0.85 (International Wellbeing Group, 2013).

3.2.2 *Domains of the PWI*

Despite the reliability and validity of the PWI and the consistency of the results derived from its use, the Australian Unity Wellbeing Index survey data reveals that the domains do not contribute equal unique variance toward satisfaction with life as a whole (International Wellbeing Group, 2013). In fact the domain of ‘Standard of living’ typically contributes the most (between 4.5% and 8.9%), followed by ‘Achievements in life’ (2.9% - 4.9%) and ‘Relationships’ (3.2% – 4.9%) (International Wellbeing Group, 2013). All remaining domains contribute moderately less, ranging between 0% (Safety) and 1.4% (Health) (International Wellbeing Group, 2013). The highest contributing domains happen to correspond with three of the first four questions on the PWI and provide more than double the unique variance than the remaining 4 domains. This study will address the theory that this phenomena may be due in part to item order effects; consequences of the order in which the questions are asked.

4. ITEM ORDER EFFECTS

4.1 **Influence of Context on Item Response**

The features of a questionnaire including questionnaire format, question wording and context have the potential to influence an individual’s response (Schwarz, 1999), with even trivial changes in the context surrounding an item altering decision-making outcomes (Krosnick & Alwin, 1987). It has been suggested that the tendency for a respondent to adapt their answer due to context effects, is a byproduct of the cognitive process undertaken when arriving at their answer.

When a judgment is formed about a target stimulus (or question) an individual needs to both retrieve a cognitive representation of it and define a standard of comparison in order to evaluate it (Schwarz & Bless, 1992). At the moment of response, an individual

relies on only a subset of the most readily accessible information derived from a combination of stable (cognitive) and temporarily available (contextual) influences (Schwarz & Bless, 1992). Stable influences represent the individual characteristics of each respondent (i.e. education, personality etc.), while temporary influences are primarily due to questionnaire variables, known as question context effects (Schwarz & Bless 1992).

Pertinent to the current study is that information used to answer subsequent questions in a questionnaire may include that which was primed by a preceding question (Schwarz & Bless 1992), driven by the context or rules used by the respondent to formulate their answers. The following sections will discuss some theories surrounding context effects, how they drive and shape survey response and ultimately how response order may affect survey results.

4.2 Cognitive Influences

4.2.1 Theories of economic and heuristic response

There have been several cognitive theories proposed to describe how individuals form answers to self-report survey questions. Underlying most of these is the common assumption that respondents adhere to the “cognitive miser” principle; that minimal cognitive effort is used, prompting the use of heuristic strategies to generate responses (Strack & Martin, 1987). Similarly “satisficing theory”, based on Simon's (1957) satisficing explanation, posits that individuals make economic decisions when answering survey questions. This theory suggests most responses are made with minimal psychological cost by choosing a satisfactory or acceptable response rather than taking the time to select an optimal answer. Based on this principle, survey items with a large number of responses would elicit the first acceptable response, particularly when a number of the alternatives seem similar or equally suitable (Krosnick & Alwin 1987).

The ‘cognitive accessibility’ theory (Srull & Wyer, 1980) furthers this suggesting that individuals do not retrieve all, or even a representative sample of relevant information from memory, but rather only the most easily accessible information. Bishop, Oldendick and Tuchfarber (1982) purport that survey respondents likely answer questions with the first thing that comes to mind. This is further explained by the ‘Primacy Effect’ bias, which suggests items presented early may be used to create a cognitive framework for comparison, that directs further question interpretation and response (Krosnick & Alwin

1987). Taken together, these theories emphasise the tendency to use easily available and readily accessible information when answering survey questions, thereby not always providing the most accurate response to the question asked.

4.2.2 Commonality and Contradiction among theories

The common components of these theories of economic and heuristic response support the idea that salient response cues (such as a previously supplied answers) or easily accessible information (that which is available in short-term memory) can impact the answers provided to subsequent questions. Furthermore, that early items are likely to be subjected to a deeper level of cognitive processing, which may dominate thoughts and inhibit further deliberation when considering later items (Krosnick & Alwin 1987).

In contradiction is has been argued that individuals may intentionally avoid an economic or heuristic response because other factors necessitate that these not be used (Schwarz, Strack & Mai, 1991). A number of influences outside the individual support this type of theory and can also affect survey results.

4.3 Context Influences

4.3.1 General-Specific Question Sequences

The influence of context can be explained with reference to question order, and an example often used is the general-specific question sequence. This is a type of ‘funnel’ sequence in which a general question is asked first, followed by a number of relevant specific questions (i.e. Converse & Presser, 1986; Sudman & Bradburn, 1982). An example of the general-specific question format can be found in SWB research with questionnaires using a general life satisfaction question (life as a whole) followed by a subset of specific life domain questions.

The central task of analysing the results from these questionnaires is to identify the relative effects or contributions of satisfaction in each of the specific domains, with life as a whole. Evidence suggests the level of overall wellbeing derived depends on whether the domain questions follow or precede the general question (Schuman & Presser, 1996). This is thought to be due to such questionnaires invoking the use of contextual information in response formation. A variety of reasons have been suggested, many of which follow the

philosophical principals of conversation.

4.3.2 *Conversational Effects*

Some theorists suggest that participant responses to a series of items follow a pattern of providing information that is common in general verbal conversations. Accordingly, survey response can be seen as a type of conversation that occurs between the survey respondent and the researcher. According to Grice's (1975) 'cooperative principle' the participants of a conversation try to be cooperative, aiming to uncover some common ground of understanding. In a research setting participants attempt to cooperate by making some determination about the meaning of the researcher's contributions to the 'conversation' (Schwarz, 1999). When a researcher is present, this can be achieved by asking for clarification. In the case of self-administered surveys, no researcher is available to clarify meaning and therefore the participant must make assumptions. Grice (1975) implies that this is achieved by relying on decision-making principles of conversation, known as the 'maxims of conversation'.

4.3.2.1 Maxims of Conversation

Of the four 'Maxims of Conversation' proposed by Grice (1975), two are particularly relevant. The 'Maxim of Relation' specifies that contributions to a conversation should be relevant to the ongoing exchange, while the 'Maxim of Quantity' stipulates that these contributions should be as informative as required but not beyond what is asked. According to these principles of conversation, participants are required to provide information that is both pertinent to the concepts and topics provided as well as informative but not more than is necessary and as such, provide information that is non-redundant. This idea of providing information that has not already been provided is also known as the 'Given-New Contract' (Haviland & Clark 1974). If respondents apply this conversational 'rule' within their survey responses, each new question could be viewed as part of the same conversation and therefore seen as a request to provide new information with each subsequent answer. These rules of communication may invoke two alternate types of responses, known as assimilation and contrast.

