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Implications of Disagreement Between Self-Reporting and Objective Measures: A Scoping Review

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Abstract

Introduction: Researchers and health specialists generally collect data and information about chronic diseases from self-reports. However, the accuracy of self-reports has been questioned as they depend on the respondents' ability to recall information and their understanding of pathological conditions. Therefore, an objective diagnosis is usually regarded as a more accurate indication of the presence of diseases.

Objective: A scoping review will examine the extent of the disagreement between self- reports and objective measures, focusing on the implications of this disagreement in terms of indicators of physical and emotional health as well provision and planning of health services.

Method: There are few publications on the impact of disagreements between self-reporting and objective measures. In this case, a scoping review was chosen as an efficient tool to explore the issue, due to the limited amount of available evidence. This review was conducted in two major research databases: Scopus and Medline databases. The criteria of the study included all genders, age groups, and geographic areas. The source of information for the scoping review included existing literature such as guidelines, letters, meta-analyses, systematic reviews, and primary research studies.

Result: In the 12 studies, the total participants were 155,939 and each study's sample size ranged from 77 to 118,553. Four out of twelve studies showed a significant difference between self-reported ailments and objective diagnosis for (kappa=0.17 to 0.3), whereas the agreement was moderate for the utilization of health services and quality of ambulatory care (kappa=0.43 to 0.5), however, the agreement on whether counselling and referrals were needed was low (kappa= 0.3, 95% CI [0.3-0.3]). The disagreements between self-report and objective measures had implications regarding prevalence of diseases (20% less by self-reported) or risk factors (such as physical activity [PA]), costs of treatments (15 EUR high by reports), risk factors such as car accidents for elderly (useful field of view in elderly drivers was a risk over four times larger than obtained from self-reported [OR= 13.7 vs OR=3.4]), and utilization of health services (34.1% higher by reported).

Conclusion: In most health domains, we found there was low to moderate disagreement between self-reporting and objective measures for diagnosing illnesses and utilization of health services. The prevalence of disease was lower when self-reported, while the utilization of health services and cost of health services were higher when self-reported than when objectively measured. This disagreement has implications regarding the increasing the cost of health services and provides a misleading basis for health planning.

Keywords: chronic diseases; diabetes, hypertension; self-reporting; accurate measure; objective measure; agreement; disagreement; impact and effect.

1. Introduction

Chronic diseases are a group of diseases that could be long-lasting and have persistent effects. The Department of Health (2017) stated that chronic diseases have a broad range of complex and chronic health conditions over the spectrum of sickness including trauma, disability, mental illness, and genetic disorders in Australia. This group of diseases shares common risk factors such as ageing and changing lifestyles. These factors become increasingly common and now lead to most of the burden of ill health. The Australian Institute of Health and Welfare (2014)

pointed out that for the purpose of simplification, chronic disease can be classed in four major disease groups cancers, cardiovascular diseases, diabetes, and chronic obstructive pulmonary disease.

Diabetes and hypertension are the two main chronic diseases that contribute considerably to the burden of disease globally. World Health Organization [WHO] (2011) states that these diseases are associated with high morbidity, mortality, and disability. Moreover, they are significant risk factors for heart failure, coronary artery disease, and cerebrovascular disease (Mohan, Seedat, & Pradeepa, 2013). Mathers and Loncar (2006)predict that diabetes will be the seventh leading cause of death and hypertension will be the eleventh leading cause of death by 2030.The distribution of these two diseases increased in the last decades in the world and they also lead to many complications of other non-communicable diseases. The global prevalence of diabetes increased from 108 million cases in 1980 to 422 million cases in 2014 (WHO, 2016), while the number of hypertension cases increased from 600 million in 1980 to 1 billion in 2008 (WHO, 2013). Chow et al. (2013) highlight that hypertension is a risk factor for cardiovascular disease and is associated with approximately 7.6 million annual deaths worldwide. Diabetes, on the other hand, is the main cause of kidney failure, stroke, heart attacks, lower limb amputation, and blindness (WHO, 2016). The World Health Organization (2016) states that this disease was the direct cause of approximately 1.5 million deaths in 2012. Furthermore, diabetes can increase the risk of developing hypertension. Nishikawa, Edelstein, and Brownlee (2000) state that diabetes can also damage arteries, which causes hypertension and others serious complications such as heart attacks and kidney failure.Meanwhile, hypertension can cause many complications such as heart attack, blindness, cognitive impairment and kidney failure (WHO, 2015). In other words, each disease is a risk factor for the other. For example, one United Kingdom-based study shows that controlling blood pressure can reduce strokes and deaths related to diabetes (Adler et al., 2000). In brief, these diseases are major public health challenges worldwide and are associated with each other.