4.3.3 *Assimilation and Contrast*

If participants are dominated by the desire for cooperative communication, they may see questions as being related by topic, causing a carry-over effect or ‘assimilation effect’ to drive responses. In this instance, viewing the questions as somehow topically or conversationally related would lead to the use of similar considerations in response formation (i.e. Schuman & Presser, 1996), creating a singular foundation of information, from which answers are derived. From the view of conversational norms, asking a general question before a series of specific domains, may suggest that the domains are a portion or part of what makes up the general assessment of ‘life as a whole’. In this case each subsequent question is primed by, in relation to and viewed as a portion of that general topic.

Alternatively, if the non-redundancy or given-new principles are invoked, the respondent may assume that each subsequent answer is a request for new information. This would lead the respondent to exclude already provided information resulting in a ‘contrast’ or ‘subtraction’ effect (i.e. Schuman & Presser, 1996; Tourangeau, Rasinski & Bradburn 1991), finding new information to answer each subsequent question. Given this, if asked a specific (domain) question that provides some information about a subsequent general question, respondents will ‘subtract’ the information used in previous answers to provide only unique information as the basis for answering the general question. This can result in a reduced correlation between responses to the general and specific questions (i.e. Strack, Martin & Schwarz, 1988; Schwarz et al., 1991; and Tourangeau et al. 1991)

4.4 **Influence of Item Position**

This limited review of supporting and conflicting theories establishes the idea that influences such as context and the cognitive processes of the respondent can affect the answers given to survey items. Those effects can be influenced heavily not only by what information is provided within each question, but more importantly when it is provided. The order in which items are revealed can affect the context surrounding those items and subsequently their interpretation. The particular order of items can cause a respondent to use a different theoretical process or decision-making construct to answer each individual question, suggesting that each question will be considered with reference to where it falls in the survey, rather than simply taken on face value. This implies that results derived

from items within a survey may be more representative of the order in which they appear and their subsequent influencing context, rather than a reflection of the item itself and that which it measures. Research in question sequencing consistently finds that the content of previously appearing questions can affect responses to subsequent survey items, resulting in differing sample means based on such sequencing (Kaplan, Luchman, & Mock, 2013).

5. ITEM ORDER EFFECTS AND THE PWI

5.1 The Current Study

5.1.1 Study Rationale

The previous review of literature has described some of the theoretical processes that are believed to create item order effects, revealing a consensus that influences external to a respondent can affect item response. The underlying theories suggest that item sequencing can, even in the instance of a series of specific (domain) questions only, still affect results derived from self-report. These theories have been proposed in the absence of sufficient evidence to support that item sequencing can actually affect responses. Regardless of the theoretical approach adopted, testing the strength of any scale used in survey research should include a test for item order context effects, in order to ensure scale, strength and robustness. If indeed a scale is valid and reliable, item order should have no effect on overall scores generated from the measure.

The PWI is a scale that is considered extremely valid, reliable and robust, obtains consistent results and follows the general-specific question sequencing (International Wellbeing Group, 2013). It has been used in research both within Australia and internationally for over a decade and has the support of the Australian Centre on Quality of Life, as a tool for promoting public and political awareness of the factors underpinning wellbeing. It is a fluid scale that is continually updated to produce the most valid and reliable version. Though it has been psychometrically tested and altered many times and as such has increased its strength and robustness as a scale, it has yet to be tested for item order effects.

The typical method for exploring item-order effects is by manipulating the sequence of questions and comparing the results across conditions (Kaplan et al., 2013). The following study will use this method to explore possible item order effects within the PWI. Given the variability and stability in domain scores regressing to ‘life satisfaction as a whole’, it is expected that altering the item order will have no effect on the results. Instead the relative contributions will remain the same across conditions.

Given the wide and varied use of the PWI and the considerable impact a significantly different finding would have on the volume of historical data collected via this scale, it seems pertinent to eliminate any uncertainty by way of psychometric testing. If the scores on the PWI are affected by item-order, then over a decade of survey results produced both nationally and internationally may become invalid.

5.1.2 Study Aim and Hypothesis

The aim of this study is to explore whether the order in which the life-domain questions appear on the PWI scale, impacts their relative contributions to overall life satisfaction. For the present study, the order of the PWI items will be randomised, and the psychometric properties of the scale compared to its traditional format. It is hypothesised that:

- H1: Between the two groups (Fixed-order and random-order), there will be no overall difference in mean scores on the PWI and GLS.
- H2: In a factor analysis of the 7 PWI domains, a single factor structure will emerge, regardless of the item-order.
- H3: Randomising the order of items will result in similar relative contributions compared to the fixed-order pattern, when the domains are entered in a multiple regression to predict satisfaction with life as a whole.

6. REFERENCES

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CHAPTER 2: EMPIRICAL REPORT

ABSTRACT

The aim of this study was to explore whether the order in which domain questions appear on the Personal Wellbeing Index (PWI) affects the overall scale scores. To achieve this, the order of the PWI items were randomised and the psychometric properties of this scale compared to results from its traditional format. It was hypothesised that there would be no overall difference in mean scores on the PWI and Global Life Satisfaction (GLS) constructs, that a single factor structure would emerge regardless of item-order and that similar relative contributions would be found between groups when the domains were entered in a multiple regression to predict GLS. Participants were recruited voluntarily via social media. A total of 693 participants completed one of two surveys. 360 completed a random-order (RO) survey and 333, a fixed-order (FO). Participants in the RO sample (72.2% female, 27.8% male) ranged in age from 18 – 71 years, with a mean age of 34.57 years ($SD=11.31$). The FO sample (69.1% female, 30% male, 0.9% preferred not to answer) comprised a random sub-sample of participants, ranging in age from 18 – 84 years, with a mean age of 34.05 ($SD=15.16$). Results revealed lower mean scores and more variation in scores when the items were randomised, and although a single factor structure emerged, there were somewhat different relative contributions to the prediction of GLS. A subsequent confirmatory factor analysis revealed that correlating error terms of adjacent domains would improve the model fit of the FO data, a pattern that was not found in the RO data. These results interpreted within theories of conversation, particularly assimilation and contrast, suggested that item-order effects might be apparent within the PWI. It was recommended that future research be dedicated to confirming if and clarifying how and where item-order effects are affecting responses.

The pursuit of happiness is an endeavour as old as man. Ancient Greek philosopher Aristotle (384-322 BC) suggested that the pursuit is not only inevitable, but the point of human existence (Aristotle; Ross & Brown 2009). Centuries later, individuals and nations continue to focus on understanding and increasing happiness, and in the field of psychology it is the study of Subjective Wellbeing (SWB) that is dedicated to this. SWB refers to how a person experiences the quality of their life (Diener, 1984). It is considered as the combination of emotional reactions (the frequency of positive and negative affect) and cognitive judgments of satisfaction (Diener, 1984). Though there is general agreement that these two components are central to SWB research (i.e. Diener, Lucas & Oishi, 2002; Diener, Oishi & Lucas, 2003; Linley, Maltby, Wood, Osborne & Hurling, 2009; Shmotkin, 1998), there is debate as to their relative contributions. A variety of theories have been proposed to explain SWB, and most are guided by the prominence of either affect or cognition over the other.

7.1 Subjective Wellbeing

7.1.1 Measuring SWB Via Affect and Cognition

Early research into SWB concentrated on the individual's experience of happiness (Bradburn & Caplovitz, 1965) with the conceptualisation emphasising the 'subjective' nature of happiness. This perspective acknowledges that humans are best placed to judge their own levels of happiness (Kesebir & Diener, 2008). Early measures used direct report by asking how individuals felt about the state of their life. Bradburn promoted an affective model of wellbeing, focusing on psychological wellbeing as the differentiation between positive and negative feelings. This focus on affect continued with Watson, Clark and Tellegen (1988), who extended Bradburn's work by assessing a range of emotional states over time. During this time, Diener, Emmons, Larson and Griffin (1985) took another approach, focusing on the assessment of global cognitive life evaluations rather than affective reactions. In contemporary research these two perspectives are combined in an affective-cognitive model (i.e. Diener, Lucas & Oishi, 2002; Diener, Oishi & Lucas, 2003; Linley, Maltby, Wood, Osborne & Hurling, 2009; Shmotkin, 1998). In this model, measuring satisfaction has been shown to explain 90% of the variance in SWB (Davern, Cummins & Stokes, 2007).

The Personal Wellbeing Index (PWI) is a scale that focuses on domains that are

responsive to both objective and subjective measurement (IWBG, 2013). The PWI is developed and distributed in Australia by the International Wellbeing Group (IWBG), who study SWB by way of survey results derived from the PWI. The Organisation for Economic Co-operation and Development (OECD) that promote policies to improve the economic and social wellbeing of people around the world, recommend the PWI as a preferred tool to measure SWB (OECD, 2013).

7.2 The Personal Wellbeing Index (PWI)

7.2.1 Design of the PWI

The PWI is a self-administered instrument available in written, verbal and electronic format. It employs an 11-point end-defined Likert scale, as developed by Jones and Thurstone (1995), anchored by 0 – ‘Not at all satisfied’ and 10 – ‘Completely satisfied’ (IWBG, 2013). Wellbeing data are negatively skewed with most participants answering within a restricted portion of the positive end of the scale, presumably due to the large trait component found when using SWB to measure outcomes (Cummins & Gullone, 2000). Scale sensitivity therefore becomes crucial, as small deviations in scores can be very meaningful (Cummins & Gullone, 2000).

7.2.2 Psychometric Properties of the PWI

The seven domains of life satisfaction that constitute the PWI are verified using the criterion that a contribution of unique variance should be made from each domain, when entered into a multiple regression to predict GLS. The combination of these unique contributions, together with the variance they share, predicts roughly 40-60% of the overall variance in GLS (IWBG, 2013). Furthermore, factor analysis of the domains consistently reveals a single factor that accounts for roughly 50% of the variance across both Australian and international samples (IWBG, 2013). In addition, the PWI has been translated into over 20 languages and all translated scales have demonstrated evidence of reliability and internal consistency (IWBG, 2013). In the Australian data, internal consistency ranges from 0.70 to 0.85 (IWBG, 2013).

7.2.3 *Domains of the PWI*

Despite the validity and reliability of the PWI as well as the consistency of the results derived from its use, the Australian Unity Wellbeing Index survey data shows that the domains do not contribute equal unique variance toward GLS (IWBG, 2013). The domain of ‘Standard of living’ typically contributes the most (between 4.5% and 8.9%), followed by ‘Achievements in life’ (2.9% - 4.9%) and ‘Relationships’ (3.2% – 4.9%) (IWBG, 2013). All remaining domains contribute moderately less, ranging between 0% (Safety) and 1.4% (Health) (IWBG, 2013). Though the domain of Safety often fails to make a unique contribution to GLS in Australia, it is retained in the scale for comparability with the PWI in countries where Safety does contribute unique variance. Of note, the highest contributing domains happen to correspond with three of the first four PWI questions and provide more than double the unique variance than each of the remaining 4 domains. This study will address the theory that these results may be due in part to item order effects.

7.3 **Item Order Effects**

7.3.1 *Influence of Context on Response*

When a judgment is formed about a question (or target stimulus), an individual needs to both retrieve a cognitive representation of it as well as define a standard of comparison in order to evaluate it (Schwarz & Bless, 1992). At the moment of response, an individual relies on only a subset of the most readily accessible information, derived from a combination of stable (cognitive and affective) and temporarily available (contextual) influences (Schwarz & Bless, 1992). Stable influences represent the individual characteristics of each respondent (i.e. personality, education etc.), and it is thought that the PWI is primarily driven by the stable influence of affect (Davern et al., 2007) retrieved via affective heuristics. Conversely, temporary influences are predominantly due to questionnaire variables, known as context effects (Schwarz & Bless 1992).

The features of a questionnaire including format, wording and context have the potential to influence responses (Schwarz, 1999), with subtle changes in the context

surrounding an item modifying decision-making outcomes (Krosnick & Alwin, 1987). It has been suggested that the tendency for a respondent to adapt their answer due to context effects is a byproduct of the cognitive process undertaken. Furthermore it is thought that participant responses to a series of items follow a pattern of providing information that is common in general verbal conversations.