The burden of non-communicable diseases, such as hypertension and diabetes, has increased in Oman over the last two decades; several studies document that economic development has increased the risk factors for non-communicable diseases such as lifestyle (Al Riyami et al., 2012). The authors also highlight that the Oman World Health Survey 2008 found the prevalence of diabetes and hypertension to be 12.3% and 40.3% in Oman, respectively. Similarly, the 2000 National Health survey reports the prevalence of diabetes has increased from 8.3% in 1991 to 11.6% in 2000, an increase of about 40% over a single decade (Al Shafaee et al., 2008). Thus, economic development contributed to increasing the prevalence of these diseases and their burden in Oman.

Epidemiologic studies commonly use self-report questionnaires to obtain health data. This data could be collected by any one of several self-report techniques, including telephone interviews, face to face interviews, or mail back questionnaires. Self-report questionnaires are efficient and simple to obtain the opinions and views directly from the participant (Paulhus, Vazire, Robins, Fraley, & Krueger, 2007). Nevertheless, this method has some disadvantages: participants fail to offer accurate responses due to impression management, poor memory, mood or cognitive biases, and social bias (McDonald, 2008).T¦he accuracy of this type of method could vary from one study to another, depending on the characteristics of the nature of the disease, a population, and participants' health symptoms or status (Huerta, José Tormo, Egea-Caparrós, Ortolá-Devesa, & Navarro, 2009). Likewise, the accuracy of self-report depends on both knowledge of health related information and also recall ability of the participant (Goldman, Lin, Weinstein, & Lin, 2003). Briefly, collecting health data by self-reports could be inexpensive and efficient; however, its accuracy relies on participants' knowledge and ability.

Based on this self-reported information decisions on planning and policies are made. While many studies show substantial disagreement between self-reports and objective measures for diagnosis of chronic diseases, the understanding of implication for this disagreement on health planning or health status is not been sufficiently examined. Sibley and Glazier (2009) pointed out that the disagreement between self-reported and objective measures could affect the health planning, which could lead to inappropriate specification of health service needs, services, accessibility and acceptability. The implications of this disagreement could be varied from specific disease to other whether on health planning or health status and there is need for further studies to understand more (Merkin et al., 2007). In this paper, a scoping review will examine the extent of the disagreement between self-reports and objective measures for diagnosis of chronic diseases, focusing on the implications of this disagreement in terms of indicators of physical and emotional health as well provision and planning of health services. Finally, some recommendations will be suggested to address these impacts.

2. Methods

There are few publications on the implications of disagreement between self-reporting and objective measures. In this case, a scoping review is considered an efficient tool to explore an issue with a limited amount of available evidence (Peters et al., 2015). Other types of reviews are designed to answer specific research/ study questions. For instance, a systematic review examines the efficacy of an intervention on a particular set of results (Arksey & O'Malley, 2005). Meanwhile, the scoping review is utilized to map the main concepts that support a research area, which can identify gaps in the knowledge of research base and present the evidence in scope to inform and address practice (Peters et al., 2015). Therefore, scoping review is useful for a complex topic and less published studies.