7.3.2 Influence of Conversation on Response

Some theorists suggest that survey responses can reflect a type of conversation that occurs between the survey respondent and the researcher. According to Grice's (1975) 'cooperative principle', the participants of a conversation try to cooperate, with the aim of uncovering some common ground of understanding. In a research settings participants attempt to cooperate by making a determination about the meaning of the researcher's contributions to the 'conversation' (Schwarz, 1999). In the case of self-administered surveys, no researcher is available to clarify meaning and as such the participant must make assumptions, reminiscent of an experimenter effect, even in the absence of an experimenter. In trying to help the researcher, participants alter their responses, or more accurately alter the cognitive process used to formulate those responses. Accordingly, responses may better reflect an individual's desire to comply rather than their true answers. These rules of communication may invoke two alternate responses, known as assimilation and contrast.

7.3.3 Assimilation and Contrast

If participants are directed by the desire for cooperative communication, they may view questions as being topically related, causing a carry-over or 'assimilation effect' to drive responses. In this instance, viewing the questions as topically or conversationally related would lead participants to use similar considerations in response formation (i.e. Schuman & Presser, 1996), creating a foundation of information from which subsequent answers are derived. Alternatively, if the non-redundancy or 'given-new' principles are invoked, the respondent may assume that each subsequent answer is a request for new information. This would lead the respondent to exclude already provided information resulting in a 'contrast' or 'subtraction' effect (i.e. Schuman & Presser, 1996; Tourangeau,

Rasinski & Bradburn 1991), therefore offering unique information to answer each subsequent question.

7.3.4 Influence of Item Position

Theories of context and conversation (along with many others) support the idea that seemingly trivial questionnaire features can affect the answers given to questionnaire items. Not only can those effects be influenced by what information is provided, but also when it is provided. The particular order in which items appear can result in a respondent using a different theoretical or decision-making process to answer each question. This implies that results derived from items within a survey may be more representative of the order in which they appear and their subsequent influencing context, rather than as a reflection of each item and what it measures. Research in question sequencing has consistently found that the content of previously appearing questions can affect responses to subsequent survey items, resulting in differing sample means based on such sequencing (Kaplan, Luchman, & Mock, 2013).

7.4 Item Order and the PWI

Irrespective of the theoretical approach adopted, testing the strength of a scale used in survey research should include a test of item order (OECD, 2013), to ensure scale strength and robustness. For a scale to be deemed valid and reliable, the order of items should have no effect on the scores generated from the measure. The PWI is considered an extremely valid, reliable and robust scale that obtains consistent results (IWBG, 2013). It has been used both within Australia and internationally for over a decade and has the support of the Australian Centre on Quality of Life, as a tool for promoting public and political awareness of the factors underpinning wellbeing. The PWI is a fluid scale that has been psychometrically tested and altered many times to improve its strength and robustness, though it has yet to be tested for item order effects.

7.5 Study Rationale

The measurement of SWB by way of self-report has one overriding assumption: that responses are a reflection of the individual's true feelings and thoughts about the topic

at hand plus a component of measurement error. If this is not true, the validity of any self-report measure is in doubt. This study aims to explore the effect of item-order on the validity of the PWI, to establish that sources of error are minimised and therefore improve the accuracy of responses provided. The typical method for exploring item-order effects is to manipulate the sequence of questions and compare results across conditions (Kaplan et al., 2013). The following study will use this method to explore the possibility that item order effects are at play within the PWI. Given the stability of domain scores with regard to GLS, it is expected that the PWI will be resistant to item-order effects, with relative domain contributions remaining similar across conditions.

7.6 Aim and Hypotheses

The aim of this study is to explore whether the order in which the life-domain questions appear on the PWI scale affects the results obtained from analysis. For the present study, the order of the PWI items will be randomised and the psychometric properties of the scale compared to its traditional format. It is hypothesised that:

- H1: Between the two groups (fixed-order and random-order), there will be no overall difference in mean scores on the PWI and GLS.
- H2: In a factor analysis of the 7 PWI domains, a single factor structure will emerge, regardless of the item-order.
- H3: Randomising the order of items will result in similar relative contributions compared to the fixed-order pattern, when the domains are entered in a multiple regression to predict satisfaction with life as a whole.

8. METHOD

8.1 Participants

Participants were recruited via groups on social media sites including Facebook and LinkedIn. Participation was voluntary, with consent indicated via submission of an anonymous online questionnaire. A total of 693 participants completed one of two surveys. Of these, 360 participants completed a random-order (RO) survey, and 333 completed the fixed-order (FO). Participants in the RO sample ranged in age from 18 – 71 years, with a mean age of 34.57 years ($SD=11.31$) and gender distribution of 72.2% female, 27.8% male. The FO data comprised a random sub-sample of participants, ranging from 18 – 84 years, with a mean age of 34.05 ($SD=15.16$) and gender distribution of 69.1% female, 30% male, 0.9% preferred not to answer. The proportions of demographic characteristics across the two samples are presented in Table 1., which can be found in the results section along with further analysis of the homogeneity of the samples.

8.2 Materials

The 7-item *Personal Wellbeing Index* (PWI; Appendix A) and its preceding item, a single global life satisfaction (GLS) question, “How satisfied are you with your life as a whole?” were included. The PWI represents subjective wellbeing (SWB) as the aggregation of satisfaction with seven domains of life: standard of living, health, achieving in life, personal relationships, safety, community-connectedness, and future security. These domains represent the first level deconstruction of satisfaction with life as a whole and their composite average score reflects overall SWB. All items were rated on an 11-point end defined Likert scale, anchored with ‘not at all satisfied (0) and ‘completely satisfied’ (10). The randomisation function was enabled within the Qualtrics software used to conduct the survey, in order to computer generate a random-order of the PWI domain questions for each participant in the RO sample. Though the order of the PWI domains was randomised, the GLS item remained as the first question, as per the standard delivery. Historically the reported reliability coefficient of the PWI is .82 (Cummins, 2003). In the present study, Cronbach’s alpha was consistent, at .81 (RO Sample = .86, FO Sample = .78).

8.3 Procedure

Following approval from the Deakin University Human Research Ethics Committee (Appendix B), the online questionnaire was generated using Qualtrics online survey software and made accessible for 10 days beginning June 30 2014. The plain language statement explaining the purpose of the study and anonymous nature of collection, was outlined on the first page of the survey (Appendix C), with participants given the option to continue. A link to the survey was publicised in an advertisement (Appendix D) posted in a variety of groups and pages available on Facebook and LinkedIn.

9. RESULTS

9.1 Data Screening and Preliminary Analyses

SPSS 22.0 was used to screen and analyse data. All data were translated from a 1-11 scale onto a 0-100 scale, for ease of comparison.

9.1.1 Accuracy of data entry and univariate outliers

Data cleaning was undertaken separately for the RO and FO groups. RO data were first assessed for incomplete or ineligible entries and four cases were removed as they indicated that they were under the age of 18, violating a requirement of inclusion. Univariate outliers were identified as total PWI scores that fell three standard deviations below the mean. An iterative process was undertaken to recalculate mean scores and standard deviations until all scores fell within range. In total, eight univariate outliers were removed. Participants who recorded a total score of 100 on the PWI were also removed, as this pattern of responding is consistent with an acquiescent response style (IWBG, 2013). In all, 67 cases were deleted leaving a total sample of 360 participants. The same data cleaning procedure was undertaken for the FO group, with four cases removed due to response sets. A total of six univariate outliers were also removed, leaving a total sample of 333 participants.

9.1.2 Normality, Linearity, Homoscedasticity and Autocorrelation

PWI data were assessed for the RO and FO groups with both violating the Kolmogorov-Smirnov test of normality ($p < .001$). However, it is acknowledged that SWB measurement is not normally distributed, but rather is subject to negative skew (Cummins, 1995; 1998). Analysis of the skewness of PWI data found negative skew across both groups as expected (RO = $-.78$ [SE = $.13$], FO = $-.71$ [SE = $.13$]) and the assumptions of normality were subsequently relaxed. The assumptions of linearity (multicollinearity and singularity) and homoscedasticity of residuals were also assessed, with no violations found.

9.2 Data Analysis

9.2.1 Analysis of the homogeneity of sample data by demographic characteristics

Before groups were compared on wellbeing measures, their demographic profiles were compared. An independent samples t-test was conducted to compare participant age across samples. Results indicated no significant difference in the mean age of the samples (FO Group: $M=34.05$, $SD=15.16$, RO Group: $M=34.57$, $SD=11.32$), $t_{(612)} = -.51$, $p > .05$.

Chi-Square tests revealed no significant differences among the groups in gender $\chi^2(1, N=670) = 3.79$, $p = .15$, but did reveal a significant difference across samples for the distribution of income $\chi^2(2, N=670) = 9.66$, $p = .008$. The RO group had a disproportionately larger number of participants earning above \$60,000. Also, there appeared to be a significant difference in the distribution of relationship status, with the RO group comprising more participants that were married compared to the FO group $\chi^2(5, N=692) = 16.76$, $p = .005$. Finally, there appeared to be proportionately more participants from the RO group in full time employment, study and home or family care $\chi^2(5, N=691) = 15.01$, $p = .01$. Details of the demographic statistics can be found in Table 1.

Table 1:
Distribution of Demographics by Sample Group

Data	Random-Order Sample (%)	Fixed-Order Sample (%)
Relationship Status		
Never Married	34.4	46.8
De facto/ living together	18.9	16.5
Married	39.7	32.1
Separated	3.1	1.2
Divorced	3.6	1.8
Widowed	0.3	1.2
Full-Time Work Status		
Paid Employment	39.2	37.2
Home or Family Care	6.7	5.4
Study	31.7	27.9
Volunteer	0.0	0.6
Retired	0.6	4.5
None	21.7	24
Annual Household Income		
< \$15,000	9.2	12.0
\$15,000 - \$30,000	10.0	13.8
\$31,000 - \$60,000	15.8	19.2
\$61,000 - \$100,000	22.5	22.2
\$101,000 - \$150,000	22.5	15.9
\$151,000 - \$250,000	11.9	7.5
\$251,000 - \$500,000	5	3.6
> \$500,000	.8	1.2

Compared to the FO group, the RO group had more married participants, with higher incomes, which have been shown to result in higher levels of wellbeing (Cummins et al., 2013), and therefore may have important implications for the results in further analyses.

9.2.2 Analysis of the homogeneity of sample data by variables

9.2.2.1 Correlation Analysis

Pearson correlations were conducted to assess the relationships between all PWI domains and GLS for the RO sample. There were statistically significant ($p < .01$) positive correlations between each variable and all others, as seen in Table 2. The RO group can be found below the diagonal and the FO group above.

Table 2:

Correlations between variables of Seven Domains against Life as a Whole for the RO Group

	GLS	1.	2.	3.	4.	5.	6.	7.
GLS	1	.46**	.42**	.59**	.49**	.22**	.37**	.50**
1. Standard of Living	.58**	1	.41**	.29**	.18**	.31**	.34**	.48**
2. Health	.54**	.49**	1	.40**	.20**	.24**	.22**	.30**
3. Achieving	.67**	.47**	.51**	1	.36**	.20**	.31**	.43**
4. Relationships	.68**	.50**	.41**	.52**	1	.36**	.27**	.25**
5. Safety	.52**	.54**	.42**	.44**	.48**	1	.43**	.47**
6. Community	.50**	.37**	.39**	.46**	.48**	.38**	1	.55**
7. Future Security	.57**	.55**	.43**	.54**	.38**	.52**	.50**	1

** All results significant, $p < .01$

The RO data revealed a narrower range with stronger correlations between items (.50 to .68), than the FO sample (.18 to .59). The strongest bivariate correlations for the RO group were found between GLS and the domains of the PWI, particularly relationships ($r = .68$), achieving ($r = .67$) and standard of living ($r = .58$). For the FO group, the strongest correlations in order were; achieving with GLS, community with future security and future security with GLS.

9.2.2.2 Mean score difference due to randomisation: Hypothesis 1

The means and standard deviations for all measured variables are shown in Table 3, along with t-test results for comparison of the FO and RO groups on all measures.

These were conducted to test the first hypothesis that between the two groups (FO and RO), there would be no overall difference in mean scores on the PWI and GLS. Results reveal lower means and higher standard deviations across the board for the RO group when compared to the FO group. Given that differences between groups on all domains reached statistical significance in a t-test comparison, it was expected that the total PWI would be significantly different. Despite the hypothesis that there would be no mean difference between groups, results revealed that the RO group scored significantly lower on the PWI than the FO group $t(678)=7.17, p<.001$.