2.1 Search Strategy

Studies were searched in Scopus and Medline databases, accepting all English-language studies published after 1990. The searched keyword terms included "chronic diseases or diabetes or hypertension" and "self-reporting" and "accurate measure or objective measure" and "agreement or disagreement" and "impact or effect". The search terms were sufficiently broad to capture relevant articles.

2.2 Inclusion Criteria

The criteria of the study included both genders, all age groups and any geographic area. The source of information for the scoping review included any existing literature such as guidelines, letters, meta- analyses, systematic reviews, and primary research studies. Furthermore, studies which examine the disagreement between self-reports and objective measures for diseases and non-diseases were included.

2.3 Data Presentation

Collection data will be shown in tables. The first table will summarize the main characteristics included in these of collection studies to give the overall idea about these studies. Other tables will present findings from these 12 studies which help for comparative analysis.

2.4 Data Extraction

General characteristics for each study were extracted. These data include the author, country, data collection for self-report, study design, sample size, percentage of females out the total of participants, the aim of study, age of participants, diseases, and objective measure - data collection. Moreover, measures of association for each study, attrition rate, and the main findings were presented in a separate table.

3. Results

Figure 1 shows the process of chosen articles included in this study. Overall, 541 studies were selected from Scopus database (n=189) and Medline (n=352) from which 130 studies remained after duplicates and non-English language articles were removed. Out of these studies, 28 studies were excluded after screening because the abstract did not mention a self-reporting method. After full-text articles were assessed for eligibility 64 articles were excluded because no objective measure was available. In addition, eleven articles had unclear agreement between self-reporting and objective measures, and sixteen articles did not report any impact of the disagreement between them. Consequently, 12 studies were included in this study.

3.1 General Characteristics of Included Studies

Table 1 presents a summary of the main characteristics of twelve studies included in this study. Seven of the twelve studies were published in the United States, one in the United Kingdom, one in Germany, one in the Netherlands, one in Taiwan, and on in six other countries (Belgium, the Czech Republic, Denmark, Spain, the United Kingdom, and the United States). The majority of studies that were included were published between 2007 and 2015. The total participants were 155,939 and the sample size ranged from 77 to 118,553 in all the studies. Two studies had more than ten thousand participants. The percentage of female participants ranged from 26% to 66% in these studies. Six of the twelve studies had participants age 55 and above, whereas the participants in another five studies were 18 years and above, and one study had participants age 12 years and older.

The majority study design used in all twelve studies was a cross-sectional study. Nine studies used face-to-face interviews in collecting data for self-reports, two studies used online questionnaires, and one study used a telephone interview method. Objective measures were calculated by using secondary data in all twelve studies.

3.2 Extent of Agreement Between Self-Reporting and Objective Measures

The overall agreement between self-reporting and objective measures varies from weak to moderate in these twelve studies. In four out of twelve studies, the overall agreement was a weak for disease prevalence with kappa = 0.17 to 0.3 (Daniels et al., 2011; Gao et al., 2015; Sakshaug et al., 2014; Van den Akker et al., 2015). However, the agreements within variables were low to high. The overall agreement between self-diagnosis and objective diagnosis for presence of several chronic illnesses (such as diabetes, migraine, heart disease and rheumatoid arthritis) was low (kappa= 0.17, 95% CI [0.21 – 0.13]), whereas the lowest agreement was in rheumatoid arthritis (kappa=0.17, [0.11-0.23]) and the highest in the diagnosis of diabetes (Kappa=0.86, [0.83-0.87]) (Van den Akker et al., 2015). In addition, the overall agreement was moderate for the utilization of health services (kappa = 0.43 to 0.5) (Cunningham et al., 2007; Tisnado et al., 2006; Wu et al., 2014) and risk factors, such risk of accidents (kappa= 0.45) (McGwin et al., 1998) in other studies discussed in this scoping review. Furthermore, the agreement within their variables varies between weak to moderate. The overall agreement for quality of ambulatory care was moderate (kappa = 0.5); however, the agreement for counseling and referrals was low (kappa= 0.3, 95% CI[0.3-0.3]), and so was medication use (kappa=0.6, 95% CI [0.5-0.7]), but both diagnoses and clinical services delivered (kappa=0.6, 95% CI [0.05-0.6]).

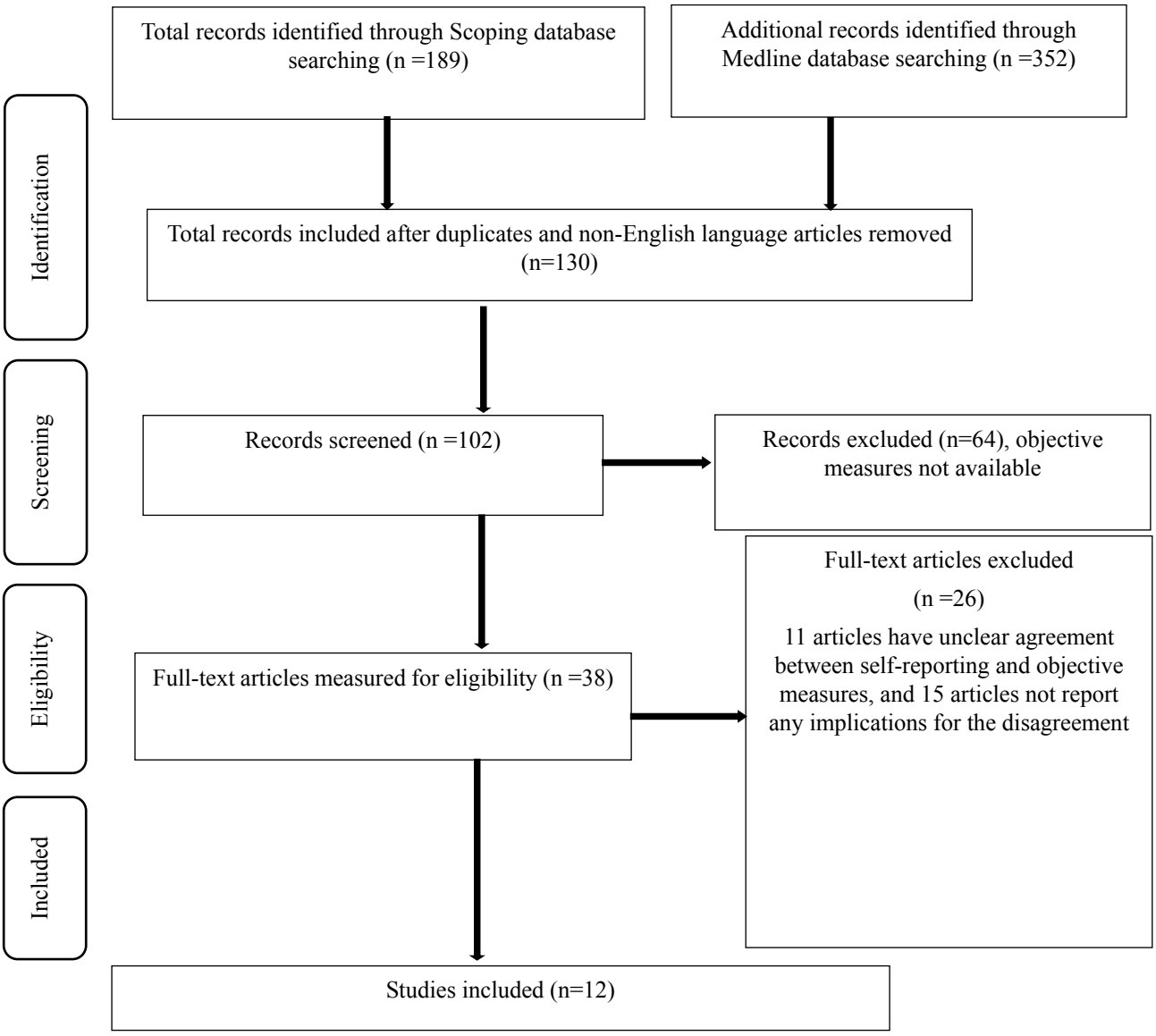

Figure 1. The process of selecting the ten articles which are included in this study