Table 3:

Means, standard deviations and t-test results for all measured variables

Variable	Random-Order		Fixed-Order		T
	Mean	SD	Mean	SD	
PWI	67.09	15.12	74.53	12.14	7.17***
GLS	67.94	17.32	72.52	14.47	3.79***
Std. of Living	73.39	19.03	79.25	16.55	4.33***
Health	60.53	21.89	73.33	18.24	8.39***
Achieving	67.53	19.17	71.59	17.03	2.96**
Relationships	68.81	21.82	74.17	19.75	3.40**
Safety	76.86	18.43	82.82	16.95	4.44***
Community	59.83	21.32	71.92	20.03	7.68***
Future Security	62.69	21.72	68.65	20.99	3.67***

*** $p < .001$, ** $p < .01$

It was hypothesised that GLS would be unaffected by changes to the item-order, however a t-test analysis revealed the RO group scored significantly lower on GLS than the FO group, $t(691) = 3.79, p < .001$. In this study the RO group should have scored higher

due to their objective characteristics of higher income and more married participants.

9.2.3 One Underlying Factor Structure: Hypothesis 2

Prior to performing a factor analysis, the suitability of the data was assessed. Inspection of the correlation matrix revealed all coefficients to be above .3. The Kaiser-Meyer-Olkin value for the RO sample was .89 and the FO sample .77, both exceeding the recommended value of .6 (Kaiser, 1970, 1974) and suggesting the sample is both factorable and significantly different from a singularity matrix. Bartlett's test of Sphericity reached statistical significance for both samples, further supporting the factorability of the correlation matrix.

Separate Maximum Likelihood Factor Analyses were conducted for each sample in order to test the hypothesis that a single factor structure would emerge. As anticipated, one factor was extracted from the RO data, explaining 47.20% of the total variance. This is consistent with previous factor analyses of the PWI where data consistently reveal a single factor that accounts for roughly 50% of the variance with both Australian and international samples (IWBG, 2013). Also, while the FO data revealed one factor structure, this explained only 34.25% of total variance. Table 4 reveals the correlations between each variable and the extracted factor.

Table 4:
Factor loadings for PWI domain items

Component	Fixed-Order Group	Random-Order Group
<i>Future Security</i>	.79	.75
<i>Community</i>	.66	.62
<i>Safety</i>	.59	.68
<i>Standard of Living</i>	.58	.71
<i>Achieving</i>	.54	.72
<i>Health</i>	.45	.63
<i>Relationships</i>	.41	.70

For the RO group, correlations clustered closer together and loaded in a different order to that of the FO group.

9.2.4 Relative Contributions to Life as a Whole: Hypothesis 3

Separate multiple regression analyses were conducted to compare the relative contributions of each of the 7 domains of the PWI to GLS for both samples. It was hypothesised that randomising the order of items would result in similar relative contributions compared to the FO pattern. Table 5 displays the results of the multiple regression analysis conducted for both the samples.

Table 5:

Multiple Regression Statistics

	Random-Order Sample				Fixed-Order Sample			
	B	SE B	β	sr ²	B	SE B	β	sr ²
Standard of Living	.13	.04	.14**	.10	.17	.04	.14***	.17
Health	.10	.03	.12**	.10	.10	.03	.12**	.11
Achieving	.25	.04	.27***	.20	.25	.04	.27***	.24
Relationships	.26	.03	.33***	.25	.23	.03	.33***	.28
Safety	.06	.04	.06	.05	-.14	.04	.06**	-.13
Community	.05	.03	.06	.05	.05	.03	.06	.05
Future Security	.05	.04	.07	.05	.14	.04	.07***	.14
R²			.65				.56	
Adjusted R²			.65				.55	

***p<.001, **P<.01

Overall for the RO sample, the domains of the PWI explained 65% of the variance in GLS, $R^2=.65$ ($F_{(7,352)}=94.78, p<.001$). This exceeds the typical rate of 40-60 percent of overall variance in GLS (IWBG, 2013), suggesting that responses to the RO survey are more correlated and have more in common than are found in the FO data. Results reveal that only the first four domains were statistically significant unique predictors and as such these four appear to be resistant to item-order effects. Comparatively, in the FO sample six of the seven domains were significant unique predictors. Together, the domains

explained 56% of the variance in GLS, $R^2=.56$ ($F_{(7,325)}=58.09, p<.001$).

9.2.5 Additional Testing

Having addressed the hypotheses, further confirmation of the factor structure of the PWI was sought. Initial confirmatory factor analyses were conducted separately for each group, to determine whether stricter tests of invariance could be pursued. The model in Figure 1 was tested for each group using SPSS AMOS 22.0, with model fit considered in accordance with Hu & Bentler (2007)

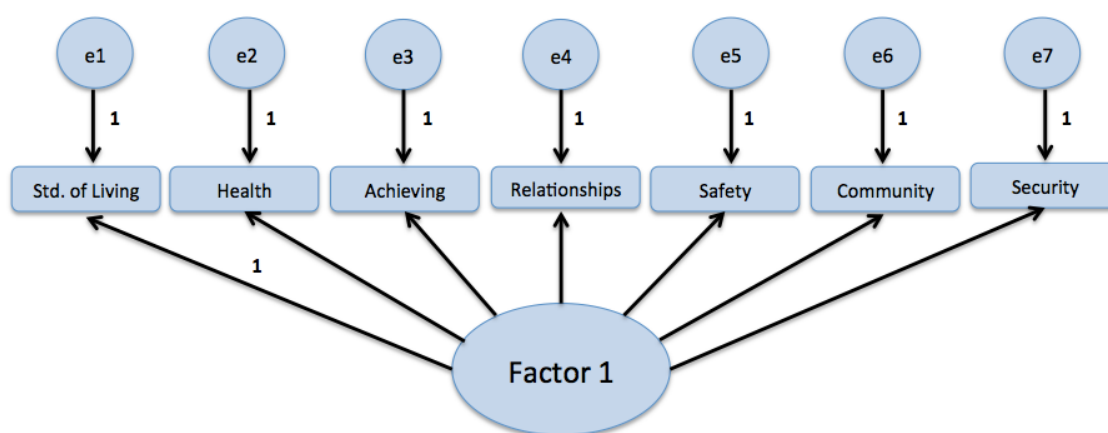


Figure 1: Confirmatory Factor Analysis Model

For both samples, the fit indices are presented in Table 6.