3.3 Implications of Disagreement Public Health and Health Care Services Utilization

We examined the implications of the disagreement between self-report and objective measures onprevalence of conditions or risk factors (such as PA), cost of treatments, risk factors (such as car accidents for elderly), and utilization of health services (Table 3). Five of twelve studies pointed out the prevalence of illnesses was 6% to 20% lower by self-reporting (Gao et al., 2015; McAdams et al., 2007; Sakshaug et al., 2014; Tisnado et al., 2006; Van den Akker et al., 2015). The low reporting of illnesses had potentially impacted the increasing of cost of health care, misrepresenting the need for health care spending and utilization for diseases, and giving a low number of cases than the objectively measuring cases (less about 20%). Two studies found that participants self-reported sufficient PA 33% more often than was accurate (Cerin et al., 2016; Downs et al., 2014). The sitting time recorded was three hours more than self-reports indicated (Cerin et al., 2016), which means that students were more sedentary than reported. In addition, the cost of mental health service was 15 EUR (95% CI -434 to 405) higher in self-reports (Heinrich et al., 2011). In contrast, the useful field of view in elderly drivers was over four times larger than that obtained from self-report (OR= 13.7 vs OR=3.4). This observation impacts vision during driving, which increases the risk of car accidents (McGwin et al., 1998). Furthermore, the optimal ambulatory care utilization in HIV cases (≥ 2 visits for 6 months) was 34.1% higher in self-reports, which impacts evaluations of this service and when and how to improve this service for HIV patients (Cunningham et al., 2007). The planning for budget of health insurance was misled because the inaccuracy of prevalence of health conditions (ranging from behavioral health diagnoses to heart disease to arthritis) was lower in self-reports than claims

records show (1.6% vs 6.8%, and 3.9% vs 8.2%, and 3.3% vs 7.0%, respectively) (Wu et al., 2014).

4. Discussion

This scoping review sought to evaluate the extent of the disagreement between self-report and objective measures, and examine the implications by reviewing the data from twelve studies that met the selection criteria. In most health fields, the agreement was weak to moderate (Table 2). We found that the agreement was weak for disease diagnosis, while the agreement for utilization of health services was moderate. Our findings also showed the prevalence of health conditions and some risk factors (such as a lack of PA) were low when self-reported. Meanwhile, costs of health services, other risk factors (such as car accidents for elderly), and utilization of health service were higher when self-reported than when measured objectively. We found that this disagreement had an impact on the cost of health services, risk factors (such as risk of accidents for elderly drivers), and planning for health services utilizations.

In this review, the overall agreement was weak for prevalence of health conditions in these twelve studies. The statistical difference between self-reports and objective measures could be explained by low awareness of these diseases because of a lack educational effort to spread awareness about them in the general population (Control & Prevention, 2003; Norris et al., 2002). Likewise, Merkin et al. (2007) highlighted that a lack of awareness about various health conditions and few educational interventions can be responsible for the discrepancy between self-reports and objective measures. In addition, self-reports and objective measures moderately agreed on how frequently patients utilized health services, data which could be affected by the types of services available to patients and the population sample reviewed. This level of agreement could be caused by different factors such as type of services, utilization frequency of services, and population sample (Bhandari & Wagner, 2006).

The disagreement between self-reporting and objective measures for the prevalence of health conditions leads to inaccurate estimations, which have an impact on community health and planning for health services budgeting. Our findings showed that in most studies estimating the prevalence of health conditions, the estimation was 20% lower when self-reported than when measured objectively. Consequently, this disagreement contributed increased the cost of health services by 15 EUR, misleading health services budgeting and expected utilization, and leading to inaccurate assessments of future health trends. The disagreement between medical records and self-reported estimations of health conditions' prevalence leads to substantial differences in estimated parameters of health conditions and also affected planning of health services (Barbara, Loeb, Dolovich, Brazil, & Russell, 2012).

Accurate assessment of PA is required to assess changing and improving levels of PA (Prince et al., 2008). Our findings showed, as the result of the discrepancy between self-reported PA and objectively measured PA, PA is 33% lower than self-reported, which means over 2 hours daily more sedentary than reported. Downs et al. (2014) stated the discrepancy in self-assessment of PA has a negative impact on implementing strategies for increasing physical activity levels the population.

It is important to bridge the gap between self-reports and claims records because the self-reported questionnaires are the most common method of collecting information in health care services. The agreement for volume of health care services utilization and the cost of these services was moderate in this review. The impact of this disagreement was increased cost of health services by 15 EUR and difficult to evaluate the HIV care services (HIV care service utilization was high over 30% by reported). Moreover, the impact of this disagreement on health services was misleading health insurance planning because of the lower number self-reported of chronic diseases than by claim records.

Some limitations of this review needed to be considered. First, most of the studies were cross-sectional which limited our ability to assess the impact of disagreements between self-report and objective measures for chronic ailments on other predictors. Second, the study also drew from studies discussing many countries; the US and the UK for example have very different health care systems and may measure or plan for health conditions in the population very differently.

5. Conclusion

We found that there were low to moderate agreements between self-reported and objective measures for diagnosing diseases and utilization of health services. The prevalence of health conditions was low when self-reported, while the utilization of health services, and cost of health services were higher by self-report than objective measures. This disagreement has implications on increasing the cost of health services and provides misleading basis for long term health care planning. More research for investigating the impact of measures tools with representative sample size for a population is needed.

Competing Interests Statement

The authors declare that there are no competing or potential conflicts of interest.

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Table 1. Summary of general characteristic of studies

Source	Country	Study Design	N	%Female	Aim	Age	Chronic Condition	Self-report measure	Objective measure
(Van den Akker, Van Steenkiste, Krutwagen, & Metsemakers, 2015)	Netherlands	Cross-sectional study	2,893	51%	Assessing the agreement between Patients reporting for chronic diseases and medical records	55 years and older	14 chronic diseases	questionnaire	Electronic medical record system
(Tisnado et al., 2006)	USA	cohort study	1,270	54.1%	Evaluating the association between ambulatory medical record and patients survey	Over age 50 years	Low back pain, ischemic heart disease, asthma, chronic obstructive pulmonary disease, and diabetes	patient self-report surveys	Medical record
(Wu, Lai, Gau, Wang, & Tsai, 2014)	Taiwan	Cross-sectional study	15,574	48.9%	To evaluate the agreement between claims records and patients self-reports	12 years and above	Clinical diagnoses, medication use, and health system utilization	National health interview survey	National health interview survey
(Gao et al., 2015)	USA	Longitudinal study	242	59.1%	To evaluate disagreement between self-reported suicidal ideation and clinician ascertained suicidal ideation	18 years and older	Depression and anxiety severity	interview	Medical record
(Cunningham, Li, Ramsey, &Sohler, 2007)	USA	Cross-sectional study	428	26%	To understand about marginalized population id disproportionately affected by HIV	18 years and older	HIV	Audio computer –assisted self-interviews	Medical record
(Daniels et al., 2011)	UK	Cross-sectional study	78	44.9%	To assess treatment burden for people with cystic fibrosis	18-60 years	Cystic fibrosis	questionnaire	Questionnaire and medical records
(McAdams, Dam, & Hu, 2007)	USA	Cross-sectional study	10,639	66.38%	To evaluate the agreement between the validity of self-report and objective measure for BMI	20 years and older	Body mass index (BMI)	Home survey	National health and nutrition education study