Table 6:

Confirmatory Factor Analysis Statistics

	Random-Order Group	Fixed-Order Group
Chi Square	36.74	89.09
<i>Df</i>	14	14
Sig	.001	.001
Chi^2/df	2.62	6.36
CFI	.97	.86
TLI	.96	.80
RMSEA	.07	.13
SRMR	.03	.06

Analysis revealed that while the RO group showed good model fit with CFI and TLI above .9, RMSEA approaching .08 and SRMR less than .06, the FO group did not show acceptable model fit. Modification indices revealed that the RO model could be improved with three correlations, most of which were not adjacent terms. Interestingly, modification indices suggested that the FO model could be improved by allowing error terms of all adjacent domains to correlate. This may be subtle evidence of conversation effects influencing responses to items, with responses to each item correlating with responses to the next.

10. DISCUSSION

The purpose of this study was to examine item order effects within the PWI. Research in question sequencing finds that the content of previously appearing questions can affect responses to subsequent items, resulting in differing sample means (Kaplan, et al., 2013). The PWI mean across all Australian Unity Wellbeing Index Surveys (2013) is 75.29, which was similar to the average reported by the fixed-order (FO) sample in this study and markedly higher than the random-order (RO) sample. This significant and unexpectedly lower mean result for the RO group is the first indication that changing the order of items in the PWI may affect the scores it yields. The multiple regression analysis revealed that the RO domains also accounted for 9% more variance in GLS than the FO, at a rate exceeding the historical average ceiling by 5% (IWBG, 2013). Furthermore, while 6 of the 7 domains were significant unique predictors in the FO data, only 4 were significant in the RO data. Though this is a noticeable difference, it is perhaps not consistent with the idea of item-order effects because despite randomisation, the same 4 factors traditionally most important to GLS emerged as significant. The RO results reveal achieving, standard of living, relationships and future security appear to be resistant to item order effects. However, as wellbeing data are negatively skewed with most people answering within a restricted portion of the positive end of the scale, scale sensitivity means that subtle variations in scores can be very meaningful (Cummins & Gullone, 2000). Despite the first four domains remaining significant, results showed less unique variance explained by each domain (except community) in the RO data, which while small may still be indicative of item-order effects.

Given differences were found in the data when domains were randomised, a confirmatory factor analysis was conducted. This revealed that the FO data did not show

good model fit and that the PWI item loadings on the single underlying factor, were different across groups. Furthermore modification indices revealed the FO model could be improved by allowing error terms of adjacent domains to correlate, a pattern not found in the RO data. The suggestion to correlate error terms implies that items overlap in ways not captured by the latent factor extracted. If this error explained another common factor intrinsically present between the domains, then similar error correlations should have been present despite randomisation. Therefore, if the FO model could be improved by correlating adjacent error terms, perhaps the additional shared variance is a result of the influence of each domain on the next. Given the impact previously appearing questions can have on responses to subsequent items, the correlating error terms may be a result of the principles of conversation and assimilation in action.

Principles of conversation require participants to provide information that is non-redundant (Grice, 1975; Haviland & Clark 1974). These principles, resulting in a contrast effect, could account for the fact that in the FO group, non-adjacent error terms did not show significant error correlation. Introducing new information or a new foundation from which to answer subsequent questions would result in uncorrelated unique variance. Participants are also known to rely on a subset of the most readily accessible information (Schwarz & Bless, 1992) and when abiding by rules of relevance, this may invoke an assimilation response. If dominated by the desire for cooperative communication, respondents would see each domain as being related by topic. This could cause a carry-over effect via the use of primed and therefore similar considerations in response formation (i.e. Schuman & Presser, 1996). If this propensity for assimilation is competing with the desire to adhere to conversational norms such as the 'given-new contract', this could result in unique error variance that is both similarly found in the prior appearing domain due to assimilation and different from the non-adjacent domains due to contrast.

When randomising the order of domains, the resulting error correlations were few and almost entirely non-sequential. If these competing effects are in operation, then randomising the item order should create a 'conversation' specific to the order allocated to the participant. With 5040 possible PWI sequences, presumably each of the 360 participants in the RO sample was part of an entirely different 'conversation'. This would theoretically result in fewer adjacent error correlations, as any significantly found residual error would be 'balanced out' across the data, due to the number of times traditionally adjacent domains were not adjacent during randomisation (5 out of every 6 times). This is supported by the multiple regression results where the RO data were more correlated, with

more in common. With two of the three hypotheses rejected and significant differences found among most data, results in this study indicate that some item-order effects may be apparent within the PWI.

10.1 Limitations & Conclusions

The results of the current study should be interpreted within the context of its limitations. Given the lack of good fit across analyses, the most obvious limitation to the current study was a comparison sample that did not adequately yield historically expected results. This casts doubt over the magnitude of any item-order effects, as differences could be amplified or masked by an unrepresentative sample. Initial sample analysis revealed the RO group had significantly more participants that were married and had a higher income, both of which are known to relate to higher levels of wellbeing (Cummins et al., 2013). As it was anomalous to find significantly lower mean wellbeing and increased variance among scores for all measured variables, this is one indication that the RO sample may not have been representative. However, as the RO sample showed good model fit and extracted one factor explaining variance in line with expectations, this could alternatively represent evidence that in comparison, it was the FO group that was not representative.

Domains loading in a historically inconsistent order, significantly lower variance explained by the factor structure and bad model fit suggest that future research should first attempt to replicate these results with a FO sample that is more demographically similar to the RO sample, as well as more in line with historical expectations. Secondly, given the number possible combinations of PWI items, a larger sample may more adequately represent the effect of randomisation, also potentially helping to resolve some of the issues with demographic invariance and model fit. Furthermore, because the data were randomised, the actual order in which participants completed the items is unknown. Future research should consider a study that systematically changes the order of items as it may produce different results, providing further insight into item-order effects in the PWI.

Given the widespread use of the PWI, future research should be dedicated to confirming if and clarifying how and where these item-order effects are taking place. If in fact order effects have been at play within the PWI, future updates to the scale should be made mindful of any results found from item-order testing. Furthermore, as item order effects can alter responses to questionnaire items, they should be considered a standard part of psychometric testing within the PWI going forwards.