(Sakshaug, Weir, & Nicholas, 2014)	USA	Longitudinal study	2,028	55.9%	Measuring the agreement between the chronic condition ware diabetes algorithm for Medicare claims and self-report measures.	Over age 50 years	diabetes	Face to face interview	Medicare claims (secondary data)
(Downs, Van Hoomissen, Lafrenz, & Julka, 2014)	USA	Cross-sectional study	77	48.6%	Examining intrapersonal and contextual variable	17-24 years	Physical activity	Email	Accelerometer-measured
(Cerin et al., 2016)	Six country (a)	Cross-sectional study	3,865	51.9%	Assessing factors influence accurate assessment of physical activity and sedentary behaviour	18-65 years	Physical activity	International physical activity questionnaire	Accelerometer-based
(Heinrich et al., 2011)	Germany	Prospective Cohort study	330	49.4%	To assess the accuracy of self-reports and calculated for costs of mental health services	Under 18 years	Costs of mental health services utilization	telephone interview	Hospital data
(McGwin, Owsley, & Ball, 1998)	USA	Case-control study	278	49.7%	Assessing the risk factors for crash involved older drivers	55 years and older	Crashes	Questionnaire	state-recorded crash

(a) Belgium, Denmark, Spain, Czech Republic, United Kingdom, and the United States.

Table 2. Summary of agreement between self-reporting and objective measures

Source	**Comparison**	**Overall agreement (95%CI)**	**Comments**
(Van den Akker et al., 2015)	Presence of several chronic diseases	Kappa=0.17, (0.21 – 0.13)	Highest agreement in diabetes (Kappa=0.86, (0.83-0.87)), and lowest in rheumatoid arthritis (kappa=0.17, (0.11-0.23)).
(Tisnado et al., 2006)	Quality of ambulatory care	Kappa = 0.5, (0.5– 0.6).	Agreement for counseling and referrals (kappa=0.3, (0.3-0.3)), medication use (kappa=0.6, (0.5-0.7)), both diagnoses and clinical services delivered (kappa=0.6, (.05-0.6).

(Wu et al., 2014)	Clinical diagnoses, medication use, and health system utilization	Kappa = 0.43	The agreement for medication use (kappa=0.64), health system utilization (kappa = 0.61)
(Gao et al., 2015)	Depression and anxiety severity	Kappa = 0.3	The disagreement was positively correlated to depression severity (R^2=0.4), and anxiety severity (R^2= 0.79) with both major depressive disorder and bipolar disorder, but was only positively correlated to anxiety severity (R^2= 0.46) in bipolar disorder.
(Cunningham et al., 2007)	Ambulatory visits, medications use and laboratory tests performed	Kappa =0.12, (0.06–0.19)	Agreement for medication (kappa =0.27-0.48), and for laboratory tests (kappa= 0.11-0.14)
(Daniels et al., 2011)	clinician report and electronic monitoring of nebulizers	r= 25.3%, (18.7%-31.9%)	The agreement for clinician report (r=80%, (60%-95%), And for electronic monitoring (R = 36%, (5%-84.5%)
(McAdams et al., 2007)	Height and weight and other disease markers	Diff. means = -0.56, (- 0.71, - 0.41)	Agreement for fasting blood glucose (r = 0.43), systolic blood pressure (r = 0.54), and high-density lipoprotein cholesterol (r= - 0.53)
(Sakshaug et al., 2014)	Healthcare utilization outcome for each diabetes measures	Percentage of diabetes: 27.3 (Medicare claims) vs 21.2 (self-report), $p<0.05$	Have high rates of healthcare spending and utilization similar to diabetics
(Downs et al., 2014)	Intrapersonal and Contextual Variables	-t-test (male)= 8.89, $p<0.001$, -t -test(female)=3.28, $p<0.01$	Agreement for moderate–vigorous-intensity physical activity (r=-0.24), and social barriers (r = -0.27)
(Cerin et al., 2016)	Other sociodemographic, and behavioural factors	r= 0.05 to 0.37	Highest agreement in sedentary time (r= 0.37, (0.35-0.4) and lowest in MVPA- bouts (r = 0.05, (0.02-0.09).
(Heinrich et al., 2011)	Several ICD-10	Kappa=0.781, and concordance correlation coefficient (CCC) = 0.8432	Agreement for F10 (CCC= 0.8651), F3 (CCC=0.7850), and F10 (CCC=0.6180)
(McGwin et al., 1998)	Crash involved elder drivers	Kappa =0.45	Significant disagreement with respect to demographic, and driving (annual mileages, days per week driven)