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APPENDIX A.
PERSONAL WELLBEING QUESTIONNAIRE

This survey is about how satisfied people feel with their lives. This is a confidential and anonymous questionnaire. By submitting your responses you are consenting to take part in this research as explained in the Plain Language Statement. The survey should only take about 5 minutes to complete.

Please read each question carefully before selecting your answer.

Personal Wellbeing (PWI)

1. Thinking about your own life and personal circumstances, how satisfied are you with your life as a whole?

Turning now to various areas of your life,

2. How satisfied are you with your standard of living?
3. How satisfied are you with your health?
4. How satisfied are you with what you are currently achieving in life?
5. How satisfied are you with your personal relationships?
6. How satisfied are you with how safe you feel?
7. How satisfied are you with feeling part of your community?
8. How satisfied are you with your future security?

Scale: 0-10

Anchors: 0 – ‘Not at all satisfied’; 10 – ‘Completely satisfied’

****The order of items 1-8 will be randomized as part of this study.**

9. Has anything happened to you recently causing you to feel happier or sadder than normal?

Response options No
 Yes

Demographic questions

10. What is your gender?

Response options: Male
 Female

11. Age _____

12. Who lives in your household? Please indicate from the list who lives with you.

Response options: No-one, you live by yourself
 You live with your partner
 With one or more children
 With one or both of your parents
 With one or more adults who are neither your
 partner nor your parent

13. Which of the following categories best describes your relationship status?

Response options: Never married
De facto/living together
Married
Separated
Divorced
Widowed

14. Which of the following best describes your work status?

Response options: FT paid employment
FT home or family care
FT study
FT volunteer
FT retirement
None of these

15. Do any of the following part-time occupational categories apply to you? Please check all that apply.

Response options: Semi-retirement
Part-time paid employment
Casual employment
Part-time volunteer
Part-time study
Unemployed
None of these

16. Are you looking for work?

Response options: Yes
No

17. What is your gross annual household income before tax?

Response options: Less than \$15,000
\$15-30K
\$31-\$60K
\$61-\$100K
\$101-\$150K
\$151-\$250K
\$251-\$500K
More than \$500K

APPENDIX B.
ETHICS APPROVAL



Memo

To:	Dr Melissa Weinberg School of Psychology
From:	Secretary – HEAG-H Faculty of Health
CC:	Nikki Cameron, Catherine Seton
Date:	12 th May, 2014
Re:	HEAG-H 64_2014: An investigation of the psychometric properties of the personal wellbeing index

Approval has been given for Melissa Weinberg, School of Psychology, to undertake this project for a period of 1 year from 12th May, 2014. The current end date for this project is 12th May, 2015.

The approval given by the Deakin University HEAG - H is given only for the project and for the period as stated in the approval. It is your responsibility to contact the Secretary immediately should any of the following occur:

- Serious or unexpected adverse effects on the participants
- Any proposed changes in the protocol, including extensions of time
- Any events which might affect the continuing ethical acceptability of the project
- The project is discontinued before the expected date of completion
- Modifications that have been requested by other Human Research Ethics Committees

In addition you will be required to report on the progress of your project at least once every year and at the conclusion of the project. Failure to report as required will result in suspension of your approval to proceed with the project.

An Annual Project Report Form can be found at:

<http://www.deakin.edu.au/hmnbs/research/ethics/ethicssubmissionprocess.php>

This should be completed and returned to the Administrative Officer to the HEAG-H, Pro-Vice Chancellor's office, Faculty of Health, Burwood campus by **Tuesday 18th November, 2014** and when the project is completed. HEAG-H may need to audit this project as part of the requirements for monitoring set out in the National Statement on Ethical Conduct in Human Research (2007).

Good luck with the project!

APPENDIX C.
PLAIN LANGUAGE STATEMENT



PLAIN LANGUAGE STATEMENT AND CONSENT FORM

TO: Participants

Plain Language Statement

Date: 31st March 2014

Full Project Title: An investigation of the psychometric properties of the Personal Wellbeing Index

Principal Researcher: Dr Melissa Weinberg

Dear Participant,

Thank you for your interest in this research project. The aim of this study is to explore the statistical and psychometric properties of the Personal Wellbeing Index, a widely used tool to measure subjective wellbeing.

This research is being undertaken by two Honours in Psychology students as a requirement of their fourth year studies. It follows the work of the Australian Centre on Quality of Life at Deakin University, and adds to the existing research collected over the past 13 years as part of the Australian Unity Wellbeing Index. Funding for this study is supplied by Deakin University.

If you agree to participate, you will be asked to complete a short online questionnaire about your well-being. This should take you no more than 5 minutes to complete. The questions will ask you about general aspects of your life, including your satisfaction with different areas of life. It is not anticipated that you should experience any discomfort, however if you do feel distressed, you should call Lifeline on 131114.

Your anonymity is guaranteed at all times and you will not be asked for your name or any other information that could be used to identify you. Should you wish to withdraw from the project you may do so at any time without repercussion, prior to submitting your questionnaire. Since the responses are anonymous, it will be impossible to withdraw your responses after they have been submitted. The results of this study will be reported in the form of student theses and may also be published in peer-reviewed journals.

By completing and submitting the questionnaire you are consenting to participate in this study. The ethical aspects of this study have been approved by a human ethics panel at Deakin University.

If you have any complaints about any aspect of this project, the way it is being conducted or any questions about your rights as a research participant, then you may contact: The Manager, Research Integrity, Deakin University, 221 Burwood Highway, Burwood Victoria 3125, Telephone: 92517129, research-ethics@deakin.edu.au. Please quote project Number: HEAG-H 64_2014

For further information about this project, please feel free to contact Dr Melissa Weinberg at Deakin University: melissa.weinberg@deakin.edu.au.

Thank you for your involvement in our study.

APPENDIX D.
STUDY ADVERTISEMENT

How satisfied are you with your life? Do you have a spare couple of minutes to tell us? Australian Unity has been partnering with Deakin University since 2001 to find out what it is that contributes to Australian's happiness and sense of wellbeing in life. Our research explores whether changing the order of the questions in a widely-used survey affects the way that people respond. There's only 8 questions to answer, about your general life satisfaction and satisfaction with specific areas of life, like your health and relationships. There's also a few demographic questions to answer that just help to tell us a little bit more about you. The questionnaire is entirely anonymous and super fast and easy. Please click on the link below to complete the survey:

https://jfe.qualtrics.com/form/SV_71a22s963hIzsXP