Table 3. Implications of the disagreement between self-report and objective measures

Sources	**Issue**	**Findings**
(Van den Akker et al., 2015)	Prevalence of diseases	The prevalence of diseases such as inflammatory joint, severe bowel disease, and malignancy/ cancer were lower by self-reporting than medical records (19% vs 24%, kappa = 0.17), (10% vs 16%, kappa = 0.25), and (11% vs 19%, kappa = 0.6) respectively. This may result in a potential increase of cost.

(Tisnado et al., 2006)	Prevalence of diseases	Prevalence of diseases is lower by self-reported than medical records by with range from 2% to 20%.
(Sakshaug et al., 2014)	Prevalence of diabetes	The percentage of chronic condition warehouse for diabetes is lower by self-reported measures than claims records (21.2 vs 27.3). This means the rate of healthcare spending and utilization for diabetic patients are misled.
(McAdams et al., 2007)	Prevalence of obesity	BMI based on technician measurements (25.52 kg/m2) was higher than BMI based on self-reported. This difference was small but it increased with increasing average values of these measures. This leads to a greater tendency for self-reported BMI to underestimate true BMI with increasing adiposity.
(Gao et al., 2015)	Prevalence of suicide	The prevalence of major depressive disorder was 5.8% by measuring self-reported, whereas it was 22.4% by using clinician ascertained. In addition, the prevalence of bipolar disorder was higher by using clinician ascertained (35.9%) than by measuring self-reported (18.4%). This leads to higher prevalence of depression disorder than reported.
(Downs et al., 2014)	Level of physical activity	Students have less level of physical activity than their self-reporting: about 66.7% of them who thought they have sufficient physical activity, where only 33.8% of students have enough level of physical activity. This implies students are over 2 times more sedentary than reported.
(Cerin et al., 2016)	Sedentary behaviour (time)	Sitting time is less by 3 hours daily by self-reported than accelerometry- based sedentary behaviour. This means student are more sedentary than reported.
(Heinrich et al., 2011)	Costs of mental health services	Costs were higher by self-reports than based on hospital records (15 EUR [95% CI -434 to 405]).
(McGwin et al., 1998)	Risk factor for crashes	The OR for a useful field of view in elderly drivers was over four times larger than that obtained from self-report (13.7 vs 3.4), which impact on vision during driving increasing risk of car accident.
(Daniels et al., 2011)	Assessment of Adherence	The median adherence level was at 80% (interquartile range, 57.5%-95%) by self-reported measures, whereas median adherence was at 36% (interquartile range, 5% - 84.5%) by using electronic monitoring.
(Cunningham et al., 2007)	Health services utilization	Optimal ambulatory care utilization (more than or equal 2 visits for 6 months) for HIV cases was 53.5% by measuring from the medical records, where this care utilization was 87.6% by using self-report. This makes difficult to know the benefit of this care utilization.
(Wu et al., 2014)	Health insurance	The prevalence of psychiatric, heart diseases and arthritis is lower by self-reported than claims records (1.6 vs 6.8), (3.9 vs 8.2), and (3.3 vs 7.0) respectively. This means the lower prevalence by self-reported than claim records lead to misleading in planning in health insurance